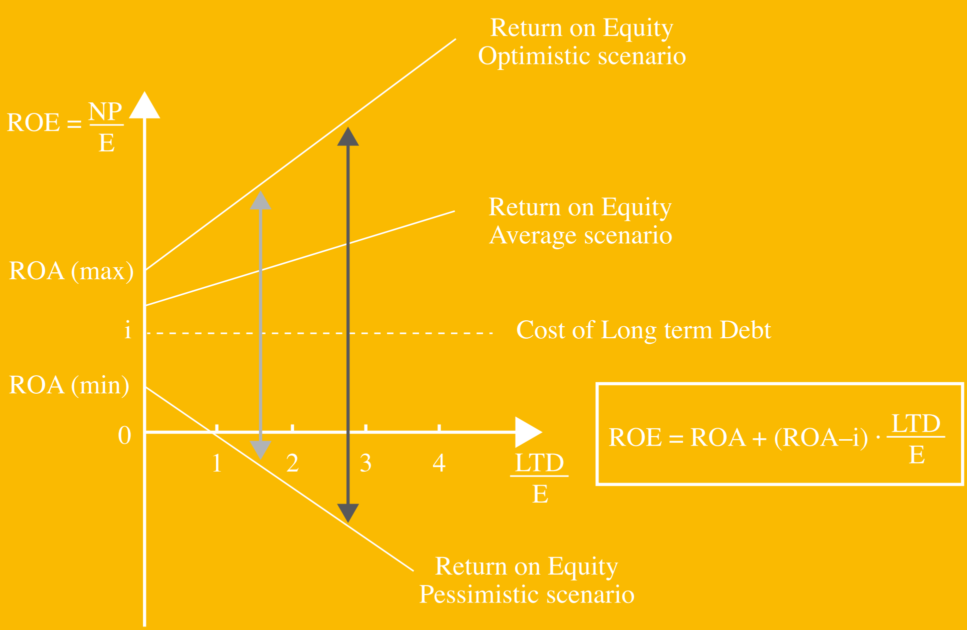
Javier Santibáñez Grúber

A (gentle) Introduction to Corporate accounting and finance

Readings for Non-Finance Professionals

Translation by Javier Santibáñez



Economics

Deusto

To my professors at the Universidad Comercial de Deusto, who trained me both professionally and personally; and, in a very special way, to Fernando Gómez-Bezares, first a professor and later a friend.

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INTRODUCTION

This book includes a brief collection of readings that constitute a summary of what I consider to be the fundamental ideas that should be kept clear in the financial field. I am writing it much closer to the end of my professional career than to its beginning (I have dedicated nearly 40 years to teaching, 35 of them in the Department of Accounting and Finance of the Universidad Comercial de Deusto -currently Deusto Business School-), which I believe constitutes an argument so that my dear reader can give me a vote of confidence beforehand and be encouraged to read it.

Among the tasks that a university professor is expected to perform, mainly Teaching, Researching and Management, the first has always been the one I have always been passionate about. It is not, normally, the most highly valued: professional success in this field is usually judged more by Research achievements and/or Management positions held. In addition, in my opinion, there are uncertainties that the development of Artificial Intelligence will bring in the educational context... but, all in all, I have to say that when I look back I consider myself a lucky person, I have been able to perform for many years a task that I find enormously rewarding, and that I conceive in terms of making it easy for the student to acquire a level of knowledge that could have taken the teacher a much longer time to acquire: success in this field consists, always in my opinion, in helping people, often more capable than the teacher himself, to grow as quickly as possible and to contribute the knowledge and criteria acquired to society as a whole.

This book is aimed at people who do not have a solid base of knowledge in topics related to Corporate Finance, but feel the need to know the implications and consequences that business decisions have from a financial point of view. In my years as a university professor, I have seen that interest in subjects related to this field is not always what is desirable: thus, many university degrees (other than Business Administration) have long included subjects related to Accounting and Finance, although their success in terms of the interest they arouse is often relatively small. However, the professional reality is often stubborn, and a significant part of the working time of any professional in the company is ultimately devoted to management tasks; with financial consequences that must be known.

The book is thus aimed primarily at practicing professionals not specialized in Finance who wish to acquire a solid base of knowledge in these subjects and have limited time available. It is not intended to put the reader in a position to ‘keep the accounts of a business’ or to perform, at least immediately, financial functions: for that it will probably be necessary to devote a longer period of time. But I believe that it is possible, in a reasonable amount of time, to acquire a sufficient level that will, on the one hand, make the non-professional in this field aware of the importance of the financial topics and, on the other hand, provide him with a knowledge base and language that will enable him to consider the financial aspect in his management tasks and also help him to ask the appropriate questions and to understand, if necessary, the corresponding answers.

I have conceived the book as a ***collection of readings, theoretically independent of each other*** (i.e., the idea is that the different chapters of the book can be read in a free and disorderly manner), with the advantages and disadvantages (mainly, the repetition of some concepts) that this entails. However, it seems convenient to give a ***small 'User's Guide'*** to help optimize its use, always starting from the idea of limited resources (especially time).

The two readings that seem to me indispensable, and that justify the order in which the set is presented, are the first two:

- ***Introduction to Accounting***. Its reading is essential for people who have no previous background in the discipline and advisable for those who, even having studied these subjects at some point in their lives, have not performed tasks related to the financial function. The latter will find it much easier to read and will remember the knowledge they have learned, and will also be able to adapt it, in some specific points, to the regulations in force. As for the former, and although I have tried at all times to tell things from the most intuitive point of view possible, the cost in time and work will be greater; nevertheless, I am convinced that with a very reasonable effort a sufficient level of mastery of accounting logic can be reached with this first reading (the length of which, if we disregard the appendices, is only 34 pages).

- ***Introduction to Corporate Finance***. This reading presents the main elements related to ***Investment and Financing decision making in any company***. Fundamental topics are covered, such as the ***Financial objective of the firm*** (the guide for our decisions in this field: the creation of wealth for the shareholder -and for society as a whole-), the ***concept of value*** (with a clear defence of the logic of discounted cash flow) and the most important tools used in the analysis of the two major decisions mentioned above. For non-experts in the field, the degree of benefit of this reading will be much greater after having read the previous one, although people with a minimum knowledge of Accounting techniques could theoretically do without it. This reading also presents the fundamental information that must be estimated in order to perform the valuation tasks (always using the discounted cash flow technique), which connects with readings 3 and 4, related to financial forecasting and the study of the flow of funds, and also with reading 8, which deals with the company valuation process.

The following are ***two readings that are directly connected with the previous ones*** and which go deeper into some of the aspects dealt with in them:

- ***Introduction to Financial forecasting***. This fundamentally practical reading shows how to make 'Financial Projections': based on the current financial statements (Balance Sheet and Income Statement) and the relevant 'Operating Budget' (which includes the estimated or expected behaviour of the variables that condition the company's future from a financial point of view), the technique consists of drawing up the expected (future) Financial Statements, which are the fundamental source of information for the study of Investment and Financing decisions, as well as in Company Valuation processes.

- ***Introduction to Cash Flow Statements***. Statements of Source and Application of Funds are one of the most important tools of Financial analysis, allowing a diagnosis to be made of the situation of a company; but the models presented here also involve defining a typically financial analysis methodology and mental structuring, by connecting an accounting variable (Profit) with a Financial one (cash flow). Thus, they are an essential tool for the Valuation tasks I mentioned earlier, which are the basis of any decision: in the end, choosing among several alternatives requires evaluating each of them in order to opt for the most appropriate one in each case.

In a third block, ***three additional readings*** are offered, which also connect with the previous ones, and which focus their interest on the Analysis of the Financial Statements of any company with the most commonly used techniques: Flow of Funds and Ratios (the first two); and on the performance measures that are commonly used in the financial context (the third).

- ***Introduction to Ratio analysis***. This reading offers a simple introduction to this interesting analysis tool; it presents some Ratio batteries (which include various performance measures grouped by topics and which may be of interest); and also Ratio Pyramids, which attempt to relate the behaviour of some variables to others (which gives an overall view of the situation of a company), and which can be used as a tool for Sensitivity Analysis (which consists of detecting the main variables to be monitored and makes it possible to study the sensitivity of the most relevant measures to changes in the behaviour of others).

- ***Analysis of (real) Financial Statements through the most frequently used tools: Cash flow and Ratios***. In this reading, the tools seen in the previous two are applied to real data published by three prestigious institutions in this field relating to the average Financial Statements of more than 100.000 Spanish companies in the period 2015-2020 grouped in 143 sectors of activity (according to the National Classification of Economic Activities, CNAE, 2009).

- ***Financial performance measures***. This reading presents the most commonly used measures in the context of financial decision making, both in terms of internal decisions and those related to the agents that relate to the company. It is structured in three different sections: accounting measures, measures used in investment and financing decisions, and measures useful in the analysis of portfolios and funds management in financial markets. It connects with all the previous readings, especially with the second one, in which investment decisions are studied mainly with a measure, the most complete, of financial performance (the Net Present Value, NPV): in this reading the range of measures is considerably widened, which also complements (sometimes repeats) those presented in the readings related to ratios.

Finally, there is an ***eighth reading***, somewhat more complex than the previous ones, which deals with the ***process of Company Valuation***. In it, the reader will find a general reflection on the concept of value and the process to be followed to value a company with the best possible technique from a theoretical point of view: ***discounted cash flow***. The steps to be taken to apply this technique are presented and explained (in summary, the calculation of the expected free cash-flows and the applicable discount rate, which allow the application of the corresponding discount formula on the results obtained); and some contrasts related to complementary valuation techniques are also proposed, such as the ***direct penalization of the value with its risk*** or the ***valuation by comparable operations***, with special attention to the main ***multiples*** commonly used. For the non-financial expert, it is advisable to read the seven previous readings beforehand.

At the end of each reading an extremely ***brief selection of works*** is provided in which the interested reader can continue to deepen the topics covered, and reference is also offered to some spreadsheets (available for free download on the website itself) with which the user can work autonomously: the intention of the latter is that the user can apply the concepts studied to simplified real case studies and request the correction of their calculations, receiving sufficient feed-back to continue the process of acquiring knowledge and skills in this field.

The ***bibliographical references*** to which I referred are basically the following:

GÓMEZ-BEZARES, F. (2012): *Elementos de Finanzas Corporativas*, Desclée de Brouwer, Bilbao.

GÓMEZ-BEZARES, F. (2014): *Dirección financiera (Teoría y aplicaciones)*, Desclée de Brouwer, Bilbao, 5th edition.

GÓMEZ-BEZARES, F., J.A. MADARIAGA, J. SANTIBÁÑEZ and A. APRAIZ (2013): *Finanzas de empresa (Selección de lecturas)*, Sociedad para la Promoción y Reconversión Industrial, SPRI, Bilbao (available for free download at https://www.eumed.net/libros-gratis/2013a/1290/index.htm).

GÓMEZ-BEZARES, F., J.A. MADARIAGA and J. SANTIBÁÑEZ: 'Sostenibilidad, rentabilidad y objetivo financiero', *Revista Española de Capital Riesgo*, 2/2023, pp. 23-34.

SPANISH GENERAL ACCOUNTING PLAN (2007), *Official State Gazette of November 20,* Supplement to number 278.

Regarding ***Spreadsheets***:

SANTIBÁÑEZ, J. (2023): 'Proyección y análisis financiero'. Registered as a computer program in the Intellectual Property Registry under the name 'APLICACIÓN EXCEL PARA LA ADQUISICIÓN DE COMPETENCIAS RELACIONADAS CON LA PROYECCIÓN FINANCIERA Y EL ANÁLISIS DE ESTADOS FINACIEROS (MEDIANTE EL ESTUDIO DEL FLUJO DE FONDOS Y LOS RATIOS)', Registration Number 01 / 2024 / 258, with effect from 19-9-2023. Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx.

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FONDOS Y LOS RATIOS’, Registration entry number 01 / 2024 / 1043, effective from 21-2-2024. Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS-with-real-data.xlsx.

SANTIBÁÑEZ, J. (2024): ‘Inversión en condiciones de certeza’. Registered as a computer program in the Intellectual Property Registry under the name ‘HERRAMIENTA INTERACTIVA DE APRENDIZAJE AUTÓNOMO EN EXCEL PARA LA ADQUISICIÓN DE COMPETENCIAS RELACIONADAS CON EL ANÁLISIS DE VIABILIDAD DE PROYECTOS DE INVERSIÓN EN CONDICIONES DE CERTEZA’, Registration Number 01 / 2024 / 1042, effective from 21-02-2024. Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Investment-decision-in-certainty-conditions.xlsx.

I cannot finish this brief presentation without referring to my teacher and friend, Professor Fernando Gómez-Bezares, from whom I have learned much of what I can tell today in this field. Together with professors Juan Jordano and Luis Abril, he was responsible for the design of the general architecture related to financial training at the former Universidad Comercial de Deusto, where a multitude of nationally and internationally recognized professionals were trained. Much of what is told here has its origin in his classes and in the excellent book mentioned above, *Elementos de Finanzas corporativas*. I would like this supposedly simplified version of the main ideas contained in it to be a tribute to his work.

And, as a good friend of mine says, ‘I don't want to take up any more of your time’, dear reader, you will have many things to do (for example, enjoy the enjoyable readings included below!). An affectionate greeting.

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A (GENTLE) INTRODUCTION TO ACCOUNTING

Javier Santibáñez Grúber *

1. INTRODUCTION

Learning accounting is all too often more painful than would be desirable. For people who know the technique, it is sometimes difficult to understand why it is so complicated to understand something that seems so simple; however, it is not difficult to explain the reasons that force to spend a significant amount of time in the learning process... in fact, it is convenient first of all for the expert to remember how long it took him to learn the technique, probably a simple calculation of the number of classes received and the hours needed to prepare the corresponding exams can give an idea of the time required to acquire a reasonable and adequate mastery of it.

After more than thirty years working in the Department of Finance of the Faculty of Economics and Business Administration of the University of Deusto, and more specifically, in Executive training courses, I believe I am in a position to point out the elements that should be reflected upon prior to the beginning of the process of teaching the technique (a process that can take place in a training centre or, more informally, within the company itself). This is, therefore, a proposal for reflection addressed both to the neophyte who intends to approach the technique, as well as to the professionals in the company who have to communicate on a daily basis with people who perform different functions in the organization and who must be aware of the consequences of their decisions from a financial point of view... for which it is essential to have a minimum, but sufficiently solid, accounting base). The following are the fundamental elements to which I referred earlier.

- Accounting requires a clear distinction to be made between '**flows**' as opposed to '**stocks**'. Flows refer to a period of time (the number of litres that have passed through a pipe, the births that have occurred in a community, the cars that have passed through a road...), while stocks refer to a specific moment in time (the amount of water in a reservoir, the number of people in a population, the number of cars in a parking lot...). As can be seen intuitively, stocks can only be explained from the corresponding flows, in fact, whenever a flow (inflow or outflow) occurs, changes the stock; and stocks can be influenced by a multitude of flows (the amount of water that we find at a given moment in a water reservoir is the result of considering the inflows and outflows that have occurred up to the current moment; the total population that we observe at a given time is the result of considering births, deaths and

* Professor of the Department of Finance and Accounting at Deusto Business School.

migratory movements, whose effects are added to the starting population; and the cars that we can count at a given time in a parking lot depend on those that have arrived and left the place, always on the basis of the number at the beginning of the period under consideration). Thus, if I want to observe a stock, I have to interrupt all flows: there must be a 'temporary suspension' that allows me to observe the stock I want to study.

- The accounting required for a minimally complex activity makes it necessary to reason in terms of what is known as '**double entry**' (instead of **single entry**), which means using a key that is far from intuitive in principle. Indeed, in the management of our 'domestic finances', it is usually sufficient to focus on a single item: the current bank account. To make financial decisions on a personal level, it is normally enough to make sure that 'more money goes into the account than comes out' ('he who spends all will have none', as the popular saying goes): increases in our account balance are reasons to be happy, and vice versa. It is enough to make sure that no errors occur (that we are not charged twice for the same bill, that the amounts invoiced correspond to what has actually been consumed, that the prices are those previously agreed, etc.) and to foresee in good time any possible extraordinary outflows that may occur... all of which will avoid the dreaded overdrafts, which are often too expensive.

  However, in a business activity it would be impossible to work with a single line item, the amount of information generated in the various processes (procurement, manufacturing, marketing, administration, etc.) requires the application of a logic such as 'double entry'. The technique could be crudely defined as one that 'always looks at things from two different points of view'; in the double entry logic 'it is impossible for an economic event to have consequences in only one place: at the very least, that economic event causes effects (and notes) in two different places'. And this way of working, combined with some elements that we will comment later (related to the vocabulary and nomenclature used) causes a certain discomfort in the first moments (which can cause the worst of the consequences: that discouragement causes the first steps to be at the same time the last steps in the discipline). We will see later that there is only one recipe for overcoming this discomfort: the humility necessary to repeat processes that are apparently too simple a sufficient number of times to 'internalize' the technique (and the language used).

- Closely related to the previous point (double vs. single entry) is the fact that some terms we use in our daily lives have a very different meaning in accounting. One of the fundamental elements that must be understood in double-entry accounting is the **difference between 'expense' and 'investment'** (taking things to the extreme, I would go so far as to say that this is the only concept that it is essential to be clear about: if the difference between the two is understood in depth, accounting is a piece of cake; but not doing so makes it impossible to understand the technique).

  The problem is that in our usual language we use the terms 'expense' and 'cash outflow' as synonyms: that is why we say that 'this month we have spent a lot' if the current bank account outflows have been high in relation to the inflows... regardless of what we have used the money for. Thus, for example, we understand that the purchase of a book, a pair of pants, even a cell phone or a computer, are expenses, when in fact, technically (or accounting-wise, if you like), they are not: in all cases they are 'investments', i.e., I have given up money, but in exchange I have something tangible that I can use (or even, if necessary, sell). In other words, paying for a meal or the electricity bill is not the same as buying a pair of glasses: the first two examples are 'expenses', they are reductions in our wealth that we consider necessary to move forward, but they are not an exchange of 'one thing for another'. It is clear that the expense 'has brought something' (otherwise it would be absurd to incur it), but in principle we could not say that I can transfer to a third party 'what I have bought'; however, when I buy a book, besides reading it and getting the same satisfaction (or more) than with a meal in a restaurant, and once read, I can read it again, I can decorate my library with a nice book, I can show it to my friends and look very smart... I can even sell it (on the Internet, of course).

- Again, related to the logic of double entry, **some terms we use do not favour an intuitive interpretation of certain concepts**. For example, in accounting we speak of Profit, Capital and Reserves. As we will see later, in all three cases these are accounts that appear 'on the right-hand side of the balance sheet' (what we might loosely call the Liabilities side of the balance sheet) and, therefore, as we will see later, we are referring to 'items' that explain how it is possible for the company to have what it has: they are 'information' accounts, they may have nothing to do with the company's cash position at a given time. In other words, although it may sound strange, a company may have an enormous capital and go into Payment Default (a term that expresses the company's impossibility of meeting its obligations); and it could happen that a company with a very large volume of reserves does not have the necessary liquidity to replace a machine whose useful life has come to an end; or that a firm that has achieved succulent profits does not have the capacity to distribute dividends to shareholders.

- Finally, and in this intuitive recounting of reasons that take accounting away from intuition, there are **terms that are used even within the financial sphere with completely different meanings and in completely different senses**: thus, in our normal life we use the word 'amortize' to refer to the repayment of a loan (or part of it), while in the financial context we can also use the same word to refer to the recognition of the cost involved in the fact that the things we buy are losing value as a result of use or the passage of time; thus, the amortization of a loan would involve a cash outflow, while the depreciation of an asset (fixed asset) would have no impact on cash flow, it would be what we call a 'non-cash charge'.

In reality, the **fundamental problem** that underlies all the others has to do with the fact that **the life of the company is not reduced to a single period of time** (in accounting we speak of 'accounting period', which for all intents and purposes we normally identify with the calendar year), but that companies 'live longer' and we divide their life into different periods that we call accounting periods:

- The fact that the life of the company is divided into different periods **makes it necessary to value everything** it has at the end of each period. It implies presenting all the 'stock variables' that the company maintains (not only in inventories, but also in balances receivable, machinery, computer programs...) at the end of that period.

- **The valuation I make of everything I have influences the recognized profit**: if 'I say that what I have is worth a lot' I declare myself 'richer', my profit will be higher than what I would otherwise recognize. In other words, the profit is linked to 'what I say the things I have are worth'.

- In order to avoid the feeling of joking that may probably come to mind when reading the previous point, accounting has some resources or **mechanisms that try to limit subjectivity:**
    - The accountant should **seek 'fairness' in terms of the temporal allocation of profits** (i.e., profits should appear when it is reasonable for them to do so).
    - **To reflect the consequences of good things (revenues) in accounting, one must wait for them to occur**; however, bad things (losses) must be accounted as soon as they become known.
- This, in turn, is combined with the **valuation criterion** that plays a **fundamental** role in accounting, which is applied to the vast majority of the items that make up the company's assets: **the historical cost** (or simply cost). Using this criterion means valuing the item in question at the price we have paid for it (if we have acquired it: this is what we call the 'acquisition price'); or at the price it has cost us to manufacture it, if we have made it ourselves (this is the so-called 'production cost'). As always, what seems simple (especially with regard to the acquisition price) becomes somewhat more complicated (not much) when it comes to applying it in reality. A simple example of this complication: if we buy a machine for 100.000 euros and the transport to our company is paid for by us and invoiced by a different company specialized in this type of activity (let's assume an additional 10.000 euros), we could wonder whether the machine 'cost' 100.000 or 110.000. We will see later that the accounting regulations are very precise in this respect, insofar as it seems quite clear what I should do if one of the guidelines of my reasoning is 'fairness in the temporal imputation of profits'.

In fact, we have already 'got to the heart of the matter'. The fundamental problems faced by Accounting have been outlined in the preceding lines. It only remains to consider a multitude of nuances (which sometimes require the definition of new words and concepts), but their understanding is relatively simple if the concepts presented so far are seen in a 'clear and distinct' way. Although it may seem absurd, insofar as perhaps what has been discussed so far seems too obvious, my recommendation would be to reread the previous paragraphs whenever problems appear at some later step, probably the answer to the question is to be found in one of them. Let us now go into some more detail.

2. ON DOUBLE ENTRY, FLOWS AND STOCKS

As we have indicated above, the complexity of a business, however simple it may be, makes it impossible to use single-entry accounting (that which focuses only on the cash flow, on the current bank account). The fundamental reasons could be summarized in two: on the one hand, our memory could easily betray us (we should remember, for example, who owes us money and at what time they must pay us -or to whom we owe and when we are obliged to make the corresponding payment-; we should also remember on what date we bought a computer and to what extent we have recognized that it has lost value so far; to give just two very simple examples); on the other hand, it is important in Accountings to 'generate' a fundamental concept when third parties can evaluate us in their decision of how to relate to us: I am referring to the 'profit' of the activity, a concept that results from comparing the income with the expenses associated with it.

Thus, there are two **fundamental financial statements** that every company must present, and which make up our 'financial business card' to third parties: **the balance sheet and the income statement**. The former shows what we have called 'stock variables', while the latter shows the comparison of the flows (income and expenses) that justify the stock (profit or loss) that appears in the balance sheet itself. Let's go step by step.

2.1. The balance sheet

The balance sheet shows 'the assets and financial position of the company'. In the definition itself there are two distinct elements, which already anticipate the logic of the double entry: assets refers to what the company 'has' (it can be goods or rights); while 'the financial position' indicates who owns everything that appears in the Assets, it shows the ownership of the funds that have been made available to the business and are 'materialized' in said Assets (it is what we generally call 'Liabilities' in the accounting context).

As far as the ownership of everything that appears in the assets is concerned, there are basically two holders: **the shareholders** (the partners, the promoters of the business, the 'owners' of the business) and '**the others'** (persons, individuals or legal entities, who in different ways have lent money, goods or services to the company and to whom 'the corresponding amount is owed'). Thus, for a business to come into existence, it is necessary that the promoters (the partners) make an initial contribution: this is what we call the 'Capital' of the company. We could say that here begins 'the mess' of the double entry: what the partners contribute is money (we will call 'Cash' the account where we will consider the cash flows), the Capital is the mirror, 'the explanation' (therefore, Liabilities) of the fact that in the Assets this cash figure appears. Cash & equivalents and Capital are the two sides of the same coin: what the company has (Cash & equivalents, which coincides at this moment with total Assets) is 'explained' with the ownership of that money (Capital, which coincides at this moment with total Liabilities). See Figure 1.

ASSETS			LIABILITIES
Cash & equivalents	400.000	Share Capital	400.000
TOTAL ASSETS	**400.000**	**TOTAL LIABILITIES**	**400.000**

Figure 1

The reader can at any time think of the invested flows that have made possible the assts that appear on a particular balance sheet. As we have said before, to present the balance sheet of a company, a temporary suspension must be carried out. Let us think for a moment of a water reservoir. In it, there are inflows (mainly those provided by the rivers that flow into it and rainwater) and outflows (the water that leaves the reservoir when the dam floodgates are opened, but also that which evaporates due to the sun or that which is lost as a result of seepage). Curious concept, time, we handle it in our daily life, although it is much more difficult to define it (many philosophers have spent a lot of time reflecting on it): can time stand still? The answer seems obvious: no. Time is always a moving reference (unlike space, which can remain static -'in time'-). That is to say, we must refer to flows 'flowing in another flow', which is time. But let us leave this reflection, which is out of the Accounting... for us time is simply a coordinate, and although it cannot be stopped, it is possible to observe the world 'supposedly interrupted by the temporal flow'. We can look at a photograph that someone took of us at a given moment, thirty years ago; at the very moment of taking the picture we were getting older... but some time later we can see what we looked like at that precise moment. **This is a balance**: the result of interrupting all the flows (we will see, as soon as the situation becomes minimally complicated, that there are many), which **allows** us **to see 'what a particular company has and why' at a given time**.

In our example, the amount observed in the balance sheet is the consequence of a single flow, in both cases of inflow, in the two items or accounts (which is what we call the different elements that appear in Accounting) of the balance sheet: Assets (Cash) have increased 'because' an ownership account (Capital, Liabilities of the company) has also increased.

Now look at figure 2.

ASSETS			LIABILITIES
Cash & equivalents	50.000	Suppliers (trade payables)	100.000
Stocks	100.000	Lending financial institutions	250.000
Buildings	600.000	Share Capital	400.000
TOTAL ASSETS	**750.000**	**TOTAL LIABILITIES**	**750.000**

Figure 2

Try to mentally reproduce the flows that could have led from figure 1 to figure 2. A possible time sequence of events (a possible reconstruction of the flows that have communicated the first stock with the second) would be the following:

- In view of the fact that it needs to buy a building with a price of 600.000 euros, and having initially received a contribution of only 400.000 euros from the partners (see figure 1), the company asks for (and is granted) a loan of 250.000 euros from a local bank. This involves 'opening' a new account under Liabilities, which explains why the additional amount appears in the cash register (Figure 3).

ASSETS			LIABILITIES
Cash & equivalents	650.000	Lending financial institutions	250.000
		Share Capital	400.000
TOTAL ASSETS	**650.000**	**TOTAL LIABILITIES**	**650.000**

Figure 3

Note that there have been two flows (for identical amounts) that explain the passage from figure 1 to figure 3: there has been a '+' in an Asset account (Cash) made possible by a '+' in a (new) Liability account (Creditor Financial Institutions). At this point, there are two 'owners' (with different attributions and rights) of what appears in the Assets: the partners and the lenders.

- With the available cash balance in Figure 3, the company is in a position to purchase the building in which it will develop its activity, for which it pays 600.000 euros, resulting in Figure 4.

ASSETS			LIABILITIES
Cash & equivalents	50.000	Lending financial institutions	250.000
Buildings	600.000	Share Capital	400.000
TOTAL ASSETS	**650.000**	**TOTAL LIABILITIES**	**650.000**

Figure 4

On this occasion, the appearance of a new account (Buildings) for an amount of 600.000 has been possible not 'because someone new has appeared on the liabilities side', but because another asset 'has left its place' (disappeared so that it could appear): there has been a negative flow in an asset account, Cash (-600.000), which corresponds to a positive flow for the same amount in another asset (Buildings, +600.000).

- The company needs to buy **goods for resale** (we call so the goods that a company acquires with the intention of selling them under the same conditions, merely performing a **distribution activity**) for an amount of 100.000 euros; it does not have the necessary liquidity, so it requests a deferral of payment (30 days), which is granted. This brings us to figure 2 (which is the one we wanted to explain).

ASSETS			LIABILITIES
Cash & equivalents	50.000	Suppliers (trade payables)	100.000
Stocks (goods for resale)	100.000	Lending financial institutions	250.000
Buildings	600.000	Share Capital	400.000
TOTAL ASSETS	**750.000**	**TOTAL LIABILITIES**	**750.000**

Figure 2

It can be seen that this operation is very similar to the process that allowed the purchase of the building (loan request and subsequent acquisition of the asset), but on this occasion the flows have been 'simplified' (there has been, for the moment, no impact on cash; and the one who lends the money is the same one who provides the good to the company): a '+' has been recognized in a new Asset account (Inventories, +100.000), which has been possible thanks to the recognition of a '+' (for the same amount) in a new Liability account (Suppliers).

Many things have happened in this simple process that deserve reflection. The reader will have noticed that we have always taken care that 'nothing appears in the Assets that cannot be explained': in other words, we have taken special care that what appears in the Assets always has its correspondence in the Liabilities, that the two parts of the balance sheet add up (in value) to the same thing. When this happens (and this must always be the case) we say that '**the balance sheet balances**' (we also say that it is a 'balanced balance sheet'; in fact, the word 'balance sheet' refers to the fact that there must always be this balance between the two constituent parts of the balance sheet).

To achieve this, we have applied the **logic of double entry accounting**: for example, whenever 'something' appears in the Assets, 'something' for the same amount must appear in the Liabilities or 'something else' must disappear in the Assets (for the same amount); and when 'something' disappears in the Liabilities, either the same figure appears in another liability, or some asset is reduced.

Another important idea to which attention should be drawn is the following: 'at this moment' (Figure 2), the Capital is 400.000 euros, but the company has only 50.000 euros in Cash & equivalents: this means that, if tomorrow it had to pay the amount due to Suppliers, it would be in trouble, since it would not have sufficient liquidity. It can be intuited that **it is possible to default with a very large Capital**: the fact is that the Capital figure only indicates that a part of what is in the Assets was possible with the help of the shareholders, but has little or nothing to do with the Cash that the company has **at this moment**. Let us remember that everything that the company has is in the Assets, the Liabilities only show the explanation, the ownership of the funds that have been put at the disposal of the business and are materialized in these Assets.

More interesting ideas: the shareholders do not know 'where their money is' (neither do the suppliers, nor the bank that has lent resources to the company): this money 'is somewhere in the Assets' (but it is not known in which one). Thus, we say that **the Liabilities as a whole 'finance' the Assets as a whole**.

One last important reflection related to the above. When we interrupt time to see how much water there is in a reservoir, the way to measure it is clear: I can do it in cubic meters, litres or other similar measure, but what is in it is a homogeneous good. However, when we interrupt the time in the activity of a company, what we find in its Assets **are elements of a very different nature, so there is no choice but to calculate the value of each of them**, which is a rather complicated task. In the example we are dealing with, we know that the company has acquired the property for 600.000 euros, but is it really worth that figure? would it make any difference if we knew that someone was offering us 1.000.000 euros for it?

If the answer to the above were 'yes', accounting would have a very serious problem: it could say what the accountant wants it to say. In other words, it would open an important door to subjectivity. **To limit this subjectivity** (although, as we shall see later, it is impossible to eliminate it 100%) we must appeal to one of the six (in the Spanish General Accounting Plan) principles that should govern the process of preparing accounting information, the so-called '**principle of prudence**'. This principle tells us that in order to reflect good news in accounting we must wait for the events that justify it to occur (in our example, we will have to wait until the property is effectively sold for 1.000.000, at which time, and only then, can the good news be recognized: that the wealth of the company's partners has increased by 400.000 -the difference between the sale price and the purchase price of the asset sold-), which is directly related to the valuation criterion indicated above and which is applied to the vast majority of the company's assets: the **historical cost** (acquisition price, in our case).

The principle of prudence has another consequence: if there are reasons to believe that the purchase was a poor decision (that the asset is worth less than what was paid for it), the loss must be recognized as soon as the fact becomes known; but we will come back to this later when we go a little further.

So far, we have dealt with simple operations in which, in principle, there was no reason to think about profit or loss on the transactions: if you stop for a moment on the principle of prudence, the profit never occurs at the time of purchase (if we make a mistake, the loss should be recognized at that time, but never the profit). We will come back to this shortly, but first let us reflect for a moment on the **role of the income statement in double-entry accounting**.

Businesses are formed with the healthy intention of making a profit. In a market economy, price is an indicator of the relative abundance or scarcity of goods (something is expensive when it is scarce; and vice versa), so that, in a simplistic but sufficient approach for our purpose, profit would be an indicator of efficiency in the function entrusted to the company: to allocate in the best possible way the (scarce) resources that have been made available to it. Thus, if cheap (abundant) resources are used to obtain other expensive (scarce) resources, it may be thought that things are being done well.

The Income Statement (which we also call the Profit and Loss Statement or simply the P&L) **is responsible for ensuring that the balance sheet always balances**. The procedure is simple: if at a given moment something appears on the assets side without this leading to the disappearance of another asset or the appearance of a liability, we must recognize a revenue (a '+' in the P&L account). Think of what happens if someone gives a euro to the company as a gift: this does not imply the disappearance of another asset, nor does it oblige to return it (so that the 'due' liabilities prior to the gift maintain their values); so that the only way to make the balance sheet 'balance' is to recognize an increase in the **Net Worth** (which is the name we give to the wealth deposited by the partners in the company, the difference between the Assets and the Due Liabilities, between 'what we have' and 'what we owe'), and this is done by resorting to the P&L account, recognizing the corresponding income.

Something similar would happen if a Creditor (someone to whom we owe money) 'forgives' us one euro. In this case, the Assets remain unchanged, but an enforceable liability (Creditors) has decreased by one euro... so the only way to get the balance sheet to balance is by recognizing a revenue (a '+' in the Income Statement; which, remember, appears on the Liabilities side).

The reader can now think about what happens if someone 'takes away' a euro that was in the company's Cash. In this case, the Assets decrease by that amount (the euro disappears from Cash without the appearance of another asset to compensate for it) and the company continues to owe the same as it owed before realizing its disappearance, so that the balancing of the balance sheet requires the recognition of an expense (a '-' in the P&L account, in short, a reduction in Equity). And something similar would occur if the company is imposed a penalty: a liability increases (or the cash position decreases, if it is paid at the time) without increasing another asset or decreasing the liability, so the way to make the balance sheet balance is to recognize the corresponding expense.

Thus, we see that **the Income Statement has a fundamental mission: to explain why the company's Assets 'grow more than its (due) Liabilities'** (naturally, we are thinking of things being done well, i.e., that the company sells above cost price; and we are not considering that the Assets grow as a consequence of a new contribution from shareholders -Capital increase- in which case the corresponding amount would go to the Capital account).

We are now in a position to present the complete balance sheet of a company and to interpret what we see on it. See figure 5.

ASSETS			LIABILITIES
Cash & equivalents	300.000	Suppliers (trade payables)	1.210.000
Sundry accounts receivable	130.500	VAT payable	581.000
Customers (trade recievables)	4.537.500	Payable for Income tax withholdings	75.000
Short-term loans to group companies	350.000	Corporate tax payable	1.179.250
Inventories of goods for resale	500.000	Social Security agencies	75.000
Finished product inventories	200.000	Short-term Debt with financial institutions	500.000
Product in process inventories	150.000	Long-term debt with financial institutions	5.000.000
Raw material inventories	250.000	Bonds and debentures	4.000.000
Computer applications	100.000	Income for the year	3.537.750
Patents	200.000	Retained earnings	180.000
Computer equipment	50.000	Legal reserve	50.000
Transport elements	120.000	Share Capital	5.000.000
Machinery and facilities	1.000.000		
Buildings and constructions	12.000.000		
Investments in group companies	1.500.000		
TOTAL ASSETS	**21.388.000**	**TOTAL LIABILITIES**	**21.388.000**

Figure 5

The reader can intuit that the different elements (the 'accounts') that appear in the balance sheet have not been 'thrown' at random, but have been carefully ordered. The criterion with which the assets have been ordered has to do with 'the time it will take for the item to be converted into money' (this is what we call **'liquidity' or 'availability'**: something is very liquid when it is easily convertible into money, quickly and without loss of value); and the criterion with which we have ordered the liabilities is related to 'the time that will elapse until the owner of the money comes to claim it' (we call this concept **'enforceability' or 'exigibility'**, something is very exigible when the maturity is close in time; and vice versa).

As can be seen, we have ordered the assets and liabilities ‘from most to least’ (liquidity and enforceability)[1] : at the top of the assets side appears ‘what most resembles money’, and on the liabilities side appears what will have to be paid first; and in the lower part there appears in the assets all that which will take a long time to become money (it will do so through the operation of the business), and in the liabilities that which will have to be paid in a long time (in fact, what appears is that which, if the company is born with an indefinite corporate purpose in time, will never have to be paid, it is what we call ‘non-callable’, since there is no commercial obligation to return it, it is the contribution that appears as a guarantee against third parties that are related to the company).

What the company has is worth 21.388.000 (that is the book value; remember that it could be worth more on the market, but the principle of prudence would prevent the capital gains from appearing in the accounts). And how is it possible that it has ‘all that’? Because there are many people who have put, in different ways and with different intentions, resources at the disposal of the company for the same value: there are people who have put resources at the disposal of the business whose sale constitutes its corporate purpose (this is the case of the suppliers of goods, who logically expect to receive the corresponding money in a short period of time); there are others whose function is to ‘lend money to those who need it’, some with the intention of recovering their money in a short period (Short-term debt with financial institutions) and others in a longer period (Long-term debt with financial institutions); and finally, there are those who have put money into the company with the intention of seeing it multiplied, of obtaining a fair reward for the work carried out in the organization of the business (Capital). The value of the assets has no choice but to coincide with the value of the liabilities, this is not a sign of the ‘health’ of the business, it is simply the manifestation of respect for the logic of double entry accounting.

The main points have already been presented, now let us define some additional language or vocabulary. In principle, it is understood that ‘the normal operating cycle’ is one year, i.e. the reference period in which the company’s operations ‘take’ to manifest their effects is the aforementioned period of time (which normally coincides, moreover, with the calendar year). This is, in principle, the period in which all companies are obliged to report, to file their ‘annual accounts’ (basically, the balance sheet and the income statement) with the Commercial Registry. And this ‘**normal operating cycle**’ determines in accounting what we understand by **short and long term**: the short term is defined (always in general) as one year from today; the long term is defined as what occurs at a later time.

Thus, in **assets** we distinguish **two large ‘asset masses’**, two large sets or groupings of accounts: in light pink, **current assets** (which include all those items that are either cash or will become cash in the short term); and, in darker pink, **non-current assets** (which include all those accounting items that will become cash in a period of more than one year).

Within current assets we can also distinguish three different concepts: cash (pure liquidity, mainly cash and current bank accounts), receivables (which include amounts to be collected in the

[1] The proposed ordering is consistent with International Accounting Standards, but not with the current Spanish General Accounting Plan. What is important is consistency in the two parts of the balance sheet: if the assets are ordered ‘from most to least liquid’, the liabilities should be ordered ‘from most to least callable’; and vice versa.

short term) and inventories (which, in principle and in general, are also intended to be converted into cash in the short term, but with a somewhat longer conversion period).

Non-current assets mainly include what we call '**fixed assets**'. These are assets that the company needs to undertake its mission, but which are not intended to be 'sold', but rather 'converted into cash through the company's own activities' (through the exercise of its corporate purpose).

On the **liabilities** side (understood as 'the right-hand side of the balance sheet'), we must first distinguish between two major types of accounts: in blue, those that reflect resources made available to the business by persons other than its owners (this is what we properly call liabilities), and those, in green, that reflect amounts corresponding to contributions (direct or indirect) from the owners of the business (the partners; this is what we call equity). Logically, and given that the assets have been ordered from most to least liquid, consistency in terms of maturities requires that on the right-hand side of the balance sheet there should appear first that which is going to have the shortest maturity.

Within 'liabilities payable' (which, once again, reflects 'what is not ours', the resources deposited in the company but which must be returned to their owners at a predetermined time) we must distinguish between two large groups: **current liabilities**, which reflect those items whose maturity is no more than one year from today; and **non-current liabilities**, which include those amounts that will have to be returned in a period of more than one year.

Finally, what we call '**equity**' appears on the liabilities side, which, as indicated above, includes those items that express the value of the resources invested in the company by its owners. This item is made up of two major concepts, one of which is in turn divided into two others:

- The direct contributions of the partners: these are recorded in the account called '**Capital**'. The birth of the company requires an initial contribution; but this account can see its balance increased if at some later time the company needs resources and decides that they are contributed by the partners (carrying out what we call 'capital issuances').

- The **profits** obtained by the company in the performance of its activities. This element will be developed in much greater detail in the following point, suffice it for the moment to recall that this is the 'cushion' account with which, on the one hand, we ensure that the balance sheet is balanced; and on the other, with which we explain 'why the assets are growing in excess of the liabilities due (for reasons other than new contributions from the shareholders)'.

Profit is a particularly important account in the future of the company, since, as we said earlier, it is ultimately an indicator of efficiency: a positive profit would indicate that with cheap (abundant) resources other expensive (scarce) ones are obtained, so that the fundamental task entrusted to the company (the allocation of the scarce resources that have been made available to it) is being carried out efficiently. It is this importance that justifies that it is the only account for which a detail of all the increases and decreases produced during the accounting period is required: in this case, the 'explanation' of the balance shown in the balance sheet is requested, not only 'how much it is worth', but also the reasons that justify this value. Not only this, but the income statement (the efficiency meter) must be reset to zero at the end of each accounting year, allowing the income statement for the following year to be generated.

Thus, at the end of the year (actually, in the months following the end of the fiscal year), the company (its owners) must decide what part of that profit is intended to continue to be used in the business itself (this is what we call '**retained earnings**') and what part should be distributed to its owners as a reward for their contribution (this is what we call '**dividend**'). In this way, the profit for the year (a part of the net equity) always disappears at the end of the year, its balance being transferred to two possible items: Retained earnings and Reserves (which form part of the net equity; they are what we call 'self-financing', the business operation itself partly generates the resources, the financing, necessary to continue carrying out its activity) and Creditors for dividends (which is an enforceable liability, whose vocation is to disappear in a short period of time by means of the corresponding payment).

We leave to the intelligent reader the detailed analysis of the different items that make up the large defined assets and liabilities that appear in the balance sheet shown in Figure 5, which can also be presented in a more compressed form (Figure 6).

ASSETS			LIABILITIES
Current assets	6.418.000	Current liabilities	3.620.250
Non-current assets	14.970.000	Non-current liabilities	9.000.000
		Net worth	8.767.750
TOTAL ASSETS	**21.388.000**	**TOTAL LIABILITIES**	**21.388.000**

Figure 6

2.2. The income statement

As mentioned above, the income statement (or profit and loss statement, P&L) can be conceived as a 'cushion account'; it is the item that 'guarantees' that the balance sheet adds up, that provides 'the missing explanation' (of course, in all this reflection there is something of a caricature of reality; but it is quite close to reality).

Thus, and as we indicated, if a person outside the company gives us a euro, it will appear 'magically' in the assets: it does not replace another account for the same amount nor does it make the company 'owe more' to anyone... which means that the wealth belonging to its owners (the shareholders) has grown; and it has done so for a reason other than a new contribution from the partners (which would be taken to the Capital account), we say that the company 'has earned a euro'.

The opposite example is when we are robbed of one euro: an asset (cash) disappears without another one appearing in its place (nothing has been purchased whose value compensates for the outflow of funds) and what the company 'owes' remains the same as before. If we did not fix this, the balance sheet would tend to become unbalanced: the assets would be smaller than the liabilities as a whole (remember that this word refers in this context to the right-hand side of the balance sheet). And we fix it by recognizing a 'minus' in the income statement, reflecting an expense, we say that the company 'spent' one euro.

This is easy to generalize. Thus, and following more or less freely the definitions proposed by the **Spanish General Accounting Plan** in its **Conceptual Framework** (and more specifically, those referring to the criteria for recognition of the constituent elements of the annual accounts), we could say that:

- We must reflect an **income** (a 'plus' in the income statement, a higher profit) when an asset increases without decreasing another asset or increasing a liability; and also, when a liability decreases without increasing another liability or decreasing an asset.

- We recognize an **expense** (a 'minus' in the income statement, a lower profit) when an asset disappears without being replaced by another asset or a decrease in liabilities (receivable); and also, when a liability (payable) increases without a decrease in another liability or an increase in assets.

Based on these definitions, the accountant must identify when one of the above situations occurs. And the regulations in this field propose some guidelines that seem reasonable, at least as a statement of intent:

- The income statement must always show the '**comparison between the income for the year and the expenses necessary to obtain it**': we call this 'correlation of income and expenses'.

- **Income and expenses should be recognized when it is 'fair' to do so.** A simple example: if my right to collect money has arisen, but the time has not yet come for it to be paid (a deferral of collection has been agreed), should this operation 'fairly' affect the income statement or should I wait for the collection to take place? It seems logical from a purely intuitive point of view to answer that the income from the operation should be recognized when the right 'arises' (when it has 'accrued').

- The greater **optimism or pessimism of the accountant should have as little influence as possible**. In other words, in order to try to ensure that the information provided by the accounting is 'reliable' (and therefore a good basis for making decisions based on it), it is necessary to try to 'objectify' as much as possible the process of preparing the corresponding information.

In order to achieve the objectives described above, the accounting regulations 'come to our aid'. The first element (the necessary '**correlation between income and expenses**') requires a much deeper and more important reflection than a quick or superficial approach might suggest. In fact, this is one of the fundamental keys that must be fully understood in order to have a complete picture of how double-entry accounting works.

Let us begin by pointing out that the same cash outflow (a 'minus' in an asset account') may be due to two different reasons (with effect, therefore, in different accounting 'places'): it may correspond to an **investment** (we exchange cash for something else) or it may be associated with an **expense** (money disappears without there apparently being a counterpart for doing so). Let's look at some examples, what we are saying may seem very simple (in fact, it is), but it has much more conceptual charge and importance in terms of its consequences than it seems.

When we buy a computer, it seems clear that we are 'exchanging one thing for another'. The amount that was 'invested in cash' is now 'invested in another account', computer equipment. Both are asset accounts, the space 'freed up' by one (cash) is 'occupied' by the other (computer equipment). We say in this case that the company has not incurred an expense, but has made an **investment** (replaced one investment with another).

However, when we pay the payroll, the corresponding cash outflow does not occur 'in exchange for something else'. It is payment for services rendered (in this case, labour power; the reader can think of many other examples, such as the payment of interest for the use of money that is not owned by the company or the rent paid to the lessor for the use of a physical space owned by said lessor), but it does not imply (in principle) that in exchange 'something else is owned'. Logically this amount is being paid for something, we say that it is 'an **expense** necessary to obtain the income' shown in the income statement. In principle, it is an amount 'that has evaporated'; although in reality it is not: it is money that has contributed to the company being able to do what it does, it has allowed it, together with other expenses, to invoice what it has sold. The impatient reader may be thinking about what happens when the company has not yet sold 'what it has manufactured'... and this is logical, impatience is understandable... but let's slow down a little, we will come back to this later when we have established a series of important preliminary concepts.

One (small?) catch to the above. Let's assume, as we anticipated in the introduction, that we buy a machine whose price is 1.000, which does not include transportation, which is taken care of by the supplier himself and billed separately. Let us assume that this transport is complicated from a logistical point of view (it requires traffic interruptions, etc.), which means a high cost: let us say 200. The cash outflow is therefore 1.200, and the question is immediate: is the 1.200 an investment or is part of it an expense? It seems clear that the cost of the machine should be recognized as the value of the machine (I pay 1.000 for something worth 1.000... or even more, but as we have seen, in an attempt to limit the subjectivity associated with the accounting function, it seems reasonable not to recognize profits until they occur), the question is rather, does the transport add value to the machine? If the answer is yes, we would value it at 1.200 (so we would have recognized in the year an investment and no expense related to that machine), otherwise we should recognize an investment for 1.000 and a (transportation) expense for 200.

On this point, the accounting regulations are clear: the machine is 'worth' 1.200. And the reason has to do, as we will see below, with 'fairness' (in the temporal allocation of income and expenses, at the time when profits or losses should appear or be recognized): the cost of transportation is 'necessary' for the machine to provide its services, so this cost 'should be fairly distributed' among the years in which the machine is used; and this will be the case, as we will see below, through depreciation.

There are expenses that involve an outflow of money from the company: these are what we call cash charges (examples of the above would be the payroll, interest or rents referred to above). In these cases, the 'minus' that we recognize in the income statement has as a counterpart a 'minus' in the cash account.

But there are other expenses that do not (directly) affect cash: these are what we call non-cash charges, such as, for example, the **depreciation of fixed assets**. Depreciation in this context is defined as 'the accounting recognition of the (systematic) loss of value that fixed assets suffer as a result of use, age or obsolescence'. The concept is simple: 'things' (tangible or not) do not last forever, they normally have a limited life (a life that may be conditioned by use or the passage of time), so that as time goes by, our fixed assets 'evaporate' with the activity carried out. To recognize the corresponding cost, we simply reflect a 'minus' in the income statement (depreciation expense) and a minus in the affected account (machinery, for example).

By means of the proposed entry (we call **entry** to the reflection in accounting of any change that affects the assets, financial position and/or the company's result) we are recognizing that **a part of what at the time was identified as an investment has become an expense**. The simplest situation occurs when the loss in value is due to the passage of time. In this case, 'the cost that in fairness corresponds to a specific year' can be calculated by means of a simple formula:

Depreciation for the year = (Acquisition price - Residual value) / No. of years of life

We call '**residual value**' the amount we expect to obtain from the sale of the asset in the condition it will be in at the time of sale. And we impute to each year the part of the depreciation that will occur over its life by dividing it by the number of years it will be with us in the asset.

Now think of the example we gave earlier concerning the machine that was expensive to transport. The fact is that the 1.200 we paid for the machine (1.000 for owning it, plus the 200 for transportation) 'will eventually become an expense at some point': what I have to decide is 'when'. Let us assume, for the sake of simplification, that its residual value is zero (although this is not important). What seems fair is that the 1.200 is spread over the years in which it is used (say 10 years), the first year is 'not at fault' that the transportation occurred in that year; and so, it happens through depreciation. As you can see, and all else constant, the sum of the profits obtained in the ten years will be the same in any case: that which results from subtracting from the income the corresponding costs (which as regards depreciation will include 120 each year; a figure that would be only 100 in the case that the 200 of the transport had been recognized as an expense of the first year).

Let us return to our line of argument. We have seen that we 'seek fairness' when we state that our intention is to 'compare, each year, the income with the expenditure necessary to obtain it'; and in this comparison, it is essential to identify what is expenditure and what is investment (we will come back to this from a different perspective later). But we have also said that it 'seems fair' to recognize as revenue or as expenditure those that correspond to accrued rights (in favour or against) although not necessarily liquidated. In other words, the comparison between revenues and expenses does not have to coincide (it will not, as a general rule) with the difference between cash inflows and outflows: **revenues - expenses** is not (necessarily) the same as **receipts - payments**.

This is the idea behind the application of the so-called '**accrual principle**'. Technically, it can be defined as the need to 'look at the actual flow of goods and services (and not the monetary flow)' when determining profit. This means that revenues and expenses are recognized when the corresponding obligations arise, regardless of whether the monetary consideration occurs 'at the time' or later. This is because we seek the 'fair allocation' of income and expenses, so that profits or losses appear 'when they are fairly due'.

Finally, and in our initial explanatory statement on this point, we referred to the search for the greatest possible objectivity, the desire that the reader of accounting information should not need to know the philosophical orientation of its 'maker' (if he is an optimist, a humanist convinced that human nature is good; or if he is rather a pessimist, an avid reader of Schopenhauer and Sartre, in whom he finds an explanation for his existential emptiness; ☺). Beyond the jokes, what we want to reflect here is that it is important, for the information to be reliable and relevant, that it is free of biases (intentional or not); that the recipient or user of the accounting information knows how the information has been prepared. Two very important accounting principles come to our aid here: **prudence** and **consistency**.

The **principle of prudence** obliges to reflect the bad that is foreseeable as soon as it is known, but to wait to reflect 'the good (expected)' until the moment it occurs. This means that the accountant 'only looks into the future' in an ashen fashion, to anticipate the bad and reflect its consequences in accounting as soon as they are reasonably foreseeable. However, the good things that are about to happen (which will be most of them, that is why companies exist, because there are expectations that the future will come to compensate for even a bad moment; all this is written in a context of pandemic by co-vid) can only be reflected 'when they arrive'. To put it another way, **accounting is fundamentally an account of what has happened, not a tale of what is about to happen**.

This is closely related to the valuation criterion most widely used by the technique: the **historical cost** (**acquisition price or production cost**, as appropriate). Indeed, and as you will have noticed, the presentation of a balance sheet requires valuing everything that the company 'has'; and this valuation is made, in the vast majority of cases, based on 'what it has cost' the corresponding asset (and as you may also be thinking, corrected for any impairments that have occurred; remember in this sense the depreciation). It is possible that you are VERY happy because you have bought something for 100 when in reality you believe that you are going to be able to sell it for 600 (it is what happened sometimes to some well-known businessman in his time and who went to jail); but you must restrain your happiness at the time of doing the accounting (although you can celebrate the good news if you see fit; with prudence, but you can do it): as long as you do not sell it, its value is 'what it has cost you' (100; sometimes, the individual alluded to did not know how to restrain his joy and recognized capital gains that had not yet occurred; you can think about the relationship of all this with his time in prison).

We have also talked about the **principle of consistency**. In fact, this principle is simple to define intuitively: 'be coherent'. In other words, if you have chosen a valuation criterion, you must maintain it over time and apply it to all other assets that resemble it (provided that there are no reasons to justify the change, because in this world not everything is permanent, as Heraclitus rightly pointed out -you know, that 'we never bathe in the same river'-). Think about depreciation. The deterioration suffered by a fixed asset is not something 'totally objective', there may be different opinions with respect to the same asset as regards the rate at which such deterioration should be recognized; what the principle of consistency obliges is to maintain a criterion as long as there are no reasons to change it (which is not about respecting the absurd maxim of 'sticking to one's guns' -according to the google oracle, 'the expression defines the attitude of those who stubbornly persist in blunders, even knowingly, out of pride or to keep up appearances, although maintaining the error causes worse damage than not maintaining it'-).

This section is a bit long (and a bit repetitive at times) ... I am aware, the truth is that, if I were you, I would take a little break.

2.3. Profit and valuation: the correlation between income and expenses

The opening of this sub-section is somewhat artificial, it is a continuation of the previous one, but to prevent the long-suffering reader from choking, I have preferred to open it separately. In fact, we are still going on with the same ruckus: the need for profits to appear 'when they are fairly due', and this has to do with the comparison made in the P&L being that of the income and the expenses 'necessary' to obtain them; which makes it necessary to distinguish between expenditure and investment; which in turn is related to 'how much I say things are worth at any given moment'. In the following, we will see the importance of certain nuances in this whole process.

Take a look at the income statement proposed in figure 7. With what we have seen above you are able to interpret what you see, take a chance... dare!

Let us assume for the moment that the company does not carry out any transformation, it simply sells the goods it has previously purchased without 'intervening' in the product. Let us read in this key what the income statement shows us.

Profit and Loss Statement (P&L)	
+ Sales (goods for resale)	15.000.000
- Purchases (goods for resale)	-6.000.000
- Personnel costs	-3.000.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-80.000
+ Financial income	7.000
- Financial expenses	-570.000
+ Gain or loss on disposal of fixed assets	60.000
- Corporate tax	-1.179.250
NET PROFIT	**3.537.750**

Figure 7

The first thing we can see is that the company has obtained a positive profit. Is it high? We cannot say, we should have additional information regarding the money that had to be invested to achieve it; and it would also be necessary to know the level of risk assumed by the contributors of funds. So, for example, if we were told that the net worth at the beginning of the year was 100 million, the calculation of **ROE** (**Return on Equity**, a ratio that indicates the accounting profitability achieved by the shareholders) would be somewhat less than 4%. Is this sufficient? Again, we cannot say, since we would have to know in what interest rate context it occurs (usually related to inflation), and we would also have to know something more about the risk assumed by the contributors (which is in turn related to the possible range of values, the difference between the minimum and maximum that could have been obtained; modern Financial theory assumes that individuals ‘do not like’ risk).

Another important idea: will the cash balance at the end of the year be equal to, higher or lower than the initial balance? In other words, will the company have been able to generate ‘cash’ (liquidity), apart from profit? Well, the truth is that we cannot say either. Remember that the income statement is drawn up on an accrual basis, among other things: what we see is a comparison between sales revenues (which have not yet had to be collected) and the corresponding costs (which have not yet had to be paid), some of which do not even affect cash (such as depreciation).

Let’s try to ‘break down’ a little more the information that appears in the income statement. With the information available, we could say that, in order to obtain revenues of 15 million, it has been necessary to incur a series of costs, which we could classify into different groups:

- **Operating costs with cash impact (cash charges)**. With the word ‘operating’ we identify costs that have to do with ‘the way of doing’, and not with ‘the way of financing’ (perhaps the simplest way of defining the term is ‘by exclusion’: financial expenses, which have to do with the way in which the company is financed -with its liabilities- are not considered here); and the term ‘cash charges’ indicates that we are referring exclusively to those costs that have a direct impact on cash flow. In our case, this would include merchandise purchases, personnel costs, external services and other operating costs.

- **Operating costs without cash impact (non-cash charges)**. We refer here to costs that have to do with the ‘way of doing’ (with the business operations; with the assets, regardless of how the liabilities are made up) but that do not (directly) affect the cash flow: in our case, the **depreciation of fixed assets**. And we are so lame when it comes to ‘directly’ because it should not be forgotten that depreciation does have an indirect impact on cash: it is the **tax effect**. Indeed, we are talking about a ‘deductible’ cost in the calculation of the corporate tax base (as long as it is within the maximum and minimum limits established by law), so we could say that ‘the more depreciation, the lower the profit and therefore the lower the tax cost’ (the latter aspect does have an impact on the company’s cash flow).

- **Financial costs**. We refer here to the expenses ‘necessary’ to obtain the revenues, but which do not correspond to the way we do things, but to the way we finance ourselves (all other things constant, the interest burden will be all the higher the greater the amount of financial debt we decide to use in financing the company; the same asset can be financed with a lot of debt -we say the company is highly leveraged- or with little debt and a lot of equity; and this decision would not influence in principle the operating costs, but it would influence the financial costs).

- **Corporate tax**. This is a particular cost, in the sense that it is a consequence of what happens in the income statement as a whole. If we assume that the application of fiscal logic leads to the same profit as accounting logic, we can identify the ‘**accounting profit before tax**’ with what in fiscal language we call ‘**taxable income**’, and we can deduce what the tax rate applied (or borne) by the company is: it would be the quotient of dividing the fiscal cost by the taxable income (which can be quickly calculated by adding the net profit and the corporate tax itself).

Up to this point we have referred exclusively to ‘**recurring**’, to what seems to occur year after year in a (more or less) repetitive manner in the future of the company. We have left out of the reflection the financial income (which would correspond to interest that we have received -or we have the right to receive- for lending money to someone -and that we do not know if they occur or not in a habitual way, but that in any case do not seem to be directly related to that which constitutes the ‘corporate purpose’ of the company, the ‘centre’ of its activity-) and also the positive result from the disposal of fixed assets (which corresponds to the profit obtained from the sale in the year of some fixed asset, which will not occur very often, but only on specific occasions). It seems advisable, in any analysis of the quality of a business, to separate the recurring from the **non-recurring**.

Let us introduce a small additional difficulty. The above will only be ‘correct’ (fair) if, among other things, all the goods purchased have been sold in the year under consideration. Indeed, and **in a good logic related to fairness, only the ‘consumption’ of goods (what we call the ‘cost of sales’ or ‘cost of goods sold’, which does not necessarily have to coincide with what was purchased)**, **should appear as a cost.** Let’s slow down.

Imagine that it has only been necessary to ‘consume’ (spend) half of what has been purchased: in that case, the income statement in Figure 7 would be showing an incorrect result, since ‘**part of the purchases recognized as cost would not be expenditure, but investment**’ (they should appear in the Inventories account); and if we look at the income statement in its current state, everything that has been purchased is being identified as cost.

Let us now propose to the reader a new caricature of accounting. Think of an accountant as a really busy person (not only does he have to ‘do the bookkeeping’, but he sometimes has to chase customers who are late in their payments, he has to think about how to improve the company’s results, be attentive to tax and other maturities...). With regard to merchandise purchases, and given that, in principle, their vocation is to be sold in the normal operating cycle (which we are identifying, as usual, with the calendar year), he ‘**classifies as a cost’ what at the time of purchase is actually an investment**. In other words, the cash outflow associated with this purchase should have a counterpart in the Inventories account (‘less cash, more inventories’); however, in accounting, this purchase is recognized as a cost (‘less cash, less profit’, which leaves the inventory balance intact at all times). On the other hand, every time you sell something, accounting simply recognizes the revenue from the transaction (it is not concerned at that moment with ‘writing off’ the goods sold, it does not try to determine at that moment the profit from the transaction). The procedure is convenient (I recognize as cost everything I buy; and as revenue everything I sell), but it is imprecise: **the revenue could refer to a quantity of goods different from that to which the purchases refer**. In other words, it could happen that, at the end of the year, part of what has been bought has not yet been sold; or vice versa, that what was bought during the year was not sufficient to meet the sales made during the year, and that it was necessary to 'reduce' the stock that existed at the beginning of the year. Neither of these two circumstances is contemplated, for the moment, in the income statement; and as we are in double-entry accounting, this error also manifests itself 'elsewhere': the inventories account may not be reflecting the amount that is available at the end of the year (since, for the moment, it continues to maintain the same balance as it had at the beginning of the year).

The above problem is solved by making what are known as the '**inventory adjustment entries**'. Whenever the company wants to 'close the accounts' (present its annual accounts), it must first carry out a series of tasks (called **accounting closing procedures**), mainly related to the search for the necessary correlation of income and expenses, among which are the aforementioned entries. Basically, it is a question of checking whether at the end of the year there is more or less (in value) in stocks than there was at the beginning: if there is more (closing stocks greater than the opening stock), we would say that part of the cost recognized through purchases is not an expense, but an investment, so the result obtained must be corrected; and, on the other hand, this increase in the value of the goods must be recorded in the inventories account. The entry is simple: we recognize a revenue (a 'plus' in the income statement) using the Stock as a counterpart (we make a 'plus' in the Inventory account). If we assume that half of what has been purchased has gone to stocks, the income statement would now look as shown in Figure 8.

We are at the crucial moment, everything really depends on a correct understanding of the last two paragraphs. We would like to draw attention to the differences between figures 7 and 8. The entry made (as we have indicated, the reflection of a '+' in an asset account -Inventories- whose counterpart is another '+' in a liability account -Income Statement-) is in fact a correction: the profit 'was wrong' (it was not comparing 'revenues with necessary costs') and so was the Inventories account (which did not reflect the true balance at the end of the year). The correction means that '**we have converted into an investment something that appeared as an expense**'.

Profit and Loss Statement (P&L)	
+ Sales (goods for resale)	15.000.000
- Purchases (goods for resale)	-6.000.000
+ Variation in stocks (goods for resale)	3.000.000
- Personnel costs	-3.000.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-80.000
+ Financial income	7.000
- Financial expenses	-570.000
+ Gain or loss on disposal of fixed assets	60.000
- Corporate tax	-1.929.250
NET PROFIT	**5.787.750**

Figure 8

Now think about the entry that previously had to be made in relation to the depreciation of fixed assets: how does the cost corresponding to this item appear in the income statement? By recognizing a '-' in an asset account (fixed assets) and another '-' in a liability account (income statement). In this case, what we are doing is **recognizing that something that appeared as an investment has become an expense**.

The truth is that there is not much more than this in accounting: in these two entries can be summarized the whole game of flows, stocks and the logic of double entry. If you allow me to give you some advice, reread a few times these last paragraphs, this is what in my opinion is essential not only to 'understand' but also to 'internalize'.

Let us now return to the income statement shown in Figure 7. Remember that it was implicitly assuming that 'everything purchased had been spent'; and also, that 'spending everything purchased was enough' (to meet sales). What happens if this is not the case? What do we do if, for example, we know that, in addition to using all the purchases to meet sales, at the end of the year there is in stock an amount of 3 million less than the initial amount? The answer is simple: the inventory adjustment entries must be made 'backwards'. If, when the closing stock is greater than the opening stock, we must recognize a revenue that allows us to offset the part of the cost that is not, and in turn allows us to record in the inventories account what is there but does not appear in the accounts; when the situation is the opposite (closing stock less than the opening stock), we must recognize the 'missing' cost in the P&L (necessary to meet sales), which in turn allows us to write off in the inventories account what was there at the beginning of the year and is no longer there. In this case, the entry is 'a lot' like that of fixed asset depreciation: a part of what appeared at the beginning of the year as an investment (this time in Inventories) has become an expense for the year.

Now look at one detail: when I register or de-register something somewhere (fixed assets, inventories, ...), I have no choice but to value it, I must necessarily say 'how much it is worth'. And that is not always something totally objective; and when something has a **component of subjectivity**, it opens a door to the **possibility of manipulation**. As we have seen, accounting tries to take its precautions (prudence, consistency) ... but the objective existence of a certain subjectivity in accounting is undeniable. Let's open again another chapter in a somewhat artificial way to give my dear reader a break (if you are still there, THANK YOU!... and lots of encouragement, little by little you will see that this is not 'that' difficult).

2.4. Financial impact of valuation policies. Profit and subjectivity

Let us assume that the situation of a company in terms of its income statement (and before carrying out a significant part of the closing operations) is as shown in Figure 9.

In the information presented, there seems to be only one element that has a component of subjectivity: the depreciation of fixed assets. As far as sales, purchases, external services... are concerned, the information appearing in the income statement is supported by the existence of the corresponding invoices or contracts. Let us suppose, furthermore, that we have the following extra-accounting information relating to what happened in socks (Figure 10):

Profit and Loss Statement (P&L)	
+ Sales (goods for resale)	15.000.000
- Purchases (goods for resale)	-6.000.000
+ Variation in stocks (goods for resale)	??
- Personnel costs	-3.000.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-80.000
- Financial expenses	-570.000
+ Gain on disposal of fixed assets	60.000
- Corporate tax	?
NET PROFIT	**?**

Figure 9

	No. units	Unit price
Initial stock	1.000	300
Buy 1	1.000	700
Buy 2	1.000	800
Buy 3	1.000	900
Buy 4	1.000	1.100
Buy 5	1.000	1.200
Buy 6	1.000	1.300
Sale 1	1.000	2.800
Sale 2	1.000	2.900
Sale 3	1.000	3.000
Sale 4	1.000	3.100
Sale 5	1.000	3.200

Figure 10

With the information available, the aim is to determine what the company's profit has been. First of all, it may be of interest to check the consistency of the information presented, for which we can do some simple calculations.

Let's check that sales revenues are consistent:

1.000 x 2.800 + 1.000 x 2.900 + 1.000 x 3.000 + 1.000 x 3.100 + 1.000 x 3.200 = 15.000.000

Let's check that the recognized cost for purchases is consistent:

1.000 x 700 + 1.000 x 800 + 1.000 x 900 + 1.000 x 1.100 + 1.000 x 1.200 + 1.000 x 1.300 = 6.000.000

Let us now consider how many units of goods for resale there are at the end of the fiscal year:

Initial number of units = 1.000

No. units purchased = 6.000

No. units sold = 5.000

Final no. units = 1.000 + 6.000 - 5.000 = 2.000

The question now is: how much are those 2.000 units worth? In principle, it seems that I can value them in at least three different ways:

- Suppose there is nothing to suggest that some units are different from others: in this case, it would make sense to calculate what is called the **'weighted average price' (WAP)**, which consists of dividing the cost of everything that has been purchased (in the accounting year and in previous years) by the total number of units purchased:

  Weighted average price = (300.000 + 6.000.000) / 7.000 = 900

  With this valuation method, we could say that all the units purchased (those sold and those that have remained in stock) are 'worth' the same: 900 euros. This means that the cost of everything purchased (6.300.000) is distributed as follows:

  Cost imputed to 'sold' = 5.000 units x 900 = 4.500.000

  Cost imputed to 'unsold' = 2.000 x 900 = 1.800.000

  Total imputed cost = 4.500.000 + 1.800.000 = 6.300.000

- Suppose now that I have reason to believe that 'we have sold first what we bought first' (this would be the logic applicable to a good that is subject to some kind of expiration; it is what we identify as **'FIFO system**' -first in, first out-). In this case, the calculations would be as follows:

  Cost imputed to 'sold' = 1.000 x 300 + 1.000 x 700 + 1.000 x 800 + 1.000 x 900 + 1.000 x 1.100 = 3.800.000

  Cost imputed to 'unsold' = 1.000 x 1.200 + 1.000 x 1.300 = 2.500.000

  Total imputed cost = 3.800.000 + 2.500.000 = 6.300.000

- Finally, suppose I have reason to believe that, precisely because there is no difference between one unit and another, I stack them in a pile, and always sell the first one I come across, which is the last one to enter (this system is known as **LIFO** - 'last in, first out'-).

  Cost imputed to 'sold' = 1.000 x 1.300 + 1.000 x 1.200 + 1.000 x 1.100 + 1.000 x 900 + 1.000 x 800 = 5.300.000

  Cost imputed to 'unsold' = 1.000 x 700 + 1.000 x 300 = 1.000.000

  Total imputed cost = 5.300.000 + 1.000.000 = 6.300.000

If you make a little effort, I think it is easy to arrive, and even more so in a time when political correctness tells us that 'all opinions are equally respectable', to the idea of that any of the three visions 'of what happened' can be defendable. But depending on which of them we accept, there are different consequences for accounting.

The example is intended to highlight that, depending on 'how much we say what is gone is worth' we are implicitly saying 'how much what is left is worth'. Remember that the principle of prudence obliges us to wait for good things to happen before reflecting them in accounting, which implies that in no case do we consider saying that the stock is 'worth what I think I will be paid for it'; this means that we must always value it at cost (and this is assuming that the expected realizable value is higher, otherwise the very principle of prudence would oblige us to recognize the corresponding loss as soon as it is known).

Therefore, and given that what is imputed to the sum of 'what goes' and 'what stays' is always equal to the total of what has been purchased at some point in time (in the year or in previous years), the three methods would be in line with reality and would be within the logic of the principle of prudence.

On which items does the chosen criterion have an effect? On three different items:

- In this case, and given that prices have always been increasing, the **profit** will be higher if we say that 'we sold first what came in first'.
- If we say that 'gone' is what came in before, and given that prices are rising, we say that what has remained is more valuable (i.e., if we use FIFO, our assets are larger **-stocks-** because our liabilities are larger -**profit**-).
- This has an indirect effect: if we 'say we earn more', we have to pay more **taxes**.

A summary of the above: the valuation of inventories influences the recognized profit and the value of said inventories; in the absence of taxes, the impact on cash flow would be nil, considering this effect, the higher the declared value, the higher the tax payable will be.

Just one last (but important) thought. The higher the declared value of the stock, the higher the profit recognized THIS YEAR. But that higher stated value will mean that the profit made when they are sold in the future will be lower. What does this mean? That the only **impact that valuation policies have is related to WHEN PROFITS ARE DECLARED**: in the long term, the sum of profits obtained depends on the comparison between selling and buying prices (objective data), valuation policies only have an impact at the moment when these profits 'emerge'.

In my humble opinion, it is time for you to take another break... I sincerely believe that you have earned it.

2.5. Companies that carry out transformation processes

We return to the same reflection: the **impact of valuation policies**, on this occasion, complicating things a little more, assuming that the company does not simply perform a distribution task, but that it carries out some transformation of the raw materials that at the end of the year become finished product (we will assume, for the purposes of greater simplicity, that at the end of the year there is no ‘work in progress’).

In this case, the reflection is similar to the one previously mentioned, but with some nuances. Once again, it is **a question of identifying the part of the costs recognized so far (year-end) in the P&L that are not really costs, but investment** (i.e. they are adding value to the closing stock, they will become cost when they are sold). The difference with respect to the company that only did distribution is given by two elements:

- Assuming that the value of the final finished product is higher than it was at the beginning of the year, the income that we will reflect in the ‘change in inventories’ account will not be intended to offset ‘only’ the part of the purchases that is not an expense for the year: in this case, there could be other cost items that are intended to be corrected (personnel, supplies, etc.).
- Closely related to the above, the degree of complexity is now significantly higher, insofar as it is necessary to determine ‘what part of the costs incurred give value to the final product’. This task does not fall within the scope of so-called ‘financial accounting’ (which is responsible for providing information to third parties) but within that of ‘cost accounting’, which is basically responsible for estimating ‘how much it costs to manufacture a given product’ (and, in general, for providing information for decision-making within the company itself). As may be suspected, in this field, subjectivity is even greater, since there is no single way of valuing the finished product.

Let us begin by recalling two fundamental elements (the first of which has been repeatedly pointed out). On the one hand, the **principle of prudence**, which prevents us from incorporating the expected profit into the final product (i.e. the final product must be valued at cost price); and on the other hand, the current Spanish General Accounting Plan defines **historical cost** as ‘**acquisition price**’ (applicable when we are talking about ‘merchandise’, which does not include a transformation process, but simply distribution) or ‘**production cost**’. In the latter case, it is also ‘clearly’ indicated how to proceed: cost of production must include the cost of supplies (i.e., the cost of raw materials and other consumables incorporated in the manufacturing process), direct costs (i.e., those that are clearly attributable to the units manufactured; examples would be the cost of energy used in the manufacturing process or that of direct labour) and the ‘reasonably chargeable’ part of the indirect costs (e.g., the part of the salary of the person who is doing the accounting); and it is in this last point that the element of subjectivity clearly appears.

As in previous occasions, note that the only thing that changes depending on the valuation criterion chosen is the time at which profits will emerge[2] . Let us reason first of all by reduction to absurdity: if at the end of the year there were never anything in stock, things would be clear: the profit would be given by the comparison between the sales revenue and all the costs appearing in the income statement; but if at the end of the year there is something in the inventories account, it becomes necessary to decide 'which part of the expenses incurred are not, since they are giving value to the finished product stock' -and which will become cost when they are sold-). Remember also that in order to try to avoid as much as possible the possibility of manipulation, the company must be 'consistent', and this is ensured by the **principle of consistency**, which requires the chosen valuation criterion to be maintained (both over time and 'transversally', i.e. applying the same logic to all 'similar' products).

Thus, in the corresponding department (analytical accounting) a study must be made to determine the **standard cost** of manufacturing each product: how much raw material it incorporates, how many hours of direct labour it requires, what part of the depreciation of the machinery corresponds 'in justice' to each unit manufactured... for which there is no single way of proceeding.

Let us consider a simple example. Suppose **it has been estimated** that to manufacture one unit of product it is necessary to incur the following costs:

- Raw material: 1,25 kilos of raw material X (of which only 80% is used, the rest is wastage that is lost in the process) whose price is 100 euros/kilo.
- 10 hours of direct labour, the cost of which has been estimated at 25 euros/hour.
- 3 euros cost of energy consumed in the manufacturing process.
- 3 euros is the depreciation cost that has been allocated considering the number of units that the machine is capable of processing over its useful life.
- 70 euros is the indirect cost charged to each product unit (which includes facility maintenance costs, insurance or the proportional part of other structural costs).

Therefore, based on the information presented, the standard unit cost has been estimated at:

Standard unit cost = 1,25 x 100 + 10 x 25 + 3 + 3 + 70 = **451**

Let us assume that the income statement presents, before adjusting for closing stock (and without considering taxes), the data shown in Figure 11. As can be seen, the company's profit depends, as always, on 'what we find in stock'.

Indeed, before 'going to the warehouse and making the physical inventory of finished product' (as you can see, the one for raw materials has already been made), we cannot say what part of the

[2] I am always applying, and in an extreme way, the 'all else being equal' clause. That is, we assume that everything else is constant (e.g., that the pricing policy is not set according to the valuation criterion used, but is given by the market).

cost of personnel (5.900.000), of the cost of supplies (3.000.000, the difference between purchases and the variation of raw material stocks) or of external services (300.000), among others, 'has been necessary to meet sales' (15.444.000) and what part 'has been invested in stock': at this point, the data presented correspond to the assumption that 'at the end of the year there is the same as there was at the beginning in the finished product stock' (and this may not be true).

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	0
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**4.566.000**

Figure 11

Let us consider the additional information presented in Figure 12, related to the evolution of stocks and the sales process.

Stock of Raw materials (RM)	**Quantity**	**Price**	**Amount**
Opening stock	1.500	100,00	150.000
Purchased	30.500	100,00	3.050.000
Processed	30.000	100,00	3.000.000
Closing stock	2.000	100,00	200.000
Change in inventories of RM	500	100,00	50.000

Finished product sales	**Quantity**	**Price**	**Amount**
No. units sold	24.000	643,50	15.444.000

Stock of Finished product (FP)	**Quantity**	**Standard cost**	**Amount**
Opening stock (FP)	1.000	451,00	451.000
Closing stock (FP)	3.000	451,00	1.353.000
Change in inventories of FP	**2.000**	**451,00**	**902.000**

Figure 12

With the data presented, the income statement would have to be redrawn and would now appear as shown in Figure 13.

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	902.000
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**5.468.000**

Figure 13

As can be seen, there is a significant difference between the two situations (Figures 11 and 13). Do a simple calculation: Figure 12 shows that the number of units sold in the year is 24.000. If the situation shown in Figure 11 were correct (zero change in finished product stocks, implying that the number of units 'manufactured' would have been 24.000), the actual unit cost would be the result of dividing all costs by that amount:

Actual unit cost = (3.050.000 - 50.000 + 5.900.000 + ... + 1.200.000) / 24.000 = **453,25**

Remember that the standard unit cost was 451,00 euros, which would indicate a worse performance than estimated *a priori*.

However, if we are in the situation shown in Figures 12 and 13 (stock has increased by 2.000 units), part of the costs incurred should not be charged to this fiscal year, but to the inventories account:

Actual unit cost = (3.050.000 - 50.000 + 5.900.000 + ... + 1.200.000) / 26.000 = **418,38**

which is below the standard cost (which means that 'things are being done better than expected'; logically, this would make it necessary to review the valuation of inventories, applying its true cost to the new stock in order to avoid advancing profits corresponding to unsold units, but we will not go into this, as it is beyond the objectives we are considering here).

In any case, the purpose of this section was not to go deeper into cost accounting (there are many debatable elements in the previous reflection), which is completely out of the proposed reasoning framework, but simply to recheck the consequences that valuation processes have in accounting. And more specifically, to understand the reason for the 'inventory adjustment entries' and the consequences of using one or the other valuation method: the purpose of these entries is to 'correct the part of the cost that is not an expense but an investment'; and if, all other things being equal, the valuation criterion used is 'generous' with the asset being valued, this means 'advancing profits' compared to using a criterion that is less so (generous).

2.6. Companies that devote resources to R&D activities

Let us now see what happens when a company devotes part of its resources to research. To do so, let us take as a reference the example given in the previous section. Let us assume that the starting situation is as shown in Figure 13, now extended to include the tax chapter (Figure 14).

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	902.000
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**5.468.000**
- Corporate tax	-1.367.000
NET PROFIT	**4.101.000**

Figure 14

Let us now consider that the company has devoted part of its resources to research on the improvement of a process that at the end of the year has not been completed, but which it is considered likely to eventually allow the registration of a patent with the knowledge gained. In addition, detailed and precise information is available on the part of the costs that have been devoted to this research, which is presented below (Figure 15).

Resources dedicated to research	% dedicated to the project	Amount
Personnel costs	2,20339%	130.000
External services	7%	21.000
Other operating costs	3%	12.000
Depreciation of fixed assets	1,02564%	800
Total related costs		**163.800**

Figure 15

Once again, we would find ourselves in a situation in which the ‘correlation of income and expenses’ is not being respected: the costs shown in Figure 14 are not ‘those necessary to obtain the income’, since part of them have been devoted to carrying out a task that ‘seems likely to come to fruition' and, therefore, to have a value for the company. It should be recalled that the principle of prudence prevents the valuation of the research project in progress at the price at which it can be estimated that the patent will be sold; but if two conditions are met, the company can proceed to make the corresponding '**capitalization of expenses'**. The two conditions required are as follows:

- That there are reasonable grounds to believe that the project will come to fruition.
- That accurate information is available regarding the resources dedicated to the project.

In our case, since both of the above conditions are met, the company must recognize a revenue in the income statement that allows it to record an intangible asset ('Research projects in progress') for the amount we have justified above. The income statement would be as shown in Figure 16.

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	902.000
+ Work performed for ongoing research projects	163.800
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**5.631.800**
- Corporate tax	-1.407.950
NET PROFIT	**4.223.850**

Figure 16

2.7. Accruals and deferrals

We are really close to finishing. We will try to be brief. Let us assume the Financial Statements presented in Figure 17 (some of the elements that appear have been studied and justified in previous sections).

Let us suppose that the Other Operating Costs include the insurance premium for a van owned by the company and for which 1.200 euros have been paid. As part of the closing operations, the date of the invoice is checked and it is found that it was received on July 1 of the accounting year, the coverage being extended until June 30 of the following year.

At this moment, the income statement is not adequately respecting the necessary 'correlation of income and expenses', since, of the total amount (1.200 euros), only half is this year's cost (the other half should appear as cost in the next year). How do we fix the situation? By proceeding in the same way as in previous cases: we must recognize a revenue (in this case we do so by reducing the corresponding expense, since the correction refers to a specific item that has an exaggerated balance -Other operating costs-), which, since it represents a '+' in the income statement, requires a '+' in an asset account. The account to which we carry the corresponding balance is called 'Prepaid expenses' and is an account that appears in current assets (you can see all of it in Figure 18). What it indicates is that 'at the end of the year, we have a right to use the van being covered from the risks by the insurance company without having to pay for it' (the payment was made six months ago). And the account will disappear (conceptually, we could say, 'will be depreciated'; although technically the word is reserved for the systematic deterioration suffered by fixed assets) during the first six months of next year, which are the ones who must bear the corresponding cost.

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	902.000
+ Work performed for ongoing research projects	163.800
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-400.000
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**5.631.800**
- Corporate tax	-1.407.950
NET PROFIT	**4.223.850**

ASSETS			**LIABILITIES**
Current assets	**5.858.500**	**Current liabilities**	**2.520.450**
Cash & equivalents	444.500	Suppliers (trade payables)	612.500
Customers (trade receivables)	3.861.000	Corporate tax payable	1.407.950
Finished product inventories	1.353.000	S/T Debt with financial institutions	500.000
Raw material inventories	200.000	**Non-current liabilities**	**6.000.000**
Non-current assets	**12.313.800**	L/T debt with financial institutions	6.000.000
Computer applications	100.000	**Net worth**	**9.651.850**
Ongoing research projects	163.800	Income for the year	4.223.850
Computer equipment	50.000	Retained earnings	1.378.000
Transport elements	120.000	Legal reserve	50.000
Machinery and facilities	1.000.000	Share Capital	4.000.000
Buildings and constructions	11.200.000		
- Depreciation of fixed assets	-320.000		
TOTAL ASSETS	**18.172.300**	**TOTAL LIABILITIES**	**18.172.300**

Figure 17

Profit and Loss Statement (P&L)	
+ Sales revenue	15.444.000
+ Variation in Finished Product stock	902.000
+ Work performed for ongoing research projects	163.800
- Purchases of raw materials	-3.050.000
+ Variation in raw material inventories	50.000
- Personnel costs	-5.900.000
- External services	-300.000
- Other operating costs	-399.400
- Depreciation of fixed assets	-78.000
- Financial expenses	-1.200.000
Profit before taxes	**5.632.400**
- Corporate tax	-1.408.100
NET PROFIT	**4.224.300**

ASSETS			LIABILITIES
Current assets	**5.859.100**	**Current liabilities**	**2.520.600**
Cash & equivalents	444.500	Suppliers (trade payables)	612.500
Customers (trade receivables)	3.861.000	Corporate tax payable	1.408.100
Prepaid expenses (insurance)	600	S/T Debt with financial institutions	500.000
Finished product inventories	1.353.000	**Non-current liabilities**	**6.000.000**
Raw material inventories	200.000	L/T debt with financial institutions	6.000.000
Non-current assets	**12.313.800**	**Net worth**	**9.652.300**
Computer applications	100.000	Income for the year	4.224.300
Ongoing research projects	163.800	Retained earnings	1.378.000
Computer equipment	50.000	Legal reserve	50.000
Transport elements	120.000	Share Capital	4.000.000
Machinery and facilities	1.000.000		
Buildings and constructions	11.200.000		
- Depreciation of fixed assets	-320.000		
TOTAL ASSETS	**18.172.900**	**TOTAL LIABILITIES**	**18.172.900**

Figure 18

It only remains for me to say goodbye (for the moment). I sincerely hope that the trip has been ‘reasonably pleasant’ ... I have certainly enjoyed preparing this text. Thank you very much for making the time spent meaningful!

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APPENDIX I

REVENUE RECOGNITION BY STAGE OF COMPLETION (IFRS 15)

INTRODUCTION

In recent times, and even more so after the entry into force in January 2021 of Royal Decree 1/2021, which introduced some changes to the 2007 Spanish General Accounting Plan, it has been frequent that, especially in In-Company courses, attendees demand some reference to the accounting of income by degree of progress, which shows clear differences with respect to the 'standard' logic presented in the main body of this reading. Given that, always in my view as a 'user' of accounting information for financial decision-making, the new standard does not represent a substantive or philosophical change with respect to what has been applied so far, but simply improves the previous system to achieve a 'better true and fair view' in certain circumstances (increasingly frequent, on the other hand), I have preferred to keep the general part of the reading and introduce the subject as a complementary reflection to all the above. In other words, I still think that the fundamental ideas that allow an in-depth understanding of accounting logic remain those presented so far, which may put my dear reader in a position to understand without any problem what comes next.

In a caricatured summary of the subject in question, the application of the new logic inspired by IFRS 15 implies a reflection on the conditions that must be met for something to appear in the company's assets. The entry into force of the standard does not change the concept of asset: it was and remains an asset item controlled by the company and from which future economic benefits are expected. The crux of the matter is the concept of 'transfer of control' of the risks associated with the item under consideration.

In principle (and with important nuances, such as those related, for example, to financial leasing operations, which we will dispense with in this reflection), we could say in a simplified manner that things appear in assets 'when they are ours'; and, in principle, we identify that something is ours when we have ownership (which, in turn, we normally associate with possession) of the thing. This is why when a company manufactures a standardized good, if at the end of the accounting year it has not had time to complete the process, what we do is 'capitalize' the expenses associated with its manufacture in the 'work in progress' account; is to say, the limit of income that we can recognize, in application of the principle of prudence, is given by the costs incurred, regardless of the conviction that we may have that we will sell at a profit (which will be recognized at the moment of closing the operation; in which it is assumed that 'we transfer the control of the thing to its buyer'). In the remainder of this paper, I will use the term 'standard method' to identify this way of proceeding.

But there are occasions when, regardless of whether or not the good 'is in my possession', rights and obligations have arisen for both parties (buyer and seller) that suggest that, in reality, the risks associated with the good are being transferred from the seller to the buyer 'over time' (as a series of clearly identifiable milestones are met). In these situations, the method of accounting changes, shifting the asset account on which the revenue to be recognized pivots from 'work in progress' to the 'customer' account; this removes the revenue recognition ceiling on costs incurred, allowing revenue to be recognized as the seller's obligations are fulfiled. Let us slow down, as usual, and allow me to offer a more general reflection that connects what we have seen so far in the main body of the reading with the new regulations introduced in the BOE[3].

As is well known, the ultimate intention of the accounting regulations in force is that the Financial Statements prepared on the basis thereof should reflect a true and fair view of the company's assets, financial position, and results. And as you may also recall, it is impossible to understand what the term "true and fair view" means without referring to the accounting principles that lead to it.

In a simplified way, and always in my capacity as a 'user' and not as a 'maker' of accounting regulations, I believe that the ultimate intention behind the application of accounting principles can be summarized in three elements: to achieve maximum 'fairness' in the temporal imputation of profits, to ensure the greatest possible objectivity and to try to ensure that the information is of the highest quality, that it is sufficiently complete; all this with the (recognized) objective that the information generated is 'relevant and reliable', that it is useful for decision making in relation to the company in question.

From this point of view, the ***accrual*** and ***going concern*** principles would be fundamentally related to the aforementioned fairness: thus, the *accrual principle* implies that revenues and expenses should be recognized when the corresponding obligations arise (i.e., based on the actual flow of goods and services; irrespective of when the monetary consideration occurs); and the *going concern principle* requires, inter alia, that no impairment of assets should be recognized even when their realizable value is less than their carrying amount, provided that their value in use (i.e., that which the asset has for the particular enterprise in question in the course of its business) is not less than their carrying amount.

Continuing with the proposed approach, the principle of ***Prudence***, which requires waiting for beneficial events to occur before recognizing income in accounting, or the principle of ***Consistency***, which requires coherence in applying criteria in the valuation of assets and liabilities, would seek the greatest possible objectivity in terms of the information provided by accounting (insofar as assets would generally be valued at their historical cost, provided that this is not lower than their realizable value or, where appropriate, value in use); this relates to the time at which the benefits of good management will emerge in the accounts).

[3] A summary can be found in Appendix II of this document.

Finally, and in line with the above, the principle of ***no netting*** would seek the greatest possible detail, so that the user of the accounting information can get an idea as close as possible to the reality of the situation in which the company finds itself.

To the above must be added a final principle, that of ***materiality***, which seeks to bring sanity and common sense to all the above: the accountant must always bear in mind what the final objective of the preparation of the financial statements is, applying concepts such as materiality ('the best is the enemy of the good', as the popular saying goes), and use common sense, which dictates that what is important is not respect for accounting principles, but for the objective they pursue (which will automatically lead to sacrificing, when necessary, the application of any principle, when this leads to a better '***true and fair view of the company's assets, financial position, and results***'); all of which is reminiscent -a little- of Machiavelli and his 'Prince', it is simply enough to replace the original concept of 'virtue' with the more accounting-oriented concept of 'true and fair view', for the achievement of which we are willing to do -almost- anything).☺

Closely related to this way of looking at accounting regulations, the ***criteria for recognition*** of the items appearing in the financial statements can be seen in a manner consistent with the above: thus, the difference between expenditure and investment is related to the necessary correlation between income and expenditure (to determine the profit, income must be compared with the expenditure 'necessary' to obtain that income), which ensures that profits appear at the time it is reasonable for them to do so.

The valuation criteria presented in the Conceptual Framework of the Spanish General Accounting Plan can also be approached from the proposed perspective: the historical cost criterion (acquisition price or production cost, as appropriate), applicable to the vast majority of assets in any company, leads, together with the principle of prudence, to profits appearing when it is most reasonable for them to do so and closes the door to subjectivity; and the recognition of impairment (which requires comparing book value with realizable value for current assets; or the aforementioned book value with value in use for most fixed assets) acts along the same line of reasoning.

From this perspective we can look at a good part of the entries to be made in the exercise of the activity of any company, classifying them in one of two large groups of entries:

- Entries that reflect the fact that something that was previously recognized as an investment has become an expense. This group includes the depreciation of fixed assets (accounting recognition of the systematic impairment that occurs in this type of asset as a result of use, the passage of time or obsolescence) and any other impairment (both of fixed assets and current assets, such as inventories of any kind or trade receivables); there are also the inventory adjustment entries, provided that the value of the closing stock is lower than the opening one; or the accrual entries, when payments made in advance in previous years are converted into an expense.
- Entries in which we recognize that something that was previously recorded as an expense is, in reality, an investment, which requires the corresponding entry to correct the 'error'. Here we would find ourselves with the inventory adjustment entries in the event that the value of the closing stock exceeds that of the opening stock (which involves capitalizing

> the manufacturing expenses which in the year are not such expenses, but which give value to the inventories account, by applying the 'cost of production' valuation criterion); and the capitalization of expenses corresponding to the manufacture of fixed assets (tangible; or intangible assets, such as those corresponding to R&D activities which are clearly identifiable and which suggest that the process will be successful; all this, again, by applying the 'cost of production' criterion); and the necessary accrual adjustments in the event that expenses have been recognized during the year which in reality correspond to the activity of subsequent years.

This is the general context in which we found ourselves prior to the consideration of FRS 15, relating to revenue recognition through the application of the percentage-of-completion system, in our Spanish General Accounting Plan. In reality, and as stated in the explanatory memorandum of the law, its implementation does not imply a change in criteria with respect to the previous logic, but simply the introduction into the current regulations of a series of clarifications of the standard that the ICAC had been making over time. The logic of the rule is overwhelming, and allows a more reasonable distribution of income over the life of the company, particularly for those companies that work against orders or provide services on a continuous basis over time; and, in general, in all those companies in which the activity necessary for the fulfilment of the obligations entered into by contract extends beyond the duration of the accounting period.

Indeed, the 'operating cycle' had until now had a fundamental impact on the definition of the short and long term, and therefore on what should be considered as current or non-current assets. But it meant giving a fundamental role to the 'work in progress' account (in any of its forms), in which the corresponding expenses could be capitalized, but never the profits of the operations until they had been completed, thus allowing the transfer of the risks and expected benefits of the asset to its final recipient (principle of prudence). The current standard makes it possible to reflect on the different stages of the contract, so that the profits can be recognized at the same pace as the milestones that generate obligations for the counterparty are met, without having to wait for the final delivery of the asset; which obviously contributes to a better true and fair view, by allowing the profits to appear at a more reasonable pace than under the standard system.

In a way, the rule means transferring the prominence of the item 'work in progress' to another asset account, 'customers', which implies that revenues are recognized at the rate at which the milestones are met; and the difficulty of valuation is transferred from 'the detection of the costs that give value to the work in progress' to 'the reflection relating to the percentage that the various milestones met represent of the total amount agreed with the customer'. In other words, the standard is concerned with 'where the work in progress will appear': in the standard system, the aforementioned work in progress is shown in the assets of the supplier company (which means that the limit on the recognized value has to do with the expenses incurred to date and that the profit cannot appear until the transfer of risks related to the asset -although the loss could and should appear in application of the principle of prudence when the costs exceed the expected value of the same-); under the new standard, work in progress will appear in the client company's assets, at least as soon as the first milestone has been passed, which means that at least part of the contract has been fulfiled and the corresponding obligations have been accrued.

When is the standard applicable? Although there are many nuances that we will see throughout the presentation, we could say in general that revenue recognition by stage of completion is the method applicable to companies that work against orders (i.e. those in which there is a contract for the supply of a good that is not totally standardized and which requires compliance with a series of clearly identifiable concrete specifications; the milestones that define the accrual of obligations for the counterparty can also be made explicit); and in service companies, whose results are produced not so much 'at a moment in time' but 'over time'. All this is done in accordance with the accrual principle, i.e. irrespective of the partial payments agreed between supplier and customer in advance or deferred. In our presentation, we will also disregard any possible specific financial effects related to the above (which makes even more sense in a context of near-zero interest rates).

Before studying a complete case, let us consider a simple caricatured example: the manufacture of a ship. Let us suppose a company with a corporate purpose indefinite in time that consists of carrying out a double activity: on the one hand, it is dedicated to the transport of goods using its own fleet of ships; and on the other hand, it is also dedicated to the manufacture and sale of ships for other companies (which logically do not constitute a direct competition for its first activity). Let us suppose in this small business cartoon that the company takes four years to manufacture a ship and let us think about the way in which the different operations would be accounted for in the two cases: that the ship is built for the company itself; or that it corresponds to a customer's order.

In the first case, the vessel to be manufactured is intended to form part of the company's fixed assets; in the second case, the objective is to manufacture a vessel that will become a fixed asset for the client company, so that in principle it would form part of the inventories of the manufacturing company, if we apply the standard method of accounting. It is in this second case that the new standard would be applicable, given that, as certain milestones are met, we can understand that the risks associated with the asset are transferred to the customer company ('over time', prior to its final delivery).

But let's see everything in detail in a real example of implementation of a software project. I thank Marta Egusquiza for her help in defining the case, the merit is entirely hers, the possible errors, naturally, of the speaker.

Example: Software implementation project

There are currently two main ways of acquiring software: ***On premise*** (on the company's premises) or ***Cloud*** (in the cloud). Normally, in *on-premise* models, the company buys the servers and software licenses. It is responsible for the administration of the servers and the software itself and, in exchange for maintenance, will receive updates to the software, which it will be responsible for implementing. Maintenance fees are usually around 22-25% of the value of the licenses purchased.

Cloud models work with the '***Software as a Service***' (SaaS) concept. In other words, the company enters into a contract with the software company and pays for access to the software. The provider company is responsible for making the software available to the client company, as well as maintaining, managing and updating it. Typically, these are per-user contracts, which have some flexibility to reduce or increase fees according to the company's needs. In this type of contract, if it is an important software, such as a company management system (ERP), long-term contracts are usually closed with a scaling of payments depending on the use that the company is giving to it until its correct implementation.

A software implementation project typically has the following stages.

1. Inception. In this phase we go deeper into the requirements that must be met for a successful implementation. It is materialized in a collection of *Workshops* with the different functions of the company, in which we seek to understand the most important business needs from the point of view of each of these functions. It is also in this phase where the software is installed or provisioned (depending on whether it is *On premise* or *Cloud*). The 'Project Management Plan' and integration strategies are also developed (in case it is necessary to connect the new software with other existing ones).

The main deliverables of this stage are:

1. Infrastructure available.
2. Project management plan and schedule.
3. Future business processes at a high level.
4. Project integration and governance strategy.

2. Elaboration. This is the Design phase. It consists of setting up prototypes for each of the processes. For this, the project team is trained and it is designed how each process is going to work. If there are Gaps (i.e., if the original software needs to be modified to adapt it to the business needs), they are analysed and documented. The main deliverables of this stage are:

1. The *Blueprint* document, in which all the processes are documented, including the analysis of the *Gaps* detected.
2. Identified business data (data to be migrated to the new software).

3. Construction. In this stage the solution is built. The system is parameterized and the *Gaps* are developed and tested. Integrations are built. Data migrations are prepared and tested. The complete system is tested, and test plans are prepared for approval by key users. The main deliverables of this phase are:

1. The configured system.
2. The results of the data migration tests.
3. The results of the process tests.
4. User approval tests prepared.

4. Transition. In this phase is when the start-up is prepared. End users are trained and user acceptance tests are completed. Final migration and integration tests are performed. Finally, the system is put into production. The main deliverables of this stage are:

1. User training completed.

2. User acceptance test completed.
3. *Go Live*.

5. Optimize. In this stage we try to solve the problems that arise after the release to production, we make an exercise of lessons learned and the maintenance is delivered to support. In other words, the project is finalized and goes into operational mode. The main deliverables of this phase are:

1. Post *Go live* problems solved.
2. Lessons learned captured.
3. Delivery to support carried out.

Amounts to be invoiced by the supplier (cost to the client company):

Project management: 332.000 (to be spread over the life of the project)

Phase 1 - *Inception*: 50.000 (1 month)

Phase 2 - *Elaboration*: 389.000 (3 months)

Phase 3 - *Construction*: 760.000 (7 months)

Phase 4 - *Transition*: 100.000 (2 months)

Phase 5 - *Optimize*: 50.000 (1 month)

Cost estimation at the supplier company:

Project management: 150.000 (to be spread over the duration of the project)

Phase 1 - *Inception*: 40.000 (1 month)

Phase 2 - *Elaboration*: 250.000 (3 months)

Phase 3 - *Construction*: 400.000 (7 months)

Phase 4 - *Transition*: 50.000 (2 months)

Phase 5 - *Optimize*: 30.000 (1 month)

Both revenues and costs for 'Project Management' will be spread evenly over all months of the project's life.

Below, you can see a series of figures that summarize the starting information, as well as the accounting of revenues and expenses associated with the project, assuming two different accounting assumptions: what we have called the 'standard method', which would correspond to the way of accounting for transactions in the event that the company does not have the ability to discern when the various project milestones are being met; and the 'percentage of completion' method of revenue recognition, which would be the correct way to do it, given the defined deliverables, which can act as evidence of the 'transfer of control' from the supplier to the customer over time.

Figure A-I.1 shows a brief description of the different stages of the project, their duration and the evidence provided to detect the 'degree of progress' of the project.

Stage	Duration (months)	Period (months)	Brief description	Main deliverables
Inception	1	1 a 1	• Workshops: detecting the needs of each function • Software provisioning or installation • Project management plan • Integration strategies	• Infrastructure available • Project management plan and schedule • Future business processes at a high level • Project integration and governance strategy
Elaboration	3	2 a 4	Design stage: • Prototype design of all processes • Team formation and design of how each process will be worked on • Analysis and documentation of possible gaps	• Blueprint document (all processes documentation, including the analysis of Gaps detected) • Identified business data (data to be migrated to the new software)
Construction	7	5 a 11	Solution construction: • System parameterization and Gap development and testing • Building the integrations • Preparing and testing data migrations • Complete system testing and test preparation for key user approval	• Configured system • Results of the data migration tests • Results of the process tests • User approval tests prepared
Transition	2	12 a 13	Startup preparation: • End-user training • Completion of user acceptance tests • Final migration and integration tests • Putting the system into production	• User training completed • User acceptance test completed • Go live
Optimize	1	14 a 14	Project completion and transition to operational mode: • Analysis and solution of problems after production release • Lessons learned exercise • Maintenance delivered to support	• Post Go live problems solved • Lessons learned captured • Delivery to support carried out
Total duration (months)	14			

Figure A-I.1

Figure A-I.2 shows the total revenues and costs associated with the project (naturally, for the supplier company), as well as their allocation to the different phases that make up the project. As you can see, these are the calculations resulting from having identified the different phases as part of a single contract, having also identified the different 'performance obligations' associated with them, and having distributed the total amount among these stages (in the case of the Project Management cost, allocated among the different phases according to the number of months), as established in the standard.

Figures A-I.3 and A-I.4 show the results of accounting for income from the two paths described above.

As you can see, if it were not possible for the company to ascertain the degree of compliance with the obligations entered into by contract, it would have to wait until the contract was completed to understand that the 'transfer of control' had taken place, so that the full profit would appear at the time of delivery (until then, the company would simply capitalize the corresponding expenses in a 'work in progress' account (Figure A-I.3); whereas under the system proposed in IFRS 15, the ‘work in progress’ account disappears from the supplier’s accounts, which recognizes revenue (using the ‘Trade receivables’ account as a balancing entry) as the various milestones are reached, thus providing a better true and fair view than the system we have identified as the ‘standard method’.

Total sales price (includes project management, to be distributed evenly)	1.681.000
Project management (to be distributed evenly)	332.000
Total estimated cost (includes project management, to be distributed evenly)	920.000
Estimated cost of project management (to be distributed evenly)	150.000

Stage	Duration (months)	Period (months)	Price allocation	Project Management Imputation	Total price charged to each stage	Estimated cost in each stage	Project Management Imputation	Total estimated cost in each stage
			Total 1.349.000	Total 332.000	Total 1.681.000	Total 770.000	Total 150.000	Total 920.000
Inception	1	1 a 1	50.000	23.714	73.714	40.000	10.714	50.714
Elaboration	3	2 a 4	389.000	71.143	460.143	250.000	32.143	282.143
Construction	7	5 a 11	760.000	166.000	926.000	400.000	75.000	475.000
Transition	2	12 a 13	100.000	47.429	147.429	50.000	21.429	71.429
Optimize	1	14 a 14	50.000	23.714	73.714	30.000	10.714	40.714
Total duration (months)	14							

Figure A-I.2

"STANDARD" METHOD
(Transfer of control at a specific time -delivery of the asset-)

Stage	Duration (months)	Period (months)	Recognized income (Var. Work in progress)	Work in progress value	Recognized revenue (Sales)	Customer account value (accumul.)	Accumulated profit recognized
			Total 0		Total 1.681.000		Total 761.000
Inception	1	1 a 1	50.714	50.714	0	0	0
Elaboration	3	2 a 4	282.143	332.857	0	0	0
Construction	7	5 a 11	475.000	807.857	0	0	0
Transition	2	12 a 13	71.429	879.286	0	0	0
Optimize	1	14 a 14	-879.286	0	1.681.000	1.681.000	761.000
Total duration (months)	14						

Figure A-I.3

IFRS 15: ACCOUNTING BY STAGE OF COMPLETION
(Transfer of control over time)

			Total 0		Total 1.681.000		Total 761.000
Stage	Duration (months)	Period (months)	Recognized income (Var. Work in progress)	Work in progress value	Recognized revenue (Sales)	Customer account value (accumul.)	Accumulated profit recognized
Inception	1	1 a 1	0	0	73.714	73.714	23.000
Elaboration	3	2 a 4	0	0	460.143	533.857	201.000
Construction	7	5 a 11	0	0	926.000	1.459.857	652.000
Transition	2	12 a 13	0	0	147.429	1.607.286	728.000
Optimize	1	14 a 14	0	0	73.714	1.681.000	761.000
Total duration (months)	14						

Figure A-I.4

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APPENDIX II

Summary of Rule 14 'Income from sales and services rendered'

(*Royal Decree 1/2021, of January 12, amending the General Accounting Plan approved by Royal Decree 1514/2007, of November 16; the General Accounting Plan for Small and Medium-Sized Companies approved by Royal Decree 1515/2007, of November 16; the Rules for the Preparation of Consolidated Financial Statements approved by Royal Decree 1159/2010, of September 17; and the rules for the adaptation of the General Accounting Plan to non-profit entities approved by Royal Decree 1491/2011, of October 24*).

1. Common aspects

- A company ***recognizes revenue in*** the ordinary course of business when ***control*** of the goods or services promised to customers ***is transferred***.
- In order to apply this fundamental criterion for revenue accounting, the company will follow a complete process consisting of the following ***successive stages:***
  a) ***Identify the contract*** (or contracts) with the customer, understood as an agreement between two or more parties that creates enforceable rights and obligations for them.
  b) ***Identify the obligation or obligations*** to be fulfiled in the contract.
  c) ***Determine the transaction price*** or consideration for the contract.
  d) ***Allocate the price*** of the transaction ***to the obligations*** to be fulfiled.
  e) ***Recognize*** revenue from ordinary activities when (as) the company ***fulfils a committed obligation*** through the transfer of a good or the rendering of a service; fulfilment that occurs when the customer obtains ***control*** of that good or service.

2. Recognition

- The Company recognizes revenue under a contract ***when (or as) control*** over the committed goods or services (i.e., the obligation(s) to be performed) ***is transferred to the customer***.
- Control of a good or service (an asset) refers to the ability to decide fully on the use of that item of property, plant and equipment and to obtain substantially all of its remaining benefits. Control includes the ability to prevent other entities from deciding on the use of the asset and obtaining its benefits.
  - ✓ Revenue from commitments (generally for services rendered) that are fulfiled over time will be recognized ***based on the degree of progress towards the complete fulfilment of the contractual obligations*** provided that the Company has reliable information to measure the degree of progress.

When, at a given date, the Company is not able to reasonably measure the degree of fulfilment of the obligation (for example, in the early stages of a contract), although it expects to recover the costs incurred to satisfy that commitment, revenue and the related consideration will only be recognized in an amount equal to the costs incurred up to that date.

- ✓ In the case of contractual obligations that are fulfiled at a certain point in time, the revenues derived from their execution will be recognized at that date. Until this circumstance occurs, the costs incurred in the production or manufacture of the product (goods or services) will be recorded as inventories.

2.1. Performance of the obligation over time

It is understood that the company transfers control of an asset (generally a service) over time ***when one*** of the following criteria ***is met:***

a) The customer simultaneously receives and consumes the benefits provided by the company's activity (generally the provision of a service) as the entity develops it, as is the case with some recurring services (security or cleaning).

b) The company produces or improves an asset (tangible or intangible) that the customer controls as the activity is carried out (for example, a construction service performed on the customer's land).

c) The company produces a specific asset for the customer (generally a complex technical facility or service or a particular good with unique specifications) without an alternative use and the company has an enforceable right to payment for the activity completed to date (e.g., consulting services resulting in a professional opinion for the customer).

If the transfer of control over the asset does not occur over time, the company will recognize revenue following the criteria established for obligations that are fulfiled at a given time.

2.2. Indicators of compliance with the obligation at a given point in time

To identify the specific moment at which the customer obtains control of the asset, the company will consider, among others, the following ***indicators***:

a) The customer assumes the significant risks and rewards of ownership of the asset.
b) The company has transferred physical possession of the asset.
c) The customer has received (accepted) the asset in accordance with the contractual specifications.
d) The company has a collection right for transferring the asset.
e) The customer has ownership of the asset.

3. Valuation

- Revenue from the sale of goods and the rendering of services is measured at the monetary amount or, if applicable, at the fair value of the consideration received or expected to be received, which, unless there is evidence to the contrary, is the price agreed for the assets to be transferred to the customer, less: the amount of any discounts, price rebates or other similar items that the Company may grant, as well as interest included in the face value of the receivables.
- Taxes levied on transactions (e.g. VAT) will not be part of the income.
- The Company shall consider in the measurement of revenue the best estimate of the variable consideration if it is highly probable that there will not be a significant reversal of the amount of revenue recognized when the uncertainty associated with the consideration is subsequently resolved.

A (GENTLE) INTRODUCTION TO CORPORATE FINANCE

Javier Santibáñez Grúber *

INTRODUCTION

The document presented here is intended to be a simple introduction to modern finance, although it should be noted that the financial paradigm has remained fundamentally the same for more than forty years. It is true that the world is changing, that awareness of the importance of everything related to sustainability has grown over the years and that companies are increasingly aware of their social responsibility; but concern for stakeholders other than shareholders is nothing new (I remember that in my undergraduate studies in the mid-1980s we were already talking about the need for companies to make their contribution to society as a whole explicit through the preparation of balance sheets and social profit and loss accounts). Nor can we ignore the fact that scientific advances, particularly those related to Artificial Intelligence, are changing our lives (and at a dizzying pace). But, fundamentally, the concerns of Finance remain the same: to provide adequate tools for decision making, a process in which it is important to reflect beforehand on the concept of 'value' with which we will evaluate these decisions.

What follows can be seen as an **extraordinarily summarized and simplified version** of a book, in my opinion excellent, by my teacher Dr. Fernando Gómez-Bezares, from whom I have learned almost everything I can tell today in this field: I am referring to ***Elementos de Finanzas Corporativas***, published in 2012 by Desclée de Brouwer. The feature that seems to me the most remarkable of that work is the coherence with which the different topics are treated, which I hope I have been able to maintain in the present writing, in which I will avoid bibliographical references and in which I will not be able to logically go too deeply into many of the topics covered; nevertheless, the general approach, most of the nomenclature and many specific elements respond to and respect the logic of the cited work.

I have conceived this reading as a sufficient summary of the fundamental elements of modern Corporate Finance for decision making, **aimed at people who do not have a broad formal background in this field and have limited time available** (i.e., as a very short version of a 'Finance Course for Non-Finance Professionals'). In the event that you do not have a background in accounting, I recommend that you read beforehand another short document I have prepared on the subject ('*A (gentle) Introduction to Accounting*'); although I have tried not to make it 'essential' reading, I believe that you will get a very different degree of benefit from this document if you do so.

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* Professor of the Department of Finance and Accounting at Deusto Business School.

At the end of this reading you will find a very brief selection of works in which you can delve into some of the topics that appear here and that may have 'tasted a little'. I hope you enjoy it all.

FINANCE, WHAT FOR? A REFLECTION ON THE CONCEPT OF VALUE

This may seem obvious: Finance is for making decisions, and **deciding always involves evaluating** the options at stake.

The problem that immediately arises is that **there is no single concept of value** from which we can start. Accounting allows us to calculate at any time 'how much a company is worth': if we take away from what it has (assets) what it owes (liabilities), the difference (the net worth) is the value, the wealth deposited in it by its owners (the shareholders). But it is not difficult to understand that they will rarely be willing to sell their property for the value indicated by the accounting (for its 'book value'). And the main reason lies in the fact that **accounting 'looks' mainly at the past**, while to value any asset people focus on the future (think of your next personal decisions that have a financial component: the destination for your vacation, the possible purchase of a car, a house, a book...; past experiences with similar decisions can help to better imagine what is to come, but no one pays for what happened, but for the 'expected' experiences in the future).

If the above is true, what is the purpose of accounting information? what is the reason why Accountings decides to look mainly at the past? does it not realize that what is important to value is the future? does it do things wrong? does it misvalue accounting?

To answer these questions, we must think of a fundamental characteristic required of any information to be used in the decision-making process: it must be as objective as possible. In this sense, the subjectivity associated with the future is much greater than that related to the past: it is true that historians do not agree one hundred percent in their account of the events that have occurred; but imagine the differences of opinion that will be evident when it comes to their predictions of the future.

In order to achieve **maximum objectivity** (an objective that is impossible to achieve 100%), **accounting takes precautions** and requires the application of concepts such as the '**principle of prudence**' or the valuation criterion known as '**historical cost**'. Thus, the accountant cannot reflect in the accounts the consequences of favourable events that have not yet occurred (profits can only arise when the events that justify them have taken place), while unfavourable events must be reflected when they are known (when they are 'reasonably foreseeable'); and the assets and liabilities that appear in the accounting records must do so mainly at cost price (what it cost to buy or manufacture them; corrected for any impairments they may have suffered up to the present time) and not at what I believe I could obtain for them if they were to be sold; all of which is related to the aforementioned and logical claim to objectivity.

Thus, accounting seeks to provide information that is as objective as possible and relevant (useful) in the decision-making process, and to this end it must be complete and reliable (free of relevant biases or omissions). Thus, and in connection with the previous reflection, accounting information must give us an adequate idea of the situation in which the company finds itself (it must provide a true and fair view of the company's assets, financial position and results) and help us to imagine what its future will be like.

Let's assume that I have some useful information to imagine that future; for example, let's assume that I have concluded that the company I am trying to value will be able to earn its owners an annual amount of 10 euros for each of the next three years. How much would I be willing to pay to 'buy' that stream of cash flows? How much is a company worth today that will earn 10 euros a year for the next three years? To answer this question, Finance offers us the 'discounted cash flow technique' (DCF). Let's slow down a bit at this point.

A fundamental element to consider in the economic-financial decision-making process is the '**opportunity cost**'. This concept assumes that, in order to make decisions, I must always consider the context, I must know 'the best lost alternative'. The scarcity of resources implies that whenever I opt for something I always give up something else, which leads to a totally intuitive reasoning: if I offer you today to invest for one year in a business in which you can get a 1% return you are likely to answer me that 'no way', that right now you can get a higher return by investing in Treasury Bills that give you 3,5% (so putting your money in my business would make you lose 2,5 percentage points when compared to your best lost alternative; not to mention the different risk it would force you to incur).

This connects directly with the fundamental reason that justifies the existence of Finance: there is always an opportunity cost in any financial decision, it is what we know as '**time value of money**', it is not the same to collect today than in one year or to pay today or in one year; therefore, cash flows located at different moments in time cannot be added up without further ado, but must be previously 'homogenized'. For this purpose, discounting and capitalization techniques are used.

We call capitalizing (or calculating the final value) the operation we perform to answer the question: how much money will I have in two years (C_2) if I invest today a capital of 100 (C_0) assuming an annual interest rate (k) of 10%?

Let's answer the above question in two steps, let's first calculate the money you would be entitled to withdraw after one year:

$$C_1 = C_0 + C_0 \text{ x } k = 100 + 100 \text{ x } 0{,}1 = 100\ (1 + 0{,}1) = 110$$

As you can see, 100 today becomes 110 after one year by applying the 'capitalization factor' (1+k) to the initial capital:

$$C_1 = C_0 \text{ x } (1+k)$$

But at time 1, if we assume that nothing is withdrawn (this is the so-called 'compound interest' hypothesis), the capital that will generate a return during the second year is not the initial 100, but 110 (C_1), so that the capitalization factor will act in the second year on the aforementioned 110:

$$C_2 = C_1 + C_1 \text{ x } k = 110 + 110 \text{ x } 0{,}1 = 110 \text{ x } (1 + 0{,}1) = 121$$

In view of the above, it is easy to deduce that, under the conditions described, the **final value** associated with the initial investment is obtained by applying to the invested capital the capitalization factor (1+k) 'as many times as years elapse between the two positions studied':

$$C_2 = C_1 \text{ x } (1+k) = C_0 \text{ x } (1+k) \text{ x } (1+k) = C_0 \text{ x } (1+k)^2$$

And generalizing:

$$C_n = C_0 \text{ x } (1+k)^n \qquad (1)$$

Suppose now that the question I am trying to answer is another one: how much money do I have to invest today if I want to have 121 in two years' time, assuming an annual interest rate of 10%? To answer this question, it is enough to clear in the above formula, i.e., I have to calculate the amount that, invested for two years at an annual cumulative rate of 10%, becomes 121:

$$C_0 = C_n / (1+k)^n \qquad (2)$$

$$C_0 = 121 / (1+0{,}1)^2 = 100$$

In Finance we say that, if the annual interest rate is 10%, a cash flow of 100 today 'is equivalent' to having another of 110 one year from now; and that a cash flow of 121 two years from now is equivalent to another of 100 today (or 110 one year from now).

Let us now go back to the company we wanted to value and from which was expected an annual cash flow of 10 euros over the next three years in a context where the annual interest rate (yield of the best market alternative) is 10%. To do this, we have to apply the **discounting technique** to each of the three cash flows, which are located at different points in time, and add up the results obtained:

Present value of cash flow 1: $10 / 1{,}1 = 9{,}09$

Present value of cash flow 2: $10 /1{,}1^2 = 8{,}26$

Present value of cash flow 3: $10 / 1{,}1^3 = 7{,}51$

A possible interpretation of the above is the following: 9,09 is the value that we must invest today in the market to have 10 in one year (assuming an annual interest rate of 10%); in other words, 'to buy a cash flow of 10 at the end of the first year would cost 9,09 today'. This reasoning also applies to the two remaining cash flows located at points in time 2 and 3:

$$\text{Present value} = 10 / 1{,}1 + 10 / 1{,}1^2 + 10 / 1{,}1^3 = 9{,}09 + 8{,}26 + 7{,}51 = 24{,}86$$

Reasoning in the key proposed above, 'the asset is worth 24,86 because that is the price we should pay today to buy the cash flow stream it offers (10 euros per year for three years) in a market where the annual interest rate is 10%'.

If we generalize the above we arrive at the **discounted cash flow valuation formula**. Calling EV_0 the present value of the asset, Q_i the cash flow offered by said asset in year 'i' and k the annual interest rate (profitability of the best lost alternative), we arrive at the formula (3):

$$EV_0 = Q_1 / (1+k) + Q_2 / (1+k)^2 + Q_3 / (1+k)^3 + \ldots \tag{3}$$

If you think about it a bit, it is difficult to come up with a better (more logical, more reasonable) formula for calculating the value of any asset. Although this does not mean that the process is easy, as it requires estimating what it will give in the future (in terms of cash) and calculating the expected return for alternative investments, all of which is certainly complicated.

FINANCIAL GOAL OF THE FIRM

More than two hundred years ago, **Adam Smith**, who is considered one of the fathers of economic liberalism, spoke of the **benefits** (and also some limitations) associated with the **pursuit of profit** in a market economy.

The author coined an interesting term, '**the invisible hand**', a mechanism that acts automatically when economic agents try to achieve a selfish goal, their own profit, helping to solve an important problem of Economics: the **correct allocation of scarce resources**. The argument is simple: in a competitive market, price acts as an indicator of abundance or scarcity: scarce resources are expensive and abundant resources are cheap; and when an agent tries to make a profit, he/she 'avoids' (as far as possible) the use of expensive (scarce) resources, which will only be used when 'there is no other choice'. At the same time, the market provides an incentive to reduce scarcity, since the search for profit will attract agents who produce the expensive (scarce) resource.

But Smith was also concerned about the ethical aspects related to economic activity. And he already pointed out a series of functions that the State should perform in order to face problems that the market does not solve (what we could call 'market failures'); it also seems reasonable to be concerned about the distribution of income, both the initial income and the income generated in the allocation process referred to above.

We thus have a social justification of the search for profit (which theoretically leads to a correct allocation of scarce resources), but with the **intervention of the State** to perform some **functions that cannot be left to the market:**

- Provision of goods and services that are not profitable but of interest to the group (infrastructure works, administration of justice, protection of individuals from violence, etc.).

- Income redistribution tasks, through the application of fiscal and social policies.

- Prevention and avoidance of situations of abuse in the market (appearance of monopolies, oligopolies, etc.) through proposals aimed at promoting healthy competition that will allow the above-mentioned allocation mechanism to operate.

The tasks described above are carried out mainly through the laws passed by Parliament, which all agents and companies must respect. In a democratic country, **the legislation in force will incorporate the priorities of the group at each specific time and place**.

The problem is that **profit is a poor measure of performance from a financial point of view for** three fundamental reasons:

- It is subjective: it depends on how the valuation policies are applied (for fixed assets, through depreciation; for inventories, through the use of criteria such as FIFO or WAP; etc.).

- It does not take into account the timing of cash impacts: the application of accounting principles such as accrual accounting, which requires a comparison of revenues and expenses to determine it (and not receipts and payments), distances the aforementioned profit from the cash generated.

- It does not report the risk that had to be taken to obtain it; and it seems reasonable to think that individuals do not like risk (variability), we will only take risks if we expect to be rewarded for doing so.

The above reasons lead us to **reformulate the financial objective** in terms of something related to profit, but which overcomes the above-mentioned problems: thus, we say that the financial objective of the company is **value creation**.

Remember now the formula (3), in which it is easy to see that the above-mentioned problems are overcome: it does not discount profits, but cash impacts (which do not have the component of subjectivity associated with the former); it takes into account the time value of money, penalizing cash flows the further away they are from the present moment; and it allows risk to be considered, applying a discount rate that is higher the greater the risk of the asset in question.

In addition, the formula can be useful as a **tool for monitoring the performance of managers** ('technocrats' or 'agents on behalf of the owners'): in a world increasingly concerned about environmental, social and corporate governance issues (what we call **ESG, '*Environmental, Social and Governance*'**), the proposed value formula will be sensitive to everything related to the sustainability of business activities and its responsibility to other social participants (known as 'stakeholders') and, ultimately, to society as a whole.

Indeed, to the extent that customers demand sustainable processes and products from companies; investors apply **SRI (*Socially Responsible Investment*)** criteria in their decisions and find that sustainable activities are less exposed to variations caused by climate change; and lenders find that the risks of lending to responsible companies are lower… there is an incentive in the financial objective itself for these companies to show the desired responsible behaviour. The objectives of the other groups involved are thus incorporated into the financial objective itself, appearing as limitations or restrictions on the actions of companies and economic agents.

In this sense, it is important to work towards greater **transparency** in the activities carried out by the company, which should increasingly report not only on purely financial aspects, but also on everything related to its contribution to society as a whole. Without forgetting the importance of an **education in values**, which translates into the definition of and respect for **ethical codes** that prevent actions that go against the common interest, even when the law or the lack of transparency allow it, in a world immersed in a dizzying technological change.

LONG-TERM FINANCIAL EQUILIBRIUM OF THE COMPANY

Once the company's financial objective has been defined (the creation of value; for shareholders, but also taking into account other stakeholders) and the concept of value on which we will base our decisions has been made explicit (the discounted cash flow valuation formula, which considers the long term, overcomes the problems associated with profit and allows ESG and SRI aspects to be considered in the process), we must think about how we will calculate the cash flows that make up an important part of the valuation formula (the numerators of the formula). To do this, let us first think about a simple break-even equation from an intuitive point of view.

Financial equilibrium can be defined or viewed in many ways: I can state that the company is in equilibrium whenever the assets present the same value as the liabilities (including in the latter term the net equity); which is like saying that the company is always in equilibrium, since the equality between assets and liabilities is a direct consequence of respecting the logic of double-entry accounting (whether the equilibrium observed at a given moment is desirable or not is another matter). A different, but very similar, way of stating the above for people who have some knowledge of accounting is to say that equilibrium occurs when the sum of debits coincides with the sum of credits (basically, the statement is identical, since from the latter condition equality between assets and liabilities is immediately derived).

Another **alternative, more 'financial'**, way of looking at equilibrium is to state that 'the cash outflows that the business may require at some point in time are only possible if the corresponding inflow is produced beforehand'. This, which seems to be a truism, is of greater interest and consistency than it may seem at first glance. Indeed, what we are affirming is that 'there is no investment without financing' (i.e., there is no use without corresponding source -and vice versa-; there is no asset without liabilities; there is no output without input...).

Bearing in mind that **external long-term providers of funds can be lenders or shareholders**, we can visualize the financial equilibrium of the company graphically[4] : for this purpose, we will represent what we call '**cash-flow profiles**', which express the expected cash inflows with upward arrows and the expected cash outflows with downward arrows.

As can be seen in Figure 1, when the asset 'asks for money' (in our example, at project start-up; or at 3, which may be a time when the company has growth possibilities, requiring the corresponding investments), someone has to put it in (lenders, shareholders or a combination of both; in the example, it has been assumed that the initial fund requirement is covered 50% with borrowed funds and equity; and that the growth needs at time 3 are to be financed with equity).

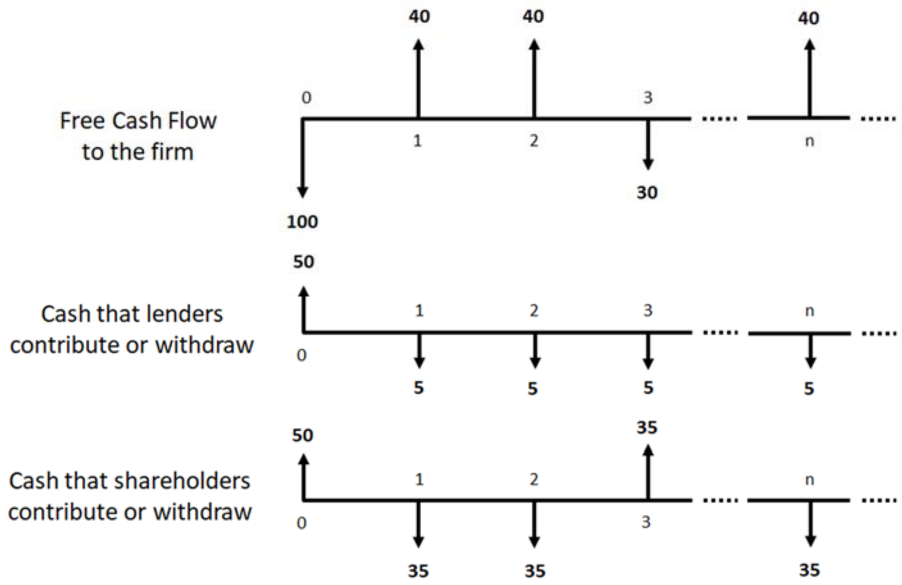


Figure 1

With regard to cash flows provided by the relationship between the company and long-term lenders, it is easy to explain the reasons why there may be a fund flow between the two: that we borrow (we will call this term LTDI, Long-Term Debt Issuances); that we return part of what we have received when the corresponding maturity arrives (we will call this second term LTDR, Long-Term Debt Repayments); or that we pay interest (we will call 'I' the figure of Interest to be paid for the use of debt; and we will correct the aforementioned figure with the so-called 'tax shield' that causes its payment, since the interest entails a tax saving, as it is a cost deductible from the corporate tax base; we will come back to this later). Thus, we will summarize in the term '**Free Cash Flow to the Long-Term Debt, FCFLTD**' the 'cash impact of our relationship with long-term lenders':

$$\text{FCFLTD} = \text{LTDI} - \text{LTDR} - \text{I} \times (1 - t) \tag{4}$$

[4] As can be inferred from what we have seen so far, when we study long-term financial decisions, it is common to use the year as the basic period of analysis. That is, we summarize everything we expect to happen in terms of cash impact in a position that we place at the end of each year.

where ‘t’ is the corporate tax rate.

Let us now think about the reasons why there can be an ‘exchange of money’ between the company and shareholders. As in the previous case, there are positive flows for the company when it asks for cash (Equity Issuances, EI; that is, the way to ask for cash from shareholders is by making available to them the corresponding property titles, the shares); and there will be negative flows when ‘a part of what was contributed by shareholders is returned’ by means of a ‘capital reduction’ (which we will identify with the term ER, Equity Redemptions) or when we pay them back by means of Dividends (which we will identify with the letter D). Thus, our relationship in terms of cash with shareholders can be summarized in the following expression (**FCFE, Free Cash Flow to the Equity**):

$$\text{FCFE} = \text{EI} - \text{ER} - \text{D} \tag{5}$$

We ‘only’ have to define the first element of Figure 1, which we will identify with the acronym **FCFF (Free Cash Flow to the Firm)**, which we have left to the end because it is somewhat more complicated (not much) from a conceptual point of view. The figure **has to be determined ‘looking’ exclusively at the asset**, i.e. the definition must answer the question ‘how much does the asset ask for or release’ (regardless of who puts in or takes the corresponding money). Let us slow down a little on this point; although the difficulty is not great, it is somewhat greater than in the previous definitions.

As you can guess**, the cash flow to the firm will depend in part on the activity (the profit generated by** operations), but **corrected by the investment requirements that it makes necessary**. In other words, the asset ‘frees’ money after meeting its own needs, which may be investments in fixed assets (machinery, computers, computer applications, etc.) or in working capital (balances pending collection -materialized in customer accounts- or stocks of inventory that the activity requires to be maintained; partly offset by balances pending payment -materialized in turn in accounts with suppliers, the Tax authority, etc.-). Again, let’s slow down.

As we said, a very important part of what happens in the company is shown in the profit and loss account. Let us assume a **simple** (in the sense of very compressed) **income statement model**, using the following nomenclature:

+	S	Income from sales (recurring activities, those that constitute its corporate purpose)
–	C	Operating costs with cash impact (supplies, wages and salaries, etc.)
–	AM	Operating costs with no cash impact (depreciation of fixed assets, impairment, etc.)
–	I	Interest (for the use of long-term debt)
–	CT	Corporate tax
=	NP	Net profit

In the proposed income statement, there are some elements that have to do with ‘the way things are done’ (with the assets) and others that are a consequence of ‘how we decide to finance the company’ (i.e., they are related to the liabilities). Those that have to do with the assets are the S, C and AM terms, i.e. sales and operating costs (cash and non-cash charge; interest, I, depends on whether we decide to finance the assets to a greater or lesser extent with borrowed funds); finally, the cost of corporate tax is influenced by all the above.

Related to this, an important requirement in modern finance is the desirability of **separating**, as far as possible, **the analysis of assets from that of liabilities.** This gives rise to margin concepts such as EBIT (Earnings Before Interest and Taxes):

$$EBIT = S - C - AM \tag{6}$$

And in our efforts to separate the analysis of assets and liabilities, we can also distinguish between the taxes that the company would have to pay if it did not take on debt and isolate the tax savings caused by taking on debt, allocating it to the use of external financing. The above is easy to consider in the proposed formulation:

$$NP = (S - C - AM - I) \times (1 - t) = (S - C - AM) \times (1 - t) - I \times (1 - t)$$

$$NP = EBIT \times (1 - t) - I \times (1 - t) \tag{7}$$

As you will recall, the interest-related element has already appeared as an application of funds in our relationship with long-term lenders (see formula 4); so, what must now appear as a source in our relationship with the asset is only the term EBIT x (1–t), which we will call **EBIAT**, Earnings Before Interest and After Taxes.

This **is the net profit that operations are able to generate**, but it is still far from cash flow; there are two main reasons for this distance:

- On the one hand, the existence of 'non-cash charge' costs (depreciation of fixed assets does not involve an outflow of funds).
- On the other hand, the application of principles such as 'accrual' (which requires comparing sales and costs, which do not necessarily coincide in time with collections and payments) or criteria such as the correlation of income and expenses (which requires not considering as a cost the investment that the business may have required in safety stocks).

These two reasons lead us to make **two corrections to the proposed net income (EBIAT)**: the first consists of **adding depreciation to** eliminate the distortion caused by its subtraction in the calculation of profit (required, as we said, by the correlation of income and expenses, insofar as it is a cost necessary to obtain income; and which in turn allows us to consider the tax effect it causes, since it is a cost deductible from the tax base, provided it is within the limits established by the legal coefficients), a correction that gives rise to what we identify as Fund Flow from Operating Activities (FFO):

$$FFO = EBIAT + AM = EBIT \times (1 - t) + AM \tag{8}$$

and subtract in a second step the 'necessary' investment in Working Capital, ΔWC (i.e., we subtract the increase that the business operation has required in working capital):

$$EBIAT + AM - \Delta WC = (S - C - AM) \times (1-t) + AM - (\Delta Customers + \Delta Stock - \Delta Suppliers) \quad (9)$$

It is not difficult to see that what remains after the proposed corrections are the collections and payments related to the business operations, after taking into account the needs that these operations pose in terms of working capital (the increase in customers 'corrects' the revenue figure that appears in the income statement with the part pending collection at the end of the year and with the collections in that year that correspond to sales 'accrued' in the previous year -a similar reasoning can be made with regard to operating costs (cash charge) and the suppliers' accounts-; and the variation in inventories makes it possible to take into account that, in addition to the cost of goods sold incurred, it has been necessary to increase -with its sign- the safety stock figure).

All that remains is to consider the **investment in fixed assets** that the operation may require in the year in question, which we will identify with the acronym CFI. Thus, and introducing the simplification that there are no non-recurring activities (which would be easy to include in the previous approach), our relationship with assets in terms of cash can be summarized in the following terms:

$$FCFF = FFO - \Delta WC - CFI = EBIT \times (1 - t) + AM - \Delta WC - CFI \quad (10)$$

We can include the formulation proposed in Figure 1 presented above and see the **long-term financial equilibrium of the company from a graphical and mathematical point of view** (see Figure 2).

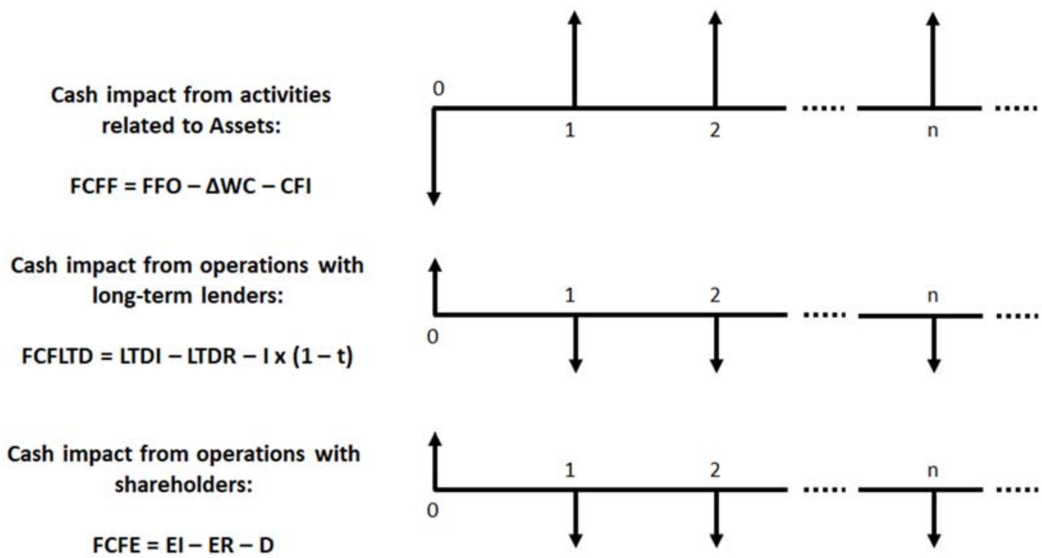


Figure 2

I am aware of the density of the last paragraphs, even though we have tried to present the concepts as intuitively as possible. However, the effort made in these pages is much more important (and profitable) than it might seem at first glance: the equation of sources and uses of funds that we have just presented (which we can summarize in the expression FCFF+FCFLTD+FCFE=0, which will be fulfiled every year), allows us to define the **way in which we calculate the free cash flows of the assets**, those that define our relationship with the lenders **in the long term and the free cash flows of the shareholders**. With this methodology we study the interest of investment projects, calculate the cost of financing sources and value companies (always using the discounted cash flow technique).

Let’s take a look at some simple examples.

FEASIBILITY ANALYSIS OF INVESTMENT PROJECTS

Let us assume an investment project that requires the acquisition of facilities for 1 million and which can be depreciated on a straight-line basis over a period of 5 years (residual value -estimated price at which the facilities can be liquidated at the end of the five years- zero, which means an annual depreciation of fixed assets of (1.000.000 – 0) / 5 = 200.000 euros).

The project would bring the company sales of 2 million euros per year, which would require incurring incremental cash-impact operating costs (supplies, wages and salaries, transportation, etc.) of 1.200.000 (also per year). Sales are collected in 90 days and costs are paid on average in 30 days, resulting in the emergence of the corresponding customer and supplier accounts. The business would also require to maintain in inventories a sufficient volume of stock to cover 1 month’s activity, let’s assume 50.000 euros, an investment that would be made at time zero and would be liquidated at the end of the project’s life (five years).

The investment would be financed 50% with borrowed funds (which require a return of 8% per year) and equity (the best alternative in the market is 14% for investments of similar risk, so they require this return, in expected terms, to put their money at the disposal of the business), which are the proportions usually used by the company in the financing of its projects.

At the end of the five-year period, the proceeds from the sale of the facilities would offset the cost of dismantling them and the working capital would be written off at book value (without profit or loss). The company, which generates abundant profits, is subject to corporate tax, which is levied at 25% of the taxable income.

With the above information, we must study the interest of undertaking the project.

Resolution

The first step is to draw up the cash-flow profile contributed by the investment. In other words, we must calculate the Free Cash Flow to the Firm (FCFF) that the project ‘adds’ (with its sign) to the company as a whole at the end of each year. Remember that the term was defined:

$$FCFF = FFO - \Delta WC - CFI \tag{10}$$

What we must now calculate is what the project contributes to the above formula in each of the six affected positions (moment zero, one... up to five).

$$\Delta FCFF_i = \Delta FFO_i - \Delta\Delta WC_i - \Delta CFI_i \tag{11}$$

The investment in fixed assets is concentrated at the initial moment, together with that related to the safety stock; i.e.:

$\Delta FCFF_0 = - \Delta CFI_0 - \Delta\Delta WC_0 = - 1.000.000 - 50.000 = - 1.050.000$

Let us now calculate what the project offers in return over its lifetime (the next five years). The FFO (the money earned each year by performing the activities, not yet considering working capital requirements) is the same in each of the five years:

$\Delta FFO_i = \Delta EBIT_i \times (1 - t) + \Delta AM_i = (\Delta S_i - \Delta C_i - \Delta AM_i) \times (1 - t) + \Delta AM_i$

$\Delta FFO_i = (2.000.000 - 1.200.000 - 200.000) \times (1 - 0{,}25) + 200.000 = 650.000$

As regards working capital requirements, these refer to the customer accounts that will be outstanding at the end of the year and the requirement to increase the safety stock, all of which is corrected by the financing we obtain from suppliers. Given that the working capital balance changes in the first year with respect to the zero point in time, but then remains constant for the rest of the years, the project only requires investments for this concept in the first year (since what is pending collection and payment at the end of the second and subsequent years is compensated by what is collected or paid in excess corresponding to the previous year; and the investment in inventories remains constant):

$\Delta WC_0 = \Delta\Delta WC_0 = \Delta Customers_0 + \Delta Stock_0 - \Delta Suppliers_0 = 0 + 50.000 - 0 = 50.000$
$\Delta WC_{i\neq 0} = \Delta Customers_i + \Delta Stock_i - \Delta Suppliers_i = 500.000 + 50.000 - 100.000 = 450.000$
$\Delta Customers_{i\neq 0} = 2.000.000 / 360 \times 90 = 500.000$
$\Delta Stock_{i\neq 0} = 50.000$
$\Delta Suppliers_{i\neq 0} = 1.200.000 / 360 \times 30 = 100.000$
$\Delta\Delta WC_1 = \Delta WC_1 - \Delta WC_0 = 450.000 - 50.000 = 400.000$
$\Delta\Delta WC_{i\neq 1} = \Delta WC_i - \Delta WC_{i-1} = 450.000 - 450.000 = 0$

The above means the following: if the project had no collection and payment terms associated with revenues and expenses, it would generate the same amount every year, the FFO previously calculated, i.e. 650.000 euros. But at the end of each year, a portion of the revenues will remain uncollected (the calculated customer balance, 500.000) and a portion of the costs will not yet have been paid (100.000). Since the investment in safety stock does not change (it is made in full at time zero and is paid in cash), a correction must be made to the FFO in the first year: 400.000 must be subtracted (the difference between the 500.000 that is not collected and the 100.000 that is not paid); this correction is not necessary in subsequent years, since 'what is not collected on each year is compensated by what is over-collected for the previous year', and the same reflection can be made with regard to costs.

Thus, the summary of the above calculations is as follows:

$\Delta FCFF_0 = - \Delta CFI_0 - \Delta\Delta WC_0 = - 1.000.000 - 50.000 = - 1.050.000$

$\Delta FCFF_1 = \Delta FFO_1 - \Delta\Delta WC_1 = 650.000 - 400.000 = 250.000$

$\Delta FCFF_{i=2 \text{ to } 5} = \Delta FFO_i - \Delta\Delta WC_i = 650.000 - 0 = 650.000$

Only one thing remains to be considered: at the end of the fifth year the 'working capital liquidation' must be added (i.e., in the months following the end of that year the outstanding amounts will be collected and paid; and safety stock will be liquidated which, according to the case statement, will be sold without profit or loss -at book value-), which implies that the true FCFF of the fifth year will be:

$\Delta FCFF_5 = \Delta FFO_5 - \Delta\Delta WC_5 + \Delta WC_5 = 650.000 - 0 + 450.000 = 1.100.000$

The above calculations are summarized in the **incremental funds profile** (contribution to the project company in cash terms without considering -yet- any aspect related to financing) shown in Figure 3.

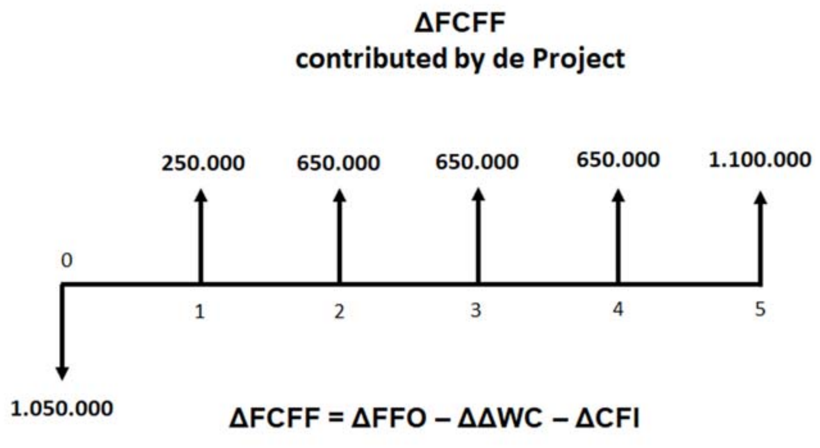


Figure 3

Next step consists of calculating the **minimum profitability required from the project** if it is to meet the commitments made to the contributors of funds. Remember that the cost of borrowed funds must be calculated by subtracting the tax savings resulting from interest payments (which have not been considered in the preparation of the cash flow profile, in our attempt to separate the analysis of assets from that of liabilities). Thus[5]:

$$K_d = K'_d \text{ x } (1 - t) = 8\% \text{ x } (1 - 0{,}25) = 6\%$$

$$k_e = 14\%$$

$$WACC = k_d \text{ x } LTD / (LTD+E) + k_e \text{ x } E / (LTD+E) \tag{12}$$

$$WACC = 6\% \text{ x } 0{,}5 + 14\% \text{ x } 0{,}5 = 10\%$$

All that remains is to calculate the '**Net Present Value (NPV)**', the most powerful financial tool when looking for value creation opportunities. The formula compares, in present value, what the project asks for with what it gives, and the difference indicates the value it brings to the company, the wealth it generates for its shareholders (the money obtained from it over and above what it asks for and which could not have been obtained by investing in the market).

$$NPV = FCFF_0 + FCFF_1 / (1+WACC) + FCFF_2 / (1+WACC)^2 + ... + FCFF_5 / (1+WACC)^5 \tag{13}$$

$$NPV = - 1.050.000 + 250.000 / 1{,}1 + 650.000 / 1{,}1^2 + ... + 1.100.000 / 1{,}1^5 = 1.329.790$$

As a result, the project is feasible, bringing a value of 1.329.790 euros to the company.

As you can see, it is in this last step where 'assets and liabilities meet', but they arrive separately to the calculation (which means to study independently the financial structure decision; and to take the result to the feasibility analysis of investment projects, which are studied in a first step independently of the way the company decides to finance itself).

SOME PARTICULARLY RELEVANT KEY RATIOS AND A REFLECTION ON RISK

As its name suggests, a ratio shows the **relationship between two concepts**, in this context, with a financial meaning or relevance. A widely used example is ROE (Return On Equity), which is defined as the quotient of Net Profit (NP) and the Equity (E) invested to achieve it:

$$ROE = NP / E \tag{14}$$

5 We will 'tiptoe' a little over the justification of the figures and nomenclature used at this point, which will be defined in greater detail in a later section. For the moment, let us simply say that what we are calculating is the WACC, the weighted average cost of capital, which allows the liabilities to be adequately remunerated.

What the ratio provides in relation to the profit figure is to **facilitate comparisons** between companies with different volumes of operations, i.e. it is a typical tool in ***benchmarking* processes**, in which the company compares its performance with that of another company (or with the sector, or with itself in the past and/or in the future). But **we must be very careful when making these comparisons**, since we could be comparing very different things (apples and oranges, to put it in the language of the street). As we shall see in the following lines, two identical ROEs obtained in two different companies may not be equally desirable.

Before beginning the reflection, let us remember that, as we have indicated above, it seems reasonable to think that individuals **behave as 'risk-averse'**. Here we should note two important ideas:

- **In finance, risk is variability**: a decision is riskier the wider the range of possible outcomes that may eventually occur.

- The **risk aversion hypothesis** is easy to justify by appealing to a concept we take from Microeconomics: the ***Theory of Diminishing Marginal Utility***. According to the model, the satisfaction that successive units of wealth bring us (the 'marginal utility' associated with each additional euro) is always positive (we always prefer to 'have more') but decreasing (the joy that new units bring us is smaller and smaller, we are more excited about the first increases in wealth than the last ones). This would justify that when choosing between a safe decision (for example, one million euros) and an identical average amount, but subject to risk (a double-or-nothing game, two million or zero at 50% probability) we prefer the former: the loss of the million would take away a greater satisfaction than adding the second; and if the two events have the same probability of occurrence, there is no 'risk premium', the 'expected' figure coincides with the safe one that is necessary to give up in order to play. The situation would change if the probability of obtaining the 2 million were 80% and that of being left with nothing were 20%; in this case, the 'expected' wealth associated with the game would be 0,8 x 2.000.000 + 0,2 x 0 = 1.600.000, so that the game offers a premium (not certain, only 'expected') of 600.000 euros and a risk-averse individual could accept to take it.

Modern finance is thus based, among other things, on the idea that individuals **will only accept to take risks if they expect a reward for doing so**. And what we are now going to see from the most intuitive point of view possible is that the risk assumed by the shareholder is significantly related to the level of indebtedness of the company (which may seem obvious, but I think it is worth studying in some detail).

An intuitive vision of the aforementioned relationship between risk and indebtedness can be found in the documentary '**Wall Street - The Great Crash of 1929**'[6] . It shows very graphically how the aforementioned indebtedness, combined with a disorderly greed for profitability, led to the assumption of exaggerated risks at a time when it seemed that the stock market could never go down (typical in a boom situation, which can lead to a real speculative bubble). Let us take a brief look at the process shown in the aforementioned documentary.

[6] https://www.youtube.com/watch?v=oqfNgt6bzfc.

In 1929 a potential investor could buy a share valued at 10 euros for only 2,5 euros (although the euro is somewhat more modern, we will reason in this currency to bring the reflection closer to our current situation; because we are by no means free from the possibility that what is said there might happen again -History dixit-). Let us suppose that I believe that a stock trading at 10 today can have a maximum value of 11 and a minimum value of 9 tomorrow (i.e. I am convinced that the range of possible returns is ±10%); and let us also suppose that I assign a greater probability to the rise than to the fall (let us say 70%–30%; this would mean that, according to my calculations, the expected return from investing in a stock like this is 0,7 x 10% + 0,3 x (-10%) = 4%).

Let us suppose now that I have 10 euros to invest and that, when I call my broker to give him the purchase order, he asks me to advance only 2,5 euros, leaving the rest due. This way of acting would allow me to buy four shares paying the 10 euros I have, leaving the rest (30 euros) owed; since I do not have that wealth today, I expect to be able to pay the 30 euros I owe when I sell my stake. Let's see what happens in the two situations we consider possible:

- If things go well, the shares will trade tomorrow at 11 euros, so selling them will bring 44 euros, I will return the 30 I owe and my final wealth will be 14 euros. The profitability obtained will then be 40%.

- If things do not go as I would have wished, share price will be only 9, so the sale of the four shares will yield 36 euros, of which only 6 will remain after repaying what I owe. My return will then have been -40%.

If I now weight the two possible returns by the assigned probabilities, the expected return if I take on debt will be 0,7 x 40% + 0,3 x (-40%) = 16%.

What we have just seen is a simple and extraordinarily logical mechanism: the same underlying return (10%) is leveraged (for better and for worse) thanks to indebtedness, i.e. the said indebtedness is accompanied by a leverage effect of both the return and the risk. The 4% expected that I can obtain if I buy without debt carries with it a range of possible values of ± 10%, and the 16% expected associated with the purchase with debt is accompanied by a range of ± 40%. The debt alternative thus presents a risk premium of 12 percentage points (16% – 4% = 12%), which may or may not be offset by the increased risk it forces us to take (the move from a spread of ± 10% to one of ± 40%). What is clear is that we cannot simply compare these two returns, as they are once again 'apples and oranges' and have radically different levels of risk associated with them.

The same is true of corporate management. Assuming certain conditions (an expected return on assets higher than the cost of debt) it is easy to increase the expected return to the shareholder without the need to do things better in terms of the company's activities: it is enough to take on more debt. The problem with the above is that we must be aware of what the above-mentioned documentary identifies as '**the dark side of leverage**': it can act positively or negatively depending on what, in the end, happens in the relationship between the return on assets and the cost of debt. Let's look at it a little more slowly.

Let us first define some relevant ratios, starting from a long-term perspective (which focuses on 'investments and permanent capital'):

- We will call **ROA** the Return on Assets **(**or **operating return)** regardless of how they are financed:

$$ROA = EBIT \times (1 - t) / (FA+WC) \quad (15)$$

where FA+WC represents the aforementioned permanent investments (in Fixed Assets and Working Capital). You can see the coherence of the ratio: in the numerator appears the profit that we are able to obtain with that asset and that will serve to repay the liabilities as a whole (remember that EBIT is the Earnings Before Interest and Taxes); and in the denominator appears the total investment (which may have been partly financed with external funds, and not only our own).

- Let us call **'i'** the **cost of long-term debt financing**:

$$i = I \times (1 - t) / LTD \quad (16)$$

The interpretation is again clear: 'I' is the interest I have to pay for using a LTD volume of debt, so 'i' is the incremental cost (net of taxes) of using one euro of long-term debt financing.

- Let's call **ROE** the **shareholder return**:

$$ROE = NP / E \quad (17)$$

The ratio indicates the profitability that we are able to give to the shareholder by way of profit, which is normally identified by the acronym ROE (Return on Equity).

- Finally, let's think about a **'financial structure' ratio**, a ratio that indicates the company's level of indebtedness: LTD/E. Assuming a given asset, high values in the ratio would indicate high levels of indebtedness and vice versa.

It is easy to prove mathematically (although we will not do so, since it can also be seen intuitively, as we will do next) that the following expression will always be true (in any situation and for any company):

$$ROE = ROA + (ROA - i) \times LTD / E \quad (18)$$

where it can be seen that **shareholder return can be decomposed into two elements**, the operating return (ROA) and a second term related to the level of indebtedness. Let us interpret expression (18). In the absence of indebtedness (LTD / E = 0), the return we will be able to give to the shareholder will coincide with the return we obtain on his money by investing it in an asset that yields ROA (the second term of the expression becomes zero).

Based on the above, and assuming that ROA is greater than 'i' (an essential condition for a business to be viable, it makes no sense to carry out an activity in which the expected return is lower than the cost of the debt, which by a logic of return-risk will always be lower than the return demanded by the shareholders), if we decide to take on debt, to the return we get on the shareholders' money invested in an asset that yields ROA we add the return we get on the lenders' money invested in the asset above its cost: (ROA – i) is the return on one euro of debt above (if ROA > i) its cost; if we multiply that spread by the debt used we have the total amount (in euros) with which we can 'over' remunerate shareholders; which divided by E becomes the 'contribution of debt to shareholder return'. This means that, assuming a certain range of operating performance values (assets), the range of possible returns for the shareholder will be very different depending on the level of indebtedness we decide on. Thus, the shareholder's expected return will be higher with higher indebtedness (always assuming that ROA > i), but so will be its risk (leverage acts positively or negatively, depending on the ex-post relationship between ROA and 'i'), so that **a higher expected return is not always good news** (it may not sufficiently compensate for the increased risk that it forces the shareholder to bear).

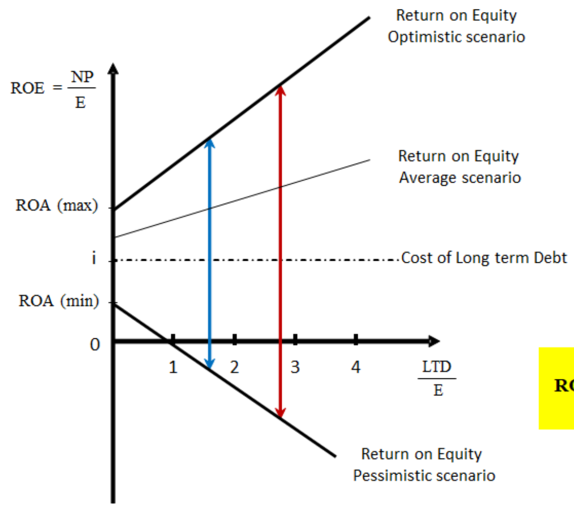
Although it is not essential, let us look at the above from a graphical point of view (if the reasoning proposed below disturbs you in the least you can dispense with it, it does not add much to the above beyond being a different way of looking at the same thing). The proposed equation (18) can be represented on axes relating shareholder return ROE to LTD/E ratio. Under such conditions, the expression is actually the equation of a straight line, with ROA ordinate at the origin and whose slope coincides with 'ROA–i'. In the real world, and although in expected terms, the starting point is that ROA is greater than 'i', *a posteriori* the opposite could also occur. We will therefore assume that ROA can, *a posteriori*, be greater than, equal to or less than i (although the probabilities of the first situation are greater, leading to ROA being greater than 'i' 'in expected terms'). Let us represent in the graph the two extreme situations (the relationship between ROE and the level of indebtedness in the best and worst possible scenarios), as well as the straight line that relates both concepts in expected terms (which results from weighting the maximum and minimum values of ROA; and which will be, under the above conditions, greater than 'i').

As you can see in Figure 4, the range of possible values associated with the ROE ratio (difference between the maximum and minimum values on the vertical axis) becomes larger as indebtedness increases. And it is easy to see and intuit that, even assuming always positive asset returns, shareholder return could become negative if ROA turns out, *a posteriori*, to be lower than the cost of debt ('i').

The above can be very useful when thinking about the financing decisions that will be discussed in the following section, and which require prior reflection on the profitability to be demanded by the contributors of funds.

FINANCING DECISIONS

As far as liabilities are concerned, there are basically two decisions to be made: we will have to decide what weights will be given to equity and debt financing (this is what is known as the 'financial structure' decision); and the second would have to do with how we intend to remunerate shareholders (dividend policy).



$$\mathbf{ROE = ROA + (ROA - i) \cdot \frac{LTD}{E}}$$

Figure 4

The decision on the financial structure requires a prior calculation of the cost of funds, i.e., the profitability requirements of lenders and shareholders, which, together with the weights to be given to each of them, will indicate the minimum profitability to be demanded from the investments.

The cost of borrowed funds

The return required by lenders is generally **very easy to calculate**, since it **is defined by contract**. It is only necessary to ‘translate’ the information appearing in the contract into the cash profile defined in the section on the company’s financial equilibrium (FCFLTD profile, Long-Term Cash from Borrowed Funds -formula 4-). Once the funds profile has been drawn up, the cost of this source of financing is calculated by simply clearing the corresponding discount rate, which equals, in present value, the inflows and outflows associated with the loan in question, and which is called by different names depending on the context (it is usually called APR, Annual Percentage Rate; although in the Spanish General Accounting Plan it is also called ‘Effective Interest Rate’ and in general terms it is an Internal Rate of Return, IRR).

Example

Let us consider a five-year loan in which the principal (the money we receive at time zero) is one million euros, which we collect in exchange for paying 100.000 euros at the end of each year and repaying the full amount at the end of the five years. The company is subject to corporate tax and the rate applicable to its profits (abundant in recent years and expected to be maintained in the future) is 25%. The simple example proposed would be associated with a cash profile (in incremental terms) as shown in Figure 5.

To calculate the cost of this source of financing (which intuitively you will have guessed to be 10% before taxes, and will become 7,5% if we take into account the tax savings that will result from its use; paying 10% 'costs' the company 7,5%, the borrowing decision has an associated cost of 7,5% when reasoning in incremental terms) we have to calculate the discount rate that equals, in present value, the inputs and outputs associated with the project and which we will call k_d:

$$FCFLTD_0 = - FCFLTD_1 / (1+k_d) - FCFLTD_2 / (1+k_d)^2 - FCFLTD_3 / (1+k_d)^3 - FCFLTD_4 / (1+k_d)^4 - FCFLTD_5 / (1+k_d)^5$$

where, as you will recall, FCFLTD = LTDI – LTDR – I x (1 – t), so the justification for the values presented, reasoning now in incremental terms (what the project studied contributes to the company's overall situation) is as follows:

$$\Delta FCFLTD_0 = \Delta LTDI_0 = 1.000.000$$

$$\Delta FCFLTD_{1\text{-}4} = - \Delta I_i \text{ x } (1 - t) = - 100.000 \text{ x } (1 - 0,25) = - 75.000$$

$$\Delta FCFLTD_5 = - [\Delta LTDR_5 + \Delta I_5 \text{ x } (1 - t)] = - [1.000.000 + 100.000 \text{ x } (1 - 0,25)] = - 1.075.000$$

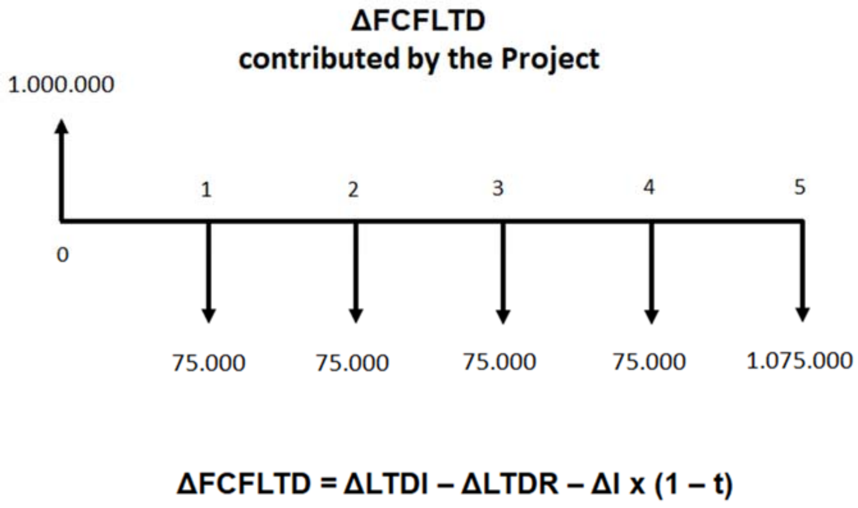


Figure 5

Thus, the equation to be solved is:

$$1.000.000 = 75.000 / (1+k_d) + 75.000 / (1+k_d)^2 + 75.000 / (1+k_d)^3 + 75.000 / (1+k_d)^4 + 1.075.000 / (1+k_d)^5$$

To clear the unknown in the above expression, there are financial functions in Excel that allow us to obtain the figure we are looking for, which in our case leads to 7,5%, the aforementioned cost of debt.

Cost of equity

With regard to the cost of equity, i.e. the return expected by shareholders when they put their money at the disposal of the business, the matter is much more complicated, insofar as **there is no contractual obligation on the** part of the company **to return the money contributed or to obtain a certain return for the shareholder**. In other words, the 'deal' with the shareholder is that, if things go well, he will be given a high return; but if they go badly, the return can be negative (with a limit of -100% in the case of a limited liability company that goes 'very badly'). Therefore, we cannot calculate the cost of equity from the FCFE we saw earlier (expression 5), since the cash-flow profile corresponding to this source of financing is not known *a priori*.

Financial theory provides us with different tools that try to help us when calculating the required return based on the risk assumed. It is common to use the logic of what is known as **CAPM**, which stands for ***Capital Asset Pricing Model***. Let us look very succinctly at the logic implicit in the model, which can be summarized as follows:

$$k_e = \text{Risk-free interest rate} + \text{Market premium x Beta (risk measure)} \quad (19)$$

As can be seen, the required return on equity (which we have called k_e) consists of **two elements**: **the risk-free interest rate** (which would be the return required for a safe investment; the return on government fixed income -that associated, for example, with Treasury bills- is usually considered to be 'safe', so that the opportunity cost of a safe investment would be easy to calculate; at the time of writing, one-year bills are yielding just over 3,6%); to which is added a '**risk premium**', which in turn depends on two elements: the expected premium per unit of risk in the market and the amount of relevant risk of the asset to be valued (which is measured by the well-known 'beta'). Let's slow down a bit.

CAPM starts from a premise whose logic is overwhelming: if we individuals do not like risk, a rational investor will not bear risks that can be avoided. It would therefore be absurd to invest 'only' in one asset (a security, for example), since part of the risk of our investment can be eliminated through the convenient process of '**diversification**', which is the name we give in Finance to the old aphorism 'it is not advisable to put all your eggs in one basket'. It is easy to verify empirically that part of the risk (of the variability) of the return of my portfolio is reduced until it disappears as I include more securities in it (if possible, from totally different sectors and activities). But, at the end of the day, and assuming that I have spread my investment over securities from different sectors of activity, there is a part of the risk that cannot be eliminated by diversification, insofar as the different activities are, some more and some less, influenced or related to the economic cycle: we call this part of the risk 'systematic risk' or 'non-diversifiable risk'. Thus, according to the model, **only the risk that the asset to be valued contributes to a suitably diversified portfolio would be remunerated**; and the **measure of the 'systematic'** (or non-diversifiable) **risk** is the so-called '**beta**' of the asset in question. The way to calculate it is relatively simple: it is a matter of studying to what extent the return on the asset is related to (influenced by) the general performance of the economy, for which there is a statistical technique that seeks the best possible adjustment between the returns of the asset and those corresponding to the market as a whole.

Example: suppose I want to calculate the beta of a specific listed security (Telefónica, for example). I have the historical returns associated with this stock (I can, for example, take the monthly returns obtained over the last five years by its owner through dividends and the corresponding capital gains, which means I have 60 observations) and I can also obtain the returns of a sufficiently diversified investment over the same period (in our example we will take those reported by an index, the Ibex-35, composed of a good sample of the various sectors of activity). We can represent the resulting point cloud in a map that relates the two possible investments: we will put in ordinates the profitability of Telefónica, and in abscissae the performance of the Ibex-35 and we will represent the 60 points that show, for each month of the last five years, the returns reported by both (Figure 6).

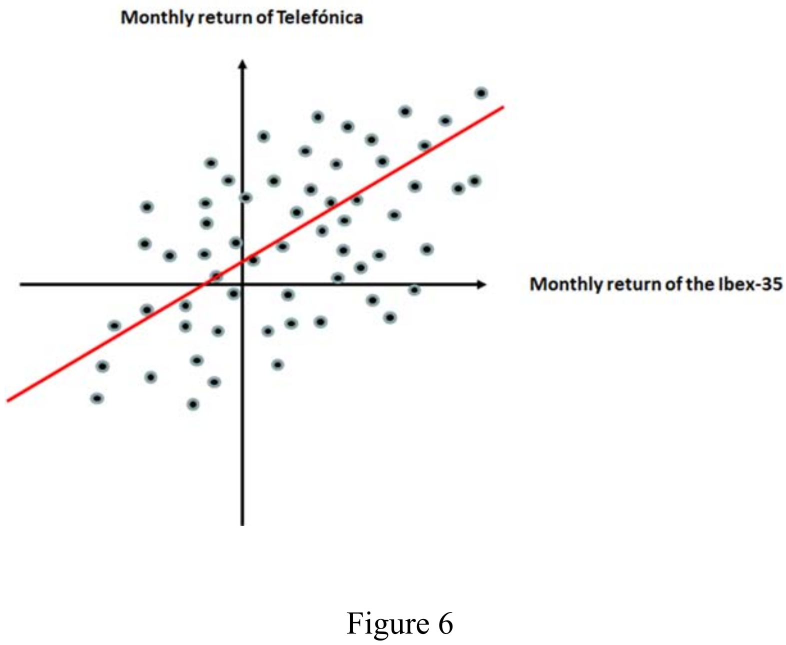


Figure 6

The regression technique looks for the line that best fits the cloud of points, the one that minimizes the sum of (the squares of) the distances of the points to the line; and the slope of this line is precisely the beta, the measure of systematic risk, which expresses the sign and intensity of the relationship between the two variables considered (stock return and market return).

We can thus find different types of securities, as can be seen in Figure 7: in the first case we would be looking at an asset with a lot of risk (a lot of variability in its monthly returns), but easy to eliminate (since the activity is not related to the whole, so by investing in other securities it will be easily diversifiable); the second security shows a strong relationship with the market, but the security reacts by smoothing changes in the market (it goes up a little when the market goes up a lot and goes down a little when the market goes down a lot: it is what we call a **'defensive' stock**); the third is an **'aggressive' stock**, it reacts strongly, leveraging changes in the market. According to CAPM, first security would have a zero-risk premium (the rational investor will easily diversify the risk associated with this investment), the second will have a small premium and the third will require a higher premium.

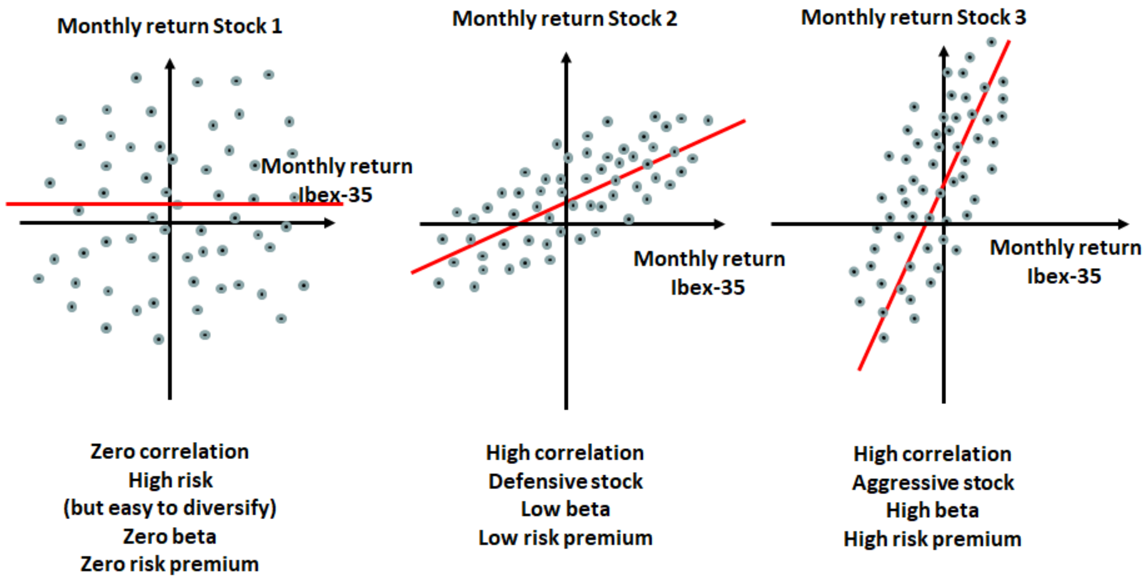


Figure 7

Finally, it should be noted that, always in the proposed model, the risk premium associated with the market is calculated as the difference between the expected return for the market as a whole and the risk-free interest rate.

Example

Let us place ourselves in a context in which the risk-free interest rate is 4% and the risk premium offered by equities over fixed income, calculated on the basis of information referring to the last few years and which is considered a good approximation of future performance, is 6 percentage points.

Once the 'regression adjustment' processes corresponding to two securities framed in different sectors of activity have been carried out, the results obtained are as follows: $\beta_A = 0{,}3$ and $\beta_B = 1{,}2$ (remember that the beta coincides with the slope of the regression line indicated above). Under these conditions, the returns required for the securities presented would be as follows:

k_{e_A} = Risk-free rate + Market premium x $\beta_A = 0{,}04 + 0{,}06 \times 0{,}3 = 0{,}058$
k_{e_B} = Risk-free rate + Market premium x $\beta_B = 0{,}04 + 0{,}06 \times 1{,}2 = 0{,}112$

Thus, the return that shareholders would demand from company A would be 5,8%, while that associated with company B would be 11,2%.

Just a brief final thought: as we have seen, indebtedness leverages risk, so if we calculate the beta of the shares of two companies in the same sector, they can be radically different depending on the level of indebtedness of each of them; in other words, we must be careful when calculating the beta of the shareholders of an unlisted company, for which the data of a listed one is usually taken as a reference (the necessary information is easier to obtain), since the levels of indebtedness of both (the company we are taking as a reference and the one we are studying) could be very different.

The weighted average cost of capital

From the above information (cost of borrowed funds, k_d; and best estimate of the cost of equity, k_e), we can calculate the weighted average cost of funds, which will be the minimum return required for any investment: this is what is usually identified as **WACC** (*Weighted Average Cost of Capital*), for which it is advisable, whenever possible, to use **market values** when establishing the weights to be given to each of them.

$$WACC = k_d \times LTD / (LTD+E) + k_e \times E / (LTD+E) \quad (12)$$

The Financial Structure decision

If we remember the company's financial objective (to create value), together with the concept of value from which we start (the one that results from applying the discounted cash flow technique), it is easy to see that from a financial point of view I can try to contribute to the objective through the numerator or the denominator:

$$NPV = FCFF_0 + FCFF_1 / (1+WACC) + FCFF_2 / (1+WACC)^2 + ... + FCFF_5 / (1+WACC)^5 \quad (13)$$

How can I create value with the investment decision? By finding projects that 'give a lot for a little', i.e. investments that require small negative FCFF and offer large positive FCFF in return (numerator of the formula); also, by finding investments with low risk, which will result in a lower return requirement (denominator).

And can I try to contribute to the 'value creation' objective through the financing decision? Theoretically, yes: by seeking the optimal financial structure, the one with the lowest weighted average cost of funds (the minimum WACC). The problem is that, as far as this issue is concerned, things are not clear. **Modigliani and Miller**, both **Nobel Prize winners in economics**, owe a very important part of their recognition to the statement that '**financial structure is irrelevant**'. The logic of their argument is irrefutable: each contributor of funds will demand a different return depending on the risk assumed (the risk of the asset will be distributed in different ways between lenders and shareholders, depending on the level of indebtedness); but the risk assumed 'by the whole' is the same regardless of the level of indebtedness, since it depends on the asset; the weighted average cost should therefore be the same regardless of the level of indebtedness, and the financial structure decision would not contribute to the objective of value creation.

This **would be true in a market with no imperfections**. In the real world, **it seems advisable to maintain a certain level of indebtedness** to take advantage of the fiscal advantage that debt has over equity, but avoiding the possibility of markets interpreting closeness to bankruptcy (or payment default). In any case, Finance is not the same since the publication of the work of these authors: their message is key, financing is not the key issue, financial management efforts should be concentrated primarily on the search for good investments, and only in the background, on trying to find an adequate financial structure.

A reference to the dividend policy

The first thing to indicate is what we mean by 'dividend policy': naturally, when we ask ourselves about the relevance of this policy, we are not discussing the importance of the company adequately remunerating shareholders (and this is done fundamentally through dividend). The reflection refers to whether or not it is convenient to maintain some 'routine' or more or less formal commitment as regards the way of remunerating the shareholder: one possible policy would be the payment of a constant dividend; another possibility would be to set and try to respect a certain 'pay-out', which is the name given to the ratio that relates the dividend to the profit generated; or others (always, of course, in compliance with the law, assuming that there are freely available Profits and/or Retained earnings that allow it).

In this regard, the same Nobel Prize winners mentioned above, Franco Modigliani and Merton Miller, stated some time ago that **the only reasonable dividend policy is not to have a dividend policy**: what does this mean? It means that the logical thing to do is to determine the dividend according to liquidity: to pay them when we have money and there are no interesting ideas (investments) to undertake that create value; and not to pay them when there is no money or when there are interesting uses for the money that make it possible to obtain a higher return than the shareholders could obtain on their own (i.e., investments that create value).

Again, the logic of the statement is beyond reproach; but in the real world **there are imperfections that may make it advisable to maintain dividend policies**. Thus, a different **tax treatment** for capital gains and dividends could make it advisable to take into account the situation of shareholders when deciding on the dividend to be paid; on the other hand, dividends still have an important **informative content** today, their payment implies transferring information to the market (for example, a constant dividend policy conveys a sense of stability), which makes it advisable to take into account certain elements in addition to liquidity when making the corresponding decision.

And, as Bugs Bunny used to say... 'that's all, folks' (for now!). If you wish, you can further elaborate on some of the topics covered in this reading in the 'Inversión en condiciones de certeza' Spreadsheet, Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Investment-decision-in-certainty-conditions.xlsx.

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A (GENTLE) INTRODUCTION TO FINANCIAL FORECASTING

Javier Santibáñez Grúber *

1. INTRODUCTION

In a previous reading ('A (gentle) introduction to accounting') we saw that the market value of a company is not normally reflected in accounting. And this is for a fundamental reason: Accounting is primarily a narrative of what has happened so far, whereas in the real world we only pay for the 'experiences' (financial or otherwise) that we expect to receive in return in the future. However, this does not mean that 'accounting is useless' (in this task of valuing companies): in fact, the best theoretical alternative for calculating the value of a company is to use the discounted cash flow valuation technique, which requires determining what can be expected from it in the future (always in terms of cash impacts; these are the well-known 'free cash flows') and the applicable discount rate (which will always be an opportunity cost, i.e. the profitability that could be obtained in the best alternative with similar risk). And the information relating to the expected cash-flows can only be extracted from the 'expected' or forecast accounting for the future in relation to the company in question.

So, what we are dealing with now is the preparation of the future Financial Statements of a company, starting from the current ones and on the basis of the relevant 'Operating Budget', which would be the document in which we reflect the expected behaviour of the relevant variables as regards the results and the assets and financial position of the company. What we are going to present here is the way in which we prepare the Income Statement, the Cash Budget and the Balance Sheet based on the current Financial Statements and the aforementioned Operating Budget.

Given the eminently practical nature of this activity, I consider that the best way to approach it is through the realization of a simple case study in which the main theoretical elements involved appear. I will use an example inspired by the spreadsheet 'Proyección y análisis financiero' (translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx).

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2. ANNUAL FINANCIAL FORECASTING EXCLUDING VAT

2.1. The Operating Budget

As indicated above, the Operating Budget reflects the expected behaviour of the variables that have an impact on the company's assets and liabilities and/or profit; this, combined with the opening Financial Statements (Balance Sheet and Income Statement for the last accounting year), will make it possible to draw up the fundamental Financial Statements for the forecast horizon, which we will identify as one year.

We will begin by considering the case in the absence of VAT (in a later section we will include the effect of this tax). The information described is presented below:

Company X presents, as of December 31, 2024, the following Financial Statements for the last year:

P&L ACCOUNT	2024
Sales (goods for resale)	1.000.000
Purchases (goods for resale)	-360.000
Variation in inventories	0
Wages and salaries	-250.000
Other supplies	-40.000
Rents	-50.000
Depreciation of fixed assets	-100.000
Interest	-40.000
Corporate tax	-48.000
NET PROFIT	**112.000**

ASSETS	31-XII-2024
Cash & equivalents	50.000
Customers (trade receivables)	250.000
Stocks	30.000
Gross fixed assets	2.000.000
- Accumulated depreciation	-600.000
TOTAL ASSETS	**1.730.000**

LIABILITIES	31-XII-2024
Suppliers (trade payables)	60.000
Corporate tax payable	48.000
Long-term debt	800.000
Profit or loss for the year (P&L)	112.000
Retained earnings (Reserves)	272.000
Share Capital	438.000
TOTAL LIABILITIES	**1.730.000**

Its CFO (Chief Financial Officer), Miguel Ángel Larrondo, has prepared the following Operating Budget:

- ***Sales, which are spread evenly throughout the year (the company does not close in August), will grow by 1% with respect to the previous year. The collection period that the***

company has been granting to its customers, which will be maintained throughout next year, is 90 days.

- ***Cost of goods sold (C.O.G.S.) will also grow by 1% with respect to the previous year's figure. The payment term to suppliers, both in the year now ending and in the next one, is 60 days.***

- ***The stock that is considered adequate for next year is 30.300 euros, so the corresponding adjustment will be made in January.***

- ***Wages and salaries will increase by 2% with respect to the previous year. The company has introduced a system of 12 regular annual payments. The breakdown of payroll recipients is as follows:***

    - ***Payment to workers (monthly): 60%.***
    - ***Payment of Income tax withholdings to the Tax authorities (monthly): 10%.***
    - ***Payment to Social Security agencies (monthly): 30%.***

- ***Cost of other supplies will increase by 3% with respect to the previous year. They are paid deferred every four months.***

- ***The cost of Rents will grow by 4% with respect to the previous year's figure. This item is paid on a semi-annual basis in advance.***

- ***The following items should be considered in relation to fixed assets:***

    - ***On January 1, investments of 100.000 euros, to be paid in cash, will be made.***
    - ***On December 31, an asset with a purchase price of 1.000.000 euros is scheduled to be sold and will be depreciated by a total of 400.000 euros at that time. The expected sale price is 720.000 euros, which will be collected with a three-month deferral.***
    - ***The company depreciates its assets over an average 20-year horizon.***

- ***With respect to long-term debt, the following information should be considered:***

    - ***On December 31, 50% of the balance at the beginning of the year will be repaid.***
    - ***Cost of debt (before taxes) represents 5% of debt balance during the year. The related interest is paid on a semi-annual basis.***

- ***In the month of June, a capital increase for a total amount of 1.000.000 euros will be carried out.***

- ***Fiscal aspects. The following information should be considered in this regard:***

    - ***Value added tax. The company's operations are not subject to this tax.***

- ***Corporate tax. The rate borne by the company is the general rate (30%). It is settled in July of the following year. Gains or losses on the disposal of fixed assets are included in the taxable income.***

- ***The company plans to distribute 20% of the previous year's profit as a dividend, to be paid in April 2025.***

Based on the Financial Statements as of December 31, 2024 and the Operating Budget presented, we must prepare the Balance Sheet, the Income Statement and the Cash Budget for 2025.

2.2. Forecast Income Statement

Before starting with the preparation of the Profit and Loss Account, it is useful to remember a couple of important concepts that we saw in 'A (gentle) introduction to accounting': the **'fair' allocation of income and expenses over time** requires the application of principles such as '**accrual**' (in the Profit and Loss account, income and expenses are compared, which do not necessarily coincide with receipts and payments) and respecting the logical '**correlation of income and expenses**' (i.e. expected income must be compared with the costs that will have to be incurred to obtain them -and only them-); this requires considering costs with no cash impact -such as the depreciation of fixed assets- and making a clear distinction between 'expenditure' and 'investment'). This has two important consequences for the preparation of the forecasted income statement:

- **The timing of collection and payment is irrelevant** (revenue is recognized when the right to receive the consideration for the provision of goods and services by the company arises, regardless of when collection, often deferred, is agreed; and the same applies to 'out-of-pocket' costs, i.e. those that have a direct impact on cash flow).

- The **part of the goods that are going to be purchased with the intention of providing a larger stock** should not, in the end, appear as an expense for the year; therefore, since the total amount that we are going to acquire will appear under the Purchases heading, the part of the goods that will not be an expense for the year (they will remain in stock at the end of the year, i.e. they **will be an investment**) should be corrected by recognizing the corresponding income (under the heading 'Variation in inventories').

In most cases, it is sufficient to **apply the growth rates estimated in the Operating Budget** to the amounts corresponding to the previous year (this is what happens with Sales, Wages and Salaries, Other Supplies and Rents). As regards the Cost of Purchases, should be added to the expected Cost of goods sold (which is obtained by applying the growth rate corresponding to the previous year's figure) the desired increase in stock (which, as indicated above, is offset by the income that we recognize in the Inventory Variation account).

The costs of '**fixed asset depreciation**' (an example of 'non-cash charge') and '**interest**' (a cost of a financial nature) require a simple preliminary thought: since these are flows related to the 'stock held', we must think of the balances of Fixed Assets and Long-term Debt 'to be used' by the company over the projection period. Since, in our case, there is a purchase and a sale planned for the first and the last day of the year, respectively, the 'balance of Fixed Assets to be used in the projection period' is calculated by adding to the previous year's balance the amount corresponding to the purchase planned in January. With regard to Long-term Debt, there is a principal repayment scheduled for the last day of the year, so the 'debt amount to be used in the projection period' coincides with the opening balance.

This greatly simplifies the calculation of the depreciation cost (which is obtained by dividing the balance used by the number of years in which, by law, the asset can be depreciated; with the information available, we will assume zero residual value for this fixed asset) and the interest cost (which is calculated by applying the corresponding interest rate to the balance used).

The heading identified as '**Non-recurring earnings**' includes in our case the profit or loss that will be obtained on the sale of fixed assets planned for the last day of the forecast period, and is obtained by comparing the estimated selling price with the book value of the asset at that time (which, in turn, is obtained by comparing the purchase price and the accumulated depreciation associated with the asset at the time of sale).

Finally, the **corporate tax cost** is obtained by applying the corresponding tax rate to the taxable base (which, for simplification purposes, we identify with the accounting profit before taxes).

You can see all of the above in Figure 1.

P&L ACCOUNT	**2024**	**2025**	
Sales (goods for resale)	1.000.000	***1.010.000***	***= 1.000.000 x (1+0,01)***
Purchases (goods for resale)	-360.000	***-363.900***	***= - [(360.000 - 0) x (1+0,01) + 300]***
Variation in inventories	0	***300***	***= 30.300 - 30.000***
Wages and salaries	-250.000	***-255.000***	***= -250.000 x (1+0,02)***
Other supplies	-40.000	***-41.200***	***= -40.000 x (1+0,03)***
Rents	-50.000	***-52.000***	***= -50.000 x (1+0,04)***
Depreciation of fixed assets	-100.000	***-105.000***	***= -(2.000.000 + 100.000) / 20***
Interest	-40.000	***-40.000***	***= -0,05 x 800.000***
Non-recurring earnings (fixed assets)	0	***120.000***	***= 720.000 - (1.000.000 - 400.000)***
Corporate tax	-48.000	***-81.960***	***= -0,3 x (273.200)***
NET PROFIT	**112.000**	**191.240**	

Figure 1

2.3. The cash budget

What we are going to reflect here are the **expected collections and payments in the forecast period**. Thus, what is relevant now is not 'fairness', but the actual time at which the corresponding collections and payments occur (regardless of whether or not they are transactions carried out in the projection period).

In our case, a good part of the items shown here will have a figure identical to the one they have in the Income Statement: Wages and salaries will have been paid in full at the end of the year (it will suffice to break down the amounts for Employees, Social Security or the Tax authority, applying the percentages that appear in the Operating Budget); as regards Supplies and Rents, although they are paid in arrears and in advance, respectively, at the end of the year the full amounts appearing in the P&L will have already been settled, as will the Interest.

In addition to the above, there are other outflows whose calculation is also extraordinarily simple: the payment for Corporate Tax to be made in the forecast period corresponds to that which accrued in the previous year (and which appears as pending payment in the Opening Balance Sheet under the corresponding heading); the dividend to be paid is calculated by applying the pay-out (percentage of profit to be distributed in the form of a dividend) shown in the Operating Budget to the profit for the previous year; and the purchase of fixed assets will present the figure also indicated in the aforementioned Operating Budget, while the repayment of Long-Term Debt is obtained by applying the corresponding percentage to the amount of the opening Balance Sheet.

As regards Capital, the collection corresponding to the capital issuance scheduled for the month of June should appear, while no collection associated with the sale of fixed assets will do so, since the operation will be carried out in December, with a three-month deferral in the collection.

As you can see, we have left to the end the only two concepts that present some major difficulty (small, in any case, as you can see): the collection from customers (for recurring Sales) and the payment to suppliers (for Purchases of goods for resale). In both cases, they can be calculated in two different ways:

- **Collections from customers**: Given that, in our case, the Sales are collected in 90 days, in the forecast period the collections will correspond to those made in the last three months of the previous year and which remained pending collection (this is what appears in the opening Balance Sheet under the heading 'Customers') and with the Sales from months 1 to 9 (January to September, both inclusive) which will be collected between months 4 and 12 (April and December; the remainder, i.e., the Sales of October, November and December of the forecast period will remain at the end of the year in the Balance Sheet as pending collection in the Trade Receivables account).
- **Payment to suppliers**: Remember that, according to the Operating Budget, Purchases are paid with a 60-day deferral. What does this mean? That what is purchased in January

is paid in March; what is purchased in February is paid in April; and so on. Thus, in the forecast period, the Purchases of the previous year 'that did not have time to be settled' will be paid (those of the last two months of the year, which appear in the initial Balance Sheet under the heading Suppliers) and the Purchases corresponding to months 1 to 10 (January to October, both inclusive) which will be paid during months 3 to 12 (the rest, i.e. the Purchases of November and December of the forecast period will remain at the end of the year in the Balance Sheet as pending payment under the corresponding heading, Suppliers).

Thus, the calculation of the two figures indicated can be done as follows:

Collections from customers (2025) = Customers (2024) + Sales (2025) / 12 x 9
= 250.000 + 1.010.000 / 12 x 9 = 1.007.500

Payment to suppliers (2025) = Suppliers (2024) + Purchases (2025; January to October)
= 60.000 + 300 + (363.900 – 300) / 12 x 10 = 363.300

As you can see, the calculation of the payment to suppliers has a minor additional difficulty, since in order to obtain the 'normal' payment for months 3 to 12, the effect on Purchases of the stock variation to be incurred in January (the full payment of which is shown separately) must be eliminated. An 'alternative' calculation (closely related to the one proposed) of these amounts may help to better understand the above.

This way, collections from customers can be conceived as 'Forecast sales for the year 2025, adjusted by the amount not collected at the end of the year (final balance of Trade Receivables on the Balance Sheet, which must be subtracted from the previous amount) and by the amount that, being sales of the previous year, will be collected in the forecast horizon (opening balance of the Trade Receivables account on the Balance Sheet, which must be added)':

Collections from customers (2025) = Sales (2025) – Customers (2025) + Customers (2024)
= 1.010.000 – 1.010.000 / 360 x 90 + 250.000 =
= 1.010.000 – 252.500 + 250.000 =
= 1.007.500

If we apply the same logic to suppliers:

Payment to suppliers (2025) = Purchases (2025) – Suppliers (2025) + Suppliers (2024)
= 363.900 – (363.900 – 300) / 360 x 60 + 60.000 =
= 363.900 – 60.600 + 60.000 =
= 363.300

As you can see, here too there is an element that requires minimal explanation (although from a theoretical point of view it is important as it has to do with the relationships between flows and stocks). To calculate the final balance of Suppliers in the Balance Sheet, we must start from the expected 'Cost of goods sold' (Purchases - Increase in stocks) and not from 'Purchases': the reason is that 'what will be outstanding at the end of the year is what will be purchased in the months of November and December'; that is, 'normal' Purchases (not influenced by the stock variation, which will take place in the month of January), so the starting figure, 'what is spread evenly throughout the year and allows us to think about what corresponds to the last 60 days' is the aforementioned Cost of sales.

You can see everything presented in this section in Figure 2.

INFLOWS	-	2025	
Sales (customers)	-	1.007.500	= 1.010.000 + 250.000 – 252.500
Equity Issuances	-	1.000.000	= 1.000.000
Sale of fixed assets	-	0	= 0
TOTAL INFLOWS	-	**2.007.500**	

OUTFLOWS	-	2025	
Purchases (Suppliers)	-	363.300	= 363.900 + 60.000 – 60.600
Workers	-	153.000	= 255.000 x 0,6
Tax authorities for personal Income tax withholdings	-	25.500	= 255.000 x 0,1
Social Security Agencies	-	76.500	= 255.000 x 0,3
Other supplies	-	41.200	= 41.200
Rents	-	52.000	= 52.000
Interest	-	40.000	= 40.000
Corporate tax	-	48.000	= 48.000
Dividends	-	22.400	= 0,20 x 112.000
Purchase of fixed assets	-	100.000	= 100.000
Repayment of long-term debt	-	400.000	= 0,5 x 800.000
TOTAL OUTFLOWS	-	**1.321.900**	

Figure 2

2.4. Forecast balance sheet

Cheer up, it won't be long now! What remains for us now is to present the projected balance sheet for the end of the forecast period (December 2025). And you will be the architect and witness of accounting magic: if we have not made any mistakes so far and we are careful not to do so in the remainder... the assets will have the same value as the liabilities! Ta-ta-ta-ta-chaaaannnnn, as the unforgettable Magician (with capital letters) Tamariz would say. Look.

First of all, remember that what appears in this exciting Financial Statement (the Balance Sheet) are 'stock' variables, i.e., those that refer to a specific moment in time. They are the 'snapshot' of the company's assets and financials as of the date indicated (December 31, 2025; just a few minutes away from the New Year's Eve dinner). And the values that will appear here are explained on the basis of the opening balances, modified by the flows expected throughout the forecast period that have been noted in the two previous Financial Statements (Income Statement and Cash

Budget). If you wish, you can follow the explanation in Figure 3, which shows the two Balance Sheets, the opening and the closing one.

ASSETS	31-XII-2024	31-XII-2025	
Cash & equivalents	50.000	735.600	= 50.000 + 2.007.500 – 1.321.900
Receivables from sale of fixed assets	0	720.000	= 720.000
Customers (trade receivables)	250.000	252.500	= [1.010.000 / 360] x 90
Stocks	30.000	30.300	= 30.000 + 300
Gross fixed assets	2.000.000	1.100.000	= 2.000.000 + 100.000 – 1.000.000
- Accumulated depreciation	-600.000	-305.000	= -600.000 – 105.000 + 400.000
TOTAL ASSETS	**1.730.000**	**2.533.400**	

LIABILITIES	31-XII-2024	31-XII-2025	
Suppliers (trade receivables)	60.000	60.600	= [363.600 / 360] x 60
Corporate tax payable	48.000	81.960	= 81.960
Long-term debt	800.000	400.000	= 800.000 - 400.000
Profit or loss for the year (P&L)	112.000	191.240	= 191.240
Retained earnings (Reserves)	272.000	361.600	= 272.000 + 112.000 x (1 – 0,2)
Share Capital	438.000	1.438.000	= 438.000 + 1.000.000
TOTAL LIABILITIES	**1.730.000**	**2.533.400**	

Figure 3

With respect to **Assets**, closing balances are justified as follows:

- **Cash & equivalents**: It is sufficient to add to the opening balance the collections and payments expected for the period and which were justified in the Cash budget.
- **Receivables from sale of fixed assets**: as you will recall, an asset sale is scheduled for December 31, for an amount of 720.000, which will not be collected until three months later. Therefore, the corresponding amount should appear as receivable in the Balance Sheet.
- **Customers**: according to the Operating Budget, the payment term granted to customers is 90 days, which means that a quarter of the Sales forecast in the P&L (corresponding to the last three months of the forecast year) will not yet have been collected at the end of the year, which justifies the outstanding figure shown in the Balance Sheet; naturally, and as for sure you have already seen, the opening balance has disappeared, it is shown as collected in the Cash Budget together with the part of the Sales for the forecast year that will have been collected in time).
- **Stocks**: do you remember that the ‘Purchases’ heading (in the Income Statement) would show a figure somewhat higher than that required to meet Sales? At the time, we corrected the ‘mistake’ (the difference should not appear as a cost of sales, but as an investment) by

recognizing an income (Variation in inventories), which is what now feeds the opening balance of Inventories.

- **Gross fixed assets**: as you know, the concept reflects the historical cost of the fixed assets held by the company; and you will remember that the opening balance had to be corrected for two operations, a purchase in January, and a sale scheduled for December. Logically, in both cases the relevant figures are the 'historical cost' (the purchase price of the new one; and what it cost to acquire or manufacture the one that is expected to be sold and which is to be written off in December).
- **Accumulated depreciation of fixed assets**. As with any Balance Sheet account, it refers to the 'live' stock at the end of the year; in our case, the opening stock (opening balance) is increased (in absolute value) by the depreciation cost that we have recognized in the Income Statement, and its balance is reduced (in absolute value) by the amount corresponding to the accumulated depreciation associated with the asset sold that will have to be written off in December.

On the **liability side**:

- **Suppliers**. According to the Operating Budget, Purchases are paid with a deferral of 60 days. Therefore, at the end of the year the amount corresponding to the last two months will remain unpaid; as we have indicated in the previous section, the reference to know 'the purchase of a normal day' (understanding by such the one that is not influenced by the purchase of goods for resale that is made with the intention of increasing inventories, and that in our case is made in the month of January) is the annual cost of goods sold that, divided by 360, would indicate us the mentioned daily purchase corresponding to each one of the last days of the year.
- **Corporate tax payable**. At the end of the forecast period, only the amount corresponding to the tax accrued in the forecast period itself (and shown as a cost in the forecast Income Statement) will remain outstanding, since the amount corresponding to the previous year is shown as paid in the Cash Budget.
- **Long-term debt**. Remember my dear reader that in the above-mentioned Cash Budget the amount that, according to the Operating Budget, will be repaid at the end of the year is shown as a payment.
- **Profit or loss for the year**. The balance shown in this account is that which is justified in the Profit and Loss Account. The amount corresponding to the previous year disappears at the beginning of the forecast period, giving up its balance to the accounts 'Dividend payable' (which is settled and therefore disappears during the year; you can see it in the Cash Budget) and 'Retained earnings' (which sees its balance increase by the difference between the profit of the previous year and the amount paid as a dividend).
- **Retained earnings**. As we have just mentioned in the previous point, the opening balance is increased by the part of the 2024 profit that is not distributed in the form of a dividend.

- **Capital**. The opening balance is increased by the amount corresponding to the issuance included in the Operating Budget.

3. IMPACT OF VAT ON THE ANNUAL FORECAST

Let us now analyse the impact that the inclusion of Value Added Tax (VAT) would have on the Operating Budget raised at the beginning of section 2, focusing our attention on the effects that it would have on the different elements that appear in the forecast Financial Statements.

Before starting, it is worth remembering that **VAT is an example of an indirect tax**, the purpose of which is not to tax the income generated by the taxpayer (as in the case of Corporate tax or Personal Income tax) but consumption. Thus, **it is not the company that bears the burden of the tax, but the end consumer**, although the company we are studying, together with all those involved in the value creation process (from the extraction of the first raw materials to the sale of the product to the end consumer), are responsible for the collection and management of the part of the tax related to the value created by each of them.

The **way the tax works** is reasonably simple. Every time the company sells a good or service, it must invoice its customer (whether or not the customer is the final consumer) an amount added to the sale price as VAT: this is what we call 'output VAT'. This amount invoiced (and collected) by the company is not a 'reason for joy' for the company (it is not income), since it is collected 'on behalf of the Tax authority' and must be paid at the end of the settlement period.

In the same way, when another organization or person sells us some good or service, they are also obliged to charge us the corresponding VAT, so the amount of the invoice we receive and pay is higher than what we would be billed in the absence of the tax. Again, the extra money we pay 'is not a reason for sadness' (it does not directly affect our profit and loss account, it is not a cost), since it is an amount 'that we advance on behalf of the final consumer' (who bears the tax) and we will recover it in the tax settlement.

Thus, the effect that the appearance of VAT in the accounting entries would have (remember that we call accounting entry to the operation that we carry out in accounting to reflect the consequences of an economic fact) is the following. If in the absence of VAT, we sell for 100 with deferred payment, the operation would imply a '+' in an account of Customers (assets) and a '+' in a liability account (P&L), in both cases for an amount of 100. But when we include VAT, the Customers account increases, assuming a general rate of 21%, by 121; however, the '+' in the P&L account is maintained (the extra money that we are going to collect 'is not in the end for the company', it will have to be paid to the Tax authority), so that a balance of 21 appears in the liabilities (due) account.

As you can see, **VAT 'does not have a direct impact on the income statement'**, but it does have an effect on the company's cash flow: it causes some receipts and some payments to be higher than in the absence of the tax; assuming that the company creates value, the difference between output VAT and input VAT will generally be positive (we will have overcharged more than we have overpaid in the corresponding invoices), so that the difference will have been paid to the Tax authority.

The tax therefore affects the Cash Budget (increasing some amounts and forcing us to include an additional caption to express our relationship with the Tax authority) and the balance sheet (in which outstanding balances with customers and suppliers will see their balances increase due to the effect of the tax).

Let's see all this in our simple example. The first element of the Operating Budget presented that will be affected is the opening Balance Sheet (the end of the previous year), which will see how some items appear with a higher balance than before (Customers and Suppliers); also, the Cash balance will be different, since we will have collected and paid in the previous year different amounts in part with respect to those that would appear in the absence of the tax. The starting Financial Statements would now be as shown in Figure 4.

In addition to the above, there would be another change in the Operating Budget, the section related to value added tax:

Value added tax. The company's operations are taxed at the general rate (21%). It is settled quarterly in arrears (on the last day of each quarter).

NOTE: The items taxed are Purchases and Sales (both of goods for resale and fixed assets), as well as Other supplies and Rents.

In a first step, we will focus only on the different items affected by the tax, pointing out the new resulting values; in a later step, the complete Financial Statements achieved after the inclusion of the tax will be shown.

P&L ACCOUNT	**2024**
Sales (goods for resale)	1.000.000
Purchases (goods for resale)	-360.000
Variation in inventories	0
Wages and salaries	-250.000
Other supplies	-40.000
Rents	-50.000
Depreciation of fixed assets	-100.000
Interest	-40.000
Corporate tax	-48.000
NET PROFIT	**112.000**

ASSETS	**31-XII-2024**
Cash & equivalents	10.100
Customers (trade receivables)	302.500
Stocks	30.000
Gross fixed assets	2.000.000
- Accumulated depreciation	-600.000
TOTAL ASSETS	**1.742.600**

LIABILITIES	**31-XII-2024**
Suppliers (trade payables)	72.600
Corporate tax payable	48.000
Long-term debt	800.000
Profit or loss for the year (P&L)	112.000
Retained earnings (Reserves)	272.000
Share Capital	438.000
TOTAL LIABILITIES	**1.742.600**

Figure 4

3.1. Forecast income statement

As we have indicated, the appearance of the tax has no **effect on this financial statement**: the VAT is borne by the final consumer, the company acts only as an intermediary between the consumer and the Tax authority (see Figure 5 for a text and numerical explanation of all the figures).

3.2. Cash budget

There are **five elements** of this Financial Statement that **are affected** by the consideration of VAT, to which must be added the **appearance of a new payment concept** (that of the tax itself to be paid to the Tax authority; the complete budget can be seen in Figure 6):

- **Sales Collections**. The amount collected remains conceptually the same, the Sales expected for the forecast period, minus the final balance and plus the opening balance of Customers; all of them affected in this case by VAT (the opening balance of Customers already includes the effect, which will now have to be added to the other two concepts).

  Sales Revenue = 1.010.000 x 1,21 + 302.500 – 1.010.000 x 1,21 / 360 x 90
  = 1.222.100 + 302.500 - 305.525 = 1.219.075

- **Payments for Purchases**. In the same way as in the collections from Customers, we must start from the forecast Purchases, and correct them by adding the balance of Suppliers of the previous year and subtracting that which will be pending payment at the end of the forecast period; now including the effect of VAT (except in the opening balance of Suppliers, which logically appears already increased by the tax).

  Payments for Purchases = 363.900 x 1,21 + 72.600 – 363.600 x 1,21 / 360 x 60
  = 440.319 + 72.600 - 73.326 = 439.593

- **Payments for Other supplies, Rents and Purchase of fixed assets**. We simply include the effect of the tax in the three captions:

  Payments for Other supplies = Cost of Other supplies x (1 + VAT) = 41.200 x 1,21 = 49.852

  Rent Payments = Cost of Rents x (1 + VAT) = 52.000 x 1,21 = 62.920

  Payment for purchase of fixed assets = Purchase price x (1 + VAT) = 100.000 x 1,21 = 121.000

- **Payment to the Tax authority for VAT**. It is obtained by applying the corresponding VAT rate to the tax base:

  Payment to the tax authorities for VAT = VAT rate x Taxable base
  = VAT x (Sales – Purchases – Other supplies – Rents – Purchase FA + Sale FA)
  = 0,21 x (1.010.000 – 363.900 – 41.200 – 52.000 – 100.000 + 720.000)
  = 246.309

3.3. Balance sheet

Only **four items are affected** (see Figure 7 for the complete balance sheet):

- **Cash & equivalents**. As the expected receipts and payments change as a result of the tax, different figures must logically be added to and subtracted from an opening balance that is also different:

  Cash balance = Opening balance + Expected collections - Expected payments
  = 10.100 + 2.219.075 – 1.685.074 = 544.101

- **Customers (trade receivables)**, **Trade receivables for sale of fixed assets** and **Suppliers (trade payables)**. The final balances must now include the effect of VAT.

  Customers (2025) = Sales (2025) x (1 + VAT) / 360 x Collection period (days)
  = 1.010.000 x 1,21 / 360 x 90 = 305.525

  Accounts receivable (2025) = Sale price of fixed assets x (1 + VAT)
  = 720.000 x 1,21 = 871.200

  Suppliers (2025) = Cost of goods sold (2025) x (1 + VAT) / 360 x Payment term (days)
  = 363.600 x 1,21 / 360 x 60 = 73.326

3.4. Resulting Financial Statements

We present here the **complete Financial Statements considering the effect of Value Added Tax**, with the corresponding explanations. We leave it to the interested reader to compare the figures shown here with those that appeared in the previous section.

P&L ACCOUNT	2024	2025	
Sales (goods for resale)	1.000.000	***1.010.000***	***= Sales 2024 x (1 + Δ Sales 2025)***
Purchases (goods for resale)	-360.000	***-363.900***	***= C.O.G.S. 2024 x (1 + Δ C.O.G.S. 2025) + Stock change 2025***
Variation in inventories	0	***300***	***= Desired stocks for 2025 – Stocks 2024***
Wages and salaries	-250.000	***-255.000***	***= Personnel cost 2024 x (1 + Δ Personnel cost 2025)***
Other supplies	-40.000	***-41.200***	***= Other supplies 2024 x (1 + Δ Other supplies 2025)***
Rents	-50.000	***-52.000***	***= Rents 2024 x (1 + Δ Rents 2025)***
Depreciation of fixed assets	-100.000	***-105.000***	***= - [FA 2024 + Purchase FA 2025] / Amort. FA (years)***
Interest	-40.000	***-40.000***	***= -Interest rate 2025 x L/T Debt 2024***
Non-recurring earnings (fixed assets)	0	***120.000***	***= Sale price FA sold – Book value FA sold***
Corporate tax	-48.000	***-81.960***	***= -Tax rate 2025 x Taxable Base 2025***
NET PROFIT	**112.000**	**191.240**	

P&L ACCOUNT	2024	2025	
Sales (goods for resale)	1.000.000	***1.010.000***	***= 1.000.000 x (1+0,01)***
Purchases (goods for resale)	-360.000	***-363.900***	***= - [(360.000 – 0) x (1+0,01) + 300]***
Variation in inventories	0	***300***	***= 30.300 – 30.000***
Wages and salaries	-250.000	***-255.000***	***= -250.000 x (1+0,02)***
Other supplies	-40.000	***-41.200***	***= -40.000 x (1+0,03)***
Rents	-50.000	***-52.000***	***= -50.000 x (1+0,04)***
Depreciation of fixed assets	-100.000	***-105.000***	***= -(2.000.000 + 100.000) / 20***
Interest	-40.000	***-40.000***	***= -0,05 x 800.000***
Non-recurring earnings (fixed assets)	0	***120.000***	***= 720.000 – (1.000.000 – 400.000)***
Corporate tax	-48.000	***-81.960***	***= -0,3 x (273.200)***
NET PROFIT	**112.000**	**191.240**	

Figure 5

INFLOWS	-	2025	
Sales (Customers)	-	*1.219.075*	*= Sales 2025 x (1 + VAT) + Customers 2024 – Customers 2025*
Equity Issuances	-	*1.000.000*	*= Equity issuances 2025*
Sale of fixed assets	-	*0*	*= Sale of fixed assets 2025 to be collected in 2026*
TOTAL INFLOWS	-	**2.219.075**	

OUTFLOWS	-	2025	
Purchases (Suppliers)	-	*439.593*	*= Purchases x (1 + VAT) 2025 + Suppliers 2024 – Suppliers 2025*
Workers	-	*153.000*	*= Personnel cost 2025 x % to Workers*
Tax authorities for personal Income tax withholdings	-	*25.500*	*= Personnel cost 2025 x % to tax authorities for Income tax withholdings*
Social Security Agencies	-	*76.500*	*= Personnel cost 2025 x % to Social Security Agencies*
Other supplies	-	*49.852*	*= Other supplies 2025 x (1+VAT)*
Rents	-	*62.920*	*= Rents 2025 x (1+VAT)*
Interest	-	*40.000*	*= Interest 2025*
Corporate tax	-	*48.000*	*= Tax Authorities for corporate tax 2024*
Value added tax	-	*246.309*	*= VAT rate 2025 x (Sales – Purchases – Other supplies – Rents + Sale price FA sold – Purchase FA) 2025*
Dividends	-	*22.400*	*= Pay-out 2024 x NET PROFIT 2024*
Purchase of fixed assets	-	*121.000*	*= Purchase price of fixed assets 2025 x (1+VAT)*
Repayment of long-term debt	-	*400.000*	*= Repayment of long-term debt 2025*
TOTAL OUTFLOWS	-	**1.685.074**	

INFLOWS	2025	
Sales (Customers)	*1.219.075*	*= 1.010.000 x 1,21 + 302.500 - 305.525*
Equity Issuances	*1.000.000*	*= 1.000.000*
Sale of fixed assets	*0*	*= 0*
TOTAL INFLOWS	**2.219.075**	

OUTFLOWS	2025	
Purchases (Suppliers)	*439.593*	*= 363.900 x 1,21 + 72.600 - 73.326*
Workers	*153.000*	*= 255.000 x 0,6*
Tax authorities for personal income tax withholdings	*25.500*	*= 255.000 x 0,1*
Social Security Agencies	*76.500*	*= 255.000 x 0,3*
Other supplies	*49.852*	*= 41.200 x 1,21*
Rents	*62.920*	*= 52.000 x 1,21*
Interest	*40.000*	*= 40.000*
Corporate tax	*48.000*	*= 48.000*
Value added tax	*246.309*	*= 0,21 x (1.010.000 - 363.900 - 41.200 - 52.000 + 720.000 - 100.000)*
Dividends	*22.400*	*= 0,20 x 112.000*
Purchase of fixed assets	*121.000*	*= 100.000 x 1,21*
Repayment of long-term debt	*400.000*	*= 0,5 x 800.000*
TOTAL OUTFLOWS	**1.685.074**	

Figure 6

ASSETS	31-XII-2024	31-XII-2025	
Cash & equivalents	10.100	544.101	= Cash 2024 + TOTAL INFLOWS 2025 - TOTAL OUTFLOWS 2025
Receivables from sale of fixed assets	0	871.200	= Sale price FA sold 2025 x (1+VAT)
Customers (trade receivables)	302.500	305.525	= [Sales 2025 x (1+VAT) / 360] x Collection term for sales 2025 (days)
Stocks	30.000	30.300	= Inventories 2024 + Increase in inventories 2025
Gross fixed assets	2.000.000	1.100.000	= Gross fixed assets 2024 + Purchase of fixed assets 2025 - Purchase price FA sold 2025
- Accumulated depreciation	-600.000	-305.000	= - Accumulated depreciation 2024 - Depreciation 2025 + Accumulated depreciation FA sold 2025
TOTAL ASSETS	**1.742.600**	**2.546.126**	

LIABILITIES	31-XII-2024	31-XII-2025	
Suppliers (trade payables)	72.600	73.326	= [C.O.G.S. 2025 x (1+VAT) / 360] x Payment term 2025 (days)
Corporate tax payable	48.000	81.960	= Corporate tax 2025
Long-term debt	800.000	400.000	= Long-term debt 2024 - Repayment of long-term debt 2025
Profit or loss for the year (P&L)	112.000	191.240	= NET PROFIT 2025
Retained earnings (Reserves)	272.000	361.600	= Reserves 2024 + NET PROFIT 2024 x (1 - Pay-out 2024)
Share Capital	438.000	1.438.000	= Capital 2024 + Capital Issuance 2025
TOTAL LIABILITIES	**1.742.600**	**2.546.126**	

ASSETS	31-XII-2024	31-XII-2025	
Cash & equivalents	10.100	544.101	= 10.100 + 2.219.075 - 1.685.074
Receivables from sale of fixed assets	0	871.200	= 720.000 x 1,21
Customers (trade receivables)	302.500	305.525	= [1.010.000 x 1,21 / 360] x 90
Stocks	30.000	30.300	= 30.000 + 300
Gross fixed assets	2.000.000	1.100.000	= 2.000.000 + 100.000 - 1.000.000
- Accumulated depreciation	-600.000	-305.000	= -600.000 - 105.000 + 400.000
TOTAL ASSETS	**1.742.600**	**2.546.126**	

LIABILITIES	31-XII-2024	31-XII-2025	
Suppliers (trade payables)	72.600	73.326	= [363.600 x 1,21 / 360] x 60
Corporate tax payable	48.000	81.960	= 81.960
Long-term debt	800.000	400.000	= 800.000 - 400.000
Profit or loss for the year (P&L)	112.000	191.240	= 191.240
Retained earnings (Reserves)	272.000	361.600	= 272.000 + 112.000 x (1 – 0,2)
Share Capital	438.000	1.438.000	= 438.000 + 1.000.000
TOTAL LIABILITIES	**1.742.600**	**2.546.126**	

Figure 7

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RECOMMENDED SPREADSHEETS

SANTIBÁÑEZ, J. (2023): 'Proyección y análisis financiero'. Registered as a computer program in the *Intellectual Property Registry* under the name 'APLICACIÓN EXCEL PARA LA ADQUISICIÓN DE COMPETENCIAS RELACIONADAS CON LA PROYECCIÓN FINANCIERA Y EL ANÁLISIS DE ESTADOS FINANCIEROS (MEDIANTE EL ESTUDIO DEL FLUJO DE FONDOS Y LOS RATIOS)', Registration Number 01 / 2024 / 258, effective from 19-9-2023. Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx.

A (GENTLE) INTRODUCTION TO CASH FLOW STATEMENTS

Javier Santibáñez Grúber *

INTRODUCTION

The Cash flow Statement (also called the 'Statement of Sources and Uses of Funds' or 'Statement of Source and Application of Funds') is the financial statement that **explains how one goes from an opening balance sheet to a closing balance sheet**. Ultimately, it is nothing more than the finding that, assuming appropriately balanced opening and closing balance sheets, the increases that have occurred on the assets side (increase in uses) have no choice but to coincide with those detected on the liabilities side (increase in sources). The differences between the **various possible models** depend exclusively on how we 'group' the aforementioned increases, which in turn is related to the objective and/or target of the analysis.

Thus, and if you remember that the balance sheet is always a 'picture' of the company's assets and financial position (it shows what it has -assets, uses of funds- and how it is possible to have it -liabilities, sources of funds-), the Financial Statement that we are now studying 'tells us' what happened between the two photos, 'puts the film' between them, somehow converts the original information (which is expressed in terms of stocks) into flows.

In view of the definition presented, it is clear that the minimum information necessary to draw up a Cash flow Statement consists of two balance sheets; although if we wish to study the company's activity in greater depth, we must also have additional relevant information, which explains an important part of what happened between the two moments considered: we are referring, naturally, to the Income Statement for the period between the two balance sheets.

Of all the existing possibilities, we will focus our attention on **two models**: **the one proposed by the current Spanish General Accounting Plan** (whose presentation is not mandatory for small companies) **and an improved model**[7], which is highly consistent with the previous one, but which has significant advantages in terms of its use as a tool for calculating the so-called 'Free cash-flows' that are usually used for making financial decisions (investment and financing) and for the valuation of assets and companies with the discounted cash flow technique. But, as always, let's slow down.

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[7] Taken from the book *Elementos de Finanzas Corporativas*, by Fernando Gómez-Bezares, Desclée de Brouwer, Bilbao, 2012.

As I suppose that you have enjoyed (quite a lot) the previous reading of the (interesting) 'A (gentle) introduction to accounting', I have no doubt that you are in a position to interpret the following Financial Statements, relating to the events of the last year (figure 1). You may think that the example is a bit of a cheat, since these are very simple annual accounts... but, in reality, their simplicity has fundamentally to do with a previous effort of understanding that someone has made when presenting them: what we want is to start from a situation sufficiently close to reality, but suitably simplified, that allows us to focus on what is important, dispensing with details that do not contribute to the understanding of the main concepts.

ASSETS	Opening	Closing
Cash & equivalents	300.000	310.000
Customers (trade receivables)	300.000	500.000
Stock	100.000	110.000
Net Property, Plants and Equipment	1.000.000	1.900.000
TOTAL ASSETS	1.700.000	2.820.000

LIABILITIES	Opening	Closing
Suppliers (trade payables)	200.000	250.000
Long-Term Debt	400.000	800.000
Net Profit	100.000	270.000
Reserves (Retained earnings)	0	100.000
Share Capital	1.000.000	1.400.000
TOTAL LIABILITIES	1.700.000	2.820.000

	Item	Amount
+	Sales (S)	2.000.000
–	Operating costs (cash charge) (C)	-1.500.000
–	Depreciation and Amortization (AM)	-100.000
–	Interest (I)	-40.000
=	**Profit before tax (=tax base)**	360.000
–	Corporate Tax (CT)	-90.000
=	**Net Profit (NP)**	270.000

Figure 1

I now encourage you to try to interpret and extract what information you can from the 'story' presented. Before reading what follows, try to deduce 'as much as you can about what happened between the two balances'; you will see that, even with such compressed information, you will be able to say a lot of things (and you will also be able to ask some interesting questions). After you have made the effort, continue with the (enjoyable) reading that follows.

The proposed reflection could be materialized in the answer to some questions:

- Is the company in equilibrium?
- Was it a good year?
- Do we have reason to believe that the company is young or old (mature)?
- Related to the above, is it in the process of growth?
- Again, related to the previous question, has the business been able to generate all the money it needed?
- Has it paid dividends in the last year?
- Going into more detail, what are the average collection and payment terms? what is the company's safety stock management policy? what has been the investment made in fixed assets? what is the tax rate borne by the business? what interest rate is paid for the use of long-term debt? how long do the fixed assets used by the company 'last'?

If you have read the collection of questions before doing the proposed reflection, you may be a little surprised at the amount of information that is contained in such seemingly simple Financial Statements... it is the magic of Accountings! Let's try to answer the questions in an orderly fashion.

The answer to the first question seems simple: **the company is in equilibrium**, since 'the sum of assets coincides with the sum of liabilities'. But, as you can guess, not all equilibria are equally desirable: a company in receivership (or even bankruptcy) is in equilibrium (it is also true that the value of assets coincides with the value of liabilities), even if the situation does not seem exactly desirable.

As to whether the last year 'has been a good year', there are indications to think that 'it has not been bad': **the profit obtained is almost three times that of the previous year**, and represents a **return for the shareholder of close to 25%** (which results from dividing the result obtained, 270.000, by the initial balance of shareholders' equity, 1.100.000; this is what is usually called '*Return on Equity*'). It does not seem, at present, a bad return (the document is written at a time when one-year interest rates are around 4%), although we lack information on the type of activity carried out by the company and the risk involved, all of which is relevant when judging the quality of the data obtained.

As to whether it is a 'young' or 'mature' company, in view of the fact that the initial value of the Reserves (Retained earnings) is zero and that important investments are being made (which we will discuss in greater detail later), **everything points to the fact that it is a young company**, which is taking its first steps in this complex world in which we live.

On the one hand, fixed assets have practically doubled, the balance going from the initial million to the final value of 1.900.000; bearing in mind that, in the absence of investments, the final balance would be 900.000 (in view of the amount appearing in the Income Statement, in the section corresponding to Depreciation, 100.000), it is reasonable to think that fixed assets have been purchased for a value of 1.000.000, a figure identical to the initial value, which means doubling this amount. Of course, there could have been some sale of fixed assets, but there is no reference in the Income Statement to any profit or loss related to this type of operation, which leads us to believe that there have been no write-offs in the balance sheet in this item.

The evolution of the balance of the Income Statement also points to solid growth: profit has increased by 170%, and this is accompanied by significant increases in working capital directly related to the activity: outstanding balances receivable (Customers) and payable (Suppliers) have grown, as well as those corresponding to Inventories, and even Cash and Cash Equivalents.

As to whether the business has been able to generate all the money it needed, the answer seems clear: no. **The balance noted above has only been possible with the help of external fund providers**, who have contributed significant amounts of money: shareholders have had to provide an additional 40% of the initial balance, while long-term lenders have doubled their contribution (which was not small: in the opening Balance Sheet, long-term debt was financing about 25% of total assets); significant contributions, amounting to a total of 800.000 euros (almost half the total value of the initial assets), compatible with a very low increase in cash. In other words, the increase in the necessary investments, in fixed assets and working capital, has required external sources of funds, in addition to self-financing (Profits and Retained earnings).

As regards whether or **not** the company has paid **dividends**, the answer again seems clear: no. The reason for this is the fact that the increase recorded in the Reserves account coincides exactly with the Profit corresponding to the previous year (which is written off).

Let us now move on to answer the collection of questions that, in reality, have to do with the description of the ‘usual’ business operations. We will try to answer all of them from a purely intuitive point of view, a more formal approach can be found in the reading on Ratio Analysis.

As for the **collection and payment terms**, to get an idea of the ‘average’ data, we must relate, in each case, a flow with a stock. If we start with the Customers, the balance that we observe in the balance sheet at the end of the year is the part of the Sales amount that appears in the Income Statement (flow for the year) ‘that has not been collected in time’. Therefore, if we assume that there are no seasonalities (i.e. the same activity is carried out every day of the year) and disregarding here the possible effects of VAT, the calculation of the payment period granted is the answer to the question: how long does it take us to sell an amount equivalent to the final uncollected balance if it takes 360 days to sell the total figure appearing in the Income Statement? The answer is given by the following operation: Final Customer Balance / Sales accrued in the year x 360 = 500.000 / 2.000.000 x 360 = 90 days.

If we now repeat the process, relating the balance of Suppliers to the amount of Operating Costs (cash charge; which implies assuming that Interest and Corporate Tax have not left a trace in the balance sheet at the end of the year, i.e., that they have already been settled), we find that the average payment term to suppliers would be 60 days (Suppliers / Operating Costs with cash impact x 360 = 250.000 / 1.500.000 x 360).

As far **as the inventory management policy is concerned**, the truth is that, with the information available, we cannot answer the question posed. If we assume, for example, that we are informed that the Cost of Sales (included in the total amount of Operating Costs with cash impact) is 1.320.000, we could calculate how long we would be able to withstand a cut in supply without impacting the activity: indeed, we can ask ourselves how long it would take to consume a value of 110.000 (final balance of the Inventory account) if in 360 days we consume a total of 1.320.000? The answer in this case would be 30 days (110.000 / 1.320.000 x 360).

The question relating to the **investment in fixed assets** has been answered above, everything indicates that such investment was 1.000.000 (which results from assuming that there have been no sales in this chapter, so the figure is explained by subtracting from the final balance of net fixed assets the initial balance, to which must be added the depreciation made in the period, 1.900.000 – 1.000.000 + 100.000).

As regards the **tax rate borne** by the business in the last accounting year (which we will call 't'), the calculation is again simple. Remember that the cost for corporate tax is obtained by applying the tax rate (which is what we want to know now) to the taxable income:

$$Corporate\ tax = Corporate\ tax\ rate\ x\ Tax\ base$$

Therefore, it is sufficient to clear in the above equation the corresponding tax rate: in our case, t = 90.000 / 360.000 = 0,25 (i.e. 25%).

Finally, to answer the questions relating to the **cost of debt** and the '**depreciation policy**' practiced, it is again sufficient to relate, in each case, a flow with a stock. As far as the cost of debt is concerned, and always assuming that the interest that we see in the income statement is the return on the long-term debt, the calculation to be made is 40.000 / 400.000 = 0,1, 10% -the operation assumes that the balance used throughout the year is the initial one, i.e. that the debt injection has occurred at the end of the year; if we assume the opposite, i.e. that the debt issuance occurs on the first day, the cost would be half; these are the limitations of the analysis performed 'from the outside', with incomplete information-). Something similar happens with the depreciation policy: if we assume that the balance of fixed assets that has been used during the year is the initial one, the average depreciation period would be 10 years (100.000 / 1.000.000 is 10%, so 'it would take ten years to depreciate it completely'); whereas if we assume that the investment is made at the beginning of the period (on the first day), the depreciation period would change to 20 years (the result of calculating the inverse of dividing the 100.000 depreciated by the 2.000.000 used in this case).

Having analysed 'the things that have happened' during the year from a purely intuitive point of view, let us try to 'systematize this view'. To do so, we will propose two models for the Cash flow Statement: both take as their starting point the calculations shown in Figure 2, which shows the 'heart' of any possible model, and perform the analysis from a typically financial perspective (with the emphasis on cash).

ASSETS	Opening	Closing	Δ = Uses
Cash & equivalents	300.000	310.000	10.000
Customers (trade receivables)	300.000	500.000	200.000
Stock	100.000	110.000	10.000
Net Property, Plants and Equipment	1.000.000	1.900.000	900.000
TOTAL ASSETS	1.700.000	2.820.000	1.120.000

LIABILITIES	Opening	Closing	Δ = Sources
Suppliers (trade payables)	200.000	250.000	50.000
Long-Term Debt	400.000	800.000	400.000
Net Profit	100.000	270.000	170.000
Reserves (Retained earnings)	0	100.000	100.000
Share Capital	1.000.000	1.400.000	400.000
TOTAL LIABILITIES	1.700.000	2.820.000	1.120.000

Figure 2

THE CASH FLOW STATEMENT (SGAP-2007)

Let's start by studying the model proposed by the current Spanish General Accounting Plan (hereafter, CFS). Let's try to look at it from the most intuitive point of view possible.

What this model proposes is to **relate two** particularly important **flows** produced throughout the period: the starting point is **the net profit** obtained (which 'looks' at what happened from the accounting point of view, conditioned by the 'true and fair view' -in turn related to the 'fairness' in the time allocation of income and expenses-); and the end point is **the cash flow** (which is a summary of what happened in the same period from the perspective of the impact on cash caused by the various events that occurred).

Some preliminary reflections: since the last column of Figure 2 does not show the Profit for the year (the real flow produced in the year), but the increase recorded with respect to the previous one, let us try to **'find' the mentioned Profit** among the available information. It is easy, just think about what justifies the increase detected in Retained earnings.

Indeed, the simplest explanation for the increase in the Reserves account is as follows:

$$\Delta Reserves = Net\ Profit_{n-1} - Dividend\ payed$$

Since, on the other hand, the increase in profit that appears in the last column of Figure 2 is the difference between the final and initial balances, it is sufficient to add the increase in Net Profit and the increase in Reserves to 'show' the Net Profit for the year (corrected by the Dividend paid), which is what we wanted to achieve:

$$\Delta NP + \Delta Reserves = (NP_n - NP_{n-1}) + (NP_{n-1} - Dividend) = NP_n - Dividend$$

On the other hand, the increase in fixed assets can be seen in the following way: if I want to explain how to go from the initial balance to the final balance in this concept (ΔFA), I must add the investments made (which we will call CFI) and subtract the depreciations made during the year (AM) and, if applicable, the book value of the fixed assets sold (BV; which in our case we have assumed to be zero, so we will disregard this element in what follows):

$$\Delta FA = CFI - AM$$

Finally, let us define an **interesting concept, Operating Working Capital (OWC)**, which is similar to Working Capital (the difference between Current Assets and Current Liabilities), but considering only the working capital related to business operations, disregarding the purely 'financial' accounts. In our case, the only strictly financial item in relation to working capital is precisely Cash, so that (still in our example), the 'Operating Working Capital' coincides with the 'Working Capital regardless of cash'.

If we consider all the above, it is very easy to get from the last column of figure 2 to figure 3.

	Δ Uses	Amount
	Δ Cash & equivalents	10.000
ΔCustomers + ΔStock – ΔSuppliers =	Increase in OWC	160.000
ΔNet Fixed Assets	Cash flow from Investing activities (CFI)	1.000.000
	- Depreciation and Amortization (AM)	-100.000
	TOTAL Δ Uses	**1.070.000**

	Δ Sources	Amount
	Δ Long-term Debt	400.000
ΔNP + ΔReserves	Net Profit	270.000
	- Dividend	0
	Δ Share Capital	400.000
	TOTAL Δ Sources	**1.070.000**

Figure 3

One last operation: let's move 'everything that appears on the uses side' (except for the increase in Cash, which is what we want to explain, the destination point) to the sources side (naturally, with the sign changed), rearranging some concepts: you can see all this in Figure 4.

Cash Flow Statement (SGAP-2007)	Sources	Amount
Operating Cash Flow	+ Net Profit (NP=S-C-AM-I-CT)	270.000
	+ Depreciation and Amortization (AM)	100.000
	- Increase in OWC	-160.000
Net Cash Flow from Investing activities	- Cash flow from Investing activities (CFI)	-1.000.000
Net Cash Flow from Financing activities	+ Δ Long-term Debt	400.000
	+ Δ Share Capital	400.000
	- Dividend	0
	Total Sources	10.000

Uses	Amount
Δ Cash & equivalents	10.000
Total Uses	10.000

Figure 4

The **interpretation of what is shown in the aforementioned figure 4** is reasonably simple, and **involves changing 'the way of looking at the events that occurred in the period under study'**, from the accounting perspective (true and fair view, which takes the form of the profit obtained) to the financial perspective (cash flow): Thus, the net profit is influenced by the 'accrual' principle (which requires comparing income and expenses, which do not necessarily coincide with receipts and payments) and by the logical 'correlation of income and expenses' (which requires considering costs such as the depreciation of fixed assets, necessary to obtain the profit, but which do not have a direct impact on Cash). These two problems are solved by making **two simple corrections** (both are shown in Figure 4):

- **The sum of the depreciation charged**, which means eliminating the distortion caused by a cost that has no cash impact (but after considering its tax effect, which does affect the company's cash flow).

- **The subtraction of the necessary investment in Operating working capital**, which overcomes the problems posed by the accrual principle (by correcting Sales with the variation produced in Customer accounts; and Operating Costs with cash impact with the increase recorded in Supplier accounts); and which also corrects the costs incurred, adding the investment in Inventories that the activity has made it necessary to make[8].

[8] The explanation is relatively simple. Using the nomenclature described above:

$$\begin{aligned} NP + AM - \Delta OWC &= S - C - I - CT - (\Delta Customers + \Delta Stock - \Delta Suppliers) \\ &= (S - \Delta Customers) - (C - \Delta Suppliers) - \Delta Stock - I - CT \end{aligned}$$

The proposed corrections lead to what is known as '**Operating Cash Flow**', the interpretation of which would be the cash 'obtained' as a result of the performance of the company's recurring activities; in fact, it would be the increase in cash recorded in the absence of operations other than those considered so far.

But the above must in turn be corrected for the investments in fixed assets that the business may have required: this is what appears in the '**Net Cash Flow from Investing activities**' section, which is subtracted (with its sign) from the Operating Cash Flow. At this point, we would have what some call the '**Self-financing surplus**', i.e. the cash generated by the performance of activities (recurring and non-recurring), without considering the impact on cash that may have occurred in our relationship with external providers of funds (lenders and shareholders).

It is precisely this last element that is considered in the last correction: in addition to the above operating and investment cash flows, we must add (with its sign) the cash impact caused by our relationship with financial debt providers and shareholders (this is the so-called '**Net Cash Flow from Financing activities**').

Before moving on to the next section, **let's complicate things a little** (very little, don't worry), so that the **connection with the alternative model** that we will propose in it will be simpler. **Let us** now **consider** the possibility **that the company has sold some fixed assets and has also paid a Dividend** in the last year, giving rise to alternative accounts to those presented and shown in Figure 5.

ASSETS	Opening	Closing
Cash & equivalents	300.000	315.000
Customers (trade receivables)	300.000	500.000
Stock	100.000	110.000
Net Property, Plants and Equipment	1.000.000	1.600.000
TOTAL ASSETS	1.700.000	2.525.000

LIABILITIES	Opening	Closing
Suppliers (trade payables)	200.000	250.000
Long-term Debt	400.000	560.000
Net Profit	100.000	345.000
Reserves (Retained earnings)	0	70.000
Share Capital	1.000.000	1.300.000
TOTAL LIABILITIES	1.700.000	2.525.000

expression in which, as you can see, depreciation of fixed assets no longer appears; sales and operating costs (determined on accrual basis) are now corrected by the amounts not collected and not paid (final balances of Customers and Suppliers) and by the amounts collected and paid in the year, but accrued in the previous one (opening balances of Customers and Suppliers); and the increase in Inventories, which is not included in cost of sales (accrued cost), but affects cash, also appears as use.

	Item	Amount
+	Sales (S)	2.000.000
-	Operating costs (cash charge) (C)	-1.500.000
-	Depreciation and Amortization (AM)	-100.000
-	Interest (I)	-40.000
+	Non-recurring Earnings Before taxes (NREBT)	100.000
=	**Profit before tax**	460.000
-	Corporate tax (25%) (CT)	-115.000
=	**Net Profit (NP)**	345.000

Figure 5

What has changed in relation to the previous example (apart from the fact that some specific figures relating to Debt and Capital issues, necessary to maintain the balance, have changed, logically, in an attempt to keep the Cash figure in a similar range to the initial one -which, in any case, you will have seen that it is quite high-)?

The answer is, once again, reasonably simple. From a conceptual point of view, in this case the change in the fixed asset balance is explained not only by the purchase of new assets and the subtraction of the depreciated amount, now the book value (BV) of the fixed assets sold in the year must also be written off:

$$\Delta FA = CFI - AM - BV$$

We can now present the 'general design' of the new Cash flow Statement, the starting point, in Figure 6.

ASSETS	Opening	Closing	Δ = Uses
Cash & equivalents	300.000	315.000	15.000
Customers (trade receivables)	300.000	500.000	200.000
Stock	100.000	110.000	10.000
Net Property, Plants and Equipment	1.000.000	1.600.000	600.000
TOTAL ASSETS	1.700.000	2.525.000	825.000

LIABILITIES	Opening	Closing	Δ = Sources
Suppliers (trade payables)	200.000	250.000	50.000
Long-term Debt	400.000	560.000	160.000
Net Profit	100.000	345.000	245.000
Reserves (Retained earnings)	0	70.000	70.000
Share Capital	1.000.000	1.300.000	300.000
TOTAL LIABILITIES	1.700.000	2.525.000	825.000

Figure 6

And we can also redo some of the figures and reorder the sources and uses of funds (last column of Figure 6) as follows (Figure 7).

	Δ Uses	Amount
	Δ Cash & equivalents	15.000
ΔCustomers + ΔStock – ΔSuppliers =	Increase in OWC	160.000
ΔNet Fixed Assets	Net Investment in fixed assets (CFI - BV)	700.000
	- Depreciation and Amortization (AM)	-100.000
	TOTAL Δ Uses	**775.000**

	Δ Sources	Amount
	Δ Long-term Debt	160.000
ΔNP + ΔReserves	Net Profit	345.000
	- Dividend	-30.000
	Δ Share Capital	300.000
	TOTAL Δ Sources	**775.000**

Figure 7

If we again clear the increase in Cash and cash equivalents and rearrange some elements, we arrive at figure 8[9]. Note that the Net Cash Flow from Investing activities reflects now the net result of investing (1.000.000) and writing off the Book Value of fixed assets sold (if we take for granted the investment of one million euros, the data would be compatible, for example, with having sold for 400.000 euros a fixed asset valued at that time at 300.000).

AN IMPROVED MODEL OF THE CASH FLOW STATEMENT

There are some elements that can be improved in the previous approach, if we want to have not only a tool that allows us to study the way in which the economic-financial equilibrium of the company has been produced in a specific year, but also a methodology for calculating the cash flows associated, on the one hand, with investment decisions and, on the other, with those that have to do with the relationship between the company and external providers of funds. It is enough to make a couple of very simple changes to the data presented in Figure 8:

[9] In fact, the Cash flow Statement of the Spanish General Accounting Plan presents small formal differences with respect to what appears in the figure. Beyond the method of calculation of some intermediate figures that justify the balance of the Operating Cash Flow, the main difference lies in the fact that the non-recurring profit from the sale of fixed assets does not appear in that section, but does so as a source in the Net Cash Flow from Investing activities (reducing, together with the book value of the asset sold, the acquisition of fixed assets made); although its tax effect remains in the former.

Cash Flow Statement (SGAP-2007)	Sources	Amount
Operating Cash Flow	+ Net Profit (NP=S-C-AM-I+NREBT-CT)	345.000
	+ Depreciation and Amortization (AM)	100.000
	- Increase in OWC	-160.000
Net Cash Flow from Investing activities	- Net Investment in fixed assets (CFI - BV)	-700.000
Net Cash Flow from Financing activities	+ Δ Long-term Debt	160.000
	+ Δ Share Capital	300.000
	- Dividend	-30.000
	Total Sources	15.000

Uses	Amount
Δ Cash & equivalents	15.000
Total Uses	15.000

Figure 8

- Firstly, and this is **the most important change from a conceptual point of view**, we are going to **break down the concept of Net Profit into three different elements**, all of which are related to what happened in the year, but which have to do with 'very different things'. Indeed, remember that:

$$NP = (S - C - AM - I + NREBT)\ x\ (1 - t)$$

We can decompose the above expression into three elements:

$$NP = (S - C - AM)\ x\ (1 - t) - I\ \ x\ (1 - t) + NREBT\ x\ (1 - t)$$

$$NP = EBIAT - I\ \ x\ (1 - t) + NREAT$$

The first element (EBIAT, Earnings Before Interest and After Taxes) tells us about the result of recurring operations (net of taxes and considering, not the taxes accrued, but those that would have been borne in the absence of non-recurring operations and Interest); the second, I x (1–t) (Interest net of taxes), indicates the incremental cost to the company of using borrowed funds (incremental in the sense that it takes into account the tax savings associated with the payment of interest); and the third, NREAT (Non-recurring earnings after Taxes), indicates the contribution of non-recurring operations (always without taking into account any aspect related to the financing of the business).

- On the other hand, **let us assume that the increase in Cash observed** at the end of the year '**is as necessary as the increase in Customers or Stocks**', so that this figure loses relative interest in the analysis. It is no longer a question of explaining how the increase in cash has been achieved, but of seeing how the balance has been possible in terms of the cash movements that have occurred as a result of the asset transactions and the relationship between the company and the external providers of funds.

Let us introduce the proposed changes in the information shown in Figure 8. For the moment, we will make only three changes: to present the broken-down components of Net Profit; to show separately the investment in fixed assets and the book value of the asset sold (assuming the book value assumption we used at the end of the previous section); and to move the increase in Cash and Cash Equivalents from the use side to the source side (so that **the ΔOWC now becomes ΔWC**). See Figure 9.

Cash Flow Statement (SGAP-2007)	Concept	Amount	
Operating Cash Flow	+ EBIAT = EBIT x (1 – t)	300.000	
	- I x (1 – t)	- 30.000	= NP
	+ NREAT = NREBT x (1 – t)	75.000	
	+ Depreciation and Amortization (AM)	100.000	
	- Increase in WC (ΔWC = ΔOWC + ΔCash & equivalents)	-175.000	
Net Cash Flow from Investing activities	- Cash flow from Investing activities (CFI)	-1.000.000	= - (CFI – BV)
	+ Book value of fixed assets sold (BV)	300.000	
Net Cash Flow from Financing activities	+ Δ Long-term Debt	160.000	
	+ Δ Share Capital	300.000	
	- Dividend	-30.000	
	Total	0	

Figure 9

All that remains is to **regroup certain terms and name the various concepts involved**: EBIAT will appear together with Depreciation, giving rise to FFO (Fund flow from operating activities); NREAT and Book Value of Fixed Assets Sold (the sum of which forms FFNR, Fund flow from non-recurring activities) are also presented together; Interest net of taxes and changes in Long-Term Debt are shown together, giving rise to the concept of FCFLTD (Free cash flow to the long-term debt); and the change in Capital and the payment of Dividends, which make up FCFE (Free cash flow to the Equity), are also presented together. You can see all this in Figure 10.

What are the **advantages of this new scheme**? They lie fundamentally in the clear interpretation that the different elements involved now have and that allow for a completely separate analysis of assets and liabilities:

- **Free Cash Flow to the Firm (FCFF)** can be read as ‘the cash generated by the asset after all its needs have been met’. Indeed, FFO and FFNR are the amounts generated by recurring and non-recurring operations (net of taxes); and the investments in working capital and fixed assets reflect the needs that the business has raised in each of the two headings. Note that now interest and the tax effect caused by its payment (which in the previous scheme were included in the Operating Cash Flow) disappear from here and only the information directly related to the operation of the business remains (without considering any aspect related to how it is financed).

- **Free Cash Flow to the Long-Term Debt (FCFLTD)** indicates the flow of funds that has occurred between the company and lenders in the long term; and the figure is stated in strict terms of decision variability, in the sense that the tax effect associated with the payment of interest has been assigned to the one who causes it (the use of borrowed funds).

- Finally, **Free Cash Flow to the Equity (FCFE)** shows the cash impact of our relationship with shareholders: the difference between the funds requested (through recourse to capital increases) and the payment of dividends.

Improved model of Cash Flow Statement	Concept	Amount
Free Cash Flow to the Firm (FCFF)	+ FFO = EBIAT + AM	400.000
	+ FFNR = NREAT + BV	375.000
	- Increase in WC	-175.000
	- Cash flow from Investing activities (CFI)	-1.000.000
Free Cash Flow to the Long-term Debt (FCFLTD)	+ Δ Long-term Debt	160.000
	– I x (1 – t)	-30.000
Free Cash Flow to the Equity (FCFE)	+ Δ Share Capital	300.000
	– Dividend	-30.000
FCFF + FCFLTD + FCFE	Total	0

Figure 10

In our case, and as you can see, the asset has generated (Free Cash-flow to the Firm) an amount equal to -400.000 (i.e. it has not been able to 'produce' all the money it needed) and it has been the long-term lenders (with a net contribution equal to FCFLTD = 130.000 euros) and the shareholders (who have put in the missing 270.000 euros) who have made it possible to balance the business.

The importance of the proposed model is greater than it may seem, insofar as, as we have indicated above, it not only serves as a tool for analysing the economic-financial equilibrium of the company in a specific year, but also **makes it possible to define the methodology for calculating the flows relating to assets and liabilities** with which investment and financing decisions are made and companies are valued (using the discounted cash flow method).

Two Appendices are provided below: the first shows the complete original Cash flow Statement proposed by Fernando Gómez-Bezares that inspires this section; the second presents a simple exercise of calculation and analysis of sources and uses of funds taken from the Excel sheet 'Proyección y análisis financiero', a translated version of which can be downloaded free of charge at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx.

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RECOMMENDED SPREADSHEETS

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APPENDIX I

Original model of Cash flow Statement taken from the book *Elementos de Finanzas Corporativas*, by Fernando Gómez-Bezares, Desclée de Brouwer, Bilbao, 2012.

		$+ S_t$	Sales
		$- C_t$	Operating Costs (cash charge)
		$- AM_t$	Depreciation and Amortization (non-cash charge)
		$= EBIT_t$	Earnings Before Interest and Taxes
		x (1–t)	Taxation (t = Corporate Tax rate)
		$= EBIAT_t$	Earnings Before Interest and After Taxes
		$+ AM_t$	Depreciation and Amortization (non-cash charge)
	$+ FFO_t$		Fund Flow from Operating activities
		$+ NRS_t$	Non-Recurring Sales
		$- BV_t$	Book Value of Fixed Assets sold
		$= NREBT_t$	Non-Recurring Earnings Before Taxes
		x (1–t)	Taxation
		$= NREAT_t$	Non-Recurring Earnings After Taxes
		$+ BV_t$	Book Value of Fixed Assets sold
	$+ FFNR_t$		Fund Flow from Non-Recurring Activities
		$+ CA_0$	Opening Current Assets
		$- CL_0$	Opening Current Liabilities
		$- CA_n$	Closing Current Assets
		$+ CL_n$	Closing Current Liabilities
	$- \Delta WC_t$		Increase in Working Capital
	$- CFI_t$		Cash Flow from Investing Activities
$+ FCFF_t$			(Long-Term) Free Cash-Flow to the Firm
	$+ LTDI_t$		Long-Term Debt Issuances
	$- LTDR_t$		Long-Term Debt Repayments
		$+ I_t$	Interest on Long-Term Debt
		x (1–t)	Taxation
	$- (1-t) \times I_t$		Net cost of Long-Term Debt
$+ FCFLTD_t$			Free Cash-Flow to the Long-Term Debt
	$+ EI_t$		Equity Issuances
	$- ER_t$		Equity Redemptions
	$- D_t$		Dividend
$+ FCFE_t$			Free Cash-Flow to the Equity
= 0	= 0		

APPENDIX II

Company X presents, as of December 31, 2024, the financial statements for the last two accounting years:

Income statement		
P&L ACCOUNT	**2023**	**2024**
Sales (goods for resale)	5.000.000	6.000.000
Purchases (goods for resale)	-4.000.000	-5.266.667
Variation in inventories	0	466.667
Wages and salaries	-120.000	-124.800
Other supplies	-72.000	-75.600
Rents	-48.000	-48.960
Depreciation of fixed assets	-360.000	-365.000
Interest	-129.600	-129.600
Non-recurring profit (fixed assets)	0	6.000
Corporate tax	-81.120	-138.612
NET PROFIT	**189.280**	**323.428**

Balance sheets		
ASSETS	**31-XII-2023**	**31-XII-2024**
Cash & equivalents	100.000	101.220
Receivables from sale of fixed assets	0	43.560
Customers (trade receivables)	1.512.500	1.815.000
Stocks	333.333	800.000
Gross fixed assets	7.200.000	7.250.000
- Accumulated depreciation	-2.160.000	-2.505.000
TOTAL ASSETS	**6.985.833**	**7.504.780**

LIABILITIES	**31-XII-2023**	**31-XII-2024**
Suppliers (trade payables)	403.333	968.000
Corporate tax payable	81.120	138.612
Long-term debt	2.160.000	1.728.000
Profit or loss for the year (P&L)	189.280	323.428
Retained earnings (Reserves)	1.660.840	1.755.480
Share Capital	2.491.260	2.591.260
TOTAL LIABILITIES	**6.985.833**	**7.504.780**

Some additional information is also available for fiscal year 2024:

Purchase Price of FA sold	***50.000***
Accumulated depreciation of FA sold	***20.000***
Investment in fixed assets	***100.000***

Based on the information presented, prepare the Cash flow statement for fiscal year 2024. Use the model proposed by the 2007 Spanish General Accounting Plan and the alternative scheme proposed by Fernando Gómez-Bezares, FCFF + FCFLTD + FCFE = 0.

In the following pages we present the solution to the exercise. In a first step, the results associated with the preparation of the Cash flow Statement proposed by the Spanish General Accounting Plan are shown (figures A-I.1, with the explanation in text format of the calculations performed, and A-I.2, in which the numerical explanation is presented).

With regard to the alternative Cash flow Statement model, the first step consists of compressing the starting information to make it more easily usable in the preparation of the model. Thus, the reader must identify the items that make up the major balance sheet assets and liabilities, and embed the different elements of the income statement in the simplified model that we have defined in the text (see figures A-I.3, for the explanation in text format, and A-I.4, for the numerical explanation). And in figures A-I.5 and A-I.6 you will find the explanation (in text and numerical format, respectively) for the Cash flow Statement itself.

Let us make a brief commentary on the results obtained:

- **Cash Flow Statement (Spanish General Accounting Plan, SGAP-2007)**. As you can see, operating cash flows have contributed a total amount of 491.860 euros. On the other hand, fixed assets have required a total net amount of 64.000 euros. Finally, there has been a repayment of Debt for an amount of 432.000 euros and a Dividend of 94.640 euros has been paid, all of which has been possible thanks to the Capital increase carried out (for an amount of 100.000 euros), which has also allowed a slight increase in the company's Cash account.

- **Alternative Cash Flow Statement**. The results indicate that the assets have released an amount equal to 517.360 euros (the recurring activities have generated 774.948 euros, while the non-recurring operations have contributed a more modest 34.200 euros; but the total amount was not available, since it was necessary to invest part of it in working capital -specifically, 191.788 euros- and in fixed assets -an additional 100.000 euros-). Since the debt service required a larger amount of money than that released by the assets (a total amount of 522.720 euros, corresponding to a net principal repayment of 432.000 euros and a net interest charge equivalent to 90.720 euros), there was no choice but to turn to shareholders, who contributed 100.000 euros through a capital increase, which was partly used to pay a dividend of 94.640 euros (which would require an explanation from the Management of the business, since it is not easy to understand why the capital increase was carried out in order to pay the aforementioned dividend).

Cash Flow Statement (Spanish General Accounting Plan, SGAP-2007)

Operating cash flows	2024	
Profit before taxes	462.040	*= Net income + Corporate tax*
Adjustments to income	488.600	*+ FA Depreciation + Interest – Non-recurring Income*
Changes in working capital (w/o Cash and equivalents)	190.568	*= WC (w/o Cash & equivalents) final - WC (w/o Cash & equivalents) initial*
Other operating cash flows	268.212	*= Corporate tax + Interest*
Total operating cash flows	**491.860**	*= Profit before taxes + Adjustments to income - Changes in working capital (w/o Cash and equivalents) - Other operating cash flows*

Investment cash flows	2024	
Disposal proceeds	36.000	*= Sales price of fixed assets sold = BV + NREBT*
Payments for investments	100.000	*= Investment in fixed assets*
Total investment cash flows	**-64.000**	*= Proceeds from divestitures - Payments for investments*

Financing cash flows	2024	
Cash flows from transactions with liability instruments	-432.000	*= Increase in long-term debt*
Cash flows from operations with equity instruments	100.000	*= Increase in share capital*
Dividends	94.640	*= NP (2023) - [Reserves (2024) - Reserves (2023)]*
Total cash flows from financing operations	**-426.640**	*= Flows from operations with Liabilities instruments + Flows from operations with Equity instruments - Dividends*

Increase in cash flow	**1.220**	*= Operating Cash Flows + Investment Cash Flows + Financing Cash Flows*

Figure A-I.1

Cash Flow Statement (Spanish General Accounting Plan, SGAP-2007)

Operating cash flows	2024	
Profit before taxes	462.040	*= 323.428 + 138.612*
Adjustments to income	488.600	*= 365.000 + 129.600 - 6.000*
Changes in working capital (w/o Cash and equivalents)	190.568	*= 1.551.948 - 1.361.380*
Other operating cash flows	268.212	*= 138.612 + 129.600*
Total operating cash flows	**491.860**	*= 462.040 + 488.600 - 190.568 - 268.212*

Investment cash flows	2024	
Disposal proceeds	36.000	*= 30.000 + 6.000*
Payments for investments	100.000	*= 100.000*
Total investment cash flows	**-64.000**	*= 36.000 - 100.000*

Financing cash flows	2024	
Cash flows from transactions with liability instruments	-432.000	*= 1.728.000 - 2.160.000*
Cash flows from operations with equity instruments	100.000	*= 2.591.260 - 2.491.260*
Dividends	94.640	*= 189.280 - (1.755.480 - 1.660.840)*
Total cash flows from financing operations	**-426.640**	*= -432.000 + 100.000 - 94.640*

Increase in cash flow	**1.220**	*= 491.860 + (-64.000) + (-426.640)*

Figure A-I.2

ASSETS	31-XII-2023	31-XII-2024	
CA	1.945.833	2.759.780	*= Cash and cash equivalents + Customers + Other accounts receivable + Inventories*
FA	5.040.000	4.745.000	*= Gross fixed assets - Accumulated depreciation*
TA	6.985.833	7.504.780	

LIABILITIES	31-XII-2023	31-XII-2024	
CL	484.453	1.106.612	*= Suppliers + Corporate tax payable*
LTD	2.160.000	1.728.000	*= Long-term debt*
E	4.341.380	4.670.168	*= Profit for the year (P&L) + Reserves + Share Capital*
TL	6.985.833	7.504.780	

P&L	2024	
S	6.000.000	*= Sales*
C	-5.049.360	*= - (Purchases - Variation in Inventories + Wages & salaries + Other supplies + Rents)*
AM	-365.000	*= - Depreciation of fixed assets*
I	-129.600	*= - Interest*
NREBT	6.000	*= Non-recurring earnings (fixed assets)*
CT	-138.612	*= - Corporate tax*
NP	323.428	
t	0,3	*= Corporate tax / (NET INCOME + Corporate tax)*

Figure A-I.3

ASSETS	31- XII-2023	31- XII-2024	Explanation figure Year 2024
CA	1.945.833	2.759.780	= 101.220 + 43.560 + 1.815.000 + 800.000
FA	5.040.000	4.745.000	= 7.250.000 - 2.505.000
TA	6.985.833	7.504.780	

LIABILITIES	31- XII-2023	31- XII-2024	Explanation figure Year 2024
CL	484.453	1.106.612	= 968.000 + 138.612
LTD	2.160.000	1.728.000	= 1.728.000
E	4.341.380	4.670.168	= 323.428 + 1.755.480 + 2.591.260
TL	6.985.833	7.504.780	

P&L	2024	
S	6.000.000	= 6.000.000
C	-5.049.360	= - (5.266.667 - 466.667 + 124.800 + 75.600 + 48.960)
AM	-365.000	= - 365.000
I	-129.600	= - 129.600
NREBT	6.000	= 6.000
CT	-138.612	= - 138.612
NP	323.428	

t	0,3	= 138.612 / (323.428 + 138.612)

Figure A-I.4

Alternative Cash Flow Statement

Concept	2024	
EBIT	585.640	*= S - C - AM*
EBIAT	409.948	*= EBIT x (1-t)*
FFO	***774.948***	*= EBIAT + AM*
NREBT	6.000	*= NREBT*
NREAT	4.200	*= NREBT x (1-t)*
FFNR	***34.200***	*= NREAT + BV*
WC (2024)	1.653.168	*= CA (2024) - CL (2024)*
WC (2023)	1.461.380	*= CA (2023) - CL (2023)*
ΔWC	***191.788***	*= WC (2024) - WC (2023)*
CFI	***100.000***	*= FA (2024) - FA (2023) + AM (2024) + BV FA sold (2024)*
FCFF	**517.360**	*= FFO + FFNR - ΔWC - CFI*
LTDI - LTDR	***-432.000***	*= LTD (2024) - LTD (2023)*
I x (1-t)	***90.720***	*= I x (1-t)*
FCFLTD	**-522.720**	*= LTDI - LTDR - I x (1-t)*
EI - ER	***100.000***	*= Share Capital (2024) - Share Capital (2023)*
D	***94.640***	*= Profit for the year (P&L) (2023) - [Reserves (31-XII-2024) - Reserves (31-XII-2023)]*
FCFE	**5.360**	*= EI - ER - D*
CHECK	**0**	*= FCFF + FCFLTD + FCFE*

Figure A-I.5

Alternative Cash Flow Statement

Concept	2024	
EBIT	585.640	*= 6.000.000 - 5.049.360 - 365.000*
EBIAT	409.948	*= 585.640 x (1 – 0,30)*
FFO	***774.948***	*= 409.948 + 365.000*
NREBT	6.000	*= 6.000*
NREAT	4.200	*= 6.000 x (1 – 0,30)*
FFNR	***34.200***	*= 4.200 + 30.000*
WC (2024)	1.653.168	*= 2.759.780 - 1.106.612*
WC (2023)	1.461.380	*= 1.945.833 - 484.453*
ΔWC	***191.788***	*= 1.653.168 - 1.461.380*
CFI	***100.000***	*= 4.745.000 - 5.040.000 + 365.000 + 30.000*
FCFF	**517.360**	*= 774.948 + 34.200 - 191.788 - 100.000*
LTDI - LTDR	***-432.000***	*= 1.728.000 - 2.160.000*
I x (1-t)	***90.720***	*= 129.600 x (1 – 0,30)*
FCFLTD	**-522.720**	*= - 432.000 - 90.720*
EI - ER	***100.000***	*= 2.591.260 - 2.491.260*
D	***94.640***	*= 189.280 - (1.755.480 - 1.660.840)*
FCFE	**5.360**	*= 100.000 - 94.640*
CHECK	**0**	*= 517.360 + (-522.720) + 5.360*

Figure A-I.6

A (GENTLE) INTRODUCTION TO ECONOMIC-FINANCIAL ANALYSIS USING RATIOS

Javier Santibáñez Grúber *

INTRODUCTION

Ratios are one of the fundamental tools in the analysis of financial statements, whose ultimate objective is to provide a diagnosis of the 'health' of a company from an economic-financial point of view. It is logical: a ratio is a quotient, which means to relativize an absolute figure, allowing to put it better in a certain context and making it more comparable with the figures of other companies.

This is a **very powerful tool for analysis**, but it also has many **important limitations** that should be pointed out. Before going on to a detailed study of some of the most commonly used proposals (those known as 'batteries of ratios', which analyse different aspects of the economic-financial equilibrium in which it may be of interest to delve deeper), we will devote a few lines to a reflection that is as intuitive as possible, in which the usefulness, but also the limitations, of this interesting tool can be seen. To this aim, we will use various ratios as an excuse, which will then be put into context.

We said that the ratio relativizes the information provided by an absolute figure and allows it to be better interpreted. A typical example is the ROE (Return On Equity), which is defined as the quotient of the Net Profit obtained in accounting (NP) and the funds that had to be invested to achieve it (the net equity, which we will identify with the acronym E, Equity):

$$\mathrm{ROE} = \frac{\mathrm{NP}}{\mathrm{E}} \tag{1}$$

Consider a company that has made a profit of 100 on an investment of 1.000, resulting in a ROE of 10%. It is clear that the ratio provides richer information than the initial figure, but I still know very little about whether or not that 10% 'is enough'. As Amaral used to say (that 'without you, I am nothing') or, saving distances, Ortega (who alluded to the importance of 'my circumstances' when it came to knowing me)**: without adequate contextual information it is impossible to assess the quality of any figure** (that 10% has a very different interpretation in Milei's Argentina or in Lagarde's Europe): a 10% gain on invested capital at a time of high

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inflation is valued very differently than in the absence of inflation; related to the above, that same 10% is not equally interesting or desirable at a time of high or low interest rates). Thus, the analysis using ratios is enriched when I put them in context, when I compare them with those obtained by organizations 'similar' to mine or when I relate them to other relevant information that allows them to be better understood.

Benchmarking' processes, which consist of comparing ourselves with someone we take as a reference or whom we want to beat, are in this line. In this sense, it is very important to choose the benchmark well, since, as we shall see intuitively, when making this type of comparison we apply the well-known **'ceteris paribus' clause** (which means 'everything else constant'). In ratio analysis it is very common to use as a reference the average values of the sector to which the company under study belongs.

Once again, we must be aware of the limitations associated with this approach. An old joke used to say that Statistics is that technique by which 'if you have two chickens and I have none, we have one chicken each' (the truth is that if the intention of the technique was to make you do an exercise of empathy and share your fortune with me, it would not be bad). Beyond the jokes, what I want to emphasize here is that the average does not have any magical property that makes it interesting for a company to approach it, it acts as a simple reference, it summarizes in a concise way information that can be very varied (although, in fact, there may not be any company that presents the indicated value). In fact, we are raising the problem of '**what is meant by comparable operations**'. I will try to explain a little better.

A ratio directly related to ROE is the PER (Price Earnings Ratio):

$$\mathrm{PER} = \frac{\text{Equity (Market Value)}}{\text{NP}} \tag{2}$$

A preliminary clarification. The analysis of Financial Statements is usually performed, as its name indicates, on information taken directly from Accounting (and not from the market). And as we have already seen at the time (remember the unforgettable experience related to the reading of the '(gentle) Introduction to Accounting'), the true and fair view pursued by the technique does not correspond (directly) to the logic of the market: the application of the principle of prudence, among others, makes the discrepancy between the market value of equity and that presented in the balance sheet very likely, since the former values 'what is about to happen' (the future), while Accounting is fundamentally 'an account of what has happened'. Thus, if we think of the ROE presented above, it would be more convenient to relate the profit obtained to the investment made, which is better represented by the market value (which we renounce by maintaining our participation) than by the book value (normally lower than the previous one).

Thus, if we now define ROE as Profit divided by Shareholders' Equity (at market value), we can see that PER is actually the inverse of ROE:

$$\text{PER} = \frac{\text{E}}{\text{NP}} = \frac{1}{\text{ROE}} \tag{3}$$

The PER ratio is often used to try to detect ‘overvalued’ or ‘undervalued’ companies: a PER higher than the industry average would indicate that the euro of profit in that company is ‘expensive’, i.e., that it is being paid for more than the average for the sector as a whole; therefore, one would think that it is ‘overvalued’ and that its price is likely to fall in the future (when others realize what I am seeing now). And note that we could look at this from the point of view of ROE: if the PER is ‘too high’ it is because its profitability (ROE) is ‘too low’. And yet **there are many reasons why the company with the lower ROE is correctly valued**, i.e. why the shareholders of the company with the lower ROE (higher PER) are reasonably happy with the situation. One possibility is that the company’s level of indebtedness is lower than that associated with the sector as a whole, which would entail a lower risk borne that would sufficiently compensate for the lower profitability obtained. Not to mention the importance that the results of non-recurring operations or the company’s growth possibilities could have had on Net Profit, which could differ significantly from those of the sector as a whole; among many other variables that would make the ‘ceteris paribus’ clause not very credible.

In short, I think we could summarize this brief reflection in the following terms: **beware of shortcuts**. Like they say in Galicia about the ‘meigas’ (kind of witches), ‘Whether they exist or not, they do’, but they do not always take you to the same destination.

Let’s continue to give ratios a go (this is a simple exercise in humility: it is a question of not sacralising an analysis that is extraordinarily useful, provided that we are aware of its limitations). Let us now consider the problems that arise when ‘relating a flow to a stock’. As we have already sufficiently criticized ROE, let us now consider another ratio with a simple interpretation, the cost of debt. We could approximate this cost (which we will call ‘i’) by dividing the financial expenses (which we will call I, Interest) by the balance of financial Debt enjoyed (which we will call LSD, Long and Short-term Debt):

$$\text{i} = \frac{\text{Interest}}{\text{Debt}} = \frac{\text{I}}{\text{LSD}} \tag{4}$$

As can be seen, the ratio indicates what it costs me to use one euro of debt; and it is calculated **by relating a flow** (interest is taken from the income statement, which we assume annually, i.e., it refers to a period of time) **and a stock** (the balance of debt ‘used’, taken from the balance sheet). Immediately, a question arises to consider: if the balance at the end of the year coincides with the initial one, we can think that we have used the same amount during the whole period, so it is obviously the same to take either of the two; but if there have been important changes in this balance, we have a problem. Suppose that the interest shown on the income statement is 100, with the opening balance of debt being 500 and the closing balance being 1.000. Depending on which one we take, our estimate of the cost of debt would be radically different: 20% per year, if we take the opening balance, versus 10% if we take the closing balance. Which of the two values is correct? We cannot know with the information available, since it **depends on the time at which the change in the balance occurred**. And this problem affects many of the ratios that relate flows and stocks.

Sometimes, however, there is not the problem of relating a flow to a stock. If what I want is to get an idea of the payment term that the company grants to its customers, the calculation seems simple. Let's call S the annual Sales and Customers the balance receivable at the end of the year; and let's give values to the two concepts, S = 1.200 and Customers = 300. To know the payment term granted, we would have to solve a simple rule of three: 1.200 is 360 days as 300 is 'X' (which is the way to answer the question 'if it takes 360 days to sell 1.200 euros, how long would it take to sell what is outstanding at the end of the year (balance of customers)'? In our case, the answer would be:

$$\text{Collection period} = \frac{\text{Customers}}{\text{Acrued Annual Sales}} \text{ x } 360 = \frac{300}{1.200} \text{ x } 360 = 90 \text{ days} \tag{5}$$

Notice how in this case the problem raised in the previous paragraphs does not appear: 'obviously' (pardon the expression, which bothers some people) the stock that we must take is the final one (i.e. 'the part of the sales made in the fiscal year that remain uncollected at the end of the period are expressed in the final balance of the Trade Receivables account'). However, other problems can also hide behind this calculation.

Indeed, **for the 'rule of three' to make sense, there should be no seasonality**, i.e., sales should be evenly distributed throughout the year. Think of a business whose corporate purpose is to sell scarves; or ice cream.

There is another problem related to the proposed calculation, although in this case its nature is different; I am referring to the **consideration of indirect taxes, such as VAT**. If the company is subject to the general VAT regime (let us assume a single rate of 10% for simplification purposes), and assuming the figures given in the previous example, the final customer balance will not be 300, but 300 x 1,1 = 330; while sales revenue will still be 1.200. If I do not make the corresponding correction on either side (numerator or denominator), the calculation of days of financing granted would be incorrect:

$$\text{Collection period} = \frac{\text{Customers}}{\text{Acrued Annual Sales}} \text{ x } 360 = \frac{330}{1.200} \text{ x } 360 = 99 \text{ days} \tag{6}$$

The error committed may not seem like a big deal; but if the VAT affecting the operation were 21%, it would be higher (logically, proportional to the rate handled).

From what we have seen so far, we can often find a theoretical solution to the problems posed; but **we do not always have the complete information necessary** to enable us to apply that solution: we often lack the market values of things (which would generally be more appropriate from a financial point of view); nor do we have, when acting as 'external analysts', a sufficient number of positions to allow us, for example, to calculate the 'average balance of debt used'; nor do we have the breakdown of VAT rates that are implicit in the outstanding receivables; and so on.

More problems. When, for example, I try to study the inventory management policy maintained by a company in relation to the general behaviour of the sector, I can use two ratios that appear in principle as the inverse of each other:

$$\text{Stock turnover} = \frac{\text{Annual cost of Sales}}{\text{Inventories}} \tag{7}$$

$$\text{Inventories term} = \frac{\text{Inventories}}{\text{Annual cost of Sales}} \text{ x } 360 \tag{8}$$

Let's look at a simple example. The first of the two ratios would yield a result of 12 (which is the number of times the numerator 'contains the denominator'); and if I calculate its inverse and multiply it by 360, I would have the term, which in this case would be interpreted as 'number of days of activity that could be attended with the available stock in the event of a supply cut'. The problem is that this inverse logic works with data from one company, but ceases to do so when applied to the average data of those that make up the sector (this is a purely mathematical problem, but it means that the two figures can no longer be related in this simple way).

As we can see, **ratios are an interesting tool for analysis, but the results should always be interpreted with caution**, being aware of their limitations. In any case, the analysis becomes extraordinarily interesting when we relate some ratios to others (which is done 'ex officio' in the so-called '**pyramids of ratios**', but not in the '**batteries of ratios**', which are limited in principle to providing different measures grouped according to the issues analysed). A simple way to do this is through a process of 'decomposition' or 'crumbling' of the ratios. Let's take ROE again as an excuse: you will recall that it is the ratio between Net Profit and Invested Shareholders' Equity. Starting from the proposed definition, we can do the following simple process:

$$\text{ROE} = \frac{\text{NP}}{\text{E}} = \frac{\text{NP}}{} \text{ x } - \text{ x } \frac{}{\text{E}} \tag{9}$$

The idea is to multiply and divide the proposed ratio by two variables, so that the expression remains valid and the final result is not altered; but the information we arrive at is now much richer. Suppose I multiply and divide the original expression by the sales made (S):

$$\text{ROE} = \frac{\text{NP}}{\text{E}} = \frac{\text{NP}}{\text{S}} \text{ x } \frac{\text{S}}{} \text{ x } \frac{}{\text{E}} \tag{10}$$

If we do the same with Total Assets (TA), we arrive at expression (11):

$$\text{ROE} = \frac{\text{NP}}{\text{E}} = \frac{\text{NP}}{\text{S}} \text{ x } \frac{\text{S}}{\text{TA}} \text{ x } \frac{\text{TA}}{\text{E}} \tag{11}$$

As you can see, the original **financial performance** is now broken down into the **product of three different ratios**, each of which has an interesting interpretation:

- The first (NP/S) is a performance ratio that indicates 'what is obtained for each euro of sales to return to shareholders'.
- The second (S/TA) shows the 'multiplier effect' that turnover ratios have: the ratio of sales to total assets can be read as 'the number of times the investment made is converted into cash through sales'.
- Finally, the third ratio (TA/E) is a measure of the company's indebtedness: assuming a given value of assets, the ratio will take high values in companies with high indebtedness, and vice versa.

Thus, the proposed decomposition can show us **companies that present identical values** in a measure such as ROE, but that achieve it with **completely different strategies** (and which, logically, may entail different levels of risk and therefore not be equally desirable).

Finally, and within this introductory section, we will indicate that the ratios can be calculated 'at a specific moment in time' (this is what in this context is associated with the term '**vertical analysis**' and which we can identify with a synchronic analysis); but we can also study the evolution over time of the values obtained in the measures in question ('**horizontal analysis**' or diachronic analysis). Logically, this last possibility enriches the process, which makes it possible to include the past and the future (the latter analysis requiring the corresponding prior financial forecasting).

SOME INTERESTING RATIO BATTERIES

Figures 1 and 2 show two examples of batteries that I consider particularly interesting, since they propose a reasonably limited number of ratios and include those most frequently used in the analysis of financial statements in general, applicable in principle to any company, regardless of the sector in which it operates.

Figure 1 shows the battery proposed by Oriol Amat and Eugenia Farrán in their work 'Los principales ratios económico-financieros', published in *Harvard-Deusto Finanzas & Contabilidad*, nº6, 1995.

In Figure 2 you can see the battery proposed in the paper *RATIOS SECTORIALES 2017. Cuentas anuales (balances y cuentas de resultados) de 143 sectores. 25 ratios para cada sector*, published in 2018 in the 'Colección MANUALES'. Study coordinated by Oriol Amat with the participation of Pilar Lloret and Xavier Puig and sponsored by ACCID (Contabilidad y Dirección), BSM (Barcelona School of Management) and REC (Registro de Expertos Contables).

The two batteries have common elements and a similar philosophy, although they present small formal differences. You can take a general look at them and try to draw some conclusions before reading the comments that follow.

Oriol Amat and Eugenia Farrán: 'Los principales ratios económico-financieros'	**Year**	**Year x-1**
1. Liquidity and short-term solvency		
Liquidity: Current Assets / Short-term Liabilities		
Acid test: (Current assets - Inventories) / Short-term liabilities		
Cash ratio: Cash and Cash equivalents / Short-term liabilities		
2. Indebtedness		
Indebtedness: Total debts / Total liabilities		
Guarantee: Real assets / Total debts		
Debt quality: Short-term debts / Total debts		
Loan repayment capacity: (Net Profit + Depreciation) / Loans Received		
Financial expenses on sales: Financial expenses / Sales		
Cost of debt: Financial expenses / Debt with explicit cost (or Financial debt)		
Average cost of liabilities: (Financial Expenses + Dividends) / Total liabilities		
Coverage of financial expenses: Earnings before interest and taxes / Financial expenses		
3. Asset turnover		
Fixed assets turnover: Sales / Fixed assets		
Inventory turnover: Sales / Stocks		
4. Collection and payment policy		
Collection term: (Trade receivables) / Annual sales x 365		
Payment term: Trade payables / Annual purchases x 365		
Financing of customer investment by suppliers: Trade payables / Trade receivables		
5. Sales evaluation		
Expansion of sales: Sales of year n / Sales of year n-1		
Market share: Company's sales / Industry's sales		
Flexibility: Sales of product A / Total sales of the company		
Range renewal: Sales of new products / Total sales of the company		
6. Evaluation of productivity, effectiveness and efficiency		
Productivity: Results obtained / Resources employed		
Effectiveness: Expected income / Income actually achieved		
Efficiency: Expenditures planned / Expenditures actually incurred		
7. Profitability		
Operating profitability: Earnings before interest and taxes / Total assets		
Operating profitability: EBIT / Sales x Sales / Total Assets		
Financial profitability: Net Income / Shareholders' Equity		
Financial Profitability: NP / Sales x Sales / Total Assets x Total Assets / Shareholders' Equity		
8. Self-financing		
Self-financing generated on sales: (Cash flow - Dividends) / Sales		
Dividend policy (pay-out): Dividends / Net Profit		
Self-financing policy: Dividends / Cash flow		
9. Stock market indicators		
PER: Share price / Earnings per share		
Book value over share price: Book value / Share price		
Dividend per share: Total dividend / Number of shares		

Figure 1

'RATIOS SECTORIALES 2017. Cuentas anuales (balances y cuentas de resultados) de 143 sectores. 25 ratios para cada sector', *Colección MANUALES*, coordinated by Oriol Amat and sponsored by ACCID (Contabilidad y Dirección), BSM (Barcelona School of Management) and REC (Registro de Expertos Contables), 2018.	**2017**	**2016**	**2015**
1. Liquidity			
Liquidity: Current Assets / Current Liabilities			
Acid test: (Current Assets – Stock) / Current Liabilities			
Cash ratio: Cash and Cash equivalents / Current Liabilities			
Working capital over sales: Working Capital / Sales			
Working capital as a percentage of total assets: Working Capital / Total Assets			
2. Indebtedness			
Indebtedness: Total Debts / Total Assets			
Debt quality: Current Liabilities / Total Debts			
Loan repayment capacity: Cash Flow / Loans			
Coverage of financial expenses: EBIT / Financial Expenses			
Cost of debt: Financial Expenses / Loans (or Financial debt)			
Asset management			
Asset turnover: Sales / Total Assets			
Turnover of non-current assets: Sales / Non-current Assets			
Turnover of current assets: Sales / Current Assets			
Inventory turnover: Cost of Goods Sold / Stocks			
4. Deadlines			
Inventories: Inventories / Cost of Goods Sold x 365			
Collection: Trade receivables / Sales x 365			
Payment: Trade payables / Cost of Goods Sold x 365			
Financing of trade receivables by trade payables: Trade payables / Trade receivables			
5. Profitability and self-financing			
Economic profitability: EBIT / Total Assets			
Financial Profitability: Net Profit / Net Equity			
Cash flow over assets: Cash flow / Total Assets			
Cash flow on sales: Cash Flow / Sales			
6. Operations			
Sales per employee: Sales (thousands of euros) / Number of employees			
Net Profit per employee: Net Profit (thousands of euros) / Number of employees			
Personnel expenses per employee: Personnel expenses (thousands of euros) / No. of employees			

Figure 2

As you can see, the batteries of ratios propose different performance measures grouped by topic. I believe that it is not difficult to deduce in most cases whether what is of interest is to obtain high or low values in each of the ratios indicated. ***Focusing on the first of the two proposed models***, we will interpret the meaning of each ratio, indicating, at times, what could be understood as 'desired figures'.

1. Assessment of liquidity (short-term solvency)

In this section, the ratios analyse the **company's ability to meet its short-term obligations**. The denominator is the same in all cases (current liabilities). As we go along, we take a smaller figure in the numerator: in the liquidity ratio we compare current assets and current liabilities, i.e. we put in the form of a quotient what the Working Capital studies in the form of a difference; the second ratio, known as the 'ordinary cash ratio' (or 'acid test'), eliminates in the numerator the item of inventories (which could be more difficult to convert into cash), leaving only what we call cash + realizable; finally, in the third and last ratio in this section, the numerator includes only Cash and equivalents, the liquid items available to meet the maturities expected in the short term.

As you can guess, if what we are studying now is '**solvency**' (understood as the company's ability to meet its obligations), what is of interest here is that the ratios take **high values**. It must be clear that, for example, a value of less than 1 in the liquidity ratio does not (necessarily) mean that the company is close to Payment Default: the situation could be maintained in certain sectors in which, with sales collections, it is possible (sometimes comfortably) to meet payments to suppliers... the problem is that the situation could become unstable and dangerous. That is why values higher than 1 are recommended for the so-called Acid test; and some authors point to values close to 0,3 for the Cash ratio.

$$\text{Liquidity ratio } = \frac{\text{Current assets}}{\text{Current liabilities}} \tag{12}$$

$$\text{Acid test } = \frac{\text{Current assets} - \text{Inventories}}{\text{Current liabilities}} \tag{13}$$

$$\text{Cash ratio} = \frac{\text{Cash \& Equivalents}}{\text{Current liabilities}} \tag{14}$$

2. Evaluation of indebtedness

This section includes a series of measures related to the way **in which the company is financed**. The first two (equations 15 and 16) study the same thing, although they express it differently: the weights given to equity and borrowed funds to finance the assets; thus, the 'Leverage ratio' relates borrowed funds to the total amount of financing, and takes high values in highly indebted (or leveraged) companies; while the Guarantee ratio presents high values when indebtedness is low, indicating how far away a hypothetical and undesirable situation of bankruptcy is. In the first case (formula 15), values between 0,4 and 0,6 are usually taken as indicative of **'healthy' levels of indebtedness**; while the so-called 'Guarantee ratio' should be as high as possible (indicating a lower probability of bankruptcy).

$$\text{Leverate ratio} = \frac{\text{Debt}}{\text{Debt+Equity}} \tag{15}$$

$$\text{Guarantee ratio} = \frac{\text{Total assets}}{\text{Debt}} \tag{16}$$

The '**debt quality**' ratio relates short-term borrowings to total borrowed funds. In general, it is understood that debt is of better quality the longer the term, so low values for this ratio would be desirable.

$$\text{Debt quality ratio} = \frac{\text{Short–term debt}}{\text{Total debt}} \tag{17}$$

The ratios of 'Loan repayment capacity' (18) and 'Interest coverage ratio' (22), give us indications related to the **difficulty that the company may have to face the so-called 'Debt service'**: in both cases, high values would be advisable, which would indicate a 'greater comfort' on the part of the company at the time of facing the contracted obligations.

As for the ratios shown in equations (19), (20) and (21), they all give an **idea of how burdensome financing is**: the first one shows the weight of financial expenditure on sales, which can be particularly interesting in comparison with the value obtained by the sector as a whole or in a company taken as a reference; while the ratios for the 'Cost of debt' and the 'Cost of capital ratio' relate the remuneration paid to the resources employed. Logically, all of them should ideally take low values (although the Cost of capital ratio does not seem to be a good measure, since it takes the value of dividends paid, which may not be those expected by shareholders).

$$\text{Loan repayment capacity ratio} = \frac{\text{Net profit + Depreciation \& Amortization}}{\text{Loans recieved}} \tag{18}$$

$$\text{Financial expenses to sales ratio} = \frac{\text{Financial expenses}}{\text{Sales}} \tag{19}$$

$$\text{Cost of debt} = \frac{\text{Interest}}{\text{Debt}} \tag{20}$$

$$\text{Cost of capital ratio} = \frac{\text{Interest + Dividend payed}}{\text{Debt + Equity}} \tag{21}$$

$$\text{Interest coverage ratio} = \frac{\text{Earnings before interest and taxes}}{\text{Interest}} \quad (22)$$

3. Evaluation of Assets turnover

The ratios that appear in this section owe their name to the fact that their interpretation could be that of '**number of times a given asset is converted into cash through sales during the year**'. Logically, and always accepting the clause 'all other things being equal' (which can be misleading in some cases), high values would be interesting, insofar as they would indicate a 'better utilization of the asset in question'.

$$\text{Fixed assets turnover ratio} = \frac{\text{Sales}}{\text{Fixed assets}} \quad (23)$$

$$\text{Inventories turnover ratio} = \frac{\text{Sales}}{\text{Inventories}} \quad (24)$$

4. Evaluation of the collection and payment policy

The ratios presented here describe the company's behaviour in terms of **the financing it grants to its customers and the financing it obtains from its suppliers**. If we take the first one, the collection term ratio, we see that it relates the outstanding balance receivable to the average daily sales (the second way of calculating it is identical, since the average daily sales are calculated by dividing annual sales by 365), so it only makes full sense if we assume the absence of seasonality in the activity. On the other hand, and as we indicated in the introductory part, it would be advisable to 'homogenize' the figures that appear in the numerator and denominator, insofar as the balances receivable include, where applicable, Value Added Tax (VAT), while the sales figure does not include the effect of this tax. As for the desirable values of the proposed ratios, it would be good, all other things being equal, if supplier financing were high, and the financing we are obliged to give to customers low.

$$\text{Collection period ratio} = \frac{\text{Trade receivables}}{\text{Average daily Sales}} = \frac{\text{Trade receivables}}{\text{Annual Sales}} \text{ x } 365 \quad (25)$$

$$\text{Payment term ratio} = \frac{\text{Trade payables}}{\text{Average daily Purchase}} = \frac{\text{Trade payables}}{\text{Annual purchases}} \text{ x } 365 \quad (26)$$

$$\text{Customer investment financing ratio by suppliers} = \frac{\text{Suppliers}}{\text{Customers}} \quad (27)$$

5. Sales evaluation

The ratios that make up this section provide information related to the volume of business operations. As for the first two ratios, high values would be desirable (all other things being equal), indicating **growth** and a **relevant role for the company in the sector's activities**. As for the ratio shown in expression (30), which must be calculated for each of the products that make up the company's range, low values would be interesting in principle, indicating a low level of dependence on specific items (thus pointing to greater **flexibility**); while for the range renewal ratio, high values would indicate a greater **dynamism** of the company and less dependence on traditional activities.

$$\text{Sales expansion ratio} = \frac{\text{Sales of year n}}{\text{Sales of year n}-1} \tag{28}$$

$$\text{Market share ratio} = \frac{\text{Company Sales}}{\text{Total Sector Sales}} \tag{29}$$

$$\text{Product A}'\text{s share of total sales} = \frac{\text{Sales of product A}}{\text{Company Sales}} \tag{30}$$

$$\text{Renewal of the product range} = \frac{\text{Sales of new products}}{\text{Company Sales}} \tag{31}$$

6. Evaluation of productivity, effectiveness and efficiency

Productivity ratios relate results obtained to resources used (number of tons manufactured per worker or sales per worker would be typical examples), so high values are desirable in principle.

We say that an action has been effective when the results obtained correspond to what was expected and/or desired. But **effectiveness does not always have to go hand in hand with efficiency**: 'shooting flies with a sledgehammer' may be effective (the aim is to make the flies disappear), but probably inefficient (the cost incurred seems excessive, the same objective could have been achieved with fewer resources). One possible way of measuring effectiveness ratios is to compare the results obtained with those planned: if the former exceed the latter, we could think that we have been effective (which corresponds to low values in ratio 33); while beating our forecasts in terms of costs would be a sign of efficiency (which would be evidenced by high values in ratio 34).

$$\text{Productivity ratio} = \frac{\text{Results obtained}}{\text{Resources employed}} \tag{32}$$

$$\text{Effectiveness ratios} = \frac{\text{Expected results}}{\text{Results actually achieved}} \tag{33}$$

$$\text{Efficiency ratios} = \frac{\text{Expected expenses}}{\text{Real expenses}} \tag{34}$$

7. Profitability evaluation

The measures described here are the most common in the analysis of the profitability of a business, studied at different levels. The '**Operating profitability**' (also known as 'Economic profitability') relates the profit achieved to remunerate the liabilities as a whole (Debt and Shareholders' equity) to the funds invested by both. This ratio, which is also commonly known as **ROA (Return on Assets)**, has the virtue of **'speaking' only of the assets**, without their value being influenced by the way in which they are financed. Multiplying and dividing by sales the original expression, we can see ROA as the product of two ratios: the margin obtained per euro sold and the turnover of total assets. Identical values in the original ratio can be achieved with very different strategies: giving up margin for the sake of a high turnover; or sacrificing volume in exchange for a higher margin.

$$\text{Return on Assets} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Total assets}} \tag{35}$$

$$\text{Return on Assets} = \frac{\text{EBIT}}{\text{Sales}} \text{ x } \frac{\text{Sales}}{\text{Total assets}} \tag{36}$$

The financial profitability ratio (also known as 'financial yield' or **ROE -Return on Equity-**) is defined as the quotient of the profit obtained for the shareholder and the contribution made by the latter. Along the same lines as the operating return, the ratio can be broken down into three others, by multiplying and dividing the original expression by the sales for the year and the investment in total assets that made it possible. This gives rise to three ratios, the product of which explains the value achieved, and which explain the margin obtained per euro sold, the turnover of total assets and the level of indebtedness used.

$$\text{Return on equity} = \frac{\text{Net profit (NP)}}{\text{Equity}} \tag{37}$$

$$\text{Return on equity} = \frac{\text{NP}}{\text{Sales}} \text{ x } \frac{\text{Sales}}{\text{Total assets}} \text{ x } \frac{\text{Total assets}}{\text{Equity}} \tag{38}$$

Obviously, high values for profitability ratios (which are still 'productivity' ratios, insofar as they relate results obtained to resources used) would be desirable.

8. Evaluation of self-financing

As we know, the term 'self-financing' refers to the capacity of a business to **finance part of its asset requirements with resources generated by its own operations**. From this point of view, values that increase this capacity would be desirable, so high values for the first of the three proposed (ratio of self-financing generated over sales) and low values for the other two are desirable.

$$\text{Self} - \text{financing ratio} = \frac{\text{Cash flow} - \text{Dividend}}{\text{Sales}} \tag{39}$$

$$\text{Pay} - \text{out} = \frac{\text{Dividend}}{\text{Net profit}} \tag{40}$$

$$\text{Self} - \text{financing policy ratio} = \frac{\text{Dividend}}{\text{Cash flow}} \tag{41}$$

9. Stock market indicators

In this section we list some of the most frequently used stock market indicators: the Price Earnings Ratio (PER) indicates what the market is paying for one euro of profit. It is usually used to detect 'overvalued' companies (those with a high value) and 'undervalued' companies (with low values in the ratio; in both cases, normally with respect to the sector average).

As for the second, the book value to share price ratio, low values would be advisable, as they would indicate **market optimism with regard to the expected future** (low values would be anticipating value creation by the company in the exercise of its function, a value that cannot be reflected in accounting when applying accounting principles such as prudence).

Finally, high values in the dividend per share ratio are usually interpreted as something positive, a **sign of strength (or solidity)** on the part of the company and of **confidence in its future**; although there is much to discuss in this respect: it seems more reasonable to decide the dividend policy based on liquidity (related in turn to the possibilities of reinvestment in the business itself), rather than on the profits obtained.

$$\text{PER} = \frac{\text{Stock quote}}{\text{Earnings per share}} \tag{42}$$

$$\text{Book value} - \text{to} - \text{price ratio} = \frac{\text{Book value per share}}{\text{Stock quote}} \tag{43}$$

$$\text{Dividend per share ratio} = \frac{\text{Total dividend}}{\text{Number of shares}} \tag{44}$$

THE DUPONT PYRAMID

In the financial literature, it is common to refer to the Dupont Company as the first precedent for the 'ratio pyramid'. In fact, what this company proposed is the **decomposition of the ROE ratio** that we have seen above, which ultimately involves **relating the behaviour of some ratios to others**. The structure of the Dupont pyramid can be seen in Figure 3.

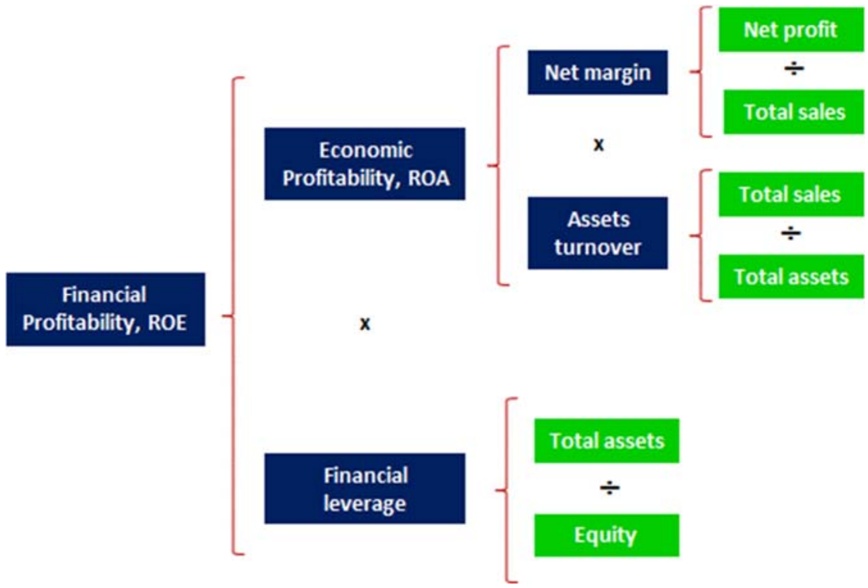

Figure 3

As we have repeatedly pointed out, the idea of relating ratios to other ratios is very interesting, and the Dupont proposal is certainly inspiring. But it has a **problem**: the definition of ROA proposed in the figure is clearly debatable[10] : the numerator (Net Profit) refers to the part of the profit generated that 'goes to shareholders', while the denominator shows the investment made by shareholders and lenders. This means that ROA thus defined has a strange interpretation, since it cannot even be seen as 'what the shareholders could have obtained in the absence of indebtedness' (since interest has been subtracted). In other words, it is the decomposition into the three ratios shown in green in the figure that is interesting, while the decomposition proposed in **the first level of the pyramid, is more difficult to interpret coherently.** We will see below an improved version of the logic proposed in the ratio pyramid designed by Professors Gómez-Bezares and Jordano.

[10] In fact, this is not the usual definition of the ratio, which is usually expressed as the ratio between earnings before interest and taxes and total assets; the latter definition makes perfect sense, as it indicates the profit obtained from recurring operations, before taxes, for each euro invested in the assets (regardless of its origin, own or third-party financing).

THE RATIO PYRAMID PROPOSED BY FERNANDO GÓMEZ-BEZARES AND JUAN JORDANO

We will now present the pyramid of ratios proposed by Fernando Gómez-Bezares and Juan Jordano in their book *Diagnóstico, previsión y control en la empresa (mediante interrelación de variables económico financieras,* published in 1982[11]. Based on the idea of interrelating the behaviour of the different ratios studied by means of pyramids that allow the value of each ratio to be analysed in relation to other ratios, they propose an original model that also complies with an important key to modern financial reasoning: the need to separate the analysis of assets from that of liabilities.

The objective of the proposed pyramid is **to explain the (accounting) profitability obtained by the shareholder in a specific year**, breaking it down into two elements: the return obtained as a consequence of the business operations (i.e., that resulting from investing his money in an asset that yields 'x'); and the contribution added as a consequence of indebtedness (which in turn influences the other relevant variable of the profitability-risk binomial that characterizes the interest of any investment). Let us slow down.

In the pyramid model proposed by the aforementioned authors, two previous concepts are of paramount importance: those known as '**operating leverage**' and '**financial leverage**'. You will see why we speak of 'leverage' in both cases and, in general, why we identify 'leveraged' companies with indebted companies.

Beforehand, let us make explicit the **information we are going to need** to develop the complete pyramid, as well as the nomenclature we are going to use in this context. We need a **low level of detail** when defining the income statement (or Profit and Loss account, P&L), as well as the balance sheet. As far as the **income statement is** concerned, we will call:

S **Sales** (those related to recurring operations and which constitute the Corporate purpose of the company).

VC **Variable operating costs (cash charge)**. The term 'operating' indicates that only costs related to 'the way of doing' (with the assets) are included here, regardless of 'the way of financing' (a decision that has to do with the composition of the liabilities and which results in higher or lower interest payments, depending on the amount of debt used). The term 'cash charge' refers to the fact that only costs that have a direct impact on cash must be included (i.e. 'non-cash charges', such as depreciation of fixed assets, which are included in a separate section, are excluded). Finally, the term 'variable' refers to costs that change when the level of activity changes (as opposed to 'fixed costs', which appear in the short term as unavoidable, since we are 'tied' to a certain production

[11] The interested reader can easily find the proposed model in *Elementos de Finanzas Corporativas*, by Fernando Gómez-Bezares, Desclée de Brouwer, 2012.

structure). Examples: the cost of supplies or the commissions we pay as an incentive for the sale of our products.

FC **Fixed operating costs (cash charge)**. These are those related to the way of doing things, which have a direct impact on Cash and do not change with the quantity manufactured and sold. Examples: the cost of personnel (in the part that will have to be paid regardless of the level of activity) or the cost of renting premises.

AM This includes the so-called **operating costs without an impact on Cash**. It includes any impairment, although, for simplification purposes, we will focus on only one, fixed asset depreciation, which in our subsequent reflection we will consider as a 'fixed cost' (which would be fully justified if we understand that systematic impairment of fixed assets occurs as a result of the passage of time or obsolescence).

I **Interest** ('financial expenses'), which we associate with the use of long-term financial debt.

NREBT We will include in this chapter the profits or losses related to non-recurring operations. For example: the result obtained on the sale of a fixed asset, which is derived from comparing the sale price (which we will call NRS, Non-recurring Sales) and its Book Value (or net book value, BV, which is the result of subtracting accumulated depreciation from the purchase price).

CT This refers to the cost of **Corporate tax**. It is calculated by applying the corresponding tax rate (identified by the letter 't') to the tax base.

NP **Net Profit** obtained, which is the result of adding, with its sign, all the above elements.

With regard to the **balance sheet**, we will identify the following **four different items** (ordering the balance sheet from most to least liquid -assets- and from most to least callable -liabilities-):

WC **Working capital**. This is the difference between current assets (which include those items that 'are either money or will be money in the short term') and current liabilities (which include those that are due in the near future, within a period of no more than one year). In other words, it is the part of the current assets 'that is not financed on its own', with the business operations (which obliges to invest in current assets, but also generates current liabilities).

FA **Fixed assets (or non-current assets)**. This includes all those accounts whose term of conversion into cash is in the long term (generally beyond one-year sight). This mainly includes fixed assets, which are the assets that the company needs to carry out its corporate purpose, and which are converted into cash through the operation of the business.

LTD **Long-term borrowed funds**. We will assume that they correspond to financial debt with explicit cost, which we will assume as the only liability payable with cost (i.e., we will understand that the interest that appears in the income statement corresponds 100%

to the use of this source of financing, which implies assuming that there is no financial debt in current liabilities).

E **Shareholders' Equity**. In this context, we identify the term with the 'net equity', composed mainly of the contributions of the members (Capital) and the self-financing generated (Profit and Loss and Retained earnings accounts).

You can see all of this in Figure 4, which shows the compressed Financial Statements relating to a company in a particular year.

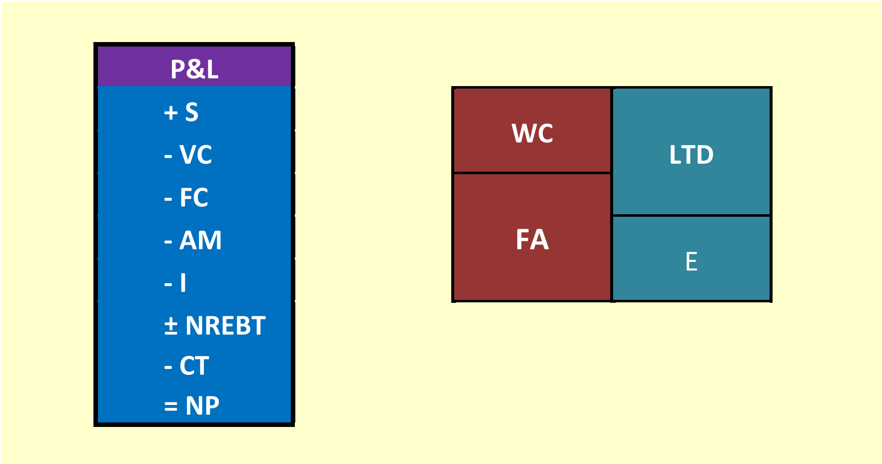

Figure 4

Operating leverage

Let us first define and interpret two simple ratios: the **Contribution margin ratio** (which we will call **CONS**) and **Break-even Sales** (which we will identify with the acronym **BES**). Thus:

$$\mathrm{CONS} = \frac{\mathrm{CON}}{\mathrm{S}} = \frac{\mathrm{S-VC}}{\mathrm{S}} \tag{45}$$

$$\mathrm{BES} = \frac{\mathrm{FC+AM}}{\mathrm{CONS}} \tag{46}$$

The interpretation of the ratios presented is simple. CONS indicates 'the margin left by one euro of sales after considering its variable cost'. Obviously, the ratio can have a maximum value equal to one (one euro sold could not leave a margin of more than one euro). It is a measure that indicates how well or badly we do things in terms of the comparison between 'direct' (variable) revenues and expenses; given a specific starting situation, we could try to improve our performance in this ratio by increasing the unit selling price or reducing the purchase price of the raw materials used in its manufacture; improving our quality control (to reduce the costs of accepting defective supplies); or reducing the cuts associated with the processing of a raw material used in the manufacture of a product.

With regard to the second ratio, Break-even Sales, its value indicates 'the sales figure we should achieve to cover all operating, variable and fixed costs'. Thus, it is the sales associated with earnings before interest and taxes (EBIT) equal to zero. In effect, by dividing the fixed costs to be covered by the Gross Margin per euro sold (contribution margin ratio), we are asking for 'the number of times we have to achieve CONS to cover fixed operating costs'.

Having presented the two ratios, let us recall the definition of Earnings Before Interest and Taxes (EBIT). It is the difference between sales and operating costs (with and without an impact in Cash):

$$\mathrm{EBIT} = \mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM} = \mathrm{CON} - (\mathrm{FC} + \mathrm{AM}) \tag{47}$$

The proposed expression is a mere definition, i.e., 'it is true by definition'. If we multiply and divide the Contribution margin (CON) by the sales made and rearrange the expression, we arrive at equation (48):

$$\mathrm{EBIT} = -(\mathrm{FC} + \mathrm{AM}) + \mathrm{CONS} \text{ x } \mathrm{S} \tag{48}$$

which, as you can see, is **the equation of a straight line** in the graph relating EBIT to Sales, with ordinate at the origin -(FC+AM) and slope equal to CONS. Thus, if we represent the above graphically, we arrive at Figure 5.

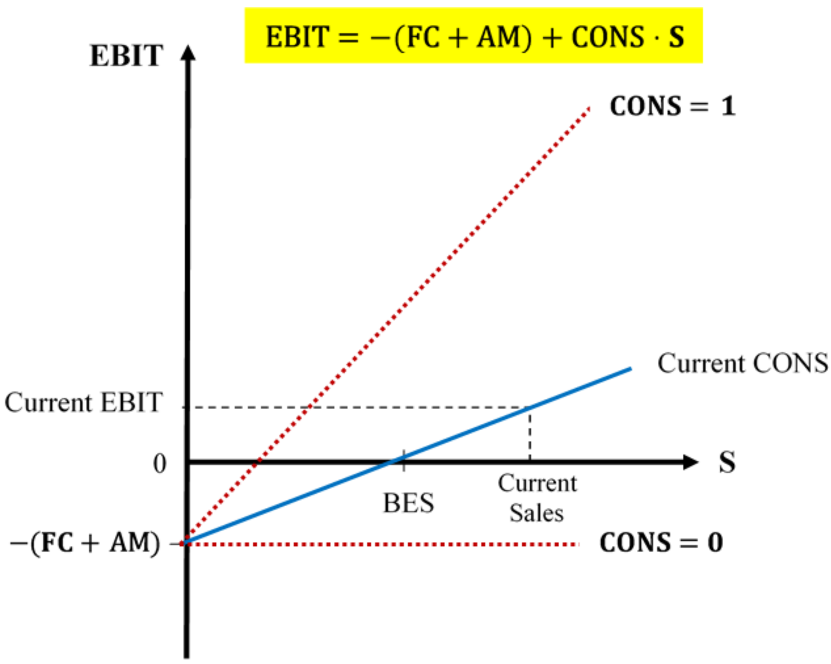

Figure 5

As you can see, the straight line arises from the fixed costs changed sign (if we do not sell anything, the profit would be negative and identical to the fixed costs); and the slope of the line coincides with the CONS, which we assume constant for any level of sales, which means that each euro we sell increases the EBIT in that amount. In red are highlighted an extreme situation (CONS=1) and the one associated with a value of CONS equal to zero.

What happens if, all other things being equal (specifically, assumed constant fixed costs), **we manage to improve our Contribution Margin ratio** (for example, by reducing the unit cost price of a raw material)? Well, **there would be a 'leverage effect'**: the straight line would still start from the same point (fixed costs); but, by increasing the CONS, the slope would be greater, so the profit would grow for any level of sales; simultaneously, we would manage to reduce the Break-even Sales (it is necessary to sell less to cover the same amount of fixed costs). You can see all this in Figure 6.

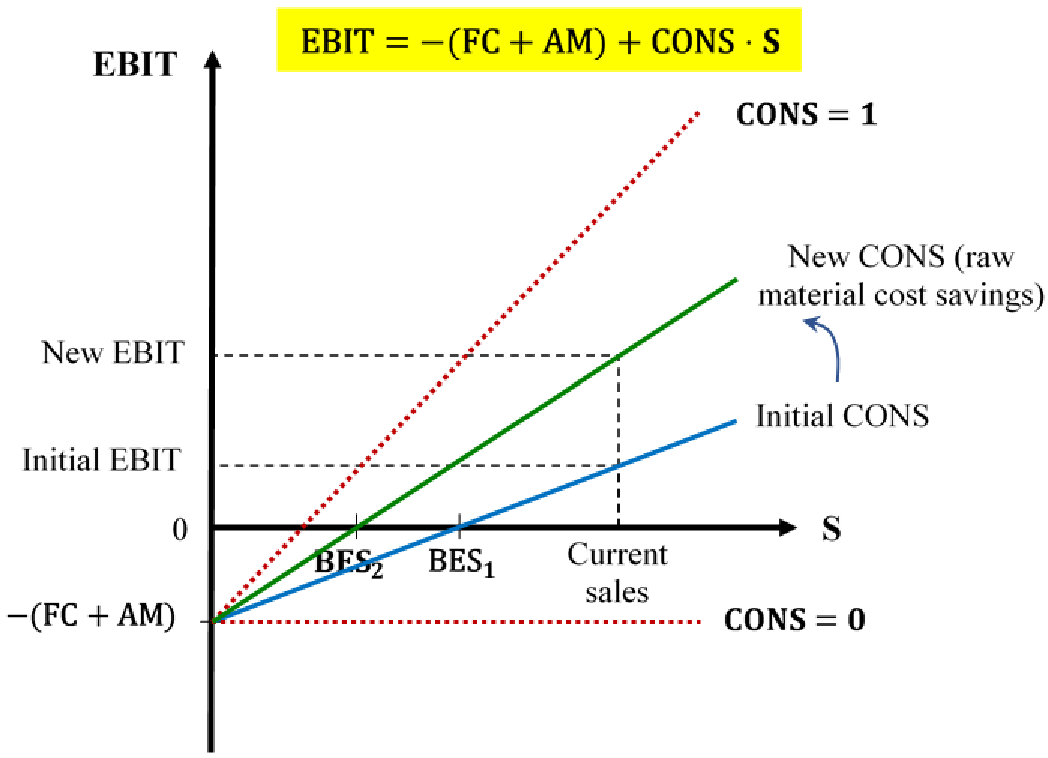

Figure 6

Financial leverage

Following the authors of the proposed pyramid, **let us define four additional ratios** (some of which will be more than familiar to you by now):

$$\mathrm{ROE} = \frac{\mathrm{NP}}{\mathrm{E}} \tag{49}$$

$$\mathrm{ROA} = \frac{\mathrm{EBIAT}}{\mathrm{FA+WC}} = \frac{\mathrm{EBIT\ x\ (1-t)}}{\mathrm{FA+WC}} \tag{50}$$

$$\mathrm{i} = \frac{\mathrm{I\ x\ (1-t)}}{\mathrm{LTD}} \tag{51}$$

$$\frac{\mathrm{LTD}}{\mathrm{E}} \tag{52}$$

Let us interpret the meaning of the proposed ratios:

- The '**ROE**' ratio is known as the '**financial return**' (or Return On Equity), and indicates the accounting profitability obtained for each euro invested by the shareholder.

- The '**ROA**' ratio, which we call '**operating return**', indicates the profitability obtained for any euro invested in the asset: we say 'any euro' because the ratio is not affected by the company's level of indebtedness, it is limited to comparing revenues with operating costs (net of taxes) and dividing the resulting figure by the investment made in the asset.

- The third ratio, identified by the letter '**i**', indicates the **cost of using one euro of borrowed funds** (after considering all the effects caused by the decision to borrow, i.e. subtracting the 'tax shield' -savings- generated by interest payments).

- Finally, the fourth and last ratio shows the company's **level of indebtedness**, the ratio between debt and equity used to finance assets.

Having considered the ratios to be used in this context, let us recall the definition of Net Income (assuming, for the time being, the absence of Non-recurring earnings):

$$\mathrm{NP} = (\mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM} - \mathrm{I})\ \mathrm{x}\ (1 - \mathrm{t}) \tag{53}$$

which can be broken down into two elements:

$$\mathrm{NP} = (\mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM})\ \mathrm{x}\ (1 - \mathrm{t}) - \mathrm{I\ x}\ (1 - \mathrm{t}) = \mathrm{EBIAT} - \mathrm{I\ x}\ (1 - \mathrm{t}) \tag{54}$$

Starting from the proposed definition, it is easy to arrive, by means of a simple algebraic procedure (which includes the incorporation of the definitions of the ratios previously presented), at an expression identical to the previous one, but made explicit 'in a different language'[12]:

[12] As we said, the procedure is relatively simple. Let EBIAT be removed from the expression (54):

EBIAT = NP + I x (1-t)

Substituting in the above expression the definitions of the ratios proposed in (49), (50) and (51):

ROA x (FA+WC) = ROE x E + i x LTD

But FA+WC is equal to LTD+E; so substituting in the previous expression and clearing we arrive at (55).

$$\mathrm{ROE} = \mathrm{ROA} + (\mathrm{ROA} - \mathrm{i})\ \mathrm{x}\ \frac{\mathrm{LTD}}{\mathrm{E}} \tag{55}$$

The interpretation of the above expression is simple: the financial return (ROE=NP/E) can be broken down into two elements, the return that the shareholder gets from the asset (the operating return, ROA = EBIAT / (FA+WC), which is the net return that 'any euro is extracted by investing it in the asset') and what we call 'financial leverage', the contribution to the shareholder's return due to indebtedness. In effect, the term (ROA-i) indicates the spread that one euro invested in the asset earns over its cost when it comes from debt; this differential, multiplied by the amount of debt used, indicates the amount (in euros) obtained from borrowed funds over and above their cost and which allows shareholders to receive 'extra' remuneration (over and above what is obtained from their money invested in the asset, the 'ROA' mentioned above), a contribution obtained by dividing this total amount by the Shareholders' Equity invested.

Thus, it is easy to deduce that the proposed equation is always true. So, we can say that 'as **long as the operating return is above the cost of debt, the higher the debt, the higher the shareholder return**'. The problem is that, for this increase in profitability to be good news, it must sufficiently compensate for the **increased risk** it forces to assume.

Indeed, following Professor Gómez-Bezares, we can see this effect graphically in Figure 7. In this figure, the 'financial leverage' (the contribution to shareholder return achieved through debt) is related to the operating return (ROA). As can be seen, it is a straight line with ordinate at the origin -i x LTD/E and slope LTD/E, which cuts the horizontal axis at the cost of debt (i). It can easily be seen that indebtedness contributes nothing in two possible situations: in the absence of external financing (in which case the straight line would be confused with the horizontal axis); or when the asset yields the same as the cost of debt (ROA=i).

$$(\mathbf{ROA} - \mathbf{i}) \cdot \frac{\mathbf{LTD}}{\mathbf{E}} = -\mathbf{i} \cdot \frac{\mathbf{LTD}}{\mathbf{E}} + \frac{\mathbf{LTD}}{\mathbf{E}} \cdot \mathbf{ROA}$$

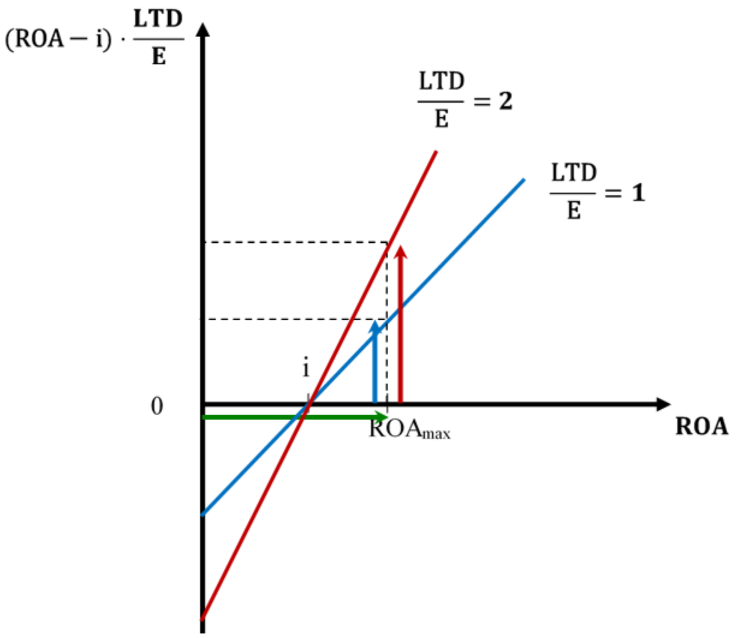

Figure 7

Figure 7 shows how, assuming a maximum value for the operating return (ROA_{max}), which we assume to be higher than the cost of debt (i), there would be a positive return contribution from indebtedness, smaller for low levels (blue) and higher for high levels of indebtedness (red).

Let us now see what happens if the return on the asset, although positive, is below the cost of debt (Figure 8). In this case, the return generated by the asset (in green) must be reduced by an amount that is higher the higher the indebtedness (since the asset yields below the cost of debt, so that part of what had been obtained with the shareholders' money must be used to service the debt).

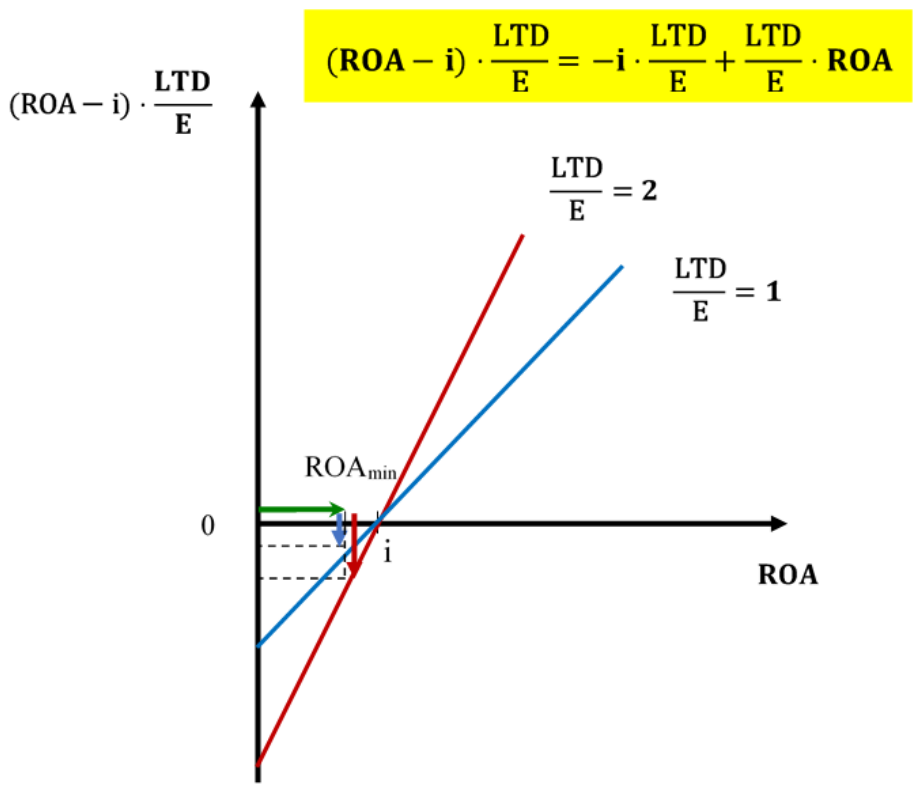

Figure 8

If we now join Figures 7 and 8 we can see in a graphic and intuitive way how an increase in indebtedness always implies an increase in risk (Figure 9): to the 'range of possible values of ROA' (associated with the risk of the asset and represented in green), we add another, the higher the level of indebtedness (shown in blue, for low levels, and in red for higher levels).

Therefore, assuming that, in expected terms, ROA is above i (it would not make sense to remain in a business in which the expected return on assets is lower than the cost of debt, which will always be lower than the cost of equity, in a logic of risk-averse individuals; to which is added the tax effect), an increase in indebtedness may not be good news if the return premium is insufficient to compensate for the increase in risk.

$$(\mathbf{ROA} - \mathbf{i}) \cdot \frac{\mathbf{LTD}}{\mathbf{E}} = -\mathbf{i} \cdot \frac{\mathbf{LTD}}{\mathbf{E}} + \frac{\mathbf{LTD}}{\mathbf{E}} \cdot \mathbf{ROA}$$

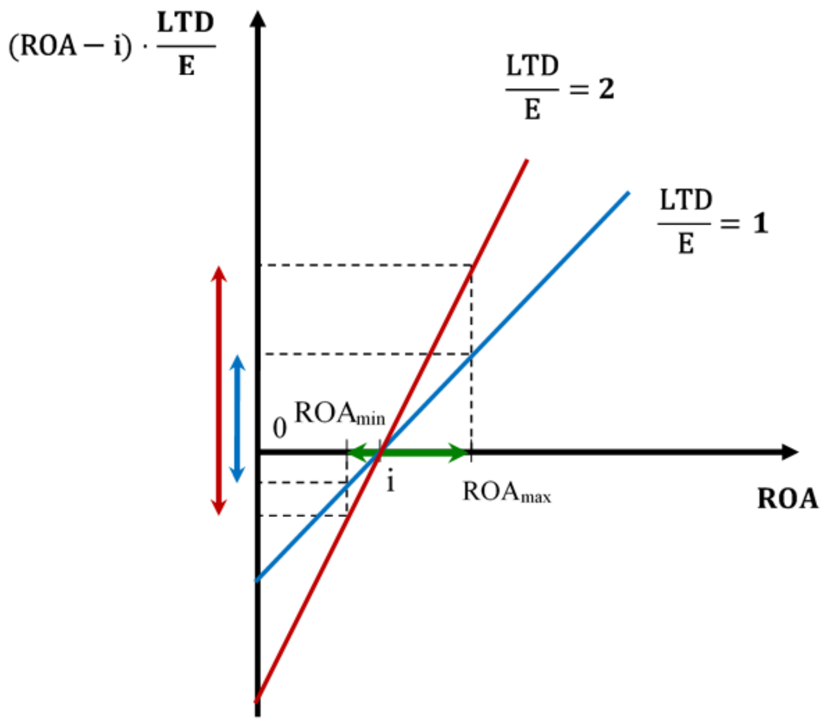

Figure 9

Connection between Operating Leverage and Financial Leverage

In the previous lines and sections we have been able to analyse two interesting concepts, operating leverage (which allows us to see how the profit of the asset grows if we achieve improvements in sales management in relation to variable costs; see Figure 6) and financial leverage (which shows how financial performance can be leveraged through indebtedness, although the increase in expected profitability achieved in this way is always accompanied by an increase in risk; you may recall Figure 9).

The two concepts indicated above appear in the pyramid of ratios that we are going to see next; figures 10 and 11 reproduce the graphs referred to and show the 'section of the pyramid' in which each of them is studied.

All that remains is to **connect the two concepts**, for which we need to 'transition' from the concept of '**earnings before interest and taxes**' (EBIT, an element to be explained in the operating leverage chart) to '**operating performance**' (ROA, which plays a fundamental role in the concept of financial leverage). The change is simple, just multiply EBIT by the factor (1-t) and divide the result obtained by the investment required to achieve it (FA+WC): we thus convert 'earnings before interest and taxes' into 'return on assets'.

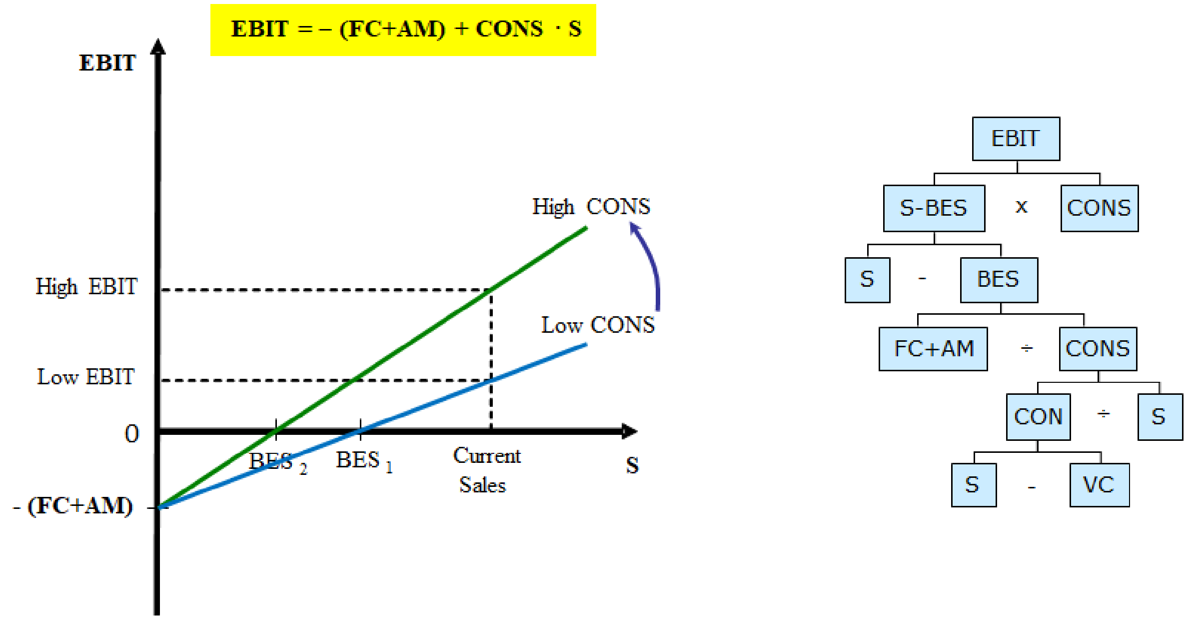

Figure 10

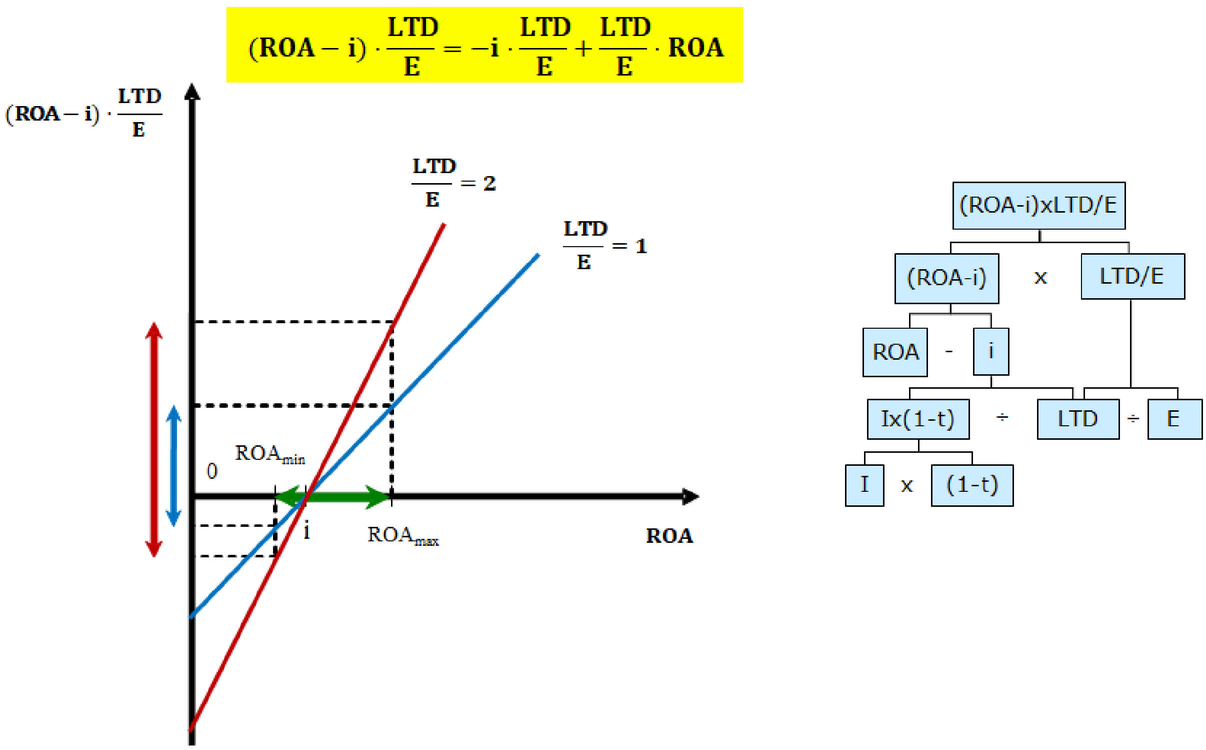

Figure 11

But, to make the connection between the two concepts of 'leverage' clearer (both 'operating' and 'financial'), we will replace the graph in Figure 6 (EBIT to Sales relationship) with the one shown on the right side of Figure 12, which represents operating performance on the vertical axis, and CONS (Contribution Margin per euro sold) on the horizontal axis.

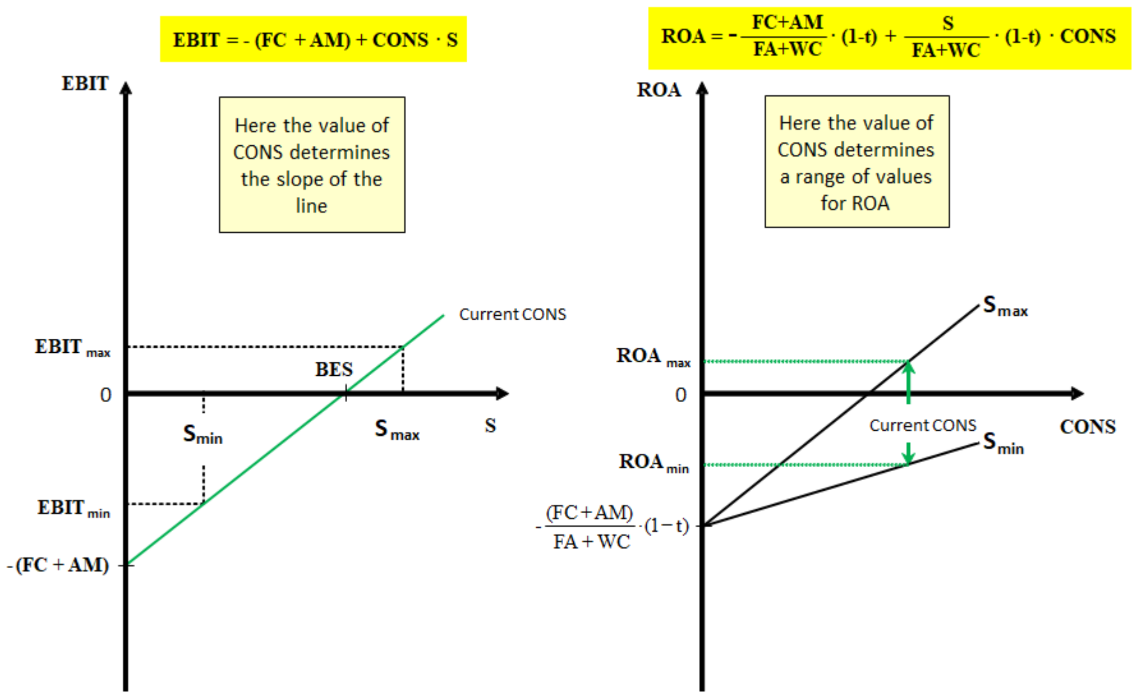

Figure 12

As you can see, in the original proposal of Gómez-Bezares and Jordano (left graph of figure 12), the value of CONS defines the slope of the straight line that arises from fixed costs, and the possible range of sales values determines that corresponding to earnings before interest and taxes. In the alternative view proposed here (right graph of figure 12), each possible level of sales is associated with a different line; and the specific value of CONS that the company presents conditions the range of possible values of ROA (you can also see this in figure 13, where the section of the pyramid of ratios associated with this concept is added to the graph).

We will also replace the original proposal relating to **financial leverage** with an **alternative view** that relates financial performance (ROE) to the level of indebtedness (LTD/E). In these new coordinates, the equation to be represented is that of a straight line, with the ordinate at the origin equal to the operating return (ROA) and slope coinciding with the difference between this and the cost of debt (ROA-i); there would therefore be a straight line for each possible value of ROA. The right-hand side of Figure 14 shows the extreme straight lines, which are given by the maximum and minimum values of operating yield (conditioned, in turn, by the maximum and minimum values of sales). In either of the two graphs (left and right), the arrow coloured in green indicates the operating risk (variability associated with operating performance), while the arrows coloured in blue and red show the additional risk contributed by indebtedness in each case (low, in blue; and higher, in red).

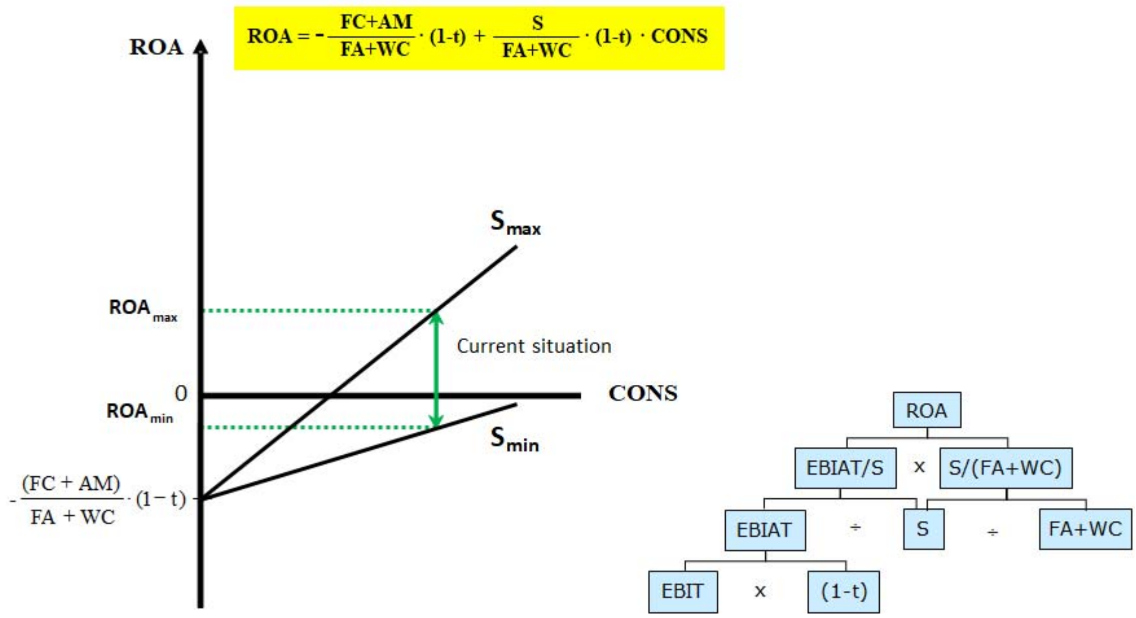

Figure 13

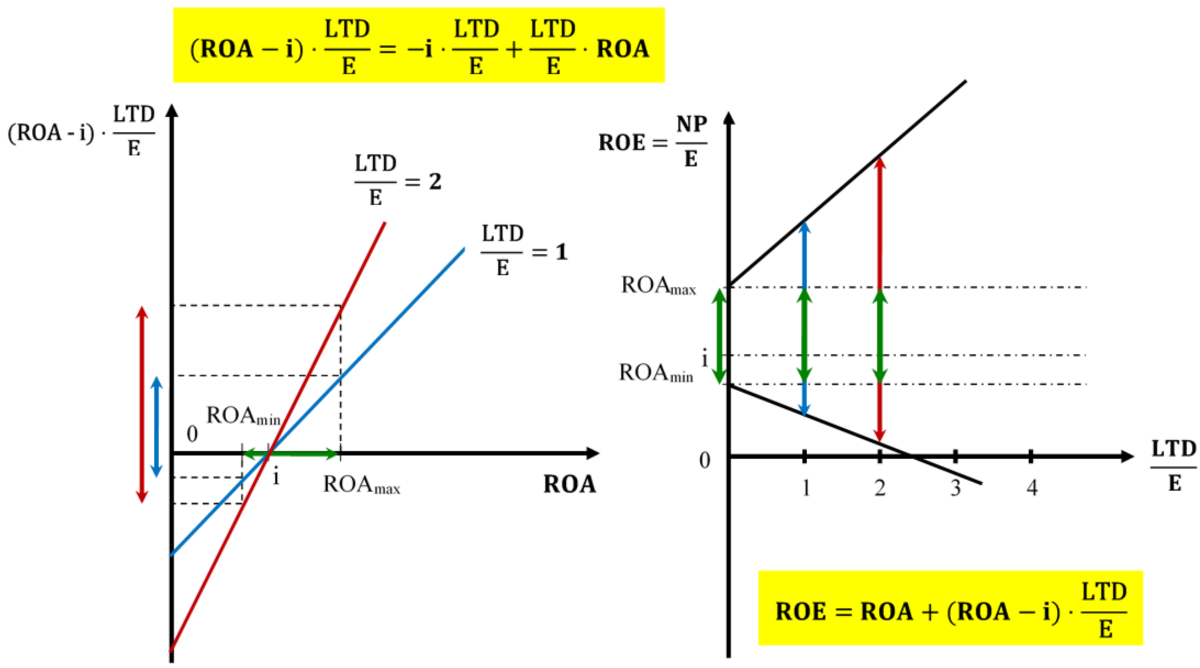

Figure 14

All that remains is to connect the two alternative concepts of leverage, which can be seen in Figure 15.

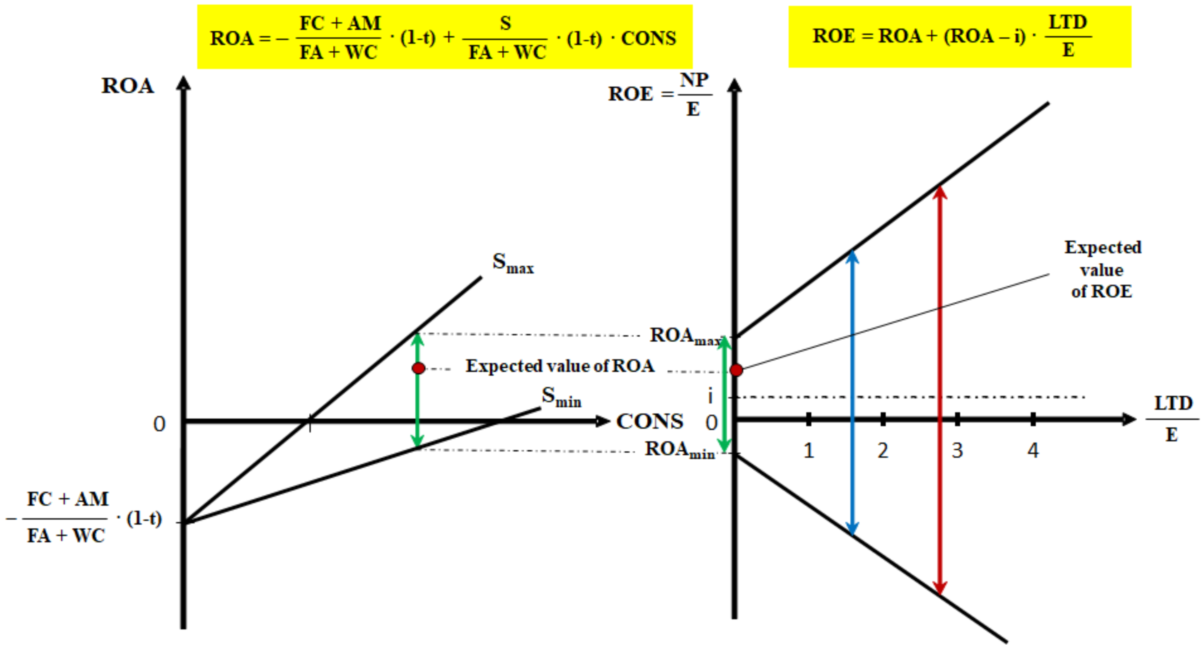

Figure 15

The interpretation of Figure 15 is simple: assuming a range of sales and probabilities of occurrence associated with each possible value, as well as a specific value of CONS, the 'expected value of ROA' (represented by the red dot) and the range of possible values of ROA in the absence of indebtedness (represented by the green arrow) are fixed. Under these conditions, **the shareholder's return can be leveraged by resorting to borrowing**: we can place ourselves at any possible point on the green line starting at the expected value of ROA in the graph on the right, which **also entails an increase in the** total **risk** for the shareholder (represented by the blue and red arrows, associated with different levels of leverage).

Thus, and in view of the above, it is not clear *a priori* which point on the line coloured in green in the second graph is better for the shareholder: increases in expected return that can be achieved by moving to the right on the horizontal axis (which correspond to higher levels of indebtedness) are accompanied by higher levels of risk; and it should be remembered that a fundamental pillar of modern finance is the risk aversion hypothesis.

Basic Ratio pyramid model

Here we come to the presentation of the basic ratio pyramid model proposed by Gómez-Bezares and Jordano. You can see the general scheme in Figure 16, which is nothing more than the result of 'putting together' all the pieces that we have been defining in the previous sections (remember that, for the moment, we have not considered the possible existence of earnings from non-recurring operations).

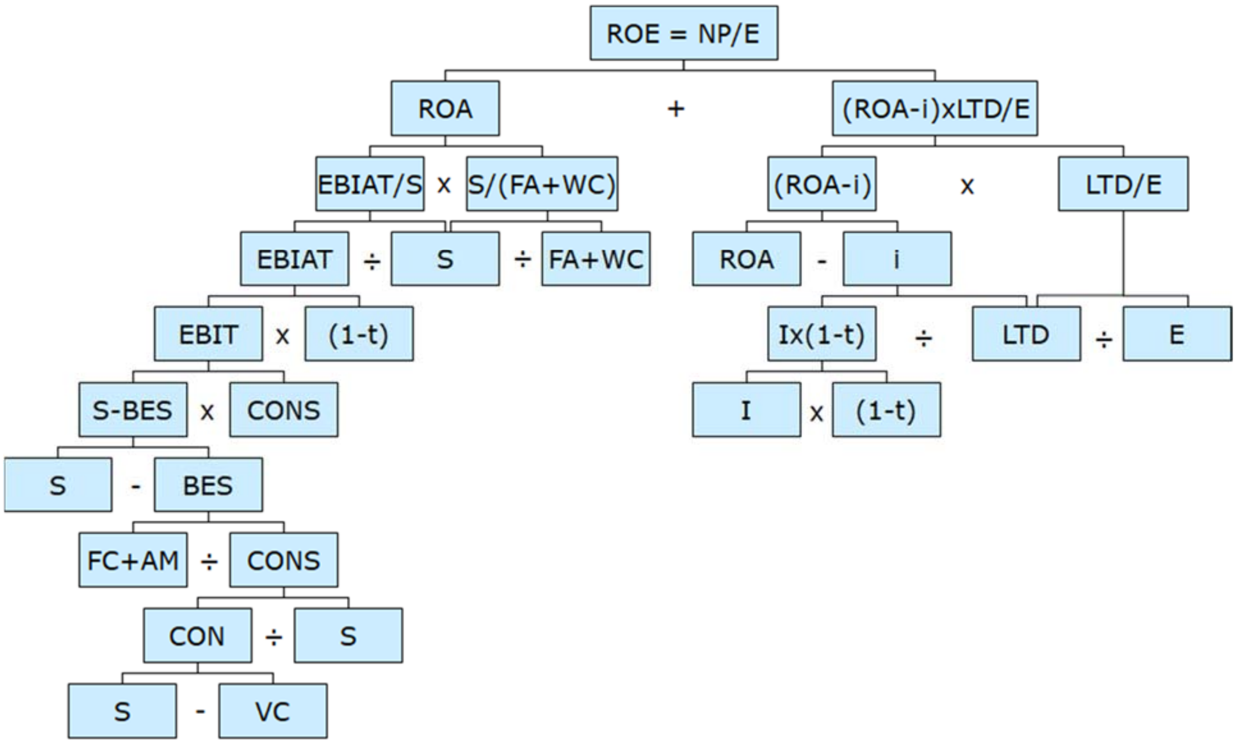

Figure 16

Logically, the Ratio pyramid must be constructed 'from the bottom up': first, starting from the left-hand side, we calculate the figures related to 'operating leverage', which allow us to reflect on how EBIT is generated. From there, we make the transition from profit to operating return (ROA), and we are ready to study the contribution of liabilities (debt) to shareholder return. Thus, the left-hand side of the pyramid refers to the **study of assets, regardless of how they are financed**, while the right-hand side is reserved for the **analysis of liabilities and their contribution to financial performance**. In this way we manage to respect one of the most important keys of modern financial reasoning, which requires precisely this separation. The proposed model also adequately serves the logic of '**incremental (or differential) analysis'**, insofar as, for example, interest is shown net of taxes, which means 'assigning the tax effect to the one that causes it'.

Possibility of including the results of non-recurring operations in the basic pyramid scheme

We will now reflect on the level of the Ratio pyramid at which it would be advisable to include the results of non-recurring operations (NREBT). Although other possibilities would be possible, it does not seem reasonable in general terms to do so below ROA (since this would mean mixing Non-recurring earnings with those of the usual activity, making it difficult to discern 'what is being done well and what is wrong'); this is why we will begin by including them at the level of operating performance, which allows us to study separately the contribution of usual and Non-recurring operations to the return on assets (see Figure 17).

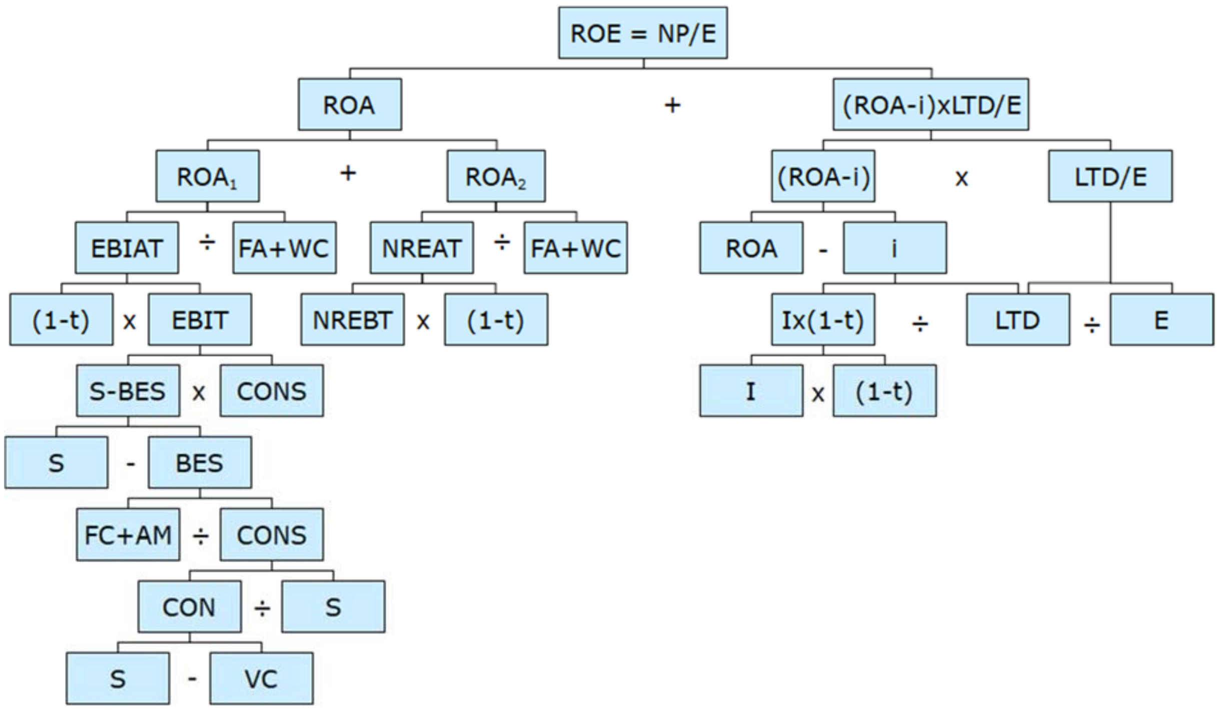

Figure 17

What is the problem with using this approach? That **the results of non-recurring activities would influence our analysis of the company's liabilities**: indeed, imagine that recurring operations have generated an operating return ROA_1=4% and that non-recurring operations have been able to contribute an additional ROA_2=4%; if the cost of debt were i=6%, this version of the pyramid would interpret that indebtedness has had a positive effect; whereas if the analysis were done considering only recurring operations, the interpretation of such indebtedness would be different.

The above could justify **the inclusion of Non-recurring results at the financial performance level**, as shown in Figure 18. In this approach, the results of non-recurring operations are left out of the analysis; we limit ourselves to incorporating them in the last step, which simply shows their contribution to financial performance and allows us to reconcile the final result obtained with that resulting from dividing profit by shareholders' equity.

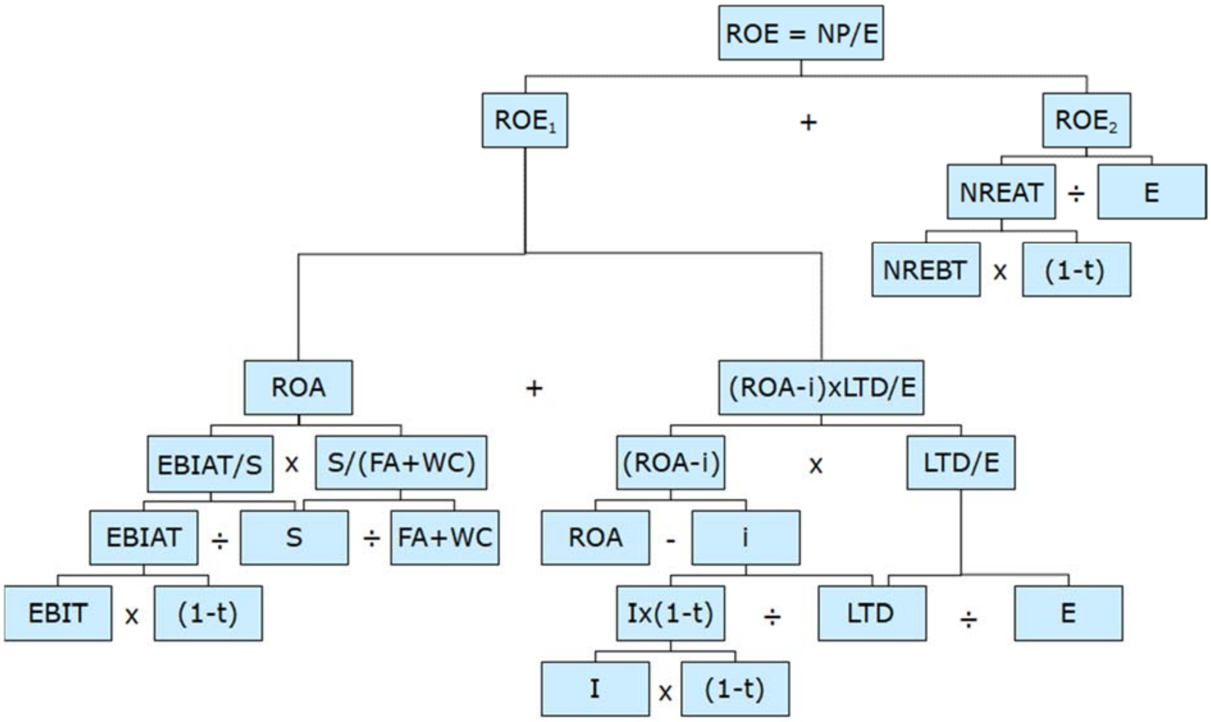

Figure 18

Possibility of isolating possible 'Non-recurring' tax effects

In the same way that the results of non-recurring operations can occur, it could also happen that, in a specific year, the company has borne a tax rate different from the general rate (understood as the rate borne on average by the rest of the companies in the sector; for example, a tax credit generated as a result of obtaining losses in previous years could have become effective). If we want to '**isolate effects**', i.e. if we are interested in ensuring that the fact of having borne a different tax rate does not influence the comparative analysis of the company with the average for the sector, we should use the same rate in all cases (which we will call the **'general rate', t_{gen}**).

The problem is that in this case a distortion would be introduced that makes it impossible to 'fit' the pyramid (this being understood as the fact that the value obtained in the pyramid coincides with the result of dividing the profit by the invested equity). The reason is clear: in the original income statement, the tax rate 'that has acted on the tax base' is the result of dividing the cost for this concept by the tax base (which we will identify as the **'input rate', t_{borne}**). This forces us to 'reconcile' our calculations with reality, correcting 'somewhere' the error made when considering a tax rate different from the borne rate. The aforementioned 'error', which we will call '**Tax earnings**', is calculated:

$$\text{Tax earnings} = \left(t_{gen} - t_{borne}\right) \text{ x Tax Base} = \left(t_{gen} - t_{borne}\right) \text{ x } (\text{EBIT} + \text{NREBT} - \text{I}) \qquad (56)$$

As you can see, the proposed formula corrects the 'error' made by applying to the three elements that make up the taxable base a rate different from the rate actually borne. It only remains for us to decide 'in which part of the pyramid' to include this element. Again, there are basically two possible alternatives, which you can see in figures 19 and 20.

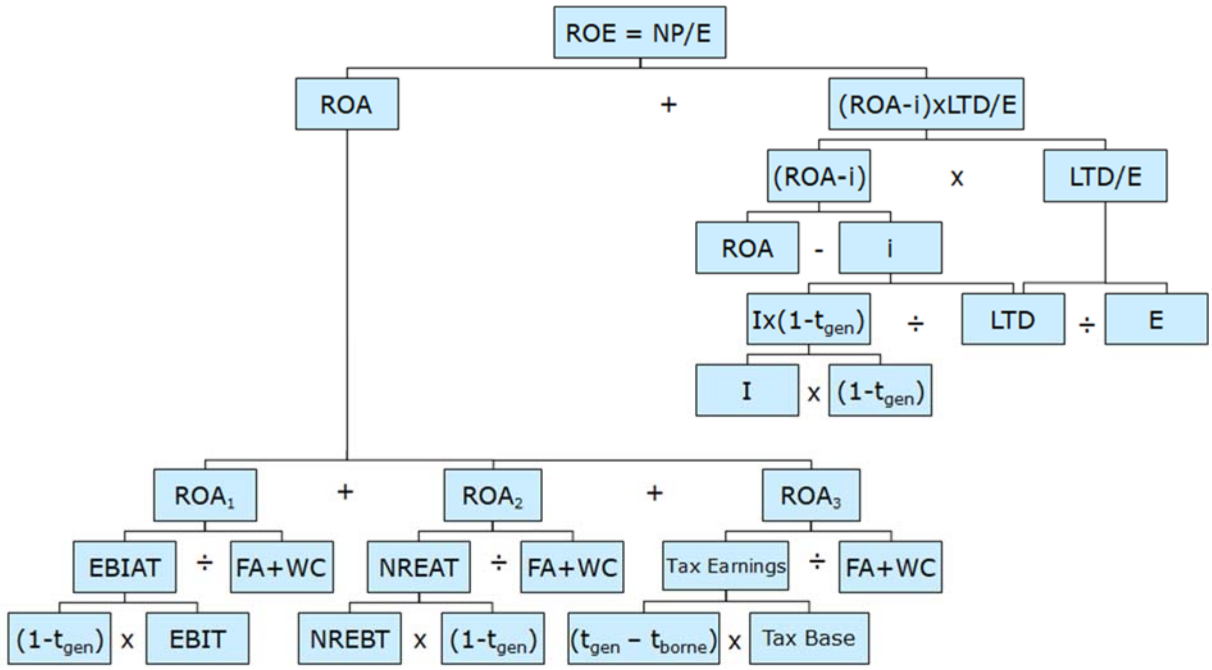

Figure 19

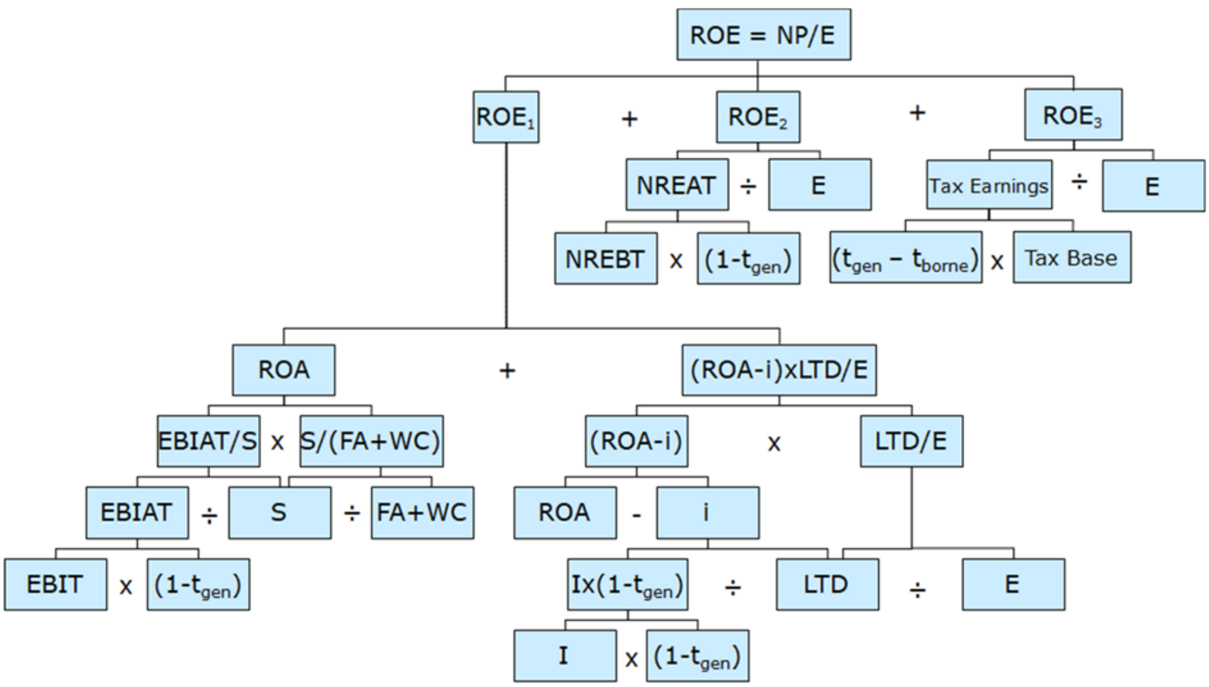

Figure 20

The reflection on the advisability of including the tax effect at one level or another is the same as that associated with the consideration of the results of non-recurring operations discussed in the previous section, so I refer you to that section to avoid unnecessary repetition.

Inclusion of Value Based Management (VBM) logic in the basic Ratio pyramid scheme

A few years ago, a trend called 'Value Based Management' became fashionable in the Corporate finance environment, driven by consultants who offered their clients to adapt their accounting with a view to **finding opportunities for value creation in all the company's activities**.

Although it was presented as something new, and included the definition of a particular language and nomenclature, what they ultimately proposed was to recover an old financial concept, that of '**Economic Profit'**, understood as the difference between the result obtained (EBIAT) and that which should have been achieved to meet the fund providers' expectations (the result of applying the weighted average cost of capital, WACC, to the investment made LTD+E = FA+WC):

$$Economic\ Profit\ (EP) = EBIAT - WACC\ x\ (FA + WC) \tag{57}$$

It is not difficult to **incorporate this concept into the general Pyramid scheme** (as we did in an article published at that time). One possibility would be to connect the top of the pyramid (which, as you will recall, culminated in the financial return 'ROE') with the aforementioned concept (Figure 21), in which, to the nomenclature defined above, we must add k_e, which is the return expected by the shareholders when they put their money at the disposal of the business (remember that WACC stands for Weighted Average Cost of Capital, the average cost of liabilities).

Another possibility would be the one proposed in Figure 22, in which the connection with economic profit is made at the level of operating performance (ROA); the problem is that in it an important part of the original pyramid of ratios is lost, the one that has to do with the study of financial leverage; although, depending on the objective of the analysis, its use could be justified.

Two Appendices are provided below. The first shows a simple exercise on the application of the basic ratio pyramid model taken from the Excel sheet 'Proyección y análisis financiero' (a translated version of which can be downloaded free of charge at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx).

The second appendix offers two alternative Ratio batteries that may be of interest. We leave their reading to the interested reader, as well as the interpretation of the different measures and the reflection on the 'desirable values'... with the effort made so far, I have no doubt that it will be an interesting and fruitful exercise!

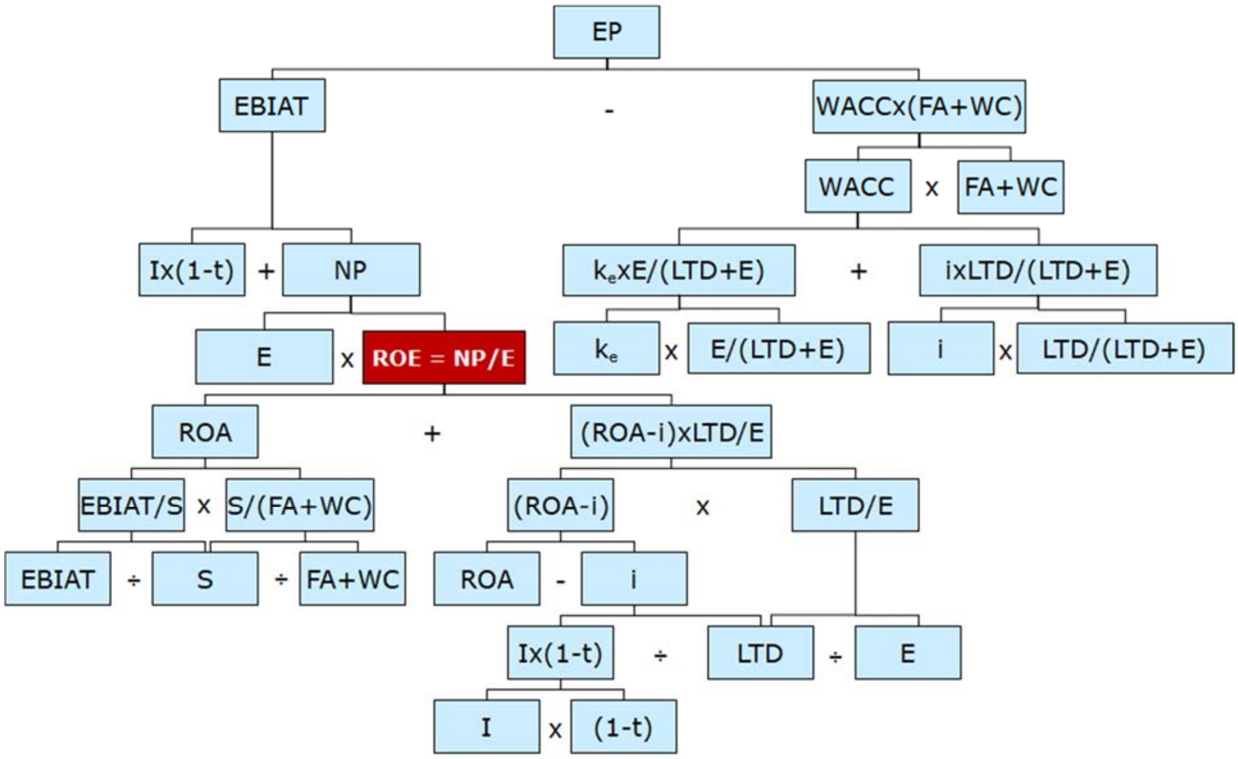

Figure 21

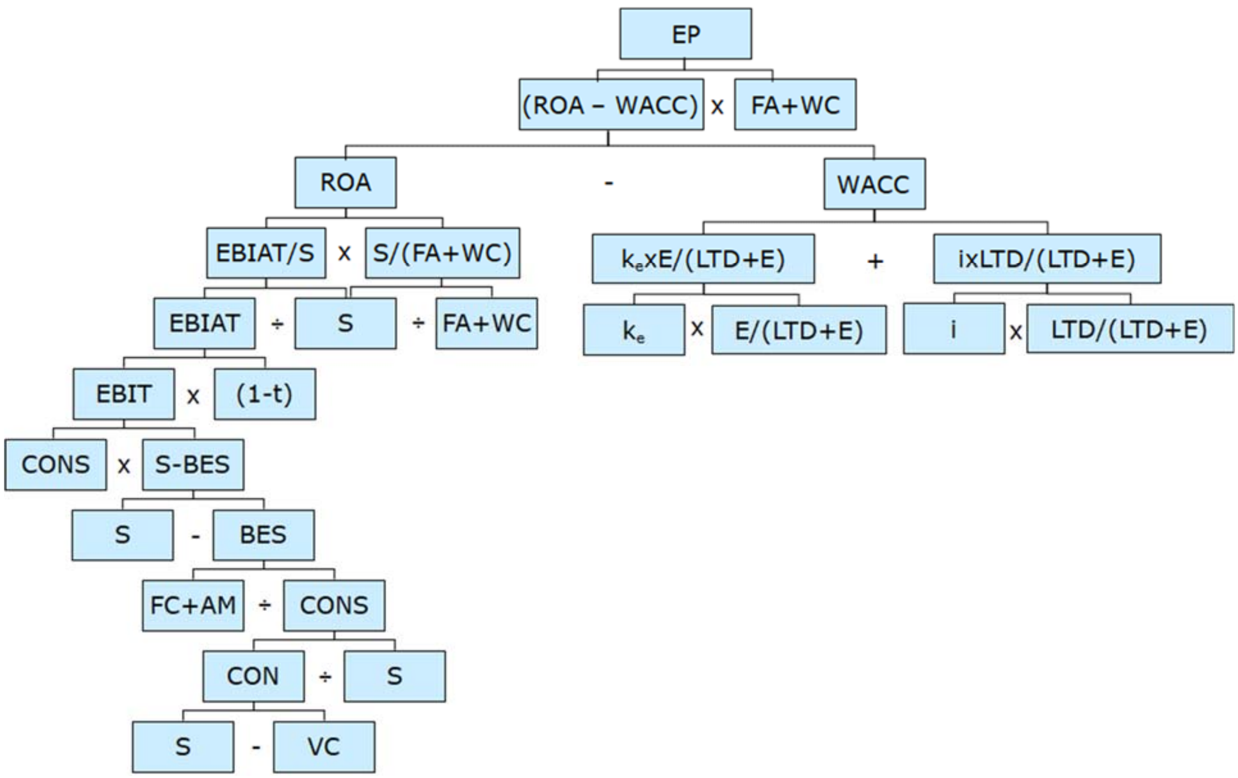

Figure 22

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RECOMMENDED SPREADSHEETS

SANTIBÁÑEZ, J. (2023): 'Proyección y análisis financiero'. Registered as a computer program in the *Intellectual Property Registry* under the name 'APLICACIÓN EXCEL PARA LA ADQUISICIÓN DE COMPETENCIAS RELACIONADAS CON LA PROYECCIÓN FINANCIERA Y EL ANÁLISIS DE ESTADOS FINACIEROS (MEDIANTE EL ESTUDIO DEL FLUJO DE FONDOS Y LOS RATIOS)', Registration Number 01 / 2024 / 258, with effect from 19-9-2023. Translated version available for free download at http://www.deusto-publicaciones.es/deusto/content/libro-finanzas-ing/Financial-forecasting-and-analysis-of-FFSS.xlsx.

APPENDIX I

Company X presents, as of December 31, 2024, the financial statements for the last two fiscal years:

INCOME STATEMENT		
Concept	**2023**	**2024**
Sales (Goods for resale)	5.000.000	6.000.000
Purchases (Goods for resale)	-4.000.000	-5.266.667
Increase in Stock (Goods for resale)	0	466.667
Wages and salaries	-120.000	-124.800
Cost of other supplies	-72.000	-75.600
Rents	-48.000	-48.960
Depreciation of Fixed Assets	-360.000	-365.000
Interest on Long-Term Debt	-129.600	-129.600
Non-Recurring earnings	0	6.000
Corporate Tax	-81.120	-138.612
Net Profit (Loss)	**189.280**	**323.428**

BALANCE SHEETS		
ASSETS	**31-XII-2023**	**31-XII-2024**
Cash & equivalents	100.000	101.220
Receivables from sale of fixed assets	0	43.560
Customers (trade receivables)	1.512.500	1.815.000
Stocks	333.333	800.000
Gross fixed assets	7.200.000	7.250.000
- Accumulated depreciation	-2.160.000	-2.505.000
TOTAL ASSETS	**6.985.833**	**7.504.780**

LIABILITIES	**31-XII-2023**	**31-XII-2024**
Suppliers (trade payables)	403.333	968.000
Corporate tax payable	81.120	138.612
Long-term debt	2.160.000	1.728.000
Profit or loss for the year (P&L)	189.280	323.428
Retained earnings (Reserves)	1.660.840	1.755.480
Share Capital	2.491.260	2.591.260
TOTAL LIABILITIES	**6.985.833**	**7.504.780**

Based on the information presented, prepare the Ratio pyramid for accounting year 2024, considering the following elements:

- ✓ ***Opening balance sheet balances must be used.***
- ✓ ***The study should be conducted from a long-term perspective (investments and permanent capital).***
- ✓ ***Supply costs and Other supplies are to be considered as variable; Personnel costs and Rents are fixed; Depreciation is a systematic loss of value due to the passage of time.***
- ✓ ***The results of non-recurring operations should not influence the analysis of the company's liabilities.***

The solution to the Case study is presented below. The first step consists of compressing the initial information to make it more easily usable in the preparation of the proposed Ratio pyramid model: the reader must identify the items that make up the main balance sheet assets and liabilities, and embed in the simplified income statement model that we have defined in the text the elements that appear in the original profit and loss account (see figures A-I.1, for the explanation in text format, and A-I.2, for the numerical explanation).

Immediately below, in figures A-I.3 and A-I.4, you will find the explanation (in text and numerical format, respectively) related to the preparation of the requested ratio pyramid.

Let us make a **brief commentary on the results obtained**. If we start with the most general, we can see that the financial return (accounting shareholder return) was 7,45%; the document is written in a context of interest rates close to 4%, so the figure does not seem very high. In any case, it can be seen that most of this return is obtained from recurring operations: the operating return, ROA, is 6,31%; Non-recurring operations have contributed an almost insignificant 0,1%, and financial leverage a modest 1% (as a result of a spread between the operating return and the cost of debt of just over two points, combined with a relatively low level of indebtedness). Nevertheless, the operating yield still does not appear to be very high.

If we continue with the analysis, we see that the observed value of 'ROA' is explained by a relatively low net margin per euro sold (6,83%), which is combined with a low turnover ratio of permanent investments (below 1). It is true that the difference in Sales with respect to break-even is quite high (realized sales are more than 2 times those needed to cover fixed costs), but the problem is the low contribution margin ratio, CONS (which stands at less than 19-euro cents). We would need more information regarding the sector in which the activity is framed, as well as the level of competition and maturity of the activity, but things can hardly improve in this case without a significant increase in the contribution margin ratio.

ASSETS	31-XII-2023	
CA	1.945.833	= Cash and cash equivalents + Other accounts receivable + Trade accounts receivable + Stocks
FA	5.040.000	= Gross fixed assets - Accumulated depreciation
TA	6.985.833	

LIABILITIES	31-XII-2023	
CL	484.453	= Trade payable + Corporate tax payable
LTD	2.160.000	= Long-term debt
E	4.341.380	= Profit for the year (P&L) + Retained earnings + Share Capital
TL	6.985.833	

P&L	2024	
S	6.000.000	= Sales
VC	-4.875.600	= - (Purchases – Increase in stock + Other supplies)
FC	-173.760	= - Wages and salaries - Rents
AM	-365.000	= - Depreciation of fixed assets
I	-129.600	= - Interest
NREBT	6.000	= Non-recurring earnings (fixed assets)
CT	-138.612	= Corporate tax
NP	323.428	

t	0,3	= Corporate tax / (Corporate tax + NET PROFIT)

Figure A-I.1

ASSETS	31-XII-2023	
CA	1.945.833	*= 100.000 + 0 + 1.512.500 + 333.333*
FA	5.040.000	*= 7.200.000 - 2.160.000*
TA	6.985.833	

LIABILITIES	31-XII-2023	
CL	484.453	*= 403.333 + 81.120*
LTD	2.160.000	*= 2.160.000*
E	4.341.380	*= 189.280 + 1.660.840 + 2.491.260*
TL	6.985.833	

P&L	2024	
S	6.000.000	*= 6.000.000*
VC	-4.875.600	*= - (5.266.667 - 466.667 + 75.600)*
FC	-173.760	*= - 124.800 - 48.960*
AM	-365.000	*= - 365.000*
I	-129.600	*= - 129.600*
NREBT	6.000	*= 6.000*
CT	-138.612	*= - 138.612*
NP	323.428	

t	0,3	*= 138.612 / (138.612 + 323.428)*

Figure A-I.2

Ratio pyramid

Concept	2024	
CON	1.124.400	*= S - VC*
CONS	**0,1874**	*= CON / S*
FC+AM	538.760	*= FC + AM*
BES	**2.874.920**	*= (FC + AM) / CONS*
S-BES	3.125.080	*= S - BES*
EBIT	585.640	*= (S - BES) x CONS*
EBIAT	409.948	*= EBIT x (1 - t)*
EBIAT/S	**0,0683**	*= EBIAT / S*
FA+WC	6.501.380	*= LTD + E*
S/(FA+WC)	**0,9229**	*= S / (FA+WC)*
ROA	0,0631	*= (EBIAT/S) x [S/(FA+WC)] = EBIAT / (FA+WC)*
Ix(1-t)	90.720	*= I x (1 - t)*
LTD	2.160.000	*= LTD*
i	**0,0420**	*= I x (1 - t) / LTD*
(ROA-i)	0,0211	*= (ROA - i)*
E	4.341.380	*= E*
LTD/E	**0,4975**	*= LTD / E*
(ROA-i)x(LTD/E)	0,0105	*= (ROA - i) x (LTD / E)*
ROE1 (recurring)	0,0735	*= ROA + (ROA - i) x (LTD / E)*
NREBT	6.000	*= NREBT*
NREAT	4.200	*= NREBT x (1 - t)*
ROE2 (non-recurring)	0,0010	*= NREAT / E*
ROE = ROE1+ROE2	0,0745	*= ROE1 + ROE2*
NP/E	0,0745	*= NP / E*
Check	0,0000	*= ROE - (NP / E)*

Figure A-I.3

Ratio pyramid

Concept	2024	
CON	1.124.400	= 6.000.000 - 4.875.600
CONS	**0,1874**	= 1.124.400 / 6.000.000
FC+AM	538.760	= 173.760 + 365.000
BES	**2.874.920**	= 538.760 / 0,1874
S-BES	3.125.080	= 6.000.000 - 2.874.920
EBIT	585.640	= 3.125.080 x 0,1874
EBIAT	409.948	= 585.640 x (1 - 0,30)
EBIAT/S	**0,0683**	= 409.948 / 6.000.000
FA+WC	6.501.380	= 2.160.000 + 4.341.380
S/(FA+WC)	**0,9229**	= 6.000.000 / 6.501.380
ROA	0,0631	= 0,0683 x 0,9229
Ix(1-t)	90.720	= 129.600 x (1 - 0,30)
LTD	2.160.000	= 2.160.000
i	**0,0420**	= 90.720 / 2.160.000
(ROA-i)	0,0211	= 0,0631 - 0,0420
E	4.341.380	= 4.341.380
LTD/E	**0,4975**	= 2.160.000 / 4.341.380
(ROA-i)x(LTD/E)	**0,0105**	= (0,0631 - 0,0420) x 0,4975
ROE1 (recurring)	**0,0735**	= 0,0631 + 0,0105
NREBT	6.000	= 6.000
NREAT	4.200	= 6.000 x (1 - 0,30)
ROE2 (non-recurring)	**0,0010**	= 4.200 / 4.341.380
ROE = ROE1+ROE2	**0,0745**	= 0,0735 + 0,0010
NP/E	**0,0745**	= 323.428 / 4.341.380
Check	0,0000	= 0,0745 - 0,0745

Figure A-I.4

APPENDIX II

Battery proposed by BANCO DE ESPAÑA (Euro system) - ECCBSO (European Committee of Central Balance-Sheet Data Offices) - Registrars of Spain

Sectoral ratios of non-financial companies

Group	Ratio
Operating costs, profits and profitability	Value added / Net revenues Personnel expenses / Net revenues Gross economic profit / Net revenues Gross economic profit / Total net debt Net economic profit / Net revenues Net revenues / Total assets Net economic result / Total assets Earnings before taxes / Shareholders' equity Net profit / Shareholders' equity
Working capital	Inventories / Net revenues Trade receivables / Net revenues Trade accounts payable / Net revenues Working capital / Net revenues
Financial expenses and income	Financial and similar expenses / Net revenues Financial and similar expenses / Gross profit/(loss) Financial earnings / Net revenues Financial earnings / Gross economic result
Asset structure	Financial fixed assets / Total assets Property, plant and equipment / Total assets Current assets / Total assets Short-term financial assets and cash and cash equivalents / Total assets
Liability structure	Shareholders' equity / (Equity+Liabilities) Provisions for liabilities and charges / (Equity+Liabilities) Payable to credit institutions / (Equity+Liabilities) Medium- and long-term Debt with credit institutions / (Equity+Liabilities) Short-term Debt with credit institutions / (Equity+Liabilities) Medium- and long-term debt / (Equity+Liabilities) Short-term debt / (Equity+Liabilities)
Activity	Sales year n / Sales year n-1

Battery proposed by ICAC

Alejandro Larriba Díaz-Zorita, '*Análisis financiero para auditores*', Instituto de Auditores Censores Jurados de Cuentas de España, Internal document.

RATIOS	x	x-1

Equity analysis		
Investment structure		
General asset structure ratio = Fixed assets / Current assets		
Financing structure		
Financial Autonomy Ratio = Borrowed Funds / Own Funds		
Investment financing		
Ratio of basic financing of fixed assets = Basic financing / Fixed assets		
Self-financing		
Overall Self-financing Ratio = Shareholders' Equity / Capital		
Comprehensive guarantee		
Guarantee Ratio = Actual Assets / Liabilities due		

Activity analysis		
Analysis of production costs		
Personnel expense cost ratio = Total production cost of the period / Personnel cost of the period		
Production volume analysis		
Total productive capacity utilization ratio = Theoretical productive capacity / Real production		
Sales volume analysis		
Ratio of the degree of compliance with the sales budget = Sales budget / Actual sales		
Revenue volume analysis		
Ratio of recurring revenue weight = Recurring revenue / Total revenue		
Productivity analysis		
Employee productivity ratio = Total value of production / Average number of employees		
Calculation of turnovers		
Finished product turnover ratio = Cost of sales for the period / Value of the average stock balance		
Customer turnover ratio = Net sales on credit for the period / Average balance of trade receivables		

Cash flow analysis		
The working capital		
Working Capital Ratio = Current Assets / Current Liabilities		
Cash flow analysis		
Profitability ratio via cash-flow = Cash-flow / Shareholders' equity		
Liquidity analysis		
Immediate cash flow ratio (acid test) = Cash / Current liabilities		

Economic analysis		
Operating margin		
Operating margin ratio = Gross sales margin / Sales		
Break-even point		
Sales Efficiency Ratio = (Sales - Sales Break-even Sales) / Sales		
Fixed cost absorption ratio = Fixed costs / Gross margin = Break-even point / Sales		
Commercial profitability		
Overall return on sales ratio = Sales revenue / Capital invested		
Return on investments		
Total economic profitability ratio = (Profit + Interest) / Total Assets		
Return on equity		
Return on Equity Ratio = Profit / Shareholders' Equity		
Profitability ratio of core funding = (Profit + Interest) / Core funding		
Shareholder return		
Earnings per share = Earnings for the year / Number of shares		
Real dividend yield = Dividend per share / Acquisition value of a share		
Stock market return of a share = (Dividends + Rights + Premiums + Capital gains) / Acquisition value of a share		
PER = Share price / Earnings per share		
Creditor profitability		
Cost of borrowed funds for the borrowing entity = Financial expenses / (Interest-bearing liabilities + Discount risk)		
Financial leverage		
Financial leverage ratio = (Profit for the year / Shareholders' equity) x (Borrowings / Financial expenses) x 100		
The added value		
Value-added ratio = Value-added / Sales		

ANALYSIS OF FINANCIAL STATEMENTS THROUGH THE STUDY OF CASH FLOW AND KEY RATIOS IN SPANISH COMPANIES (2015-2020). A SECTORAL ANALYSIS

Javier Santibáñez Grúber *

1. INTRODUCTION

The purpose of this reading is to present and comment on some of the results obtained in the application of the main tools commonly used in the analysis of Financial Statements (flow of funds and ratios), taking as a starting point real data corresponding to different sectors of activity in Spain in the period 2015-2020; with the ultimate intention of familiarizing the reader with the use of this type of tools.

The original data are taken from two publications produced in recent years by three prestigious institutions in this field, the 'Registro de Expertos Contables', Barcelona School of Management and 'ACCID (Contabilidad y Dirección)'. The aforementioned studies present summarized financial data corresponding to a large number of Spanish companies grouped into large sectors of activity (according to the National Classification of Economic Activities, CNAE, 2009) in the years between 2015 and 2020; specifically, the balance sheets and annual income statements of each sector are provided (calculated as an average of those of the companies considered in each one of them), and a battery of 25 particularly relevant ratios is made from the above information; all this in each of the three-year periods included in the total period (2015-2017 and 2018-2020).

As we will see in the following section, the papers provide the information described separately for Large and Small companies; presenting, in addition, and in each of the two previous groups, the data corresponding to those that showed a better performance and that could therefore be considered as 'benchmarks' (for which we take, in each sector, the 25% of companies with a higher ROI -Return on Investment- in the last year considered in each three-year period, 2017 and 2020). Thus, it is possible from the original information to make comparisons, both between sectors, and between Large and Small companies, also having a reference of what could be understood as values associated with successful companies within each sector.

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The aforementioned works are limited to providing the information described above and to giving general recommendations regarding the ideal values that the different ratios studied should take, but they do not enter into the evaluation of the data presented by the different sectors or into the study of the possible differences between one and the other. As we indicated at the beginning, the ultimate objective of this paper is to familiarize the reader with the aforementioned analysis process, going deeper into the study of the data presented at different levels (all of which will be explained in greater detail in the following sections).

To process the original information, an Excel application was designed to handle the large volume of data and draw the corresponding conclusions (available in a simplified version for the interested reader; here you can, among other things, practice the application of the typical analysis tools on data extracted from reality). The following two sections describe in more detail the original database and the procedures used in the analysis, and then present and discuss some of the results obtained.

2. DESCRIPTION OF THE ORIGINAL DATABASE

The analysis presented here is based on the following two documents:

- ***RATIOS SECTORIALES 2017. Cuentas anuales (balances y cuentas de resultados) de 143 sectores. 25 ratios para cada sector***. Study coordinated by Oriol Amat with the participation of Pilar Lloret and Xavier Puig. With the collaboration of UPF Barcelona School of Management, ACCID and the 'Registro de Expertos Contables (CGE y ICJCE)'. Published in 2018 in the 'Colección MANUALES'.

- ***RATIOS SECTORIALES 2020. Cuentas anuales (balances y cuentas de resultados) de 178 sectores. 25 ratios para cada sector***. Study carried out by Pilar Lloret (UOC and UVIC-UCC), Susana Domingo (UPF BSM) and Ernest Solé (UPF BSM), with the coordination of Oriol Amat (UPF). Published in 2021 in the 'Colección MANUALES'.

As indicated in the original documents, the starting data for both studies were obtained from the 'SABI (Sistema de Análisis de Balances Ibéricos)' database, distributed by the companies Bureau van Dijk and Informa. The tool includes data from around one million Spanish companies that file their annual accounts with the Mercantile Registry and ***allows groupings of up to a maximum of one thousand companies***.

In the first of these, data are presented for 143 sectors (following the grouping proposed in the National Classification of Economic Activities, CNAE, 2009), distinguishing between Large and Medium-sized companies (turnover greater than 8 million euros in 2017) and Small companies (those that presented turnover equal to or less than the aforementioned 8 million in said year); in addition, data associated with those considered 'successful companies' are presented (understanding as such those placed in the first quartile -25%- of companies with the highest ROI in 2017).

In the second paper, the number of sectors considered was expanded, following the same logic (i.e., considering as 'Large and Medium-sized companies' those with a turnover of more than eight million euros in the last year of the period considered -2020-; understanding as 'successful' 25% of the companies in each sector with a higher ROI in that year). In order to make the two historical series of data comparable, we proceeded to group some of the sectors of the second work in order to maintain the total number considered in the first of the two (143). The detail regarding the information presented in the original papers is as follows:

General information on each sector:

Concept / Year	Year n	Year n-1	Year n-2
Number of companies (maximum = 1.000)			
Balance sheet total (data in thousands of euros)			
Total revenues (data in thousands of euros)			

The above information makes it possible to 'recover' the original Financial Statements from the % presented (data are given as a % of total assets -balance sheet- and as a % of total revenues -profit and loss account, P&L-). In addition, the number of companies from which the average data have been obtained in each sector is indicated. The working capital balance and total financial debt (data implicit in the initial information) are also shown, as well as the average number of employees in each sector and year.

Concept / Year	Year n	Year n-1	Year n-2
Working capital			
Total financial debt (short-term and long-term loans and financial obligations)			
Number of employees			

Annual accounts and set of ratios corresponding to each sector:

Below is a detail of the information provided in the Financial Statements (balance sheet and income statement) and the ratios calculated for each year and sector.

BALANCE SHEET (% of Total Assets)	Year n	Year n-1	Year n-2
Non-current assets			
Current assets			
Stocks			
Realizable (trade receivables)			
Liquidity (cash and cash equivalents)			
Total assets	**100%**	**100%**	**100%**

BALANCE SHEET (% of Total Assets)	Year n	Year n-1	Year n-2
Net worth			
Non-current liabilities			
Long-term financial debt			
Other long-term debt			
Current liabilities			
Trade accounts payable			
Short-term financial debt			
Other short-term liabilities			
Total equity and liabilities	**100%**	**100%**	**100%**

PROFIT AND LOSS STATEMENT (% of operating income)	Year n	Year n-1	Year n-2
Net revenues (+)			
Other operating income (+)			
Operating income (=)	**100%**	**100%**	**100%**
Cost of sales (-)			
Contribution margin (=)			
Other operating expenses (-)			
Value added (=)			
Personnel expenses (-)			
Depreciation of fixed assets (-)			
Extraordinary result (profit/loss from non-recurring operations) (+/-)			
EBIT (=)			
Financial income (+)			
Financial expenses (-)			
EBT (=)			
Corporate tax (-)			
Profit for the year (=)			

BATTERY OF RATIOS	Year n	Year n-1	Year n-2
Liquidity			
Liquidity (Current assets / Current liabilities)			
(Current assets - Stocks) / Current liabilities			
Cash and cash equivalents / Current liabilities			
Working capital / Sales			
Working capital / Total assets			
Indebtedness			
Indebtedness (Total debt / Total assets)			
Quality of debt (Current liabilities / Total debts)			
Loan repayment capacity (Cash flow / Loans)			
Coverage of financial expenses (EBIT / Financial expenses)			
Cost of debt (Financial expenses / Borrowings)			

Asset management			
Asset turnover (Sales / Total assets)			
Turnover of non-current assets (Sales / Non-current assets)			
Turnover of current assets (Sales / current assets)			
Inventory turnover (Cost of sales / Stocks)			
Deadlines			
Inventories (Stocks / Cost of sales x 365)			
Collection (Trade receivables / Sales x 365)			
Payment (Trade payables / Cost of sales x 365)			
Customer financing by suppliers (Trade payables / Trade receivables)			
Profitability and self-financing			
Economic profitability (EBIT / Total assets)			
Financial profitability (Net income / Net equity)			
Cash flow / Total assets			
Cash flow / Sales			
Operations			
Sales / Number of employees (data in thousands of euros)			
Net income / Number of employees (data in thousands of euros)			
Personnel expenses/ Number of employees (data in thousands of euros)			

Thus, each of the two original works provides, for each sector, a total of twelve different ‘measurements’: for each of the three years considered (2017, 2016 and 2015, if we take as a reference the first of the works cited), the average values corresponding to the two groups (‘Large and Medium-sized companies’ and ‘Small companies’) are presented separately, also making explicit the values that in each of the two groups present the average of the 25% of companies with a better performance (according to the ROI obtained in the last year of the period considered, 2017 in this case).

Based on the information described above, the original data was processed, which is briefly described below.

3. MEASURES AND MODELS USED IN THE ANALYSIS

3.1. General Aspects and Preliminary Calculations

In a first step, the codes corresponding to each of the sectors studied were assigned, considering the year and type of company considered (large or small; including all companies in the sector or only 25% of ‘successful’ companies).

Next, each sector was also assigned an additional code associated with what we will call ‘MEGASECTORS’ (grouping of sectors with common elements) according to the International Standard Industrial Classification (abbreviated as ISIC); according to Wikipedia, ‘it is the systematic classification of all economic activities whose purpose is to establish their harmonized codification at a global level. It is used to know levels of development, requirements, standardization, economic and industrial policies, among other utilities. Each country generally has its own industrial classification, in the most adequate form to respond to its individual circumstances and the degree of development of its economy; since the needs of industrial classification vary, either for national analysis or for international comparison purposes. The International Standard Industrial Classification of all Economic Activities (ISIC) allows countries to produce data according to internationally comparable categories'.

The above allows for some general analysis with grouped data that may be of interest, although we will not go into it in this reading.

In order to apply two financial statement analysis tools (in addition to the battery of ratios used in the original documents, which will be presented in detail later), the initial financial information was compressed into an abbreviated model of annual accounts according to the logic defined in Figure 1.

P&L SUMMARY	
+ S	**Recurring sales**: Operating income = Net revenues + Other operating income
- VC	**Variable operating cost (cash impact)**: Cost of sales
- FC	**Fixed operating cost (cash impact)**: Other operating expenses + Personnel expenses
- AM	**Operating (fixed) cost (non-cash charges)**: Depreciation of fixed assets
- I	**Interest on borrowed funds with explicit cost**: Financial expenses
± NRE	**Non-recurring earnings**: Extraordinary result + Financial income
- CT	**Corporate tax**: Corporate tax
= NP	**Net profit:** NP = S – VC – FC – AM – I ± NRE – CT

t (borne)	**Average tax rate of the sector**: t borne = CT / (NP + CT) = CT / (S – VC – FC – AM – I ± NRE)

BALANCE SUMMARY	
+ CA	**Current assets**: CA = Stocks + Trade receivables + Cash and cash equivalents
+ FA	**Fixed assets (net)**: FA = Non-current assets
= TA	**Total assets**: TA = CA + FA
+ CL*	**Current liabilities (*)**: CL* = Trade accounts payable + Other short-term liabilities
+ SLTD	**Borrowed funds with explicit cost**: SLTD = Short-term financial debt + Long-term financial debt + Other long-term debt
+ E	**Shareholders' equity**: E = Net worth
= TL	**Total liabilities**: TL = CL* + SLTD + E

Figure 1

As can be seen, there are some clearly debatable elements in the proposed 'fit', whose only intention is to be able to make some comparisons between sectors based on incomplete information (a situation that is common when analysing financial statements 'from outside the company under study', as an 'external analyst'):

- Only cost of sales is considered as a variable cost (consistent with the initial information, which identified the contribution margin as the difference between operating income and the cost of sales); this implies considering personnel costs and other operating expenses as fixed (not changing with the level of activity of the company/sector studied).
- In the absence of more complete information for each sector, depreciation of fixed assets is identified as a fixed cost (which implies that the systematic deterioration of such assets occurs as a result of the passage of time or obsolescence).
- Income derived from financial investments (originally identified as 'Financial income') is considered as 'non-recurring' or 'atypical'.
- Short-term financial debt is eliminated from current liabilities and is included in a chapter identified as 'borrowed funds with explicit cost' (SLTD). The reason is that the subsequent analysis of the sources and uses of funds and the pyramid of ratios will be carried out on the part of the assets financed with what we identify as 'liabilities with explicit cost' (which means leaving out the part of the current assets that 'finances itself', i.e. by the business operations themselves; it also means assuming that all the financing that appears in the non-current liabilities has an explicit cost). This logic can be seen intuitively in Figure 2.

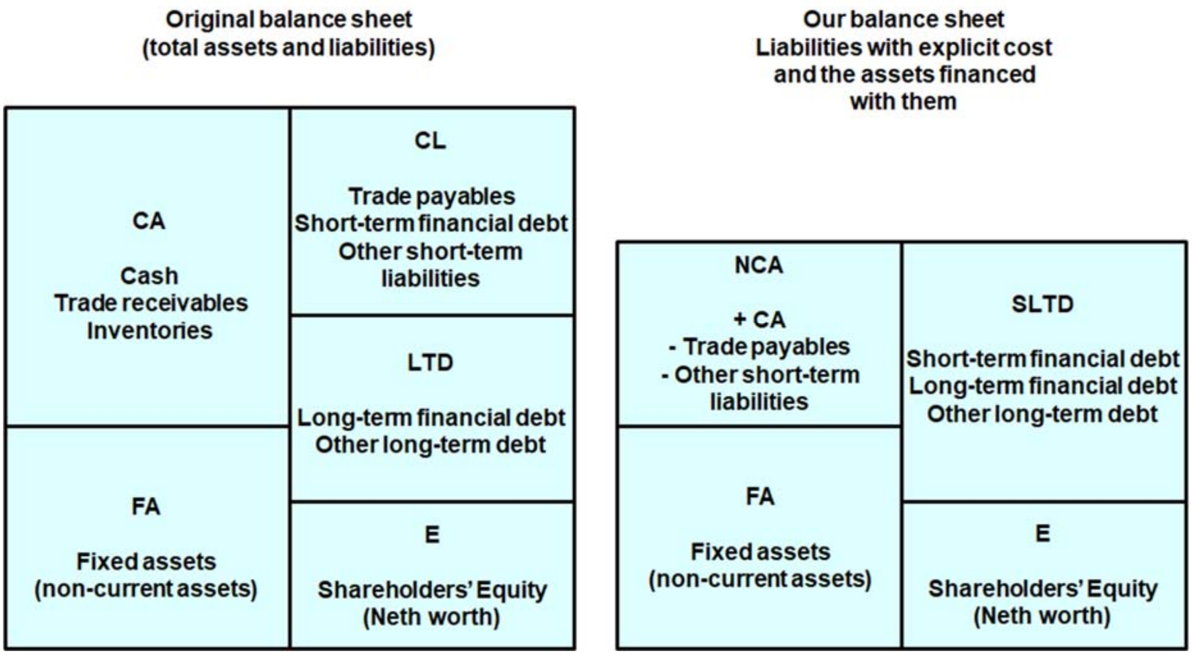

Figure 2

3.2. Description of the analysis tools used

In addition to the original set of ratios, two analysis tools developed at the Universidad Comercial de Deusto (currently Deusto Business School) are applied to the compressed balance sheet and income statement information presented in a first approximation, and which present certain elements of originality in relation to those usually used in this type of study (a detailed explanation can be found in *Elementos de Finanzas Corporativas*, by Fernando Gómez-Bezares, Desclée de Brouwer, 2012, Bilbao, chapter 3).

3.2.1. Cash Flow Statement (hereafter, 'UCD Cash flow Statement')

The model is based on the analysis of three major concepts: Free Cash Flow to the Firm (FCFF; cash flow generated in a given year by assets after their needs are met, regardless of the form of financing); Free Cash Flow to the Short- and Long-Term Debt (FCFSLTD; cash impact of the relationship between the company and suppliers of borrowed funds; recall that this concept includes all non-current liabilities and short-term financial debt); and Free Cash Flow to the Equity (FCFE; cash impact of the relationship between the company and its shareholders). The formulation used is shown in Figure 3.

CASH FLOW STATEMENT	
EBIT	**Earnings before interest and taxes**: EBIT = S - VC - FC - AM
FFO	**Fund flow from operating activities**: FFO = EBIAT + AM = EBIT x (1 - t borne) + AM
NRE	**Non-recurring earnings**: NRE
FFNR	**Fund flow from non-recurring activities**: FFNR = NREAT = NRE x (1 - t borne)
closing NCA	**Closing net current assets**: closing NCA = closing CA - closing CL*
opening NCA	**Opening net current assets**: opening NCA = opening CA - opening CL*
ΔNCA	**Investment in net current assets**: Δ NCA = closing NCA - opening NCA
CFI	**Investment in fixed assets**: CFI = closing FA - opening FA + AM
FCFF	**Free cash flow to the firm**: FCFF = FFO + FFNR - ΔNCA - CFI
SLTDI-SLTDR	**Change in borrowed funds with explicit cost**: SLTDI-SLTDR = closing SLTD - opening SLTD
Ix(1-t)	**Cost (net of tax) of borrowed funds**: I x (1 - t borne)
FCFSLTD	**Cash from borrowed funds with explicit cost**: FCFSLTD = SLTDI-SLTDR - I x (1 - t borne)
FCFE	**Free cash flow to the equity**: FCFE = closing E - opening E - NP
FCFF+FCFSLTD+FCFE	**Check**: FCFF + FCFSLTD + FCFE = 0

Figure 3

Some nuances and comments on the proposed methodology:

- For the purposes of applying the above model, in the event that the sector under study presents an amount under the 'Interest' heading and the final balance of what we have identified as 'Short- and Long-Term Debt' (SLTD) shows a zero value (and with the intention of avoiding subsequent errors that might require the information on the sector in question to be disregarded), the aforementioned financial expenses are included in the 'Fund flow from non-recurring activities (FFNR)' section.

- As can be seen, Free cash flow to the equity would include both possible issuances and redemptions of capital and the payment of dividends (and, also, any other variation in equity, such as capital grants).
- As will be seen later, the tax rate used is not always the average rate applied in the sector: the spreadsheet designed allows isolating, if so desired, the possible tax effect derived from having applied a tax rate different from the average tax rate borne by the sectors as a whole.

3.2.2. Ratio pyramid (hereafter, 'UCD Ratio Pyramid')

The proposed pyramid model tries to explain the so-called 'financial return' (accounting return obtained by shareholders, understood as the ratio between net profit and net equity), distinguishing in a first step the contribution of assets (the 'operating return', profitability associated with one euro invested in the asset regardless of its origin) and the 'financial leverage' (contribution of debt to shareholder return). In addition, the Sheet designed makes it possible to isolate the effect of the results of non-recurring operations (and also those caused by the fact that a particular sector supports a tax rate different from the general one, as we will see later). The formulation used is presented in Figure 4 and the pyramid of ratios can also be seen graphically in Figure 5.

RATIO PYRAMID (based on closing balances)	
CONS	**Contribution margin ratio**: CONS = (S - VC) / S
BES	**Break-even sales (EBIT=0)**: BES = (FC + AM) / CONS
S-BES	**Distance from break-even sales**: S - BES
EBIT	**Earnings before interest and taxes**: EBIT = (S - BES) x CONS
EBIAT/S	**Net operating margin ratio**: EBIAT/S = EBIT x (1 - t borne) / S
S/(FA+NCA)	**Turnover of investments financed by liabilities with explicit cost**: S / (FA+NCA)
ROA	**Return on assets**: ROA = EBIAT / (FA+NCA) = [EBIAT/S] x [S/(FA+NCA)]
Ix(1-t)	**(Net) interest cost**: I x (1 - t borne)
i	**(Net) cost of borrowed funds**: i = I x (1 - t borne) / SLTD
SLTD/E	**Leverage ratio**: SLTD / E
(ROA-i)xSLTD/E	**Financial Leverage**: (ROA - i) x SLTD / E
ROE1	**Financial return (recurring activities)**: ROE1 = ROA + (ROA - i) x SLTD/E
ROE2	**Non-recurring financial return**: ROE2 = NRE x (1 - t borne) / E
ROE	**Total financial return**: ROE = ROE1 + ROE2
NP/E	**Financial performance**: NP / E
CHECK: ROE = NP/E	ROE - NP/E = 0

Figure 4

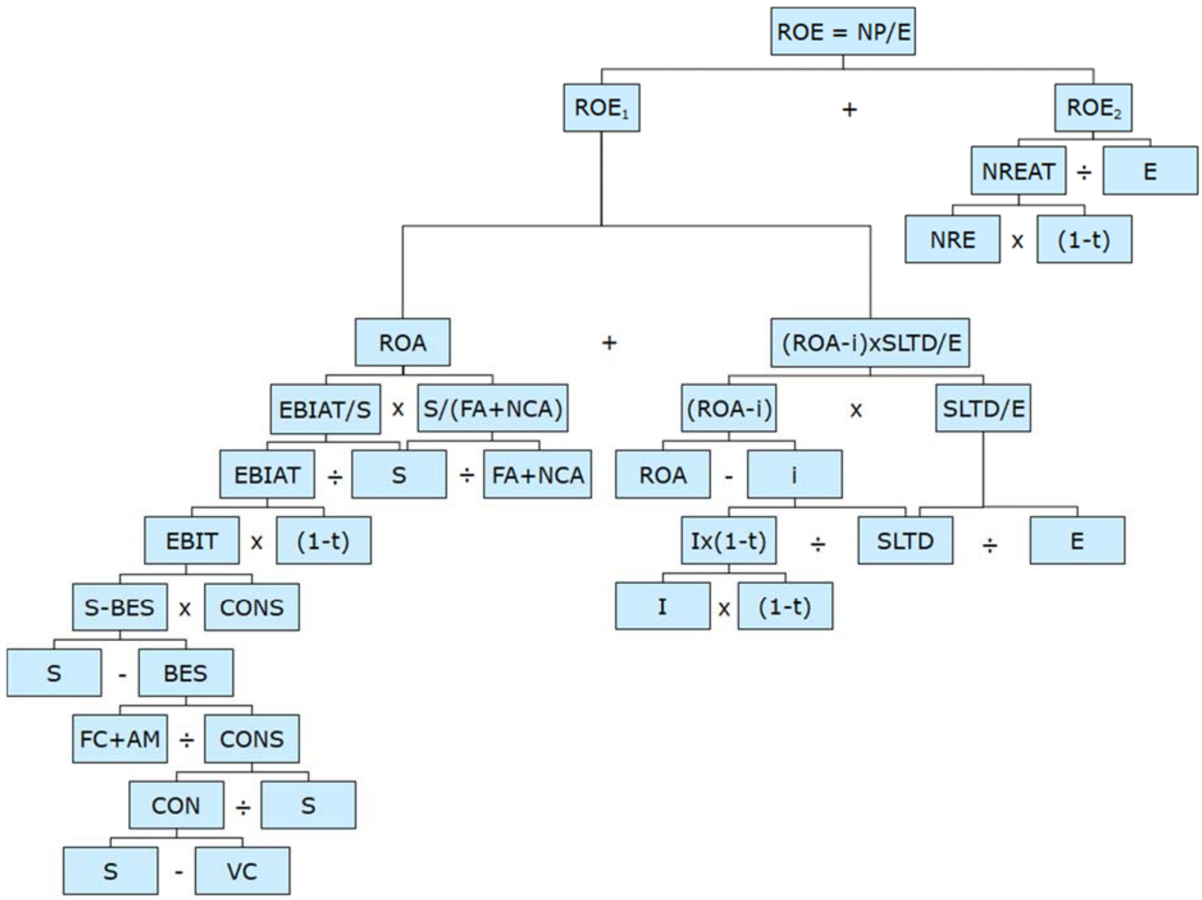

Figure 5

Some nuances and comments on the proposed methodology:

- As in the cash flow analysis, and for the purposes of applying the proposed pyramid of ratios model, in the event that the sector studied shows a value under the 'Interest' heading and the final balance of what we have identified as 'Explicit cost external financing' (SLTD) shows a zero balance (and with the intention of avoiding subsequent errors that might require disregarding the information on the sector in question), the aforementioned financial expenses are subtracted under the 'Non-recurring earnings' heading.
- As will be seen later, the tax rate used is not always the average tax rate in the sector: the sheet designed makes it possible to isolate the tax effects in the comparison between sectors.

3.2.3. Possibility of isolating the fiscal effects in the comparison between sectors

As mentioned above, the sheet designed for the analysis makes it possible to isolate the fiscal effects when making comparisons between different sectors with the 'UCD Cash flow

Statement' and 'UCD Ratio Pyramid' tools, so that the differences in the fiscal aspect do not influence the judgment of the different measures studied.

To this aim, the average tax rate borne by the set of sectors in each year is calculated (from those corresponding to each of them identically weighted) and the result obtained (identified as 'general tax rate' or 't gen') is used in the calculations of the two proposed tools, reconciling the final results in a subsequent step by opening an additional chapter on taxation. The proposed models are thus presented in figures 6 and 7; you can also see the proposed pyramid of ratios graphically in figure 8.

3.2.4. Preparation of rankings

Based on the above information, i.e., on the results of applying the three proposed tools ('UCD Cash flow Statement, 'UCD Ratio Pyramid' and the original battery of ratios, hereafter 'ACCID Ratio Battery'), the rankings corresponding to each of the measures studied were prepared for each year: each sector is thus assigned the position it occupies in each ratio, ranking the set from highest to lowest (and not necessarily in terms of what 'would be desirable', so that a high position in a given ratio does not necessarily have to be associated with a positive interpretation).

CASH FLOW STATEMENT (isolating tax effects)	
EBIT	S - VC - FC - AM
FFO	**EBIAT + AM = EBIT x (1 - t gen) + AM**
NRE	NRE
FFNR	**NREAT + Fiscal effect = NRE x (1 - t gen) + (t gen - t borne) x (S - VC - FC - AM - I ± NRE)**
closing NCA opening NCA	closing CA - closing CL* opening CA - opening CL*
ΔNCA	closing NCA - opening NCA
CFI	closing FA - opening FA + AM
FCFF	FFO + FFNR - ΔNCA - CFI
SLTDI-SLTDR	closing SLTD - opening SLTD
Ix(1-t)	**I x (1 - t gen)**
FCFSLTD	**SLTDI - SLTDR - I x (1 - t gen)**
FCFE	closing E - opening E - NP
FCFF+FCFSLTD+FCFE=0	CHECK: FCFF + FCFSLTD + FCFE = 0

Figure 6

RATIO PYRAMID (on closing balances; isolating tax effects)	
CONS	(S - VC) / S
BES	(FC + AM) / CONS
S-BES	S - BES
EBIT	(S - BES) x CONS
EBIAT/S	**EBIT x (1 - t gen) / S**
S/(FA + NCA)	S / (FA + NCA)
ROA	EBIAT / (FA+NCA) = [EBIAT/S] x [S/(FA+NCA)]
Ix(1-t)	**I x (1 - t gen)**
i	**I x (1 - t gen) / SLTD**
SLTD/E	SLTD / E
(ROA-i)xSLTD/E	(ROA - i) x SLTD / E
ROE1	ROA + (ROA - i) x SLTD/E
ROE2	**NRE x (1 - t gen) / E**
ROE3 (fiscal)	**(t gen - t borne) x (S - VC - FC - AM - I ± NRE) / E**
ROE	ROE1 + ROE2 + ROE3
NP/E	NP / E
CHECK: ROE = NP/E	ROE - NP/E = 0

Figure 7

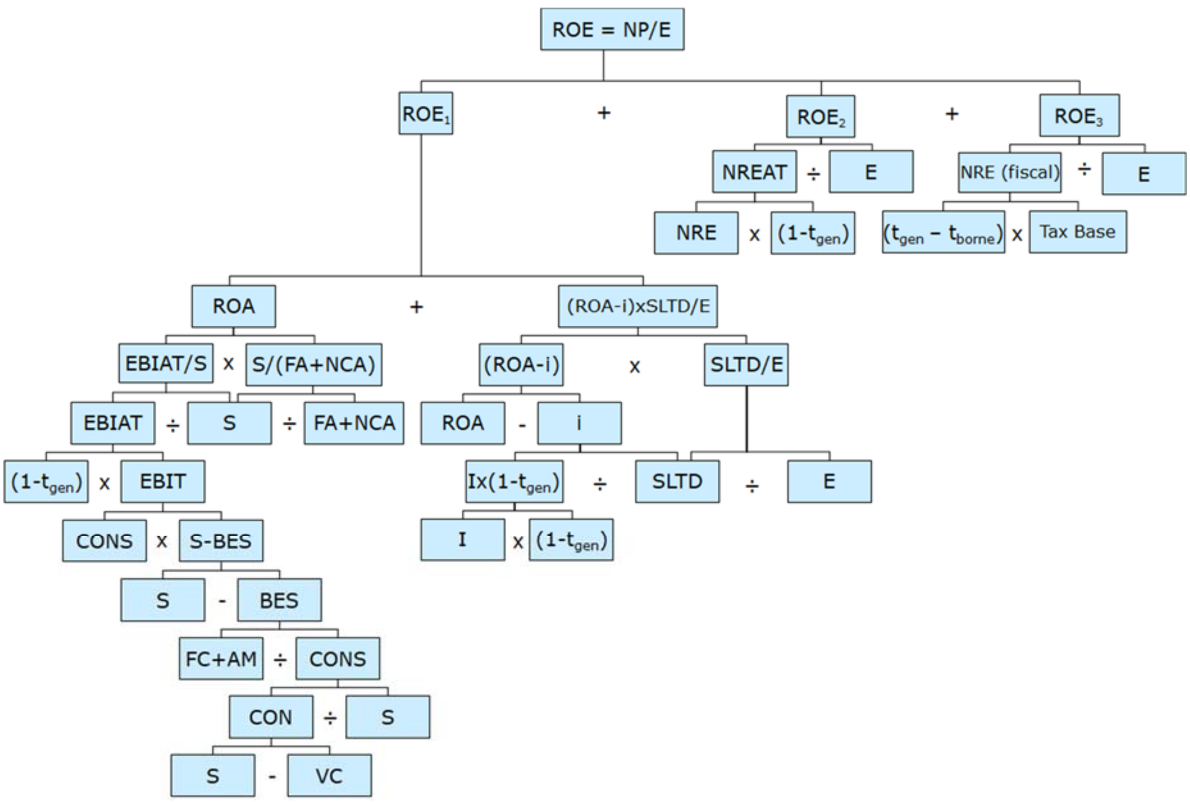

Figure 8

3.2.5. Calculation of some basic statistical parameters

Based on the above information, i.e. on the results of applying the three proposed tools ('UCD Cash flow Statement', 'UCD Ratio Pyramid' and 'ACCID Ratio Battery') to the original financial data, some basic position and dispersion parameters (mathematical expectation -simple unweighted arithmetic mean-, standard deviation, minimum value and maximum value) corresponding to the different performance measures considered were calculated for each group and year.

3.2.6. Detection of outliers

Occasionally, there are data from some sectors that cause strange behaviour in the whole. The sheet designed to perform the analysis makes it possible to detect these data that can be considered 'outliers' and to eliminate their specific effect on the performance measure in which the distortion is introduced (i.e. the entire sector is not eliminated, but only the value presented by that sector in the performance measure studied in which it behaves in an extreme manner). To do this, the number of deviations considered 'acceptable' (which in this context we will call 't') must be entered, from whose value the tolerances to be considered in each performance measure and year are calculated:

'Reasonable' minimum value = Overall average – t x Overall standard deviation
'Reasonable' maximum value = Overall average + t x Overall standard deviation

The proposed methodology makes it possible to study the differences that occur in the conclusions of the analysis when these outliers are eliminated (the number and percentage of data eliminated in the variable in question can also be made explicit).

3.2.7. Analysis of the sensitivity of each sector to the general performance of the whole

Although the statistical significance of the results is nil due to the small number of observations available, and with the sole objective of generating in the reader a certain sensitivity to the importance for risk analysis of the relationship that the different sectors show with the whole, we estimate the beta of the equity of each sector (based on the ROE1 ratio, which corresponds to the financial yield due to recurring operations, calculated with the tax rate borne in each sector). Based on the data available for each of the 143 sectors, the corresponding formula is applied to calculate its beta (sensitivity of this to the general performance of the sectors as a whole):

$$\text{Beta (sector 'x')} = \frac{\text{COVAR (Sector x,Overall average)}}{\text{VAR (Overall average)}} \quad (1)$$

Based on the above, each sector is classified into one of three possible groups: super-defensive (beta<0); defensive (beta between 0 and 1) or aggressive (beta>1). The (practically) null statistical significance of the analysis, carried out with only six values for each sector, certainly justifies the curious results obtained. The maximum and minimum values were also calculated, as well as the total number of sectors that behave as aggressive, defensive, etc.

The process described for calculating the betas associated with the different sectors is repeated on the basis of operating performance (i.e., the unlevered beta of each sector, which we can identify as 'asset beta', was also calculated). The process and the resulting information are identical to those described for the estimation of the equity betas of each sector.

In both cases, the market portfolio includes all companies (Large and medium-sized and Small ones); and the portfolio was calculated by giving equal weight to all sectors.

3.2.8. Risk analysis and calculation of penalized profitability for each sector

The Sheet developed to perform the analysis allows us to make a simple analysis of the risk associated with each sector and to generate a variable that we identify as 'Penalized Internal Rate of Return' (PIRR), which can help to better compare the financial result (recurring, 'ROE1') obtained in the different sectors. In a simple way, the proposed measure can be interpreted as follows (formula 2 and Figure 9)[13].

$$\mathrm{PIRR} = \mathrm{E}(\mathrm{ROE}_1) - \mathrm{t} \times \sigma\,(\mathrm{ROE}_1) \tag{2}$$

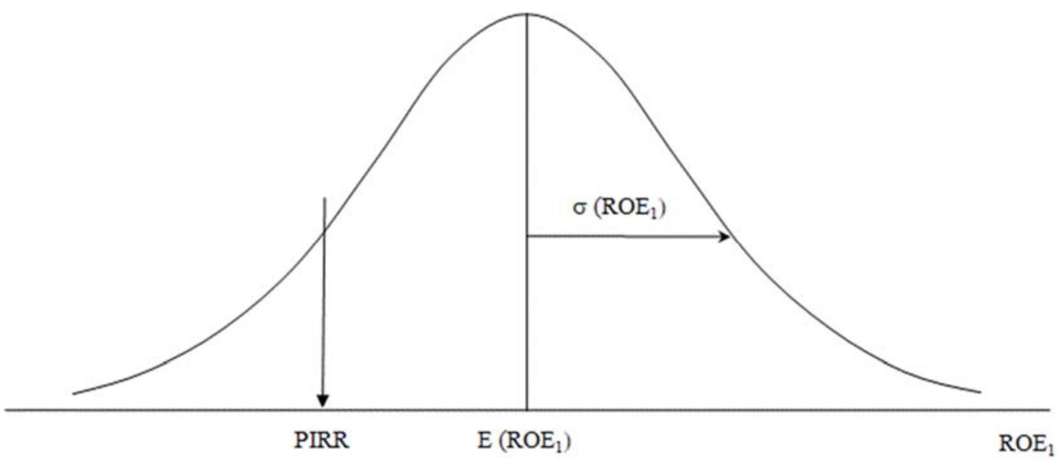

Figure 9

[13] A more complete explanation of the criterion, original by the author, can be found in *Elementos de Finanzas Corporativas*', by Fernando Gómez-Bezares, Ch. 6, Desclée de Brouwer, 2012, Bilbao.

Assuming normality of the profitability distribution (we use for this purpose the recurring financial return obtained by the different sectors -using as tax rate the one borne in each of them-; this is what we have identified as 'ROE1'; in this respect, the Sheet also allows us to study to what extent it is reasonable to accept the aforementioned hypothesis of normality, although we will not go into it in this document), the penalized internal rate of return (PIRR) is calculated by subtracting from the average 't' times (value to be defined by the user) the standard deviation of profitability.

Thus, and as can be seen in Figure 9, when we define the value of 't' to be used in the calculation, we indicate 'how many standard deviations away from the average (to the left) the value obtained'; so, the PIRR can be interpreted as the minimum guaranteed return with a specific probability (which depends on the value of 't' chosen). In this way, a value t=1 would mean focusing on the return that is one standard deviation away from the average (always on the left), which would be the minimum guaranteed value with a probability of approximately 84%; and applying a value t=2 would mean that the result obtained is the minimum guaranteed return with a probability of approximately 98%.

In order to calculate the PIRR, we need to have an idea of the risk associated with each sector, information that is not available, so a procedure is applied that consists of defining the extreme scenarios in terms of turnover for each sector, from which an estimate of the required parameter (standard deviation of ROE1, which is used as a measure of the sector's risk) can be made. The procedure is explained below.

In a first step, we must define the range of variation (in terms of ± % on the original value) that is considered possible in the turnover figure (common for all sectors; the one we use in the preparation of this document is a % variation of ±50%). Based on the defined value, the summarized financial statements (income statements and balance sheets) corresponding to the sectors available in each of the two extreme scenarios (pessimistic and optimistic) and years studied are recalculated. The logic used in the calculations is presented in Figures 10 and 11.

P&L SUMMARY	
+ S new	[Original S] x (1 ± % variation)
- VC new	[Original VC] x (1 ± % variation)
- FC new	[Original FC]
- AM new	[Original AM]
- I new	[Original I / Original SLTD] x SLTD new
± NRE new	[Original NRE]
- CT new	[Original t] x (S - VC - FC - AM - I ± NRE) new
= NP new	**Net profit new = (S - VC - FC - AM - I ± NRE - CT) new**
t borne	[Original Corporate Tax rate]

Figure 10

BALANCE SUMMARY	
+ CA new	[Original current assets] x (1 ± % variation)
+ FA new	[Original fixed assets (net)]
= TA new	**Total assets new = (CA + FA) new**
+ CL* new	[Original CL*] x (1 ± % variation)
+ SLTD new	(TA new – CL* new) x Original [SLTD / (SLTD+E)]
+ E new	(TA new – CL* new) x Original [E / (SLTD+E)]
= TL new	**Total liabilities new = (CL + SLTD + E) new**

Figure 11

In other words, as can be seen, it is understood that, in the short term, a change in turnover affects only sales and variable costs (P&L) and current assets and liabilities (balance sheet) directly; but these changes in turn cause a need to adjust debt and equity (maintaining the original financial structure), which in turn causes an additional indirect effect on P&L (interest on debt); and always, of course, with changes in corporate tax caused by the aforementioned changes in P&L (respecting the original tax rate in each sector).

Based on the results obtained, the expected value and the standard deviation of profitability (ROE1) were calculated for each year and sector using a simple formulation (the average or expected value is obtained as the simple arithmetic mean of the optimistic and pessimistic values; and the standard deviation is calculated assuming that the possible values of 'ROE1' are within a range of ±3 standard deviations with respect to the average). The ranking corresponding to this variable (PIRR, all of which can be seen in Figure 12) was also compiled.

Original ROE1	(S - VC - FC - AM - I) x (1 - t) / E [original]
ROE1 optimistic	(S - VC - FC - AM - I) x (1 - t) / E [optimistic]
ROE1 pessimistic	(S - VC - FC - AM - I) x (1 - t) / E [pessimistic]
E(ROE1)	(Optimistic ROE1 + Pessimistic ROE1) / 2
σ (ROE1)	(Optimistic ROE1 – Pessimistic ROE1) / 6
PIRR	E(ROE1) – t x σ (ROE1) (user-defined value of t)
Penalization in terms of profitability	Original ROE1 - PIRR
Penalization in terms of % of original ROE1	Penalization in percent of profitability / original ROE1
Ranking (penalization in profitability points)	
Ranking (penalization in % of original ROE1)	

Figure 12

As can be seen, the position that each sector occupies in the 'penalization ranking' is also calculated (i.e. the sectors were ordered according to the estimated risk penalization, measuring it in absolute value, and also in relative terms on the original 'ROE1' value).

3.2.9. Breakdown/explanation of the total financial return obtained by each sector

The Excel designed makes it possible to analyse the weights in the financial profitability obtained (ROE), in each year and for each sector, of the four elements considered: ordinary operating return (ROA); financial leverage [(ROA-i)xSLTD/E]; non-recurring return (ROE2); and (if applicable), the additional return as a consequence of having borne a tax rate different from the general one (ROE3) (only if the corresponding functionality has been activated).

The aforementioned breakdown shows the importance of non-recurring items in the total financial return obtained, as well as the importance of indebtedness in each case (the latter always linked to the risk assumed).

3.2.10. Relationship between the spread (ROA-i) and the level of indebtedness

The application developed makes it possible to analyse the possible relationship between the level of indebtedness (SLTD/E) and the spread (ROA-i) (the difference between the operating return and the cost of borrowed funds). The aim is to see whether a higher spread can be thought of as 'encouraging' firms to take on more debt or not; this is also studied by assuming different time lags. Specifically (and for the first three years considered):

SLTD/E year 2017 with (ROA-i) year 2017
SLTD/E year 2017 with (ROA-i) year 2016
SLTD/E year 2017 with (ROA-i) year 2015

SLTD/E year 2016 with (ROA-i) year 2016
SLTD/E year 2016 with (ROA-i) year 2015

SLTD/E year 2015 with (ROA-i) year 2015

The correlation coefficients between the level of indebtedness and the weight of financial leverage in total ordinary profitability were also calculated for each year.

3.2.11. Analysis of the shape of the probability distributions associated with the variables studied in each sector

The application designed makes it possible to analyse the shape of the probability distributions associated with the different measures studied in each of the four large groups and in each year considered; this is important in terms of the legitimacy of defining probability distributions in terms only of their average and standard deviation (which is done, for example, in the calculation of the PIRR presented above). Specifically, the following contrasts were performed:

- Hypothesis testing on the asymmetry of the distributions of the variables studied in the three tools ('UCD Cash flow Statement'; 'UCD Ratio Pyramid'; and 'ACCID Ratio Battery'). The usual statistic and test are used for this, the user simply has to define the error α to be considered (common for the three tests).

- Hypothesis test on the kurtosis of the distributions of the variables studied in the three tools.

- Hypothesis test on the normality of the distributions of the variables studied in the three tools. The test chosen is the Studentized Rank test:

$$\frac{R}{S\prime} \tag{3}$$

  which follows a distribution that can be found in David, Hartley and Pearson (1954), which is shown in the corresponding tab.

3.2.12. Study of the possible relationships between the different measures used

Excel calculates the correlation matrices between the variables studied in two of the tools used: 'UCD Ratio Pyramid' and 'ACCID Ratio Battery'. This is done for each of the two three-year periods studied, for each group of companies considered (4) and each year studied (6), also considering the possibility of lags of up to two years.

4. SUMMARY OF SOME OF THE RESULTS OBTAINED

The following is a very small part of the results obtained in the analysis performed. In order to adequately familiarize the reader with the Financial Statement analysis methodology employed, we will begin by presenting the detail of the results achieved in the analysis of the first available sector (***Agriculture, livestock, hunting and related services)***, referring only to ***large companies*** and in the first three-year period considered (***2015-2017***).

If you wish, you can practice the preparation of the 'UCD Cash Flow Statement', the 'UCD Ratio Pyramid' and the 'ACCID Ratio Battery' proposed in the 'FFSS Analysis Tools' tab of the Excel sheet 'Financial Forecasting and analysis of FFSS with real data'. In it, you will have to previously fit the original information related to the selected sector and three-year period in the abbreviated model of annual accounts, on which you will be able to apply the indicated analysis tools. Excel will correct, at your request, the calculations you make and will provide you with feedback on the hits and errors obtained, as well as on the correct way to fill in the requested information.

4.1. Results obtained in the analysis of a specific sector (period 2015-2017)

The following is the detailed report generated by Excel itself at the user's request (referring in this case to the sector indicated above) for each of the three proposed tools.

Common baseline information for all analysis tools (period 2015-2017)

As can be seen in Figure 13, the original information of the selected sector is offered in a first step, considering the type of company and three-year period chosen (in our case, the first sector of the available series, 'Agriculture, livestock, hunting and related services', has been chosen, considering large companies in the three-year period 2015-2017); in addition, it is also indicated that the 'Isolate tax effects' mode is activated, which will have its consequences in the calculations related to the analysis tools 'UCD Cash flow Statement' and 'UCD Ratio Pyramid' -meaning that the general tax rate borne on average in each year in the set of sectors will be used in all cases; later reconciling the final results by including the corresponding tax section-).

Total number of companies considered in origin for the average	272		
Balance sheet total (data in thousands of euros)	6.741.203	6.116.721	5.664.842
Total revenue (data in thousands of euros)	9.812.809	9.088.051	8.646.211
ISOLATE FISCAL EFFECT' MODE ACTIVATED			
© Javier Santibáñez Grüber			
SECTOR STUDIED	*CNAE Code 01 - Agriculture, livestock, hunting, and related services*		
TYPE OF COMPANY STUDIED	Large and medium-sized companies		

BALANCE SHEET (thousands of euros)	2017	%	2016	%	2015	%	Δ in % previous year 2017	Δ in % previous year 2016
Non-current assets	3.059.832	45%	2.789.836	46%	2.648.880	47%	9,68%	5,32%
Current assets	3.681.371	55%	3.327.496	54%	3.016.528	53%	10,63%	10,31%
Stocks	1.586.879	24%	1.469.236	24%	1.378.256	24%	8,01%	6,60%
Realizable (trade receivables)	1.189.822	18%	1.105.291	18%	973.786	17%	7,65%	13,50%
Liquidity (cash and cash equivalents)	904.669	13%	752.968	12%	664.486	12%	20,15%	13,32%
Total assets	6.741.203	100%	6.117.333	100%	5.665.408	100%	10,20%	7,98%
Net worth	3.106.346	46%	2.732.951	45%	2.519.722	44%	13,66%	8,46%
Non-current liabilities	1.029.382	15%	970.112	16%	929.601	16%	6,11%	4,36%
Long-term financial debt	737.488	11%	667.946	11%	633.329	11%	10,41%	5,47%
Other long-term debt	291.894	4%	302.166	5%	296.271	5%	-3,40%	1,99%
Current liabilities	2.605.475	39%	2.414.270	39%	2.216.086	39%	7,92%	8,94%
Trade accounts payable	943.094	14%	859.399	14%	826.500	15%	9,74%	3,98%
Short-term financial debt	603.338	9%	529.096	9%	501.905	9%	14,03%	5,42%
Other short-term liabilities	1.059.043	16%	1.025.774	17%	887.681	16%	3,24%	15,56%
Total equity and liabilities	6.741.203	100%	6.117.333	100%	5.665.408	100%	10,20%	7,98%

Working capital	1.075.896	913.226	800.442
Total financial debt (S/T and L/T loans and financial obligations)	1.340.825	1.197.042	1.135.234
Number of employees	33.042	32.097	28.718

INCOME STATEMENT (thousands of euros)	2017	%	2016	%	2015	%	Δ in % previous year 2017	Δ in % previous year 2016
Net revenues (+)	9.716.643	99%	8.997.170	99%	8.564.937	99%	8,00%	5,05%
Other operating income (+)	96.166	1%	90.881	1%	81.274	1%	5,82%	11,82%
Operating income (=)	9.812.809	100%	9.088.051	100%	8.646.211	100%	7,97%	5,11%
Cost of sales (-)	7.489.136	76%	7.080.501	78%	6.851.258	79%	5,77%	3,35%
Contribution margin (=)	2.323.673	24%	2.007.550	22%	1.794.953	21%	15,75%	11,84%
Other operating expenses (-)	693.766	7%	679.786	7%	549.899	6%	2,06%	23,62%
Value added (=)	1.629.908	17%	1.327.764	15%	1.245.054	14%	22,76%	6,64%
Personnel expenses (-)	798.763	8%	730.679	8%	691.697	8%	9,32%	5,64%
Depreciation of fixed assets (-)	233.545	2%	222.657	2%	208.374	2%	4,89%	6,85%
Extraordinary result (profit/loss from non-recurring op.) (+/-)	0	0%	0	0%	0	0%	-	-
EBIT (=)	597.600	6%	374.428	4%	344.984	4%	59,60%	8,53%
Financial income (+)	30.420	0%	38.170	0%	46.690	1%	-20,30%	-18,25%
Financial expenses (-)	66.727	1%	54.528	1%	62.253	1%	22,37%	-12,41%
EBT (=)	561.293	6%	358.069	4%	329.421	4%	56,76%	8,70%
Corporate tax (-)	124.623	1%	73.613	1%	66.576	1%	69,29%	10,57%
Profit for the year (=)	436.670	4%	284.456	3%	262.845	3%	53,51%	8,22%

Figure 13

The information described includes the average values presented by the sector as a whole in each of the three years considered, the weights that the different items represent on total sales (income statements) and total assets (balance sheets); with an indication also of the growth in all the figures involved in relation to those of the previous year.

Fitting of the original information of the sector studied in the simplified balance sheet and income statement model (period 2015-2017)

As you can see in Figure 14, the next step consists of 'fitting' the original accounting information of the chosen sector into the compressed Income Statement and Balance Sheet model that we proposed in the introductory section, in order to simplify the calculations related to two of the analysis tools used (the 'UCD Cash flow Statement' and the 'UCD Ratio Pyramid').

The weights that the different items represent on recurring sales (income statements) and on total assets (balance sheets) are recalculated and the tax rate borne by the sector in each specific year and the average rate borne by the whole (the so-called 'general rate') are made explicit; and the growth rates in relation to the previous year are also calculated.

							Δ in % previous year	
P&L SUMMARY	2017	%	2016	%	2015	%	2017	2016
S	9.812.809	100%	9.088.051	100%	8.646.211	100%	7,97%	5,11%
VC	-7.489.136	-76%	-7.080.501	-78%	-6.851.258	-79%	5,77%	3,35%
FC	-1.492.528	-15%	-1.410.466	-16%	-1.241.596	-14%	5,82%	13,60%
AM	-233.545	-2%	-222.657	-2%	-208.374	-2%	4,89%	6,85%
I	-66.727	-1%	-54.528	-1%	-62.253	-1%	22,37%	-12,41%
NRE	30.420	0%	38.170	0%	46.690	1%	-20,30%	-18,25%
CT	-124.623	-1%	-73.613	-1%	-66.576	-1%	69,29%	10,57%
NP	**436.670**	**4%**	**284.456**	**3%**	**262.845**	**3%**	**53,51%**	**8,22%**
t (borne)	22,20%		20,56%		20,21%		**8,00%**	**1,72%**
t gen (average rate borne in each group and year)	0,1796		0,2948		0,1721		-39,10%	71,34%
CHECK	**0**		**0**		**0**			

							Δ in % previous year	
BALANCE SHEET SUMMARY	2017	%	2016	%	2015	%	2017	2016
CA	3.681.371	55%	3.327.496	54%	3.016.528	53%	10,63%	10,31%
FA	3.059.832	45%	2.789.836	46%	2.648.880	47%	9,68%	5,32%
TA	**6.741.203**	**100%**	**6.117.333**	**100%**	**5.665.408**	**100%**	**10,20%**	**7,98%**
CL*	2.002.137	30%	1.885.173	31%	1.714.181	30%	6,20%	9,98%
SLTD	1.632.719	24%	1.499.208	25%	1.431.506	25%	8,91%	4,73%
E	3.106.346	46%	2.732.951	45%	2.519.722	44%	13,66%	8,46%
TL	**6.741.203**	**100%**	**6.117.333**	**100%**	**5.665.408**	**100%**	**10,20%**	**7,98%**
CHECK	**0**		**0**		**0**			

Figure 14

The designed Sheet allows the explanation of any of the calculations performed to be consulted at any time, both in numerical and text format. In the different tabs that make up the Sheet, this information is presented in different ways: in most of the analysis tabs, the way a specific figure was calculated can be consulted by entering the corresponding code in the corresponding cell; in Figures 15 and 16 the explanations in text and numerical format corresponding to one of the years of the three-year period studied (2017) can be seen.

Summary FFSS (from the original information)		
P&L SUMMARY	**2017**	**Explanation in text format corresponding to the figures for the year 2017**
S	9.812.809	*= Operating income*
VC	-7.489.136	*= - Cost of sales*
FC	-1.492.528	*= - (Other operating expenses + Personnel expenses)*
AM	-233.545	*= - Depreciation of fixed assets*
I	-66.727	*= - Financial expenses*
NRE	30.420	*= Extraordinary result (profit/loss from non-recurring operations) + Financial income*
CT	-124.623	*= - Corporate tax*
NP	**436.670**	*= S - VC - ... + NRE - CT*
t (borne)	22,20%	*= Corporate tax / (Profit for the year + Corporate tax)*
t gen (average rate borne in each group and year)	17,96%	*= Average tax rate borne (all sectors, year 2017)*
CHECK	**0**	*= NP - Profit for the year*
BALANCE SHEET SUMMARY	**2017**	**Explanation in text format corresponding to the figures for the year 2017**
CA	3.681.371	*= Current assets*
FA	3.059.832	*= Non-current assets*
TA	**6.741.203**	*= CA + FA*
CL*	2.002.137	*= Trade accounts payable + Other short-term liabilities*
SLTD	1.632.719	*= Non-current liabilities + Short-term financial debt*
E	3.106.346	*= Net worth*
TL	**6.741.203**	*= CL* + SLTD + E*
CHECK	**0**	*= TA - TL*

Figure 15

Summary FFSS (from the original information)		
P&L SUMMARY	**2017**	**Numerical explanation corresponding to the figures for the year 2017**
S	9.812.809	*= 9.812.809*
VC	-7.489.136	*= -7.489.136*
FC	-1.492.528	*= -(693.766 + 798.763)*
AM	-233.545	*= -233.545*
I	-66.727	*= -66.727*
NRE	30.420	*= (0 + 30.420)*
CT	-124.623	*= -124.623*
NP	**436.670**	*= 9.812.809 - 7.489.136 - ... + 30.420 - 124.623*
t (borne)	22,20%	*= 124.623 / (436.670 + 124.623)*
t gen (average rate borne in each group and year)	17,96%	*= Average tax rate borne (all sectors, year 2017)*
CHECK	**0**	*= 436.670 - 436.670*
BALANCE SHEET SUMMARY	**2017**	**Numerical explanation corresponding to the figures for the year 2017**
CA	3.681.371	*= 3.681.371*
FA	3.059.832	*= 3.059.832*
TA	**6.741.203**	*= 3.681.371 + 3.059.832*
CL*	2.002.137	*= 943.094 + 1.059.043*
SLTD	1.632.719	*= 1.029.382 + 603.338*
E	3.106.346	*= 3.106.346*
TL	**6.741.203**	*= 2.002.137 + 1.632.719 + 3.106.346*
CHECK	**0**	*= 6.741.203 - 6.741.203*

Figure 16

UCD Cash flow Statement in the sector studied (period 2015-2017)

Figure 17 shows the calculations corresponding to the 'UCD Cash Flow Statement' of the selected Sector (in our case, 'Agriculture, livestock, hunting and services related to them'), considering the large companies in the three-year period 2015-2017. As can be seen, the position that in the main measures that sector occupies in relation to the whole is also provided, as well as the growth rates observed in each concept.

CASH FLOW STATEMENT	(% of Total assets)	2017	Ranking	2016	Ranking	2015	Ranking	Δ in % previous year 2017	Δ in % previous year 2016
EBIT	(% of TA)	8,86%		6,12%		-		44,83%	-
FFO	**(% of TA)**	**10,74%**	33	**7,96%**	61	**-**	-	**34,96%**	**-**
NRE	(% of TA)	0,45%		0,62%		-		-27,68%	-
FFNR	**(% of TA)**	**0,02%**	116	**0,96%**	85	**-**	-	**-98,27%**	**-**
closing NCA	(% of TA)	24,91%		23,58%		-		5,65%	-
opening NCA	(% of TA)	21,40%		21,29%		-		0,50%	-
ΔNCA	**(% of TA)**	**3,51%**	36	**2,29%**	55	**-**	-	**53,59%**	**-**
CFI	**(% of TA)**	**7,47%**	29	**5,94%**	33	**-**	-	**25,67%**	**-**
FCFF	(% of TA)	-0,23%	118	0,69%	102	-	-	-133,49%	-
SLTDI-SLTDR	**(% of TA)**	**1,98%**		**1,11%**		**-**		**78,95%**	**-**
Ix(1-tgen)	**(% of TA)**	**0,81%**		**0,63%**		**-**		**29,20%**	**-**
FCFSLTD	(% of TA)	1,17%	37	0,48%	37	-	-	144,35%	-
FCFE	(% of TA)	-0,94%	44	-1,16%	61	-	-	-19,39%	-
FCFF+FCFSLTD+FCFE=0	(% of TA)	0,00%		0,00%		-			

Figure 17

Figures 18 and 19 show the explanation, in text and numerical format, of the different concepts involved in 2017 (the explanations refer to the figures considered before making the quotient of them and total assets).

Calculations performed on compressed FFSS CASH FLOW STATEMENT	2017	Explanation in text format corresponding to the figures for the year 2017
EBIT	597.600	= S - VC - FC - AM
FFO	**723.839**	= EBIT x (1 - tgen) + AM
NRE	30.420	= NRE
FFNR	**1.121**	= NRE x (1 - tgen) + (tgen - tborne) x (NP + CT)
closing NCA	1.679.234	= CA - CL* (closing)
opening NCA	1.442.323	= CA - CL* (opening)
ΔNCA	**236.911**	= closing NCA - opening NCA
CFI	**503.540**	= FA (closing) - FA (opening) + AM
FCFF	-15.491	= FFO + FFNR - ΔNCA - CFI
SLTDI-SLTDR	**133.511**	= SLTD (closing) - SLTD (opening)
Ix(1-tgen)	**54.745**	= I x (1 - tgen)
FCFSLTD	78.766	= (SLTDI-SLTDR) - Ix(1-tgen)
FCFE	-63.275	= E (closing) - E (opening) - NP
FCFF+FCFSLTD+FCFE=0	0	= FCFF + FCFSLTD + FCFE

Figure 18

Calculations performed on compressed FFSS		
CASH FLOW STATEMENT	2017	Numerical explanation corresponding to the figures for the year 2017
EBIT	597.600	= 9.812.809 - 7.489.136 - 1.492.528 - 233.545
FFO	723.839	= 597.600 x (1 - 0,1796) + 233.545
NRE	30.420	= 30.420
FFNR	1.121	= 30.420 x (1 - 0,1796) + (0,1796 - 0,2220) x 561.293
closing NCA	1.679.234	= 3.681.371 - 2.002.137
opening NCA	1.442.323	= 3.327.496 - 1.885.173
ΔNCA	236.911	= 1.679.234 - 1.442.323
CFI	503.540	= 3.059.832 - 2.789.836 + 233.545
FCFF	-15.491	= 723.839 + 1.121 - 236.911 - 503.540
SLTDI-SLTDR	133.511	= 1.632.719 - 1.499.208
Ix(1-tgen)	54.745	= 66.727 x (1 - 0,1796)
FCFSLTD	78.766	= 133.511 - 54.745
FCFE	-63.275	= 3.106.346 - 2.732.951 - 436.670
FCFF+FCFSLTD+FCFE=0	0	= - 15.491 + 78.766 - 63.275

Figure 19

Figure 20 shows the average data for each of the performance measures presented by the set of sectors, both in each of the years that make up the three-year period studied, as well as the overall average for the entire period (always taking as a reference the group of companies previously selected, in our case, Large and Medium-sized companies).

		Whole (Large and medium)			
CASH FLOW STATEMENT	(% of Total assets)	2017	2016	2015	G
EBIT	(% of TA)	6,56%	6,38%	-	6,47%
FFO	(% of TA)	8,30%	7,34%	-	7,82%
NRE	(% of TA)	1,26%	1,22%	-	1,24%
FFNR	(% of TA)	0,92%	1,41%	-	1,16%
closing NCA	(% of TA)	19,73%	19,91%	-	19,82%
opening NCA	(% of TA)	19,13%	17,92%	-	18,53%
ΔNCA	(% of TA)	1,41%	1,61%	-	1,51%
CFI	(% of TA)	4,53%	3,61%	-	4,07%
FCFF	(% of TA)	3,84%	3,48%	-	3,66%
SLTDI-SLTDR	(% of TA)	0,31%	0,04%	-	0,18%
Ix(1-tgen)	(% of TA)	1,17%	1,02%	-	1,09%
FCFSLTD	(% of TA)	-1,01%	-1,01%	-	-1,01%
FCFE	(% of TA)	-2,46%	-2,24%	-	-2,35%
FCFF+FCFSLTD+FCFE=0	(% of TA)				

Figure 20

Commentary year 2017

The following is the commentary on the ‘UCD Cash Flow Statement’ that Excel itself (designed for the analysis) offers. You can follow it on the basis of the results obtained and presented in Figures 14, 17 and 20 (and, punctually, also in Figure 28 below).

The Free cash flow to the firm (FCFF) of the sector studied was negative in 2017; moreover, the value obtained (-0,23% over total assets) places it in a position of clear disadvantage with respect to all sectors, which presented a positive value (3,84%) in the aforementioned year (2017).

The economic and financial equilibrium of the companies in the sector was only possible with the help of the lenders, who provided the money required by the assets (the aforementioned 0,23% of total assets) and allowed the flow to the shareholders (who received a net amount equivalent to 0,94% of the aforementioned assets). The composition of the Free cash flow to the firm (FCFF) will have to be studied in more detail, but it is important to note here the change in financial structure that has occurred (which we will also examine in more detail later when we study the results obtained in the pyramid of ratios).

The sector shows clear signs of growth, with investments in fixed assets representing 7,47% of total assets (higher than replacement investment) and in net current assets (3,51% of total assets), which in turn are combined with growth in sales (7,97% over the previous year's figure).

A more detailed analysis of the changes in the main elements of net current assets, which helps to better understand how the increase in this item is compatible with the simultaneous growth in sales, yields the following results: customer collection periods decreased (0,32%), while inventory periods increased (2,11%) and supplier payment periods increased (3,75%).

As noted above, assets have not been able to 'free up' funds in the year under study, presenting a negative FCFF value, for an amount equivalent to -0,23% of total assets. However, this was not due to the fact that the recurring activities did not generate money: fund flow from recurring activities, FFO, shows a positive value (10,74%), which means a financing capacity even after meeting the working capital needs of the business (which 'took' 3,51% of these assets).

With regard to 'non-recurring' operations (including the Fund flow from non-recurring activities, FFNR, and investments in non-current assets, CFI), it should be noted that FFNR has a positive value equivalent to 0,02% of assets; the positive impact of which on FCFF has been reduced by investments in non-current assets which, as mentioned above, have been higher than those necessary to replace impaired assets (and which have represented 7,47% of total assets).

One last final thought related to the tax rate used (remember that the input tax rate was calculated, for each sector, by dividing the tax burden by the taxable base). In the sector studied, the tax rate borne was higher than the general tax rate (understood as the average rate borne by all the sectors in the period studied). What does this mean? It means that the fact of having borne a higher tax burden has harmed the performance of recurring activity (since EBIT>0); it has done the same for non-recurring activity (by presenting an NRE>0); and it has favoured the cost of external financing (insofar *as interest payments have enjoyed a higher tax shield than in the sectors studied as a whole). The combined effect of all this can be seen in the second part of the Fund flow from non-recurring activities (FFNR) section.*

UCD Ratio Pyramid (period 2015-2017)

Figure 21 presents the data relating to the pyramids of ratios corresponding to the sector 'Agriculture, livestock, hunting and related services', considering the large companies in the three-year period 2015-2017. As you can see, the values obtained are offered as an average in the sector and group considered, for each year, with indication of the order number that the sector occupies in the ranking considering the whole (143 in total), always ordering the data from highest to lowest. The growth rates of the values with respect to the previous year are also shown. Figure 22 shows (again) graphically the pyramid scheme of ratios that corresponds to the data presented.

RATIO PYRAMID (based on ending balances)	2017	Ranking	2016	Ranking	2015	Ranking	Δ in % previous year 2017	Δ in % previous year 2016
CONS	0,2368	129	0,2209	132	0,2076	133	7,20%	6,41%
BES (% of S)	0,7428		0,8135		0,8078		-8,69%	0,70%
S-BES (% of S)	0,2572	21	0,1865	48	0,1922	37	37,89%	-2,96%
EBIT (% of S)	0,0609		0,0412		0,0399		47,82%	3,26%
EBIAT/S	0,0500	82	0,0291	102	0,0330	104	71,98%	-12,05%
S/(FA+NCA)	2,0706	38	2,1474	33	2,1882	31	-3,57%	-1,87%
ROA	0,1035	31	0,0624	62	0,0723	66	65,83%	-13,70%
Ix(1-tgen) (% of S)	0,0056		0,0042		0,0060		31,86%	-29,02%
i	0,0335	87	0,0256	103	0,0360	100	30,74%	-28,77%
SLTD/E	0,5256	73	0,5486	75	0,5681	75	-4,19%	-3,44%
(ROA-i)xSLTD/E	0,0368	31	0,0202	47	0,0206	37	82,37%	-2,23%
ROE1	0,1402	32	0,0825	65	0,0929	55	69,87%	-11,15%
ROE2 (includes interest when SLTD=0)	0,0080	105	0,0098	97	0,0153	87	-18,42%	-35,80%
ROE3 (fiscal)	-0,0077	96	0,0117	63	-0,0039	54	-165,61%	-398,05%
ROE=ROE1+ROE2+ROE3	0,1406	49	0,1041	75	0,1043	63	35,06%	-0,22%

Figure 21

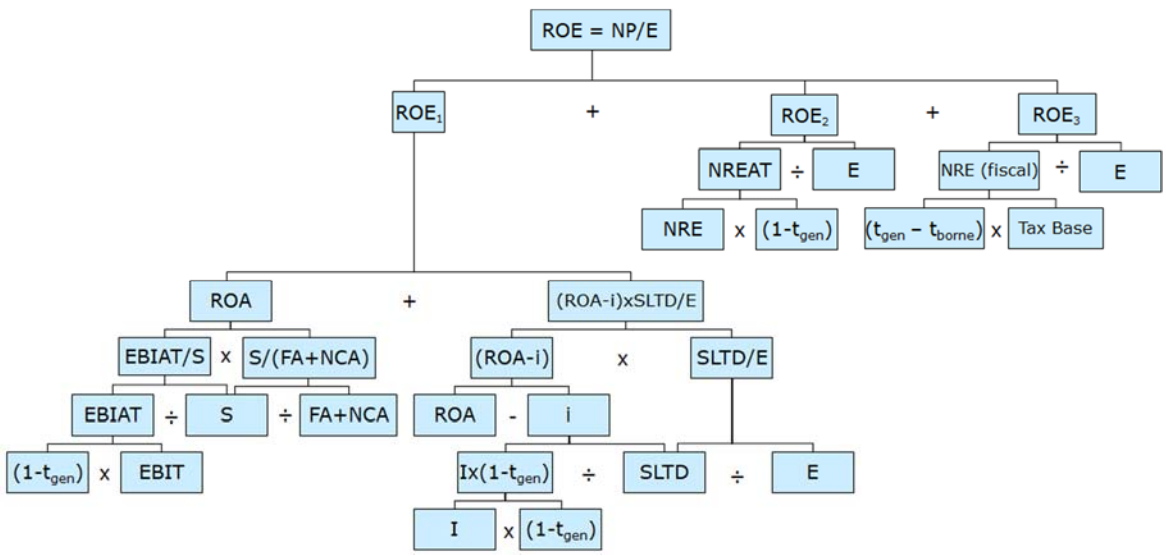

Figure 22

In Figures 23 and 24 you can see the explanation (in text and numerical format, respectively), corresponding to the 2017 figures.

RATIO PYRAMID (based on ending balances)	2017	Explanation in text format corresponding to the figures for the year 2017
CONS	0,2368	= (S - VC) / S
BES	7.289.160	= (FC + AM) / CONS
S-BES	2.523.649	= S - BES
EBIT	597.600	= (S - BES) x CONS
EBIAT/S	0,0500	= EBIT x (1 - tgen) / S
S/(FA+NCA)	2,0706	= S / (SLTD + E)
ROA	0,1035	= [EBIAT/S] x [S/(FA+NCA)]
Ix(1-tgen)	54.745	= I x (1 - tgen)
i	0,0335	= Ix(1-tgen) / SLTD
SLTD/E	0,5256	= SLTD / E
(ROA-i)xSLTD/E	0,0368	= (ROA - i) x SLTD/E
ROE1	0,1402	= ROA + (ROA-i)xSLTD/E
ROE2 (includes interest when SLTD=0)	0,0080	= NRE x (1 - tgen) / E
ROE3 (fiscal)	-0,0077	= (tgen - tborne) x (NP + CT) / E
ROE=ROE1+ROE2+ROE3	0,1406	= ROE1 + ROE2 (includes interest when SLTD=0) + ROE3 (fiscal)
NP/E	0,1406	= NP / E
CHECK	0,0000	= ROE - NP/E

Figure 23

RATIO PYRAMID (based on ending balances)	2017	Numerical explanation corresponding to the figures for the year 2017
CONS	0,2368	= (9.812.809 - 7.489.136) / 9.812.809
BES	7.289.160	= (1.492.528 + 233.545) / 0,2368
S-BES	2.523.649	= 9.812.809 - 7.289.160
EBIT	597.600	= 2.523.649 x 0,2368
EBIAT/S	0,0500	= 597.600 x (1 - 0,1796) / 9.812.809
S/(FA+NCA)	2,0706	= 9.812.809 / (1.632.719 + 3.106.346)
ROA	0,1035	= 0,0500 x 2,0706
Ix(1-tgen)	54.745	= 66.727 x (1 - 0,1796)
i	0,0335	= 54.745 / 1.632.719
SLTD/E	0,5256	= 1.632.719 / 3.106.346
(ROA-i)xSLTD/E	0,0368	= (0,1035 - 0,0335) x 0,5256
ROE1	0,1402	= 0,1035 + 0,0368
ROE2 (includes interest when SLTD=0)	0,0080	= 30.420 x (1 - 0,1796) / 3.106.346
ROE3 (fiscal)	-0,0077	= (0,1796 - 0,2220) x 561.293 / 3.106.346
ROE=ROE1+ROE2+ROE3	0,1406	= 0,1402 + 0,0080 - 0,0077
NP/E	0,1406	= 436.670 / 3.106.346
CHECK	0,0000	= 0,1406 - 0,1406

Figure 24

Figure 25 shows the average data (for the 143 sectors considered as a whole) for each of the years studied, as well as the overall average. These figures are those considered in the commentary presented later in the benchmarking process.

Figure 26 below shows the breakdown, for each year, of shareholder return in the sector and type of company considered: operating return on recurring operations, the contribution of debt to shareholder return, and the contribution of non-recurring operations and possible tax effects to shareholder return, all in % of total financial return. The position of the sector in the global ranking is also shown, as well as the growth rates of these weights over the years of the period considered.

	Whole (Large and medium)			
RATIO PYRAMID (based on ending balances)	2017	2016	2015	G
CONS	**0,5328**	**0,5363**	**0,5343**	**0,5345**
BES (% of S)	0,8310	0,8450	0,8564	0,8442
S-BES (% of S)	0,1690	0,1550	0,1436	0,1558
EBIT (% of S)	0,0814	0,0792	0,0733	0,0779
EBIAT/S	**0,0667**	**0,0558**	**0,0607**	**0,0611**
S/(FA+NCA)	**1,5552**	**1,4908**	**1,5337**	**1,5267**
ROA	**0,0780**	**0,0613**	**0,0760**	**0,0718**
Ix(1-tgen) (% of S)	0,0271	0,0180	0,0384	0,0279
i	**0,0557**	**0,0493**	**0,0665**	**0,0571**
SLTD/E	**0,7724**	**0,8369**	**0,8499**	**0,8198**
(ROA-i)xSLTD/E	**0,0167**	**0,0127**	**-0,0050**	**0,0082**
ROE1	**0,0984**	**0,0841**	**0,0643**	**0,0822**
ROE2 (includes interest when SLTD=0)	**0,0304**	**0,0268**	**0,0316**	**0,0296**
ROE3 (fiscal)	**-0,0030**	**0,0107**	**-0,0073**	**0,0002**
ROE=ROE1+ROE2+ROE3	**0,1223**	**0,1215**	**0,0917**	**0,1118**

Figure 25

Breakdown of the profitability obtained in each sector: weight that each element has in the total financial performance	2017	Ranking	2016	Ranking	2015	Ranking	Δ in % previous year 2017	Δ in % previous year 2016
Recurring operating income ('ROA')	73,60%	54	59,94%	64	69,30%	63	22,79%	-13,50%
Financial leverage (on the basis of recurring return 'ROA')	26,15%	34	19,36%	45	19,76%	56	35,03%	-2,01%
Financial performance of non-recurring operations ('ROE2')	5,72%	109	9,46%	88	14,71%	76	-39,60%	-35,66%
Fiscal financial performance ('ROE3')	-5,46%	84	11,24%	69	-3,76%	55	-148,58%	-398,71%
Total (ROE = ROE1 + ROE2 + ROE3 = NP/E)	100,00%		100,00%		100,00%			

Figure 26

Finally, Figure 27 shows a sensitivity analysis related to sales in the last year of the period considered: specifically, the ranges of variation associated with the financial return on recurring operations (ROE1) and operating return (ROA) are shown, assuming different possible levels of variation in sales; with an indication of the penalized internal rate of return (PIRR) obtained in that period (and which, as you will recall, results from subtracting from the average financial return a number of standard deviations that make the value obtained guaranteed at least with a probability decided by the user).

Possible variation ranges in sales (year 2017)	ROE1 rank (2017)	ROA rank (2017)	PIRR (2017)
Variation of ±10% from the original observed value	8,2% - 19,4%	6,6% - 13,9%	11,9%
Variation of ±20% from the original observed value	2,0% - 24,4%	2,5% - 17,2%	9,4%
Variation of ±30% from the original observed value	-4,7% - 29,1%	-1,9% - 20,3%	6,4%
Variation of ±40% from the original observed value	-12,0% - 33,6%	-6,7% - 23,2%	2,9%
Variation of ±50% from the original observed value	-19,9% - 37,7%	-11,9% - 25,9%	-1,0%
Variation of ±60% from the original observed value	-28,5% - 41,6%	-17,5% - 28,4%	-5,5%
Variation of ±70% from the original observed value	-37,9% - 45,3%	-23,7% - 30,9%	-10,7%
Variation of ±80% from the original observed value	-48,3% - 48,8%	-30,5% - 33,1%	-16,5%

Desired Guarantee (PIRR)	85%
t value	1,04

Figure 27

Commentary year 2017

The following lines present the commentary that Excel itself generates on the results obtained in the ratio pyramid corresponding to the last year of the period considered (2017).

The financial performance in the sector was positive (14,06%) in 2017 and higher than the average for the sectors as a whole (which in the period under study presented an average value of 12,23%). This is based on a positive financial performance, both in terms of recurring (14,02%) and non-recurring operations (contributing an additional 0,80%); in the sectors as a whole, the returns on recurring and non-recurring activities were 9,84% and 3,04%, respectively. The better overall performance shown by the sector is corroborated by the better performance of recurring activities (ROE1), which outperformed the sector as a whole by 42,46%.

The profitability associated with the sector's recurring operations mentioned above is based on a positive contribution from financial leverage (3,68%), which is in addition to that which, in the absence of indebtedness and without considering non-recurring operations, could have been given to shareholders (10,35%). If we focus our attention on the data for the sectors as a whole for the period under study, we see that here too, indebtedness brings a positive return to shareholders (1,67%, in addition to the operating return of 7,80%).

If we go a little deeper into the comparison of the performance of the sector studied with that of all the sectors as a whole, focusing our attention on recurring operations, we can say that this sector is in a good moment. On the one hand, it has a higher operating performance (32,66% higher than the overall figure), which is better than the average in terms of asset management; however, this is combined with a greater dependence on typical financial performance in relation to liabilities: although the sector has a debt ratio 31,96% lower than the overall figure, the weight that financial leverage has on shareholder return (always for normal operations) is 54,55% higher than the overall figure.

Next, we will look a little deeper into the way in which the targeted value of operating profitability (ROA) is achieved. As mentioned above, in the period under study, the sector presents a value of 10,35%, which can be explained as the product of the ratio of net margin per euro sold (EBIAT/S = 5,00%) and the turnover ratio (S/(FA+ NCA) = 2,07); the former (which is 25,14% lower than the overall value), grew by 71,98% with respect to the previous year, while the latter presents a value 33,14% higher than the overall value and a reduction of 3,57% with respect to the previous year. As regards the explanation of the first of the two (EBIAT/S), CONS appears as a weak point, presenting a value 55,56% lower than the whole; this is partly offset by a better performance in terms of the percentage distance of sales with respect to break-even ((S-BES)/S), which shows a value 52,21% higher than the whole. It should also be noted that the tax rate borne in the sector, which grew by 8,00% compared to the previous year, is 23,65% higher than the overall rate, which is detrimental to the operating performance of the sector and helps to understand in part all of the above.

With regard to the contribution of liabilities to the financial yield from recurring operations, the following should be noted. In the year under consideration, and as already mentioned, the so-called 'financial leverage' has turned out to be positive thanks to the fact that the operating yield (the repeatedly mentioned ROA = 10,35%) is higher than the cost of external financing (i = 3,35%), which results in a differential (ROA-i) = 6,99%; this is combined with a debt ratio SLTD/E = 0,53, which multiplied by the above explains the aforementioned contribution to shareholder profitability. If we compare the figures with respect to the previous year, we see that ROA grows by 65,83%, while i grows by 30,74%; this causes the differential to grow by 90,34%, which, considering that indebtedness is reduced by 4,19%, explains that financial leverage grows by 82,37%.

When comparing the figures in relation to the sectors as a whole, operating performance appears as a strong point (sector ROA > overall ROA) and also in terms of the cost of debt, it is the sector that beats the whole (sector i < overall i). As already noted, debt in the sector is 31,96% lower than overall, which, combined with the above, explains why leverage brings more profitability to the shareholder in the sector (always compared to overall). As for the weight or importance that this source of profitability has for the shareholder, in the sector it represents 26,21% of the typical total financial return (14,02%), a percentage that drops to 16,96% for the sector as a whole (on a value of ROE1 = 9,84%).

A final comment regarding the contribution of non-recurring operations to financial performance. In the year under review, and as we have seen, non-recurring operations contributed a return of 0,80% to the shareholder, a figure which is 18,42% lower than in the previous year. If we now take as a reference the values presented by the whole, and although in this case the comparison is less relevant, we see that the sector has behaved in line with the general trend: atypical operations also added 3,04% to shareholder returns.

ACCID Ratio Battery applied to the sector studied (period 2015-2017)

Figure 28 shows the results of applying the battery of ratios proposed in the original works to the average data of the ‘Agriculture, livestock, hunting and related services’ sector, considering large companies in the three-year period 2015-2017. As in the previous sections, the data for each of the years of the three-year period, the position that the sector occupies in the total ranking (ordering the 143 original sectors from highest to lowest value) and also the rates of change between years are provided.

							Δ in % previous year	
ACCID RATIO BATTERY (on final balances)	2017	Ranking	2016	Ranking	2015	Ranking	2017	2016
Liquidity								
Liquidity	1,4129	59	1,3783	70	1,3612	65	2,52%	1,25%
(Current assets - Stocks) / Current liabilities	0,8039	116	0,7697	116	0,7393	118	4,44%	4,12%
Cash and cash equivalents / Current liabilities	0,3472	102	0,3119	113	0,2998	115	11,33%	4,01%
Working capital / Sales	0,1107	82	0,1015	87	0,0935	85	9,09%	8,61%
Working capital / Total assets	0,1596	54	0,1493	59	0,1413	56	6,91%	5,66%
Indebtedness								
Indebtedness	0,5392	78	0,5532	76	0,5552	81	-2,54%	-0,36%
Quality of debt	0,7168	59	0,7134	57	0,7045	58	0,48%	1,26%
Loan repayment capacity	0,4999	83	0,4236	85	0,4151	78	17,99%	2,06%
Coverage of financial expenses	8,9559	36	6,8667	45	5,5417	40	30,43%	23,91%
Cost of debt	0,0498	107	0,0456	124	0,0548	123	9,25%	-16,93%
Asset management								
Asset turnover	1,4414	34	1,4708	29	1,5118	26	-2,00%	-2,71%
Turnover of non-current assets	3,1755	43	3,2250	36	3,2334	34	-1,53%	-0,26%
Turnover of current assets	2,6394	24	2,7039	26	2,8393	26	-2,38%	-4,77%
Inventory turnover	4,7194	74	4,8192	78	4,9710	72	-2,07%	-3,05%
Deadlines								
Inventories	77,3402	61	75,7392	59	73,4264	64	2,11%	3,15%
Collection	44,6950	122	44,8398	123	41,4985	124	-0,32%	8,05%
Payment	45,9638	111	44,3021	115	44,0317	113	3,75%	0,61%
Customer financing by suppliers	0,7926	16	0,7775	21	0,8487	15	1,94%	-8,39%
Profitability and self-financing								
Economic profitability (ROA)	0,0886	32	0,0612	66	0,0609	63	44,83%	0,52%
Financial profitability (ROE)	0,1406	49	0,1041	75	0,1043	63	35,06%	-0,22%
Cash flow / Total assets	0,0994	43	0,0829	67	0,0832	50	19,93%	-0,33%
Cash flow / Sales	0,0690	94	0,0564	102	0,0550	95	22,38%	2,45%
Operations								
Sales / Number of employees	294,0695	57	280,3119	60	298,2428	49	4,91%	-6,01%
Net income / Number of employees	13,2156	70	8,8624	91	9,1526	76	49,12%	-3,17%
Personnel expenses/ Number of employees	24,1742	132	22,7647	129	24,0858	129	6,19%	-5,49%

Figure 28

Figures 29 and 30 show the calculation method for each of the figures presented (both in text and numerical format). And in Figure 31 you can see the average data obtained by the set of sectors studied in each of the measures considered (in each of the years of the three-year period, as well as the overall average).

ACCID RATIO BATTERY (on final balances)	2017	Explanation in text format corresponding to the figures for the year 2017
Liquidity		
Liquidity	1,4129	= Current assets / Current liabilities
(Current assets - Stocks) / Current liabilities	0,8039	= (Realizable (trade receivables) + Liquidity (cash and cash equivalents)) / Current liabilities
Cash and cash equivalents / Current liabilities	0,3472	= Liquidity (cash and cash equivalents) / Current liabilities
Working capital / Sales	0,1107	= (Current assets - Current liabilities) / Net revenues
Working capital / Total assets	0,1596	= (Current assets - Current liabilities) / Total assets
Indebtedness		
Indebtedness	0,5392	= (Non-current liabilities + Current liabilities) / Total assets
Quality of debt	0,7168	= Current liabilities / (Non-current liabilities + Current liabilities)
Loan repayment capacity	0,4999	= (Profit for the year + Depreciation of fixed assets) / (Long-term financial debt + Short-term financial debt)
Coverage of financial expenses	8,9559	= EBIT / Financial expenses
Cost of debt	0,0498	= Financial expenses / (Long-term financial debt + Short-term financial debt)
Asset management		
Asset turnover	1,4414	= Net revenues / Total assets
Turnover of non-current assets	3,1755	= Net revenues / Non-current assets
Turnover of current assets	2,6394	= Net revenues / Current assets
Inventory turnover	4,7194	= Cost of sales / Stocks
Deadlines		
Inventories	77,3402	= Stocks / Cost of sales x 365
Collection	44,6950	= Realizable (trade receivables) / Net revenues x 365
Payment	45,9638	= Trade accounts payable / Cost of sales x 365
Customer financing by suppliers	0,7926	= Trade accounts payable / Realizable (trade receivables)
Profitability and self-financing		
Economic profitability (ROA)	0,0886	= EBIT / Total assets
Financial profitability (ROE)	0,1406	= Profit for the year / Net worth
Cash flow / Total assets	0,0994	= (Profit for the year + Depreciation of fixed assets) / Total assets
Cash flow / Sales	0,0690	= (Profit for the year + Depreciation of fixed assets) / Net revenues
Operations		
Sales / Number of employees	294,0695	= Net revenues / Number of employees
Net income / Number of employees	13,2156	= Profit for the year / Number of employees
Personnel expenses/ Number of employees	24,1742	= Personnel expenses / Number of employees

Figure 29

ACCID RATIO BATTERY (on final balances)	2017	Numerical explanation corresponding to the figures for the year 2017
Liquidity		
Liquidity	1,4129	= 3.681.371 / 2.605.475
(Current assets - Stocks) / Current liabilities	0,8039	= (1.189.822 + 904.669) / 2.605.475
Cash and cash equivalents / Current liabilities	0,3472	= 904.669 / 2.605.475
Working capital / Sales	0,1107	= (3.681.371 - 2.605.475) / 9.716.643
Working capital / Total assets	0,1596	= (3.681.371 - 2.605.475) / 6.741.203
Indebtedness		
Indebtedness	0,5392	= (1.029.382 + 2.605.475) / 6.741.203
Quality of debt	0,7168	= 2.605.475 / (1.029.382 + 2.605.475)
Loan repayment capacity	0,4999	= (436.670 + 233.545) / (737.488 + 603.338)
Coverage of financial expenses	8,9559	= 597.600 / 66.727
Cost of debt	0,0498	= 66.727 / (737.488 + 603.338)
Asset management		
Asset turnover	1,4414	= 9.716.643 / 6.741.203
Turnover of non-current assets	3,1755	= 9.716.643 / 3.059.832
Turnover of current assets	2,6394	= 9.716.643 / 3.681.371
Inventory turnover	4,7194	= 7.489.136 / 1.586.879
Deadlines		
Inventories	77,3402	= 1.586.879 / 7.489.136 x 365
Collection	44,6950	= 1.189.822 / 9.716.643 x 365
Payment	45,9638	= 943.094 / 7.489.136 x 365
Customer financing by suppliers	0,7926	= 943.094 / 1.189.822
Profitability and self-financing		
Economic profitability (ROA)	0,0886	= 597.600 / 6.741.203
Financial profitability (ROE)	0,1406	= 436.670 / 3.106.346
Cash flow / Total assets	0,0994	= (436.670 + 233.545) / 6.741.203
Cash flow / Sales	0,0690	= (436.670 + 233.545) / 9.716.643
Operations		
Sales / Number of employees	294,0695	= 9.716.643 / 33.042
Net income / Number of employees	13,2156	= 436.670 / 33.042
Personnel expenses/ Number of employees	24,1742	= 798.763 / 33.042

Figure 30

ACCID RATIO BATTERY (on final balances)	Whole (Large and medium) 2017	2016	2015	G
Liquidity				
Liquidity	1,4461	1,4517	1,4202	1,4393
(Current assets - Stocks) / Current liabilities	1,1385	1,1436	1,0998	1,1274
Cash and cash equivalents / Current liabilities	0,5395	0,5457	0,5088	0,5314
Working capital / Sales	0,1286	0,1411	0,1409	0,1369
Working capital / Total assets	0,1370	0,1384	0,1286	0,1347
Indebtedness				
Indebtedness	0,5594	0,5603	0,5670	0,5622
Quality of debt	0,6492	0,6336	0,6210	0,6346
Loan repayment capacity	2,1064	1,0375	0,8263	1,3284
Coverage of financial expenses	6,9834	6,9276	4,4456	6,1269
Cost of debt	0,1601	0,2356	0,2911	0,2293
Asset management				
Asset turnover	0,9924	0,9706	0,9698	0,9776
Turnover of non-current assets	2,8638	2,5226	2,9010	2,7630
Turnover of current assets	1,9171	1,9420	2,0130	1,9575
Inventory turnover	11,3548	18,0399	20,7445	16,7295
Deadlines				
Inventories	117,4312	115,6016	114,1798	115,7379
Collection	89,9795	91,7453	90,1135	90,6143
Payment	271,9071	115,2810	113,4585	166,8822
Customer financing by suppliers	0,4360	0,4515	0,4592	0,4489
Profitability and self-financing				
Economic profitability (ROA)	0,0654	0,0645	0,0643	0,0647
Financial profitability (ROE)	0,1223	0,1215	0,0917	0,1118
Cash flow / Total assets	0,0799	0,0797	0,0706	0,0767
Cash flow / Sales	0,1114	0,1022	0,0913	0,1017
Operations				
Sales / Number of employees	332,8631	372,9239	314,8472	340,3675
Net income / Number of employees	24,5701	25,4605	12,0548	20,6860
Personnel expenses/ Number of employees	43,5492	43,3914	42,7626	43,2340

Figure 31

Commentary year 2017

Below are the comments that our Excel itself generates in relation to the interpretation of the data obtained by sector and by the whole in the 'ACCID Ratio Battery' in 2017 (and which you can at any time consult in Figures 28 and 31).

Liquidity Ratios

The Liquidity ratio (which is defined as Current Assets / Current Liabilities) presents in 2017 a value of 1,41 (which represents an improvement of 2,52% compared to the previous year). In the period under study, the whole presents a value of 1,45, so *the sector's figure is worse than that of the aforementioned set by 2,29%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (59 out of 143), the score obtained on a scale of 1 to 10 is 5,9, so we can qualify its performance in relative terms as acceptable.*

The (Realizable + Cash and cash equivalents) / Current Liabilities ratio presents in 2017 a value of 0,80 (which represents an improvement of 4,44% compared to the previous year). In the period under study, the whole presents a value of 1,14, so the sector's figure is worse than that of the aforementioned set by 29,39%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (116 out of 143), the score obtained on a scale of 1 to 10 is 2,0, so we can qualify its performance in relative terms as very poor.

The Cash and cash equivalents / Current Liabilities ratio presents in 2017 a value of 0,35 (which represents an improvement of 11,33% compared to the previous year). In the period under study, the whole presents a value of 0,54, so the sector's figure is worse than that of the aforementioned set by 35,64%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (102 out of 143), the score obtained on a scale of 1 to 10 is 2,9, so we can qualify its performance in relative terms as very poor.

The Working Capital / Sales ratio presents in 2017 a value of 0,11 (which represents an improvement of 9,09% compared to the previous year). In the period under study, the whole presents a value of 0,13, so the sector's figure is worse than that of the aforementioned set by 13,89%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (82 out of 143), the score obtained on a scale of 1 to 10 is 4,3, so we can qualify its performance in relative terms as poor.

The Working Capital / Total Assets ratio presents in 2017 a value of 0,16 (which represents an improvement of 6,91% compared to the previous year). In the period under study, the whole presents a value of 0,14, so the sector beats the aforementioned set by 16,51%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (54 out of 143), the score obtained on a scale of 1 to 10 is 6,3, so we can qualify its performance in relative terms as good.

Debt Ratios

The Indebtedness ratio (which is defined as Total Debts / Total Assets) presents in 2017 a value of 0,54 (which represents an improvement of 2,54% compared to the previous year). In the period under study, the whole presents a value of 0,56, so the sector beats the aforementioned set by 3,61%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (78 out of 143), the score obtained on a scale of 1 to 10 is 5,4, so we can qualify its performance in relative terms as acceptable.

The Debt Quality ratio (which is defined as Current Liabilities / Total Debts) presents in 2017 a value of 0,72 (which represents a decrease of 0,48% compared to the previous year). In the period under study, the whole presents a value of 0,65, so the sector's figure is worse than that of the aforementioned set by 10,41%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (59 out of 143), the score obtained on a scale of 1 to 10 is 4,1, so we can qualify its performance in relative terms as poor.

The Loan Repayment Capacity ratio (which is defined as Cash Flow / Loans) presents in 2017 a value of 0,50 (which represents an improvement of 17,99% compared to the previous year). In the period under study, the whole presents a value of 2,11, so the sector's figure is worse than that of the aforementioned set by 76,27%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (83 out of 143), the score obtained on a scale of 1 to 10 is 4,3, so we can qualify its performance in relative terms as poor.

The Financial Expenses Coverage ratio (which is defined as EBIT / Financial Expenses) presents in 2017 a value of 8,96 (which represents an improvement of 30,43% compared to the previous year). In the period under study, the whole presents a value of 6,98, so the sector beats the aforementioned set by 28,24%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (36 out of 143), the rating obtained on a scale of 1 to 10 is 7,6, so we can qualify its performance in relative terms as good.

The Cost of Debt ratio (which is defined as Financial Expenses / Loans) presents in 2017 a value of 0,05 (which represents a 9,25% decrease compared to the previous year). In the period under study, the whole presents a value of 0,16, so the sector beats the aforementioned set by 68,91%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (107 out of 143), the rating obtained on a scale of 1 to 10 is 7,4, so we can qualify its performance in relative terms as good.

Ratios related to Asset Management

The Asset Turnover ratio (which is defined as Sales / Total Assets) presents in 2017 a value of 1,44 (which represents a decrease of 2,00% compared to the previous year). In the period under study, the whole presents a value of 0,99, so the sector beats the aforementioned set by 45,24%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (34 out of 143), the rating obtained on a scale of 1 to 10 is 7,7, so we can qualify its performance in relative terms as good.

The Non-Current Assets Turnover ratio (which is defined as Sales / Non-Current Assets) presents in 2017 a value of 3,18 (which represents a decrease of 1,53% compared to the previous year). In the period under study, the whole presents a value of 2,86, so the sector beats the aforementioned set by 10,89%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (43 out *of 143), the rating obtained on a scale of 1 to 10 is 7,1, so we can qualify its performance in relative terms as good.*

The Current Assets Turnover ratio (which is defined as Sales / Current Assets) presents in 2017 a value of 2,64 (which represents a decrease of 2,38% compared to the previous year). In the period under study, the whole presents a value of 1,92, so the sector beats the aforementioned set by 37,67%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (24 out of 143), the rating obtained on a scale of 1 to 10 is 8,4, so we can qualify its performance in relative terms as very good.

The Inventory Turnover ratio (which is defined as Cost of sales / Stocks) presents in 2017 a value of 4,72 (which represents a decrease of 2,07% compared to the previous year). In the period under study, the whole presents a value of 11,35, so the sector's figure is worse than that of the aforementioned set by 58,44%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (74 out of 143), the rating obtained on a scale of 1 to 10 is 4,9, so we can qualify its performance in relative terms as poor.

Ratios related to deadlines (collection, payment, etc.)

The Inventories ratio (which is defined as (Inventories / Cost of sales) x 365) presents in 2017 a value of 77,34 (which represents a 2,11% decrease compared to the previous year). In the period under study, the whole presents a value of 117,43, so the sector beats the aforementioned set by 34,14%. If we consider the position that the sector occupies in the general ranking with in relation to this ratio (61 out of 143), the rating obtained on a scale of 1 to 10 is 4,2, so we can qualify its performance in relative terms as poor.

The Collection ratio (which is defined as Customers / Sales x 365) presents in 2017 a value of 44,69 (which represents an improvement of 0,32% compared to the previous year). In the period under study, the whole presents a value of 89,98, so the sector beats the aforementioned set by 50,33%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (122 out of 143), the score obtained on a scale of 1 to 10 is 8,5, so we can qualify its performance in relative terms as very good.

The Payment ratio (which is defined as Trade Payables / Cost of sales x 365) presents in 2017 a value of 45,96 (which represents an improvement of 3,75% compared to the previous year). In the period under study, the whole presents a value of 271,91, so the sector's figure is worse than that of the aforementioned set by 83,10%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (111 out of 143), the score obtained on a scale of 1 to 10 is 2,3, so we can qualify its performance in relative terms as very poor.

The ratio of Customer financing by trade payables (which is defined as Trade payables / Customers) presents in 2017 a value of 0,79 (which represents an improvement of 1,94% compared to the previous year). In the period under study, the aggregate presents a value of 0,44, so the sector beats the aforementioned aggregate by 81,79%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (16 out of 143), the score obtained on a scale of 1 to 10 is 9,0, so we can qualify its performance in relative terms as very good.

Profitability and Self-financing Ratios

The Economic Profitability ratio (which is defined as EBIT / Total Assets) presents in 2017 a value of 0,09 (which represents an improvement of 44,83% compared to the previous year). In the period under study, the whole presents a value of 0,07, so the sector beats the aforementioned set by 35,47%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (32 out of 143), the rating obtained on a scale of 1 to 10 is 7,8, so we can qualify its performance in relative terms as good.

The Financial Profitability ratio (which is defined as Net Profit / Net Equity) presents in 2017 a value of 0,14 (which represents an improvement of 35,06% compared to the previous year). In the period under study, the whole presents a value of 0,12, so the sector beats the aforementioned set by 14,93%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (49 out of 143), the rating obtained on a scale of 1 to 10 is 6,6, so we can qualify its performance in relative terms as good.

The Cash Flow / Total Assets ratio presents in 2017 a value of 0,10 (which represents an improvement of 19,93% compared to the previous year). In the period under study, the whole presents a value of 0,08, so the sector beats the aforementioned set by 24,40%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (43 out of 143), the rating obtained on a scale of 1 to 10 is 7,1, so we can qualify its performance in relative terms as good.

The Cash Flow / Sales ratio presents in 2017 a value of 0,07 (which represents an improvement of 22,38% compared to the previous year). In the period under study, the whole presents a value of 0,11, so the figure for the sector is worse than that of the aforementioned set by 38,10%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (94 out of 143), the score obtained on a scale of 1 to 10 is 3,5, so we can qualify its performance in relative terms as very poor.

Operating ratios

The ratio of Sales / No. employees presents in 2017 a value of 294,07 (which represents an improvement of 4,91% compared to the previous year). In the period under study, the whole presents a value of 332,86, so the figure for the sector is worse than that of the aforementioned set by 11,65%. If we consider the position that the *sector occupies in the general ranking in relation to this ratio (57 out of 143), the rating obtained on a scale of 1 to 10 is 6,1, so we can qualify its performance in relative terms as good.*

The Net Profit / No. employees ratio presents in 2017 a value of 13,22 (which represents an improvement of 49,12% compared to the previous year). In the period under study, the whole presents a value of 24,57, so the figure for the sector is worse than that of the aforementioned set by 46,21%. If we consider the position that the sector occupies in the general ranking in relation to this ratio (70 out of 143), the score obtained on a scale of 1 to 10 is 5,2, so we can qualify its performance in relative terms as acceptable.

The ratio of Personnel Expenses / No. of employees presents in 2017 a value of 24,17 (which represents a decrease of 6,19% compared to the previous year). In the period under study, the whole presents a value of 43,55, so the sector beats the aforementioned set by 44,49%. If we consider the position that the sector occupies in the overall ranking in relation to this ratio (132 out of 143), the score obtained on a scale of 1 to 10 is 9,2, so we can qualify its performance in relative terms as very good. (NOTE: in this section the term 'better' is used only in terms of efficiency -understood as the capacity to obtain results with the minimum of resources-).

4.2. Overall analysis of some variables in the set of sectors and study of the differences between 'Large and Medium-sized companies' and 'Small companies' (period 2015-2017)

We will begin by commenting on the overall data (those achieved considering all sectors) assuming weights defined according to 'total assets' (which means giving a weight to the data for 'Large and Medium-sized companies' of between 81%-82% depending on the year, with the remaining 18%-19% corresponding to 'Small companies').

UCD Cash flow Statement

- As can be seen in Figure 32, the FCFF was positive for the entire period under study, which means that, regardless of how it was financed, the assets generated cash (about 3% per year of total assets). This made it possible to incur net cash outflows in relation to lenders (for a meagre 0,6% per year of total assets) and to shareholders (who, in net terms, received an amount equivalent to 2,3% of total assets).

  This was possible thanks to a positive fund flow from recurring activities (8,14% of total assets) and a small contribution from non-recurrent operations (1,08%), which made it possible to meet the investments required by the assets, both in NCA (1,85%) and in fixed assets (4,45%, always of total assets), leaving the remaining 2,92% (free cash-flow) previously mentioned. In short, there was moderate growth in the period under study (both short- and long-term investments grew), which was compatible in any case with a capacity to free up funds, both for lenders and shareholders.

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	WHOLE (All companies)				
CASH FLOW STATEMENT (% of Total assets)	**GLOBAL**	**2017**	**2016**	**2015**	**Ideal**
EBIT (% of TA)	0,0668	0,0683	0,0653	-	>
FFO (% of TA)	**0,0814**	**0,0837**	**0,0790**	**-**	>
NRE (% of TA)	0,0134	0,0130	0,0137	-	>
FFNR (% of TA)	**0,0108**	**0,0110**	**0,0107**	**-**	>
closing NCA (% of TA)	0,2140	0,2160	0,2121	-	
opening NCA (% of TA)	0,1955	0,1968	0,1941	-	
ΔNCA (% of TA)	**0,0185**	**0,0191**	**0,0180**	**-**	<
CFI (% of TA)	**0,0445**	**0,0449**	**0,0440**	**-**	<
FCFF (% of TA)	**0,0292**	**0,0306**	**0,0277**	**-**	>
SLTDI-SLTDR (% of TA)	**0,0053**	**0,0075**	**0,0030**	**-**	
Ix(1-tborne) (% of TA)	**0,0114**	**0,0129**	**0,0099**	**-**	
FCFSLTD (% of TA)	**-0,0062**	**-0,0054**	**-0,0069**	**-**	
FCFE (% of TA)	**-0,0230**	**-0,0253**	**-0,0208**	**-**	
FCFF+FCFSLTD+FCFE=0 (% of TA)	**0,0000**	**0,0000**	**0,0000**	**-**	

Figure 32

- When we distinguish between 'Large and medium-sized' and 'Small' companies, we observe that some differences occur (Figure 33).

  Thus, while in the Large companies we observe the logic pointed out for the whole (FCFF>0; and FCFSLTD and FCFE both negative), in the Small companies the FCFF was practically nil (only 0,18% of total assets) and it was necessary to appeal to equity (which contributed 0,41%) to be able to service the debt (which represented an outflow of 0,59%; always on total assets).

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	LARGE COMPANIES			Average	SMALL COMPANIES			Average
CASH FLOW STATEMENT (% of Total assets)	**GLOBAL**	**2017**	**2016**	**2015**	**GLOBAL**	**2017**	**2016**	**2015**
EBIT (% of TA)	0,0724	0,0742	0,0705	-	0,0424	0,0422	0,0426	-
FFO (% of TA)	**0,0861**	**0,0891**	**0,0832**	**-**	**0,0603**	**0,0602**	**0,0603**	**-**
NRE (% of TA)	0,0144	0,0139	0,0148	-	0,0088	0,0089	0,0088	-
FFNR (% of TA)	**0,0116**	**0,0117**	**0,0115**	**-**	**0,0074**	**0,0076**	**0,0072**	**-**
closing NCA (% of TA)	0,2047	0,2060	0,2035	-	0,2551	0,2600	0,2501	-
opening NCA (% of TA)	0,1868	0,1876	0,1861	-	0,2336	0,2377	0,2296	-
ΔNCA (% of TA)	**0,0179**	**0,0184**	**0,0174**	**-**	**0,0214**	**0,0223**	**0,0206**	**-**
CFI (% of TA)	**0,0445**	**0,0458**	**0,0431**	**-**	**0,0444**	**0,0407**	**0,0482**	**-**
FCFF (% of TA)	**0,0354**	**0,0365**	**0,0343**	**-**	**0,0018**	**0,0048**	**-0,0012**	**-**
SLTDI-SLTDR (% of TA)	**0,0056**	**0,0082**	**0,0030**	**-**	**0,0037**	**0,0046**	**0,0028**	**-**
Ix(1-tborne) (% of TA)	**0,0118**	**0,0137**	**0,0100**	**-**	**0,0096**	**0,0095**	**0,0097**	**-**
FCFSLTD (% of TA)	**-0,0062**	**-0,0055**	**-0,0069**	**-**	**-0,0059**	**-0,0049**	**-0,0069**	**-**
FCFE (% of TA)	**-0,0292**	**-0,0310**	**-0,0273**	**-**	**0,0041**	**0,0001**	**0,0081**	**-**
FCFF+FCFSLTD+FCFE=0 (% of TA)	**0,0000**	**0,0000**	**0,0000**	**-**	**0,0000**	**0,0000**	**0,0000**	**-**

Figure 33

Looking more closely at the differences between the two groups, we see that FFO decreased from 8,61% to 6,03%; FFNR also decreased (from 1,16% to 0,74%), while the net investment required in net current assets (NCA) rose from 1,79% to 2,14%, while the investment in non-current assets was practically identical (4,45% vs. 4,44%).

Thus, we could conclude that 'Small companies' performed somewhat worse than 'Large and Medium-sized companies', insofar as the main reasons for the lower FCFF are a lower cash flow generation capacity from recurring operations (FFO) and somewhat higher working capital investment needs, although the differences are not large.

If we now analyse the data over time, we see that the differences between one year and another are very small in both groups in terms of the large concepts (FCFF, FCFSLTD and FCFE) and also the 'minor' concepts (FFO, FFNR, ΔNCA and CFI). As a summary, we can say that the 'Large and Medium' beat the 'Small' in the vast majority of the measures considered (6/7 in the aggregate and in 2017; and 7/7 in 2016; Figure 34 can be seen).

Codes:
M=Better; P=Worse
GLOBAL-2017-2016-2015

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CASH FLOW STATEMENT (% of Total assets) -	Ideal	BIG vs WHOLE	SMALLvsWHOLE	BIGvsSMALL
EBIT (% of TA)	>	M M M -	P P P -	M M M -
FFO (% of TA)	>	M M M -	P P P -	M M M -
NRE (% of TA)	>	M M M -	P P P -	M M M -
FFNR (% of TA)	>	M M M -	P P P -	M M M -
closing NCA (% of TA)				
opening NCA (% of TA)				
ΔNCA (% of TA)	<	M M M -	P P P -	M M M -
CFI (% of TA)	<	P P M -	M M P -	P P M -
FCFF (% of TA)	>	M M M -	P P P -	M M M -
SLTDI-SLTDR (% of TA)				
Ix(1-tborne) (% of TA)				
FCFSLTD (% of TA)				
FCFE (% of TA)				
FCFF+FCFSLTD+FCFE=0 (% of TA)				

GLOBAL (M)	86%	14%	86%
2017 (M)	86%	14%	86%
2016 (M)	100%	0%	100%

Figure 34

UCD RATIO PYRAMID

- If we now focus on Figure 35, and going from the general to the specific, we must begin by saying that in the whole of the period studied, the companies that make up the sample analysed generated a positive return significantly higher than what we could identify as a risk-free interest rate (close to zero in the period under study). The average value of 'ROE' (defined as NP/E) is 11,31% per year, which can be broken down as follows:

- Operating return 'ROA' (understood as EBIAT/(FA+NCA)): 8,24%, which is the return on each euro invested in the asset (financed with funds with explicit cost) regardless of the way in which it was financed (proportions of borrowed and own funds).
- Financial leverage (ROA-i)xSLTD/E: -0,39%. In other words, considering the cost of debt (which averaged 11,90%, higher than the operating return) and the level of indebtedness (measured by the SLTD/E ratio, which averaged 1,03), it must be said that indebtedness did not contribute to shareholder profitability, but rather the opposite (albeit by a very small amount).
- Profit from non-recurring operations ('ROE2', understood as NREAT/E): 3,45%.

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RATIO PYRAMID (based on ending balances)	GLOBAL	2017	2016	2015	Ideal
	WHOLE (All companies)				
CONS	0,5421	0,5421	0,5456	0,5385	>
BES (% of S)	0,8468	0,8320	0,8393	0,8691	<
S-BES (% of S)	0,1532	0,1680	0,1607	0,1309	>
EBIT (% of S)	0,0746	0,0869	0,0778	0,0592	>
EBIAT/S	0,0619	0,0709	0,0609	0,0539	>
S/(FA+NCA)	1,8751	1,5351	1,4904	2,6007	>
ROA	0,0824	0,0801	0,0696	0,0975	>
Ix(1-tborne) (% of S)	0,0397	0,0384	0,0252	0,0555	<
i	0,1190	0,0647	0,2068	0,0854	<
SLTD/E	1,0296	0,6515	1,4943	0,9431	
(ROA-i)xSLTD/E	-0,0039	0,0227	-0,0315	-0,0029	
ROE1	0,0785	0,1028	0,0381	0,0947	>
ROE2 (includes interest when SLTD=0)	0,0345	0,0235	0,0413	0,0388	>
-	-	-	-	-	>
ROE=ROE1+ROE2	0,1131	0,1264	0,0794	0,1335	>
NP/E	0,1131	0,1264	0,0794	0,1335	
CHECK	0,0000	0,0000	0,0000	0,0000	

Figure 35

Going a little deeper into the way in which the operating return (ROA) was achieved, this can be broken down into a margin ratio (EBIAT/S) of 6,19% and a turnover ratio (S/(FA+NCA)) that presented a value of 1,88. That is to say that each euro sold left as margin, after taking care of the necessary operating costs, 6,19 cents; which in turn we can explain by analysing the contribution of the changeable in the short term (sales in relation to variable costs; which leads us to the ratio CONS=(S-VC)/S = 0,54; which means that each euro sold leaves more than half of the margin after taking care of the necessary variable cost), qualified by the effect of the fixed costs (since a part of the contribution margin must be dedicated to cover the mentioned fixed costs); in this sense, and as can be seen, the excess of sales over those necessary to cover the costs (break-even sales) was

15,32% over the sales themselves, all of which allows us to understand the observed average value of 'ROA'.

- If we now analyse the differences between the two large groups considered (Figure 36), we can see that the 'ROE' (financial performance) was clearly higher, on average, in the 'Large and Medium-sized companies', with an average of 12,44% compared to 6,28% in the 'Small companies'.

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	LARGE COMPANIES			Average	SMALL COMPANIES			Average
RATIO PYRAMID (based on ending balances)	GLOBAL	2017	2016	2015	GLOBAL	2017	2016	2015
CONS	0,5327	0,5328	0,5363	0,5290	0,5835	0,5831	0,5868	0,5806
BES (% of S)	0,8386	0,8317	0,8246	0,8596	0,8832	0,8334	0,9044	0,9117
S-BES (% of S)	0,1614	0,1683	0,1754	0,1404	0,1168	0,1666	0,0956	0,0883
EBIT (% of S)	0,0790	0,0946	0,0822	0,0603	0,0553	0,0529	0,0584	0,0546
EBIAT/S	0,0662	0,0779	0,0643	0,0564	0,0430	0,0401	0,0461	0,0427
S/(FA+NCA)	2,0234	1,6074	1,5529	2,9099	1,2183	1,2165	1,2137	1,2247
ROA	0,0909	0,0878	0,0750	0,1098	0,0450	0,0461	0,0458	0,0430
Ix(1-tborne) (% of S)	0,0436	0,0427	0,0261	0,0621	0,0223	0,0193	0,0214	0,0261
i	0,1350	0,0696	0,2435	0,0919	0,0481	0,0432	0,0446	0,0564
SLTD/E	1,1404	0,6873	1,7143	1,0195	0,5391	0,4936	0,5206	0,6029
(ROA-i)xSLTD/E	-0,0052	0,0274	-0,0396	-0,0034	0,0019	0,0021	0,0040	-0,0004
ROE1	0,0857	0,1152	0,0354	0,1063	0,0469	0,0482	0,0498	0,0426
ROE2 (includes interest when SLTD=0)	0,0388	0,0255	0,0475	0,0432	0,0159	0,0147	0,0139	0,0191
-	-	-	-	-	-	-	-	-
ROE=ROE1+ROE2	0,1244	0,1408	0,0830	0,1496	0,0628	0,0629	0,0637	0,0617
NP/E	0,1244	0,1408	0,0830	0,1496	0,0628	0,0629	0,0637	0,0617
CHECK	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Figure 36

This difference is based on a higher operating yield (9,09% versus 4,50%) and a greater effect of non-recurring operations (which contributed 3,88% in the Large companies versus 1,59% in the Small ones). However, the effect of indebtedness has a different sign in the two groups: while in the 'Large companies' the spread between operating performance and the cost of borrowing is negative (the cost of debt in this group amounts to 13,50% after tax, on average) and is combined with a debt ratio SLTD/E=1,14, in 'Small companies' it is positive and close to zero (combining a significantly lower 'ROA' value -the 4,50% mentioned above- with a cost of debt of only 4,81% and a level of indebtedness that is also much lower, 0,54)[14]. In short, large companies have a much higher level of indebtedness than Small companies, which in turn have a much lower cost of debt, all of which, combined with a higher asset performance (but insufficient to make the sign of financial leverage positive), explains why the contribution of this element is negative in the first group and positive in the second.

---

[14] It should be remembered that the averages have been calculated in all cases on the basis of the values of each ratio in each of the sectors studied (and not on the basis of the average financial statements calculated from those of the aforementioned sectors). This explains some apparently strange behaviours: it may happen that on average ROA turns out to be lower than i, and that this is compatible with a positive average leverage effect (although this normally occurs in situations where the values of ROA and i are very similar).

With regard to 'short-term management', we see that the CONS (contribution margin ratio) is slightly higher in Small companies (0,58 vs. 0,53 for large companies); however, the difference in sales with respect to break-even is higher in large companies (16,14% of sales vs. 11,68% for Small companies); this results in a higher EBIAT/S margin ratio in large companies (6,62% versus 4,30% for Small companies) which, combined with a higher turnover (2,02 versus 1,22), explains the difference in 'ROA'.

- If we now turn our attention to the annual breakdown, we conclude that also in the performance studied through the UCD Ratio Pyramid the 'Large and Medium-sized companies' beat the 'Small companies' in most cases. Of the 12 particularly relevant measures, the former beat the latter in 9 of them in the years 2017 and 2015, as well as in the period as a whole; and in 8 of the measures in 2016 (see detail in Figure 37).

Codes:
M=Better; P=Worse
GLOBAL-2017-2016-2015

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RATIO PYRAMID (based on ending balances)	Ideal	BIG vs WHOLE	SMALLvsWHOLE	BIGvsSMALL
CONS	>	P P P P	M M M M	P P P P
BES (% of S)	<	M M M M	P P P P	M M M M
S-BES (% of S)	>	M M M M	P P P P	M M M M
EBIT (% of S)	>	M M M M	P P P P	M M M M
EBIAT/S	>	M M M M	P P P P	M M M M
S/(FA+NCA)	>	M M M M	P P P P	M M M M
ROA	>	M M M M	P P P P	M M M M
Ix(1-tborne) (% of S)	<	P P P P	M M M M	P P P P
i	<	P P P P	M M M M	P P P P
SLTD/E				
(ROA-i)xSLTD/E				
ROE1	>	M M P M	P P M P	M M P M
ROE2 (includes interest when SLTD=0)	>	M M M M	P P P P	M M M M
-	>	I I I I	I I I I	I I I I
ROE=ROE1+ROE2	>	M M M M	P P P P	M M M M
NP/E				
CHECK				

	BIG vs WHOLE	SMALLvsWHOLE	BIGvsSMALL
GLOBAL (M)	75%	25%	75%
2017 (M)	75%	25%	75%
2016 (M)	67%	33%	67%
2015 (M)	75%	25%	75%

Figure 37

ACCID RATIO BATTERY

The data referred to in the following comment can be seen in Figure 38.

- With regard to the liquidity ratios, the results point to a solid position in terms of the average of all the companies studied, with very high values (even too high, which is not advisable either, since from the point of view of profitability it would be better to maintain somewhat lower values) in the liquidity ratio (1,59; it is advisable for it to be above 1), acid test (with a value of 1,25) and cash ratio (0,60; 0,2-0,3 is usually the ideal value). In addition, working capital represents 24,78% of sales and 15,45% of total assets.

	WHOLE (All companies)				
ACCID RATIO BATTERY (on final balances)	**GLOBAL**	**2017**	**2016**	**2015**	**Ideal**
Liquidity					
Liquidity	1,5884	1,5863	1,6027	1,5763	1,00
(Current assets - Stocks) / Current liabilities	1,2547	1,2526	1,2638	1,2477	1,00
Cash and cash equivalents / Current liabilities	0,6003	0,5999	0,6049	0,5961	0,25
Working capital / Sales	0,2478	0,2672	0,2376	0,2387	0,00
Working capital / Total assets	0,1545	0,1577	0,1572	0,1485	0,00
Indebtedness					
Indebtedness	0,5519	0,5494	0,5490	0,5575	0,55
Quality of debt	0,6312	0,6451	0,6299	0,6187	<
Loan repayment capacity	3,8715	7,9754	2,6510	0,9522	>
Coverage of financial expenses	6,6375	6,7960	7,5698	5,5397	>
Cost of debt	0,3329	0,1782	0,4345	0,3871	<
Asset management					
Asset turnover	1,1933	0,9748	0,9555	1,6503	>
Turnover of non-current assets	3,6253	3,2654	2,7893	4,8228	>
Turnover of current assets	2,3340	1,9000	1,8994	3,2040	>
Inventory turnover	73,2882	13,3229	84,6133	122,0326	>
Deadlines					
Inventories	251,577	193,181	369,803	192,561	<
Collection	102,155	113,563	95,767	97,135	<
Payment	725,380	1629,987	222,733	318,756	>
Customer financing by suppliers	0,510	0,490	0,510	0,530	>
Profitability and self-financing					
Economic profitability (ROA)	0,0730	0,0682	0,0659	0,0849	>
Financial profitability (ROE)	0,1131	0,1264	0,0794	0,1335	>
Cash flow / Total assets	0,0890	0,0818	0,0798	0,1056	>
Cash flow / Sales	0,0894	0,1013	0,1035	0,0633	>
Operations					
Sales / Number of employees	410,272	368,091	446,477	416,295	>
Net income / Number of employees	31,228	4,437	55,149	34,115	>
Personnel expenses/ Number of employees	42,303	42,283	42,937	41,690	<

Figure 38

- With regard to debt ratios, the average values are not excessive (total debts represent 55% of total assets; values of between 0,4 and 0,6 are usually considered advisable) and there do not seem to be problems with the quality of the debt (with a weight of 63% of short-term liabilities over total liabilities). The debt repayment capacity and interest coverage ratios show high values (3,87 and 6,64, respectively), although the cost of debt seems exaggerated (33,29%; this may be related to methodological aspects regarding the definition of 'debt with explicit cost'; in the UCD Ratio Pyramid it can be seen that the weight of interest net of taxes on sales is somewhat higher than 4%, which does not seem excessive).

- The turnover ratios present reasonable values (although the one corresponding to Inventories, which is higher than the others, is noteworthy).

- With regard to the ratios related to lead times, the conclusions are as follows: on average, the companies have stock that would allow them to meet the activity of 251 days (more than eight months; which seems somewhat high[15]) and collections are deferred on average by 102 days; very high seems the payment term to creditors (which shows an average value of 725 days; which brings us back to the methodological aspects commented above, and which make us think that perhaps part of what we have considered as commercial debts are actually debt with explicit cost; the existence of strange values or 'outliers' could also be having an important influence). In any case, the ratio of customer financing by suppliers shows a reasonable value (close to 51%).

- As for the profitability ratios, we refer to the conclusions reached in the previous tool (UCD Ratio Pyramid), as they are somewhat repetitive.

With regard to the comparison of the values obtained in the two large groups of companies studied, we can say that there are statistically significant differences (for an error of 5%) in 14 of the 25 measures studied, which are mainly concentrated in the liquidity, debt and profitability sections. In general, 'Large and Medium-sized companies' show better values than 'Small companies' (which beat the former only in the debt quality ratio, the cost of debt, the inventory ratio, cash flow over sales and personnel expenses over number of employees; see Figure 39).

4.3. Comparative study of the performance of the group of companies in relation to those considered as 'Successful Companies'

As already indicated in the presentation of the original database from which this study was conducted, we have separately available the ratios and performance measures calculated with only the 25% of companies in each sector that presented a higher ROI in 2017. In other words, companies that present a higher return on investment (regardless of how they are financed) are considered 'successful', which means prioritizing operational management over financial management. We will now try to study whether it is possible to deduce from their Financial Statements what makes these companies different and allows them to have a higher performance than the rest of the firms in the same sector (if there is a recognizable pattern in the behaviour of specific ratios that allows us to anticipate that the company will have a higher performance than the rest).

[15] Again, it should be noted that, on occasions, the use of the average in the context of the ratios can give surprising results. This is the case of the 'Stock turnover' and 'Stock Term' ratios: the former is calculated by dividing the Cost of sales by the Stock balance; while the latter is obtained as the ratio between the Stock balance and the Cost of sales, multiplied by 365; although it is true that in a particular sector the relationship between the two is clear (the latter coincides with the inverse of the former multiplied by 365), the logic 'does not apply' in terms of averaging.

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	LARGE COMPANIES			Average	SMALL COMPANIES			Average
ACCID RATIO BATTERY (on final balances)	**GLOBAL**	**2017**	**2016**	**2015**	**GLOBAL**	**2017**	**2016**	**2015**
Liquidity								
Liquidity	1,5634	1,5538	1,5783	1,5580	1,6991	1,7294	1,7103	1,6576
(Current assets - Stocks) / Current liabilities	1,2382	1,2289	1,2493	1,2364	1,3277	1,3568	1,3282	1,2980
Cash and cash equivalents / Current liabilities	0,5745	0,5698	0,5783	0,5755	0,7142	0,7325	0,7223	0,6880
Working capital / Sales	0,2199	0,2321	0,2107	0,2170	0,3712	0,4216	0,3567	0,3352
Working capital / Total assets	0,1443	0,1465	0,1474	0,1389	0,1997	0,2072	0,2004	0,1914
Indebtedness								
Indebtedness	0,5634	0,5628	0,5603	0,5670	0,5014	0,4906	0,4987	0,5151
Quality of debt	0,6346	0,6492	0,6336	0,6210	0,6164	0,6269	0,6138	0,6084
Loan repayment capacity	4,6499	9,6846	3,1533	1,0753	0,4259	0,4452	0,4281	0,4044
Coverage of financial expenses	7,2048	7,2611	8,3367	6,0081	4,1259	4,7472	4,1757	3,4548
Cost of debt	0,3864	0,1985	0,5110	0,4512	0,0958	0,0891	0,0960	0,1022
Asset management								
Asset turnover	1,2757	1,0068	0,9848	1,8354	0,8288	0,8339	0,8259	0,8265
Turnover of non-current assets	3,9885	3,5425	2,9667	5,4564	2,0171	2,0444	2,0041	2,0028
Turnover of current assets	2,4972	1,9665	1,9658	3,5593	1,6117	1,6068	1,6059	1,6224
Inventory turnover	88,4503	14,9078	102,3749	148,0680	6,1690	6,3400	6,0081	6,1588
Deadlines								
Inventories	272,947	202,523	416,796	200,535	156,975	152,026	161,828	157,073
Collection	101,572	112,607	95,608	96,501	104,733	117,773	96,471	99,955
Payment	863,022	1972,666	246,138	365,918	116,068	120,197	119,152	108,856
Customer financing by suppliers	0,511	0,488	0,511	0,532	0,507	0,498	0,507	0,517
Profitability and self-financing								
Economic profitability (ROA)	0,0802	0,0740	0,0712	0,0953	0,0412	0,0423	0,0426	0,0387
Financial profitability (ROE)	0,1244	0,1408	0,0830	0,1496	0,0628	0,0629	0,0637	0,0617
Cash flow / Total assets	0,0962	0,0871	0,0847	0,1169	0,0572	0,0583	0,0578	0,0556
Cash flow / Sales	0,0892	0,1034	0,1062	0,0580	0,0902	0,0921	0,0913	0,0872
Operations								
Sales / Number of employees	470,039	419,631	515,129	475,358	145,696	141,013	142,649	153,426
Net income / Number of employees	35,381	3,230	65,096	37,817	12,841	9,755	11,130	17,639
Personnel expenses/ Number of employees	44,778	44,695	45,554	44,086	31,347	31,658	31,356	31,028

Figure 39

The comments below correspond to the calculation of averages between ‘Large and Medium-sized companies’ and ‘Small companies’ with weights obtained from total assets.

UCD CASH FLOW STATEMENT

- As will be recalled from the previous point, the FCFF in the set of companies studied averaged 2,92% of total assets over the entire period studied, which allowed for outflows to lenders (0,62%) and to shareholders (2,30%; always over total assets; see Figure 32). These figures improve significantly in ‘successful’ companies, where FCFF reaches a positive value of 11,68%, which allows for outflows to lenders (FCFSLTD=1,84%) and to shareholders (FCFE=9,84%). You can see all this in Figure 40.

  The fundamental reason for this improvement is a significantly higher FFO value: from 8,14% (as a percentage of total assets), in the successful companies it is 18,1% (the differences are small in FFNR and CFI; although part of the increase in the capacity to generate funds from recurring operations is required by investment in net current assets (which in the group as a whole is 1,85% and in the successful companies amounts to 4,3%).

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CASH FLOW STATEMENT (% of Total assets)	WHOLE (top 25 of each sector) GLOBAL	2017	2016	2015	Ideal
EBIT (% of TA)	0,1869	0,2062	0,1674	-	>
FFO (% of TA)	**0,1809**	**0,1989**	**0,1629**	**-**	>
NRE (% of TA)	0,0224	0,0286	0,0160	-	>
FFNR (% of TA)	**0,0188**	**0,0245**	**0,0132**	**-**	>
closing NCA (% of TA)	0,3170	0,3307	0,3033	-	
opening NCA (% of TA)	0,2738	0,2832	0,2644	-	
ΔNCA (% of TA)	**0,0432**	**0,0475**	**0,0389**	**-**	<
CFI (% of TA)	**0,0397**	**0,0328**	**0,0465**	**-**	<
FCFF (% of TA)	**0,1168**	**0,1430**	**0,0905**	**-**	>
SLTDI-SLTDR (% of TA)	**-0,0097**	**-0,0149**	**-0,0045**	**-**	
Ix(1-tborne) (% of TA)	**0,0087**	**0,0086**	**0,0089**	**-**	
FCFSLTD (% of TA)	**-0,0184**	**-0,0235**	**-0,0133**	**-**	
FCFE (% of TA)	**-0,0984**	**-0,1195**	**-0,0772**	**-**	
FCFF+FCFSLTD+FCFE=0 (% of TA)	**0,0000**	**0,0000**	**0,0000**	**-**	

Figure 40

In terms of historical performance, a similar pattern can be seen in both groups: 2017 performed better than 2016.

In summary, companies with higher ROI values in 2017 are also those that generate more money above their needs in terms of asset operations (regardless of how they are financed).

UCD RATIO PYRAMID

- Starting again with the general, there is a spectacular increase in the financial return 'ROE' (see Figure 41 compared to Figure 35 presented above): from the 11,31% annual average obtained in the whole period by all companies, the successful ones present a performance that multiplies by more than 3 times the previous figure (35,04%).

  It is not non-recurring operations that are responsible for the change: ROE2, which reflects the effect of what are considered extraordinary results on shareholder profitability, increased slightly, contributing 5,13% to total profitability in successful companies (compared to 3,45% for the group as a whole). The fundamental leap occurs in ROE1, which goes from 7,85% to 29,91%; and this is supported by two elements: a significant increase in ROA, from 8,24% to 22,72%, which is leveraged by a slightly more advantageous cost of debt (10,77% per year net of taxes compared to 11,90% for the group as a whole), although the use of this source of profitability is lower, as the successful companies have a significantly lower debt ratio than the group as a whole (0,68 compared to 1,03). In short, although the effect of 'financial leverage' is positive in successful companies, these companies have less debt and therefore take less advantage of this effect (although it should be noted that the cost of debt could also be related to the aforementioned level of indebtedness).

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RATIO PYRAMID (based on ending balances)	WHOLE (top 25 of each sector) GLOBAL	2017	2016	2015	Ideal
CONS	**0,5737**	**0,5791**	**0,5745**	**0,5675**	>
BES (% of S)	0,7174	0,6732	0,7191	0,7602	<
S-BES (% of S)	0,2826	0,3268	0,2809	0,2398	>
EBIT (% of S)	0,1636	0,1943	0,1586	0,1377	>
EBIAT/S	**0,1332**	**0,1603**	**0,1266**	**0,1127**	>
S/(FA+NCA)	**2,4640**	**2,1075**	**2,0081**	**3,2834**	>
ROA	**0,2272**	**0,2442**	**0,1886**	**0,2492**	>
Ix(1-tborne) (% of S)	0,0167	0,0203	0,0110	0,0186	<
i	**0,1077**	**0,0904**	**0,0927**	**0,1401**	<
SLTD/E	**0,6817**	**0,3530**	**1,2659**	**0,4239**	
(ROA-i)xSLTD/E	**0,0725**	**0,0474**	**0,1326**	**0,0371**	
ROE1	**0,2991**	**0,2909**	**0,3204**	**0,2861**	>
ROE2 (includes interest when SLTD=0)	**0,0513**	**0,0482**	**0,0332**	**0,0727**	>
-	-	-	-	-	>
ROE=ROE1+ROE2	**0,3504**	**0,3391**	**0,3536**	**0,3588**	>
NP/E	**0,3504**	**0,3391**	**0,3536**	**0,3588**	
CHECK	**0,0000**	**0,0000**	**0,0000**	**0,0000**	

Figure 41

With regard to the explanation for the increase in ROA, successful companies have a better margin per euro sold ratio (EBIAT/S=13,32% compared to 6,19% for the group as a whole), which is combined with a better turnover ratio (2,46 compared to 1,88 for the group as a whole). The improvement in 'ROA' seems to have little to do with short-term elements (the advantage in the CONS ratio is small, from 54,21% to 57,37% in the successful companies) and more to do with the management of fixed costs and sales (break-even sales account for 71,74% of total sales in the successful companies, compared to 84,68% for the group as a whole).

- With regard to the time evolution of the 'ROE' ratio, greater stability is observed in the successful companies than in the group as a whole: the minimum value presented by this measure in the former is 33,91% (year 2017) and the maximum is 35,88% in 2015; in other words, shows a minimal downward trend, practically negligible. However, in the set the oscillations are greater: 13,35% in 2015; 7,94% in 2016; and 12,64% in 2017.

The prominence of non-recurring operations is small in the overall period considered in both groups (although it is true that in successful companies it reaches a value of 7,27% in 2015, which then drops and always remains below 5%).

There is a similar pattern in the evolution of the 'ROA' ratio, which presents its maximum value in 2015, decreases in 2016 and rebounds in 2017 (figures vary between 6,96% and 9,75% in the aggregate; and between 18,86% and 24,92% in the successful ones).

Regarding the cost of debt, the patterns are clearly different: in the aggregate, there is a significant increase in 2016 (with a value of 20,68% compared to 8,54% in the previous year) and a very significant decrease in 2017 (showing a value of 6,47%); this evolution is consistent with a significant increase in indebtedness in the year indicated (2016). In the successful companies, the variations are smaller and show a clearly decreasing trend (from 14,01% in 2015 to 9,04% in 2017), which is not consistent with the evolution of the level of indebtedness (which responds, this one, to a pattern similar to that of the whole, with a clear upturn in 2016).

The evolution of the margin per euro sold ratio responds to a similar pattern in both groups (with slight growth in general throughout the period considered); and the pattern is also similar in the evolution of the turnover ratio, which decreases in 2016 and rises slightly in 2017.

ACCID RATIO BATTERY

Data relating to the following commentary can be seen in Figures 42 (successful companies) and 38 (aggregate).

- In terms of liquidity ratios, successful companies show higher values than the group as a whole (both for the entire period and for each year considered).

- With regard to the evaluation of indebtedness, successful companies always have a lower level of indebtedness, although their debt quality is lower. The ability to meet the obligations incurred is clearly higher in successful companies (loan repayment capacity and financial expense coverage ratios), although the cost of debt (calculated using ACCID logic) is also higher; this clearly constitutes a difference in methodological aspects applied in the two tools, UCD Ratio Pyramid and ACCID Ratio Battery, which lead to clearly different conclusions.

- Turnovers are higher in successful companies in all cases except for the stock in some specific years.

- With regard to terms, they are better in successful companies in relation to customers, and worse in relation to suppliers. There are no significant differences when it comes to customer-supplier financing.

- As noted, both the returns and the ratios for evaluating the ability to generate funds are clearly better in successful companies than in the aggregate.

- Finally, it should be noted that, although the ratio of personnel expenses per employee is similar in the two large groups, the net profit generated per employee is much higher in the successful companies, which could be an indicator of greater efficiency (better results obtained with similar resources).

© *Javier Santibáñez Grúber*	WHOLE (top 25 of each sector)				
ACCID RATIO BATTERY (on final balances)	**GLOBAL**	**2017**	**2016**	**2015**	**Ideal**
Liquidity					
Liquidity	2,0446	2,2050	2,0518	1,8762	1,00
(Current assets - Stocks) / Current liabilities	1,7527	1,8946	1,7478	1,6151	1,00
Cash and cash equivalents / Current liabilities	0,9312	1,0232	0,9115	0,8587	0,25
Working capital / Sales	0,2690	0,3082	0,2566	0,2420	0,00
Working capital / Total assets	0,2658	0,2930	0,2615	0,2426	0,00
Indebtedness					
Indebtedness	0,4708	0,4397	0,4741	0,4987	0,55
Quality of debt	0,7246	0,7396	0,7249	0,7091	<
Loan repayment capacity	47,5189	46,7297	44,0394	51,8645	>
Coverage of financial expenses	49,8889	55,4806	56,0026	38,0113	>
Cost of debt	1,3269	0,9442	2,0868	0,9436	<
Asset management					
Asset turnover	1,5150	1,3707	1,2908	1,8868	>
Turnover of non-current assets	6,9822	7,0651	6,3640	7,5228	>
Turnover of current assets	2,7462	2,3134	2,2298	3,7037	>
Inventory turnover	39,1196	39,5167	38,4665	39,3922	>
Deadlines					
Inventories	79,667	76,879	82,093	80,027	<
Collection	81,303	89,007	77,250	77,609	<
Payment	616,818	1502,953	89,931	250,035	>
Customer financing by suppliers	0,497	0,464	0,504	0,523	>
Profitability and self-financing					
Economic profitability (ROA)	0,1897	0,2070	0,1671	0,1951	>
Financial profitability (ROE)	0,3504	0,3391	0,3536	0,3588	>
Cash flow / Total assets	0,1993	0,2148	0,1667	0,2166	>
Cash flow / Sales	0,1763	0,2082	0,1687	0,1518	>
Operations					
Sales / Number of employees	473,386	447,516	505,468	467,181	>
Net income / Number of employees	78,892	69,950	99,012	67,661	>
Personnel expenses/ Number of employees	42,647	42,843	42,583	42,517	<

Figure 42

4.4. Comparative analysis between 'Large and Medium-sized companies' in relation to 'Small companies' within the group of companies considered as 'Successful companies'

It may also be of interest to analyse the data obtained in the group of successful companies, focusing on the differences between 'Large and Medium-sized companies' and 'Small companies'. In short, it would be a matter of studying whether the differences observed between the two large groups also hold when we look only at those that can be considered successful.

Before we begin, we should point out that for this comparison it was decided to eliminate three sectors in the calculations of the different measures relating to the ‘Small companies’ group (specifically, the sectors eliminated were 65 -Real estate development-, 79 -Retail sale of information and communications technology equipment in specialized stores; cultural and recreational goods and other articles in specialized stores-; and 124 -Travel agency, tour operator, reservation service and related activities-). The reason is that the debt ratio referred to this group of companies was negative for the period as a whole, which was certainly surprising. In view of the original data, it can be seen that, in terms of average and always referring to Small Companies, these sectors went through difficulties in 2015 and 2016 (becoming technically bankrupt), but were able to recover in 2017.

It is always complicated to decide on the elimination of outliers, insofar as a bias is certainly introduced in the analysis; in fact, tests related to the whole process were made by eliminating a significant number of sectors that showed strange behaviours in some of the measures considered, with the intention of seeing to what extent the overall conclusions could be affected. However, in this context it seemed advisable to eliminate these sectors, insofar as the interpretation of a negative value is meaningless. Thus, the comments that follow refer to the original group, with the three sectors cited in the ‘Successful Small Businesses’ calculations removed.

UCD CASH FLOW STATEMENT

- As regards large cash flows (FCFF, FCFSLTD and FCFE), and as can be seen in Figure 43, the differences between the two groups compared are relatively small (remember that the successful companies had a clearly better performance in terms of free cash flows). Thus, both Large and Small companies generated cash in excess of their needs over the period as a whole, with FCFF (as a % of assets) of 11,95% in the former and 9,95% in the latter, which allowed both groups to incur net outflows of funds with lenders (1,68% in the former and 1,74% in the latter) and with shareholders (who received funds equivalent to 10,27% of assets in the former and 8,21% in the latter).

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	LARGE COMPANIES top25			Average	SMALL COMPANIES top 25			Average
CASH FLOW STATEMENT (% of Total assets)	**GLOBAL**	**2017**	**2016**	**2015**	**GLOBAL**	**2017**	**2016**	**2015**
EBIT (% of TA)	0,1901	0,2077	0,1724	-	0,1719	0,1987	0,1451	-
FFO (% of TA)	**0,1830**	**0,1992**	**0,1666**	-	**0,1705**	**0,1964**	**0,1446**	-
NRE (% of TA)	0,0215	0,0267	0,0162	-	0,0223	0,0297	0,0149	-
FFNR (% of TA)	**0,0179**	**0,0226**	**0,0132**	-	**0,0191**	**0,0257**	**0,0126**	-
closing NCA (% of TA)	0,3072	0,3184	0,2959	-	0,3653	0,3866	0,3441	-
opening NCA (% of TA)	0,2667	0,2739	0,2594	-	0,3109	0,3311	0,2908	-
ΔNCA (% of TA)	**0,0406**	**0,0445**	**0,0366**	-	**0,0544**	**0,0555**	**0,0533**	-
CFI (% of TA)	**0,0408**	**0,0371**	**0,0446**	-	**0,0357**	**0,0176**	**0,0538**	-
FCFF (% of TA)	**0,1195**	**0,1402**	**0,0987**	-	**0,0995**	**0,1490**	**0,0500**	-
SLTDI-SLTDR (% of TA)	**-0,0081**	**-0,0116**	**-0,0046**	-	**-0,0109**	**-0,0226**	**0,0008**	-
Ix(1-tborne) (% of TA)	**0,0086**	**0,0089**	**0,0084**	-	**0,0065**	**0,0058**	**0,0072**	-
FCFSLTD (% of TA)	**-0,0168**	**-0,0205**	**-0,0131**	-	**-0,0174**	**-0,0284**	**-0,0064**	-
FCFE (% of TA)	**-0,1027**	**-0,1197**	**-0,0857**	-	**-0,0821**	**-0,1206**	**-0,0436**	-
FCFF+FCFSLTD+FCFE=0 (% of TA)	**0,0000**	**0,0000**	**0,0000**	-	**0,0000**	**0,0000**	**0,0000**	-

Figure 43

- In both cases, the FCFF figures are based on a significant capacity to generate funds from recurring operations, even after meeting working capital requirements (the large companies have an average FFO of 18,30% and an NCA investment of 4,06% over the entire period; in the case of the Small companies, the figures are slightly worse in both cases -17,05% and 5,44%, respectively-). In both cases there is a modest contribution of non-recurring operations (equivalent to 1,79% in the large ones and 1,91% in the small ones; always as a percentage of total assets) and non-current assets show positive investments (4,08% in the large ones and 3,57% in the small ones).

- In conclusion, therefore, we can say that the two major groups, Large and Small, have a solid cash position, and that the differences in this case between the two are not very important, with a slight advantage for the former.

UCD RATIO PYRAMID

- With regard to the main ratios studied in the UCD Ratio Pyramid, the differences between large and small successful companies are somewhat greater, both in terms of the financial profitability contributed by recurring and non-recurring operations (see Figure 44). Thus, the average total financial return over the entire period amounts to 38,42% for large companies compared to 23,79% for small ones; if we focus on recurring activities, the values are 31,98% and 21,05%, respectively, while for non-recurring operations the differences are also high (6,44% compared to 2,74%).

- The advantage in financial return on recurring operations is based, on the one hand, on a higher operating return (24,07% in the Large companies compared to 17,78% in the Small companies), accompanied by a significantly higher debt ratio (0,87 in the Large companies compared to 0,28 in the Small companies), which makes it possible to take greater advantage of the financial leverage effect (which contributes 7,98% of shareholder return in the Large companies compared to only 3,26% in the Small companies); it should also be noted that the cost of debt is significantly lower in Small companies (5,46% compared to 11,78% in large companies). However, it does not seem that large companies have 'abused' this leverage effect, since their debt ratio does not seem to be exaggerated.

- With regard to the basis on which the advantage in 'ROA' for large companies is based, it should be noted that Small companies appear to be more efficient in sales management in relation to variable costs (with a CONS of 0,61 compared to 0,57 for large companies), but lose in relative terms when considering fixed costs (Small companies need 77,36% of their sales to cover these fixed costs, while large companies only need 70,52% of their revenues). As a result, Large companies have an advantage in the EBIAT/S margin ratio (13,83% vs. 11,03%) and also in the S/(FA+NCA) turnover ratio (2,61 for Large companies vs. 1,89 for Small companies).

- In conclusion, we can say that the shareholders of large companies obtained a higher return than those of Small companies, although they also assumed a higher risk.

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RATIO PYRAMID (based on ending balances)	LARGE COMPANIES top25 GLOBAL	2017	2016	2015 (Average)	SMALL COMPANIES top 25 GLOBAL	2017	2016	2015 (Average)
CONS	0,5667	0,5716	0,5682	0,5604	0,6088	0,6161	0,6061	0,6042
BES (% of S)	0,7052	0,6614	0,7056	0,7488	0,7736	0,7298	0,7823	0,8086
S-BES (% of S)	0,2948	0,3386	0,2944	0,2512	0,2264	0,2702	0,2177	0,1914
EBIT (% of S)	0,1693	0,2004	0,1644	0,1429	0,1381	0,1664	0,1317	0,1162
EBIAT/S	0,1383	0,1657	0,1311	0,1179	0,1103	0,1354	0,1049	0,0907
S/(FA+NCA)	2,6072	2,1433	2,0854	3,6000	1,8919	1,9526	1,8481	1,8748
ROA	0,2407	0,2490	0,2009	0,2725	0,1778	0,2208	0,1657	0,1470
Ix(1-tborne) (% of S)	0,0185	0,0236	0,0113	0,0206	0,0069	0,0051	0,0073	0,0085
i	0,1178	0,0971	0,0964	0,1599	0,0546	0,0523	0,0592	0,0523
SLTD/E	0,8682	0,3834	1,7438	0,4747	0,2845	0,2148	0,2928	0,3459
(ROA-i)xSLTD/E	0,0798	0,0502	0,1515	0,0371	0,0326	0,0356	0,0320	0,0304
ROE1	0,3198	0,2985	0,3513	0,3094	0,2105	0,2564	0,1977	0,1773
ROE2 (includes interest when SLTD=0)	0,0644	0,0468	0,0609	0,0856	0,0274	0,0389	0,0211	0,0222
-	-	-	-	-	-	-	-	-
ROE=ROE1+ROE2 (% of S)	0,3842	0,3453	0,4123	0,3950	0,2379	0,2953	0,2188	0,1995
NP/E	0,3842	0,3453	0,4123	0,3950	0,2379	0,2953	0,2188	0,1995
CHECK	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Figure 44

ACCID RATIO BATTERY

The data discussed below can be seen in Figure 45.

- With regard to liquidity ratios, there are differences between the two large groups in favour of the smaller ones, which have higher values in all the ratios considered (which could partly justify the worse performance in terms of profitability). In all cases, the values are very high (probably too high). In summary, successful companies have a very strong liquidity or solvency position in the short term.

- If we focus on the debt ratios, it must be said that neither of the two groups has an exaggerated level of leverage (0,48 in the large companies and 0,42 in the small ones, which can be understood as reasonably prudent). The quality of debt is similar in both, with short-term financing playing an important role. In terms of the ability to service debt, the position of the large companies is clearly better; however, the cost of debt is much lower in the small group.

- In all cases, the turnover ratios studied show higher values in large companies.

- As regards to the analysis of deadlines, the differences are not significant in inventories and customer collections (with a slight advantage for Small companies), nor in the proportion of customers financed with suppliers, but they soar in terms of payment terms to creditors, with a clear advantage for large companies.

- The profitability and liquidity generation ratios have been discussed above, and the results obtained here are consistent with those mentioned above.

- Finally, it should also be noted that Large companies 'pay better' to their employees, which is compatible with (translates into?) significantly higher NP per employee and Sales per employee ratios.

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ACCID RATIO BATTERY (on final balances)	LARGE COMPANIES top25 GLOBAL	Average 2017	2016	2015	SMALL COMPANIES top 25 GLOBAL	Average 2017	2016	2015
Liquidity								
Liquidity	2,0171	2,1543	2,0411	1,8548	2,1833	2,4408	2,1202	1,9887
(Current assets - Stocks) / Current liabilities	1,7196	1,8347	1,7290	1,5943	1,9178	2,1750	1,8526	1,7259
Cash and cash equivalents / Current liabilities	0,8862	0,9551	0,8715	0,8315	1,1387	1,3298	1,0987	0,9875
Working capital / Sales	0,2610	0,2997	0,2475	0,2357	0,3101	0,3470	0,3033	0,2798
Working capital / Total assets	0,2547	0,2786	0,2517	0,2338	0,3200	0,3583	0,3137	0,2880
Indebtedness								
Indebtedness	0,4788	0,4523	0,4809	0,5032	0,4237	0,3813	0,4311	0,4587
Quality of debt	0,7269	0,7414	0,7281	0,7112	0,7174	0,7337	0,7138	0,7047
Loan repayment capacity	57,5456	56,1980	53,4257	63,0992	3,0705	4,8658	2,4436	1,8807
Coverage of financial expenses	55,5519	60,2596	63,5938	42,5802	25,2322	35,0348	22,7243	17,9897
Cost of debt	1,5949	1,1242	2,5239	1,1293	0,1179	0,1224	0,1181	0,1131
Asset management								
Asset turnover	1,5719	1,3741	1,3063	2,0385	1,2661	1,3580	1,2259	1,2144
Turnover of non-current assets	7,6064	7,6363	6,8641	8,3237	4,2448	4,5682	4,1742	3,9920
Turnover of current assets	2,9003	2,3444	2,2819	4,0829	2,0573	2,1740	1,9876	2,0104
Inventory turnover	43,8714	43,4900	43,5733	44,5636	17,9525	21,9401	15,7142	16,2033
Deadlines								
Inventories	82,368	80,823	85,097	81,196	62,721	56,978	62,934	68,252
Collection	82,720	92,533	77,916	77,676	75,648	74,278	74,854	77,812
Payment	738,582	1828,120	92,733	286,997	78,422	70,949	78,092	86,225
Customer financing by suppliers	0,507	0,476	0,513	0,533	0,447	0,408	0,459	0,473
Profitability and self-financing								
Economic profitability (ROA)	0,1971	0,2087	0,1721	0,2107	0,1568	0,1987	0,1451	0,1265
Financial profitability (ROE)	0,3842	0,3453	0,4123	0,3950	0,2379	0,2953	0,2188	0,1995
Cash flow / Total assets	0,2063	0,2129	0,1709	0,2353	0,1672	0,2163	0,1500	0,1354
Cash flow / Sales	0,1791	0,2062	0,1737	0,1571	0,1628	0,2105	0,1470	0,1309
Operations								
Sales / Number of employees	545,263	512,167	585,064	538,512	151,573	157,829	149,687	147,203
Net income / Number of employees	91,555	78,151	116,986	79,443	21,375	29,589	18,811	15,724
Personnel expenses/ Number of employees	45,155	45,305	45,068	45,092	31,541	31,963	31,591	31,069

Figure 45

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FINANCIAL PERFORMANCE MEASURES

Javier Santibáñez Grúber *

1. INTRODUCTION

The purpose of this reading is to provide a sort of 'dictionary' or 'compendium' of the ***main performance measures commonly used in the financial environment***. In a way, what we intend here is to offer something similar to a vademecum[16] related to the aforementioned performance measures, ***aimed mainly at people who have a limited knowledge of Finance*** and that may constitute a tool for consultation and/or study and deepening of such knowledge. The difference with the aforementioned vade-mecum is that ***we do not intend to make an exhaustive list of*** all the possible measures, although we do intend to include the most important ones, ***those that are most widely used***.

The intention is to present a summary of the main measures commonly used, showing their definition, the objective pursued and, where appropriate, the criterion for action with each one of them, as well as the advantages and disadvantages that some of them present compared to others. After a short introduction, in which we will make a brief 'state of the art' in the financial field (distinguishing between the 'obsessions' of Accounting and those corresponding to Finance itself, and referring to what some have called the 'paradigm of the 70's'), we will develop our reflection in three different sections:

- ***Accounting performance measures***. We will include here different existing margin concepts, as well as some measures (mainly ratios) that allow us to study the quality of a company's financial equilibrium in a given year.
- ***Performance measures used in the context of 'Corporate Finance'***. We will refer here mainly to measures that allow us to study the interest of the main business decisions in this area, investment and financing decisions.
- ***Measures*** commonly used in the context of ***performance evaluation in fund and portfolio management***, which normally focus on the 'return-risk' binomial.

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[16] According to Wikipedia, 'A vademecum (from Latin vade, 'go', 'come', and mecum, 'with me') is a reference work containing the fundamental notions or information on a subject, whether scientific or artistic. Particularly noteworthy are those used by health professionals to consult on presentations, compositions and the main indications of medicines.'

We do not intend to make a dictionary in the usual way: the order in which the different measures will appear is not alphabetical, but logical. It is more similar to some philosophical dictionaries, in which different concepts are presented and their relationships with others are discussed. Nevertheless, so that the user can easily find the measure sought, we offer at the end an alphabetically ordered glossary of all the measures presented throughout the work, with an indication of the page on which they are defined.

2. KEYS TO MODERN FINANCIAL REASONING

As indicated above, we will present in this section a brief reflection on what we could understand as the 'state of the art' in Financial theory. It is a relatively young discipline (its birth is usually considered as something separate from the rest of Economics at the end of the 19th century) and it has always tried to respond to the problems posed by reality. After an initial period characterized by a marked 'descriptive and institutional' approach, very focused on the company's liabilities and with a strong accounting and legal component (a period that covers approximately the first half of the 20th century and is known as the 'traditional approach'), what is known as the '***modern approach to Finance***' appears, characterized by the obsession to provide tools that allow optimal investment and financing decisions to be made, with the focus on the former (asset management).

Today, and using a rather common terminology (not only in the field of the 'Philosophy of science', but even in our daily life), we find ourselves in what Fernando Gómez-Bezares has called '***the paradigm of the 70's***' (because the main scientific contributions are produced in the environment of the 60's and 70's of the last century). In a very summarized way, we could identify the 'disciplinary matrix' corresponding to the aforementioned paradigm with the following elements: in their financial decisions***, individuals behave rationally***, prefer present consumption to future consumption (which gives rise to the existence of the '***time value of money***', understood here as a reward for renouncing present consumption in order to obtain greater future consumption) and are ***risk-averse*** (understood in the sense of 'variability', which means that they will only take risks if they expect to be rewarded for doing so); and *fundamental importance* is given to the concept of '***market efficiency***' (we say that a market is efficient when the prices of what is traded in it respond quickly and adequately to the new information that comes into it) and to ***valuation models*** (with a fundamental role for the '***discounted cash flow***' method), some of which are developed from ***Markowitz's*** ideas (such as the Capital Asset Pricing Model, CAPM, or the so-called multi-factor models, among which we could include the Arbitrage Pricing Theory, APT); others seek alternative ways of valuing assets, such as the Option Pricing Model, OPM.

Going a little deeper into the ideas presented, we could identify some ***important keys to reasoning*** that we need to know in order to better understand the performance measures developed in this area:

- As indicated above, the ultimate objective pursued by Financial theory is to ***provide tools for making appropriate*** ('optimal') investment and financing ***decisions***.

- Logically, a decision is 'good' if it contributes adequately to what we consider to be our Financial Objective: in this sense, and although with many relevant nuances related to 'Corporate Social Responsibility' (CSR), it is generally accepted that the ***Financial goal of the firm is value creation*** (for the shareholder, but also for society as a whole, respecting the legitimate interests of the other social stakeholders and, in particular, the rights of future generations).

- In the pursuit of the stated objective (value creation) in Finance it is essential to consider the concept of 'time value of money' (which forces us to always define our calculations according to ***cash flow***, and not profit) and reasoning in terms of '***opportunity cost***' (there will only be value creation when we 'beat' the best market alternative).

- Related to the above, if '***risk-averse***' individuals meet and interact in the markets, there will be an agreement to reward those who assume the mentioned risks; thus, the 'opportunity cost' will be different for the different decisions, i.e., the profitability of the best lost alternative to which we referred must be 'of similar risk' (the more risk, the more 'expected' profitability).

- When we try to detect opportunities to create value, we cannot ignore the context, which is fundamentally represented by the aforementioned 'opportunity cost', but which also requires us to always reason in '***incremental terms***': to choose the best among several possible alternatives, we must analyse all of them in terms of what each one contributes to our starting position (i.e. we must be aware that the same project may be more interesting for one organization than for another, depending on their respective starting situations). We can summarize this radically important key in the following terms: to study a decision, we must look 'only' at what changes with it, but 'at everything' that changes (which sometimes requires a significant effort of creativity).

- Finally, a well-established idea in modern Finance is that, in the pursuit of the company's financial objective, '***assets are more important than liabilities***'. This should not be understood to mean that 'financing is not important' (it would be absurd, there is no investment without financing and vice versa): what we want to point out is that ***it is more difficult***, in competitive markets that work properly, to ***contribute to the financial objective through the financing decision*** (fundamentally that relating to the financial structure, understood as the proportions of borrowed and own funds with which to finance a given asset), so that efforts should be concentrated mainly on asset management (investment decision).

It is true that in recent years the paradigm described above has been tirelessly subjected to a multitude of ***attempts at 'falsification' or 'refutation'***, in Popperian language, and there have been advances and attempts to tackle things from different perspectives: thus, the so-called '***Behavioural Finance***' questions the hypothesis of rationality of economic agents; there is also a long-standing concern for the ***objectives of social stakeholders*** (other than shareholders), which has given rise to rivers of ink on how to include ***ESG (Environmental, Social and Governance)*** or ***SRI (Socially Responsible Investment) criteria*** in business decisions and how to reconcile them with the financial objective; another interesting line of research, related to some of the above elements (specifically, with financial governance) is that which has to do with '***Agency Theory***' (which studies the problems that can arise when the management of the company is carried out by technocrats, agents on behalf of the owner); finally, we could also refer to the attempts to view all financial decisions from the perspective of the Theory of Options. But it must be said that, fundamentally, ***the paradigm described above is still valid***, although it has logically been enriched by the various approaches mentioned above.

The keys indicated so far are present in one way or another in the performance measures related to Corporate finance and to the evaluation of fund and portfolio management. However, the measures used in Accountings have some particularities that should be explained.

First of all, let us recall the ***objective of accounting***, which is none other than that the financial statements prepared on the basis of the applicable regulations provide a ***true and fair view*** of the company's assets, financial position and results; and this true and fair view is the consequence of the application of accounting principles, among which it is particularly important to highlight two: the accrual principle and the principle of prudence.

- The ***accrual principle*** makes it necessary, in determining the profit for an accounting period, to compare revenues and expenses (which do not necessarily coincide with collections and payments). In other words, revenues and expenses are recognized when obligations and rights 'accrue' to the parties, and not necessarily when the corresponding transactions are settled. The application of this principle automatically distances the concept of 'profit' from the more financial 'cash flow': the same profit is compatible with very different situations in terms of cash generated.

  To the above is added another concept related to '***fairness***' in the temporal allocation of the results obtained, which we can identify as the necessary '***correlation of income and expenses***' that must preside over the preparation of the profit: to estimate it, income must be compared with the expenses 'necessary' to obtain them (this concept is the one that requires distinguishing between expenditure and investment); which obliges, among other things, to recognize what are known as non-cash costs (such as the depreciation of fixed assets), which is a further departure from the cash concept.

- The ***principle of prudence*** requires that expected events with a negative impact on the company's assets be recognized as soon as they become known (reasonably expected), while events with a positive impact can only be reflected when they occur. This principle, which aims to ***limit subjectivity as far as possible***, assumes that accounting is more a history of what has happened than an account of what is about to happen, as opposed to finance, which focuses mainly on the future.

As can be seen, the application of the two aforementioned principles distances the accounting logic from the financial one: if the aim of Finance is to provide tools to decide (which ultimately means providing instruments to 'value' the alternatives at stake), what is relevant for them is the future (which we normally find to a very small extent in Accounting) and must focus on ***cash impacts*** (and not on ***fairness*** in terms of the temporal allocation of income and expenses, which guides Accounting).

With this background, we are now ready to ***analyse and present the main performance measures in the three areas mentioned above***. But before doing so, we will refer to some ***general concepts***.

3. GENERAL CONCEPTS AND BASIC NOMENCLATURE

With regard to the accounting information that we will use at different points in the process, we will summarize an important part of the annual accounts of any company in the following terms.

Balance sheet (stock variables, measured 'at a point in time' -usually at the end of the year, at the end of the 'accounting period'-):

- ***Non-current assets*** **(*FA*)**. It includes all those items that are converted into cash indirectly, through the performance of the operations that constitute the corporate purpose of the company. ***Fundamentally, we refer to fixed assets***, which are the essential assets that accompany the firm in carrying out its corporate purpose (tangible assets, such as machinery or computers; intangible assets, such as computer applications; and financial assets, investments in other companies that have a strategic vocation).

- ***Current assets*** **(CA)**. This includes items that will be converted into cash in the short term (in the so-called 'normal operating cycle', generally one year). It includes cash items, Realizable Assets (mainly accounts receivable) and Inventories (of a very different nature).

- ***Shareholders' equity*** **(E)**. It includes the items that are identified with the term 'non-callable liabilities', basically the capital contributions made by shareholders and the profits generated in the year or in previous years and that have not been paid in the form of dividends (Retained earnings or Reserves). We speak of 'non-callable' to the extent that, if the company is born as usual with a corporate purpose indefinite in time, there would be no legal obligation to return this amount to its owners, the shareholders.

- ***Non-current liabilities*** **(LTD)**. This category includes all those items due in the long term, i.e., those for whose cancellation the corresponding payment will have to be made in a period of more than one year.

- ***Current liabilities*** **(CL)**. This refers to items that the company will be obliged to pay in the short term (in a period of less than one year, which is generally considered to be the normal operating cycle). It includes outstanding balances with suppliers, the Tax authority, Social Security agencies or various financial institutions, among others, provided that they fall due in a period of less than one year.

With regard to the **income statement** (flow variables, those referring to a 'period of time'), the different items can be grouped into one of the following general concepts:

- ***Recurring income* (S)**. We refer to what is usually identified as 'Turnover', the income obtained from the sale of goods and/or services that constitute the corporate purpose of the company.

- ***Variable operating costs with cash impact* (VC)**. This refers to costs related to the way operations are carried out (regardless of how they are financed), which change with the level of activity and have a direct impact on the company's cash flow; for example, the cost of procurement or commissions payable on sales made.

- ***Fixed operating costs with cash impact* (FC)**. These are cost items related to the activity (regardless of how it is financed), which do not change with the level of activity and which have a direct impact on cash; for example, the cost of personnel (in the part contracted on a fixed basis), rents or insurance premiums.

- ***Non-cash charges (AM)***. These are asset-related costs (i.e. excluding financial costs), necessary to carry out activities, but which do not have a direct impact (present or future) on the company's cash flow; included here are all impairments, for example, depreciation of fixed assets (accounting recognition of the loss in value suffered as a result of use, the passage of time or obsolescence; they may therefore be variable or fixed).

- ***Financial expenses* (I)**. These are costs that are 'necessary' to carry out operations, but which do not have to do with 'how we do things' (assets) but with 'how we finance them' (liabilities). We refer to what ***we can generally identify with the 'Interest'*** that must be paid for the use of borrowed money.

- ***Results from non-recurring operations* (NREBT)**. This refers to income or expenses that are included in the income statement but which do not correspond to recurring operations, and can therefore be understood as 'extraordinary results', and which it seems logical to include in a separate section, so that performance measures are not influenced by operations that do not necessarily have to be repeated.

- To all the above must be added ***Corporate tax* (CT)**, which is one more cost of the business activity, and whose value depends on the legislation in force and on the relationships between the concepts presented so far.

Figure 1 shows an important part of the nomenclature that will be used in the rest of the document (especially in the section on Accounting measures).

4. ACCOUNTING PERFORMANCE MEASURES

We will begin this section with ***some margin concepts commonly used in the context of Accounting and Financial Statement Analysis***. For a simpler understanding of what follows, it is useful to have at hand at all times the nomenclature defined above (and summarized in Figure 1).

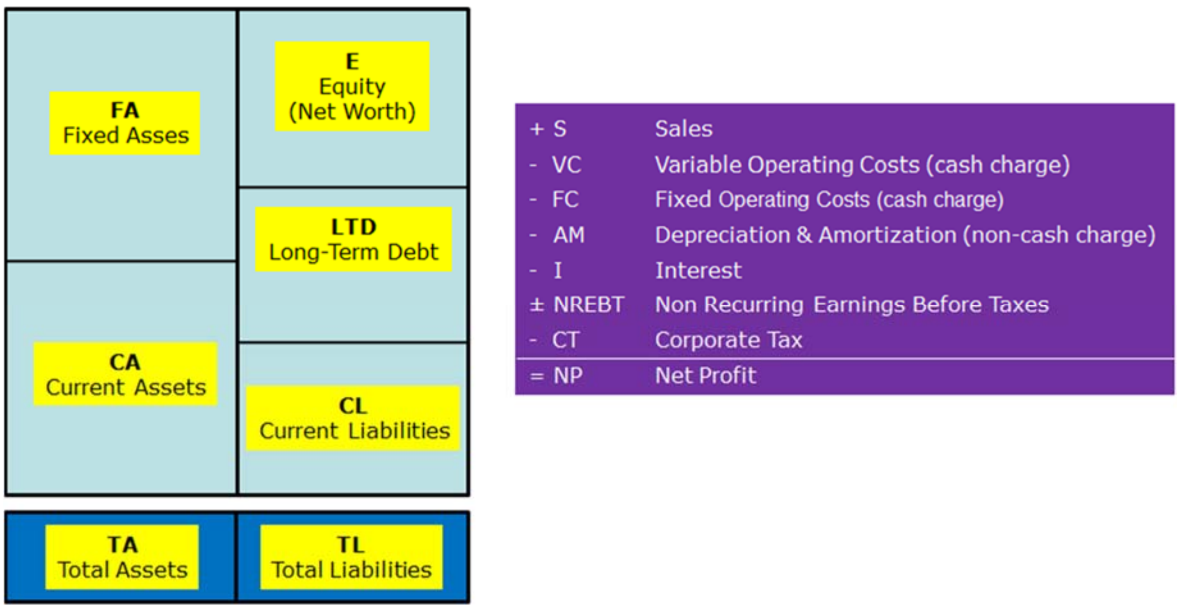

Figure 1

CONTRIBUTION MARGIN (CON)

Also called ‘***gross margin***’ or simply ‘*contribution*’.

This is the difference between turnover (recurring sales, S) and variable operating costs, VC; if part of the depreciation of fixed assets were a variable cost -systematic depreciation by use-, it should also be included here).

$$\mathrm{CON} = \mathrm{S} - \mathrm{VC} \tag{1}$$

It indicates the margin obtained without considering fixed costs, i.e., part of this margin must be applied to cover the aforementioned fixed costs before entering what is known as ‘breakeven’ or ‘break-even’ point. It is a performance measure that reports how things are being done in terms ***of what changes in the short term***, and its usefulness is greater when the size effect is eliminated, thus allowing comparisons with other companies or with the industry average, dividing the concept by the sales made (as we will see later, when we define the Contribution margin ratio, CONS).

EARNINGS BEFORE INTEREST, TAXES, DEPRECIATION AND AMORTIZATION (EBITDA)

It is an interesting margin concept that relates accounting and financial concepts by comparing revenues (S) with (only) operating costs with cash impact (variable, VC, and fixed, FC). It is true that in its calculation we apply accounting principles such as accruals (which means that part of the accrued sales and costs may not yet have been settled at the end of the year); but, in conditions of absolute stability (absence of growth in sales and costs), it can be seen as an ***approximation of the capacity of the business to generate cash*** from recurring operations (since the uncollected part of the year's sales would be offset by those collected in the year, having been accrued in the previous year; the same could be said of costs). In short, in the absence of working capital investments, it would coincide with the cash flow reported by the 'usual' (recurring) operations.

$$\mathrm{EBITDA} = \mathrm{S} - \mathrm{VC} - \mathrm{FC} \tag{2}$$

EARNINGS BEFORE INTEREST AND TAXES (EBIT)

It is a margin concept widely used when we want to make comparisons between businesses (or study temporal evolutions) and we do not want to be influenced in the analysis by elements related to the way the business is financed. It compares the sales revenue (S) with the operating costs (with and without cash impact, variable and fixed -VC, FC and AM-) 'necessary' to obtain them. Thus, the figure has the typical financial problems associated with the concept of 'profit' (affected by accounting principles such as accrual or concepts such as the correlation of revenues and expenses), but it ***has the virtue of 'speaking' only of the asset***. In other words, it is the profit obtained in the business without considering what part will go to the Tax Authority (Corporate tax), what part will be used to remunerate lenders (interest) and what part will become shareholder return.

$$\mathrm{EBIT} = \mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM} \tag{3}$$

As we will see later, it is the concept of margin that will appear in the numerator of the ratios we use to study and compare the performance of the asset, without considering aspects related to the way it is financed (we are referring to ratios such as ROA or ROI).

EARNIGNS BEFORE TAXES (EBT)

It is a concept of profit influenced by the way in which the business is financed; and, assuming that there are no differences between the application of accounting and tax criteria, it will coincide with the 'taxable income' (the figure that compares 'income with deductible costs' and on which the tax rate ('t') is applied to calculate the cost for Corporate tax).

$$\mathrm{EBT} = \mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM} - \mathrm{I} \pm \mathrm{NREBT} \tag{4}$$

NET PROFIT (NP)

Net profit is the figure that expresses the difference between total revenues and total costs in an accounting year. It reflects the amount by which the activity 'enriches' the shareholders, since, in short, it is the increase in net worth achieved in the year through activities (recurring and non-recurring). It can, in part, be converted into shareholder remuneration (through the payment of the corresponding dividends), or remain wholly or partially in the form of self-financing

(Retained earnings accounts, which make it possible to 'self-finance' part of the company's own activities).

$$\mathrm{NP} = \mathrm{EBT} \times (1 - \mathrm{t}) = \mathrm{EBT} - \mathrm{t} \times \mathrm{EBT} = \mathrm{S} - \mathrm{VC} - \mathrm{FC} - \mathrm{AM} - \mathrm{I} \pm \mathrm{NREBT} - \mathrm{CT} \quad (5)$$

ECONOMIC PROFIT (EP)

Also called by some 'Economic Value Added (EVA[17])', although the concept was 'invented' a long time ago. It compares the net book profit achieved (and more specifically, Earnings Before Interest and After Taxes, EBIAT) to remunerate the liabilities as a whole with that which should have been achieved to meet the requirements of the contributors of funds (i.e. to maintain the market value of their contributions):

$$\mathrm{EP} = \mathrm{EBIAT} - \mathrm{WACC} \times \mathrm{TA} = \mathrm{EBIT} \times (1 - \mathrm{t}) - \mathrm{WACC} \times \mathrm{TA} \quad (6)$$

where the WACC (***Weighted Average Cost of Capital***) must be added to the nomenclature defined above; and remember that 't' is the tax rate (corporate tax). Thus, as can be seen, it is a ***concept of profit that incorporates the 'opportunity cost'***: it is only positive when the profit obtained can be considered 'sufficient' (in fact, there will only be value creation when the company is capable of generating, in the long term, profits in excess of those required based on the risk contributed to the financiers; in other words, it is a partial indicator -referring to a specific year- that anticipates -albeit imperfectly, since it refers to a single year- the company's capacity to create value).

CONTRIBUTION MARGIN RATIO (CONS)

It is the ratio between contribution margin (CON, the difference between sales and variable operating costs) and sales. It indicates the margin per euro sold generated considering only what changes in the short term.

$$\mathrm{CONS} = \frac{\mathrm{CON}}{\mathrm{S}} = \frac{\mathrm{S} - \mathrm{VC}}{\mathrm{S}} \quad (7)$$

It allows comparisons to be made between companies with very different volumes of operations. It will take high values when there is effective and efficient management of the difference between sales revenue and the variable costs required for it (such as the cost of procurement, commissions paid for sales or energy consumed 'directly' in the manufacture of products).

BREAK-EVEN SALES (BES)

Refers to the ***amount of sales from which the company makes a profit***. It can be defined in many ways, depending on 'what profit we are referring to'. If we think of a break-even point

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[17] EVA is a registered trademark of Stern Stewart & Co.

understood as EBIT=0, i.e. as the situation in which operating costs (those related to assets) are covered, we must divide the fixed costs to be covered by the margin contribution of each euro of sales (the contribution margin ratio, CONS); if we assume that the depreciation of fixed assets is a fixed cost (systematic depreciation caused by the passage of time or obsolescence) we arrive at expression 8.

$$\text{BES} = \frac{\text{FC} + \text{AM}}{\text{CONS}} \tag{8}$$

Logically, and all other things being equal, it is in our interest to reduce Break-even sales and to ensure that the difference between realized sales and break-even sales is as large as possible. Thus, we could also define another measure indicating how far we are from negative EBIT (expression 9).

$$\text{Distance from Break-Even Sales} = \frac{\text{S}-\text{BES}}{\text{S}} \tag{9}$$

NET MARGIN RATIO

This is a ratio that provides information similar to the contribution margin ratio (CONS) seen above, but which considers not only the variable costs that must be incurred to obtain sales, but also the fixed costs and taxes (referring in all cases to ‘operating activities’, i.e. without considering any aspect related to the way in which the company is financed). Logically, it is important to obtain high values for this ratio.

$$\text{NET MARGIN RATIO} = \frac{\text{EBIAT}}{\text{S}} = \frac{\text{EBIT x }(1-\text{t})}{\text{S}} \tag{10}$$

ASSET TURNOVER

Turnover ratios relate a flow (numerator) and a stock (denominator); among the most common are those that relate Sales to some element of assets, and can be read as ‘the ***number of times*** during the year that we are able to ***convert the asset in question into cash through sales***’. Thus, the asset turnover ratio (expression 11) can be seen as a measure of efficiency in the management of the company, and it is therefore of interest, all other things being equal, that its value is high.

$$\text{TOTAL ASSETS TURNOVER RATIO} = \frac{\text{S}}{\text{TA}} \tag{11}$$

RETURN ON ASSETS (ROA)

This is a performance measure that ***‘speaks’ only of assets, regardless of how they are financed***. It relates the earnings before interest and taxes (a margin concept that is shared between the Tax authority, lenders -interest- and shareholders -dividend and reserves-) to the money that had to be invested to achieve it (total assets, TA; which includes the funds contributed by lenders and the company's own funds).

$$\mathrm{ROA} = \frac{\mathrm{EBIT}}{\mathrm{TA}} \tag{12}$$

RETURN ON INVESTMENT (ROI)

Also known as 'Return on Operations' and 'Economic Performance'. ***It relates the net profit obtained to the necessary investment without considering any aspect related to the way it is financed***: the earnings before interest and after taxes (EBIAT) results from subtracting from the earnings before interest and taxes (EBIT) the taxes that would have to be paid without considering the debt decision; and the total assets (TA) reflect the investment made with the help of lenders and shareholders.

$$\mathrm{ROI} = \frac{\mathrm{EBIAT}}{\mathrm{TA}} = \frac{\mathrm{EBIT} \times (1-t)}{\mathrm{TA}} \tag{13}$$

A very common variant of the above is to adopt a ***long-term perspective***, which means focusing only on the permanent part of the balance sheet; this means replacing total assets (TA) that appears in the denominator with the part of the balance sheet that is financed with permanent capital: fixed assets (FA) and working capital (WC).

$$\mathrm{ROI} = \frac{\mathrm{EBIAT}}{\mathrm{FA+WC}} = \frac{\mathrm{EBIT} \times (1-t)}{\mathrm{FA+WC}} \tag{14}$$

RETURN ON EQUITY (ROE)

This performance measure indicates the ***profitability achieved for the shareholder from an accounting point of view***. It relates the net profit (NP, which is the result of subtracting from revenues the total necessary costs, including taxes and those related to borrowed funds used) and the funds invested (by shareholders, E).

$$\mathrm{ROE} = \frac{\mathrm{NP}}{\mathrm{E}} \tag{15}$$

LIQUIDITY RATIO

The liquidity ratio is a measure of the ***company's short-term solvency*** (a concept that is also commonly identified with the word 'liquidity'). It relates the same concepts that make up working capital, current assets (CA) and current liabilities (CL). Thus, if the ratio between the two is high, this can be read as an indication that the company will not have problems in the short term to meet its obligations.

$$\text{LIQUIDITY RATIO} = \frac{\text{CA}}{\text{CL}} \tag{16}$$

GUARANTEE RATIO

The Guarantee ratio measures something related to the previous one (the liquidity ratio), although in a different way. It indicates ***how close or far a company is from bankruptcy***: it relates the (book) value of total assets to total liabilities, so it can also be seen as a measure of the company's level of indebtedness (or leverage); but the very way of defining this level of indebtedness gives an idea of the closeness of a bankruptcy situation: high values in the ratio indicate that the equity is capable of absorbing a high loss, and vice versa (a value equal to 4, for example, would indicate that, theoretically, the company could assume a loss equal to 3 times the value of the debt before not being able to meet all the committed payments).

$$\text{GUARANTEE RATIO} = \frac{\text{Total assets}}{\text{Debt}} \tag{17}$$

CASH-FLOW (CF)

It can be defined in a multitude of ways, the most common being the one given in expression (18): it is the sum of the net profit obtained (NP) and the depreciation of fixed assets (AM).

$$\text{CF} = \text{NP} + \text{AM} \tag{18}$$

Its interest lies in ***connecting*** a typically accounting concept (***profit***, subject to principles such as accrual or the correlation of income and expenses, which distances it from cash flow) with another typically financial concept (***cash flow***). Under conditions of absolute stability, it can be seen as an approximation of the business's ability to generate cash, after considering all costs (including financial and tax costs) and considering all operations (recurring and non-recurring).

FUND FLOW FROM OPERATING ACTIVITIES (FFO)

This is a variant of the previous concept (cash flow), but refers only to recurring operations (excluding what could be identified as 'extraordinary results') and without considering any effect that the way in which the company is financed may have. It would coincide with the ***cash generation capacity of the assets from recurring operations in the absence of necessary investments*** (in working capital and fixed assets). It is calculated as the sum of earnings before interest and after taxes, EBIAT, and the depreciation of fixed assets (and in general, any operating cost without cash impact), AM.

$$\text{FFO} = \text{EBIAT} + \text{AM} = \text{EBIT x } (1 - \text{t}) + \text{AM} \tag{19}$$

FUND FLOW FROM NON-RECURRING ACTIVITIES (FFNR)

This is, once again, a variant of cash flow (CF) but refers only to the ***contribution to cash flow made by non-recurring operations*** (such as, for example, a sale of fixed assets). It has the virtue of not considering aspects related to financing and makes it possible to separate in any analysis the effects of recurring operations from those related to non-recurring ones; and it has the limitation of not considering the possible investments that may need to be made (both in fixed assets and in working capital). It is calculated by adding to the Non-recurring earnings after tax (NREAT) the book value of fixed assets sold (BV).

$$\mathrm{FFNR} = \mathrm{NREAT} + \mathrm{BV} = \mathrm{NREBT} \times (1 - \mathrm{t}) + \mathrm{BV} \tag{20}$$

FREE CASH-FLOW TO THE FIRM (FCFF)

It is a particularly interesting variant of the term 'cash-flow', and is particularly relevant in the field of valuation of companies or investment projects (using the discounted cash flow technique). It refers to the ***money that the asset is capable of generating without considering any aspect related to the way in which it is financed***. It is calculated by subtracting from the Fund flow generated by recurring (FFO) and non-recurring (FFNR) operations the investments that the asset has required (in working capital, ΔWC, and in fixed assets, CFI).

$$\mathrm{FCFF} = \mathrm{FFO} + \mathrm{FFNR} - \Delta\mathrm{WC} - \mathrm{CFI} = \mathrm{EBITx}(1 - \mathrm{t}) + \mathrm{AM} + \mathrm{NREBTx}(1 - \mathrm{t}) + \mathrm{BV} - \Delta\mathrm{WC} - \mathrm{CFI} \tag{21}$$

This definition of the term implies a ***long-term approach***, i.e., it considers as a necessity only that part of the current assets 'which is not financed by itself' with its own operations (which generates financing through current liabilities), and is common in the valuation processes of companies and investment projects mentioned above. If we wish to see things from a ***short-term perspective***, it would be sufficient to replace the concept of working capital (WC) with that of current assets (CA), as can be seen in expression (22).

$$\mathrm{FCFF} = \mathrm{FFO} + \mathrm{FFNR} - \Delta\mathrm{CA} - \mathrm{CFI} = \mathrm{EBIT} \times (1 - \mathrm{t}) + \mathrm{AM} + \mathrm{NREBT} \times (1 - \mathrm{t}) + \mathrm{BV} - \Delta\mathrm{CA} - \mathrm{CFI} \tag{22}$$

FREE CASH FLOW TO (LONG-TERM) DEBT (FCFLTD)

This is the ***cash flow*** produced, in incremental terms, ***with the providers of external funds***. If we take a ***long-term view***, we refer to the cash impact of issuance and repayment of long-term debt (LTDI and LTDR, respectively) and interest payments (net of taxes, I x (1 - t), to the extent that we maintain the effort to separate what has to do with assets from what has to do with liabilities, assigning to the external financing decision the fiscal impact it causes).

$$\mathrm{FCFLTD} = \mathrm{LTDI} - \mathrm{LTDR} - \mathrm{I} \times (1 - \mathrm{t}) \tag{23}$$

In the event that we wish to take a ***short-term view***, it would be sufficient to add the changes in current liabilities (CL), giving rise to the term 'D' (Debt; which would now include short-term and long-term borrowed funds).

$$\mathrm{FCFD} = \mathrm{DI} - \mathrm{DR} - \mathrm{I} \times (1 - \mathrm{t}) = \mathrm{LTDI} - \mathrm{LTDR} + \Delta\mathrm{CL} - \mathrm{I} \times (1 - \mathrm{t}) \tag{24}$$

FREE CASH-FLOW TO THE EQUITY (FCFE)

Once again, we are dealing with a variant of the 'cash-flow' concept, but in this case referring to the ***relationship in terms of cash*** that occurs ***between the company and its shareholders***. In this relationship, cash comes in when capital stock is issued (EI), and goes out when capital stock is reduced (Equity redemptions, ER) and when dividends are paid (D).

$$\mathrm{FCFE} = \mathrm{EI} - \mathrm{ER} - \mathrm{D} \tag{25}$$

The concept thus defined contemplates the relationship, in terms of cash, between shareholders and the company from the point of view of the latter; if we change sign to the definition given, we have the cash flow seen from the point of view of the shareholder, which is the one normally used in company valuation processes (of equity, i.e. net worth) with the discounted cash flow technique.

5. PERFORMANCE MEASURES IN THE STUDY OF INVESTMENT DECISIONS

5.1. INFORMATION REQUIRED: PRELIMINARY CALCULATIONS

To analyse the interest of an investment project we need to estimate two fundamental elements:

- The so-called '***fund profile***', which indicates the impact that the project has on the company's cash flow, on an incremental basis and regardless of how it will be financed (this is what we have identified previously as the ***Free cash flow to the firm***, FCFF, defined in incremental terms -the project's contribution to the company's overall FCFF in each of the years of the project's useful life-). In long-term projects it ***is usual to define these impacts on an annual basis***.

- The '***cost of capital'***, i.e. the required return on the project. It is always defined as an opportunity cost, i.e. the return that could be obtained on the best alternative (of similar risk) to be foregone in order to undertake the project. And, logically, it must be defined in a manner consistent with the periodicity with which cash flows are calculated.

Let us start by thinking about projects that clearly behave as 'investments', those known as '***simple investments***', which are those that have a single outflow at time zero and all positive cash flows over the rest of their useful life (number of years in which the project has some impact on cash flow); and let us assume, in a first step, that the behaviour of the variables related to the project is known with certainty (this is what we identify as '***certainty environment***'; although it should be noted that everything we say here ***is directly applicable to real risk environments***, with the only qualification that the cash flows will be 'expected' -not certain- and the interest rate to be used in the calculations should be suitably adjusted for risk). Under the conditions described, the fund profile associated with this type of project has the form shown in Figure 2.

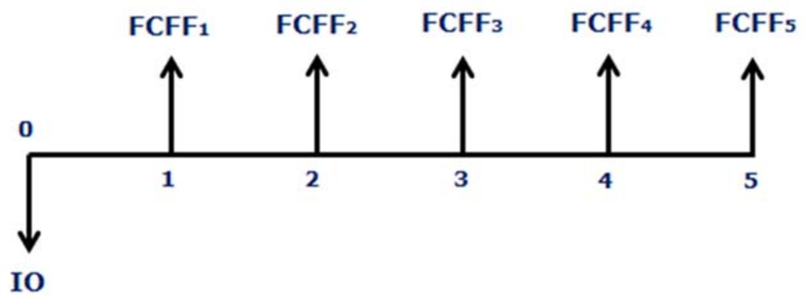

Figure 2

where IO is the 'initial outlay' (the money that the project requires at time zero) and $FCFF_i$ is the free cash flow that the project provides in year 'i'. And we will call 'K' the return on the best alternative lost (the aforementioned cost of capital, WACC; in certainty environments, the required return would be that of a safe investment, usually considered as such the return on government bonds -for example, that associated with one-year Treasury Bills-).

So that the reasoning does not become too abstract, we will always apply the concepts to a specific case. See, for example, figure 3.

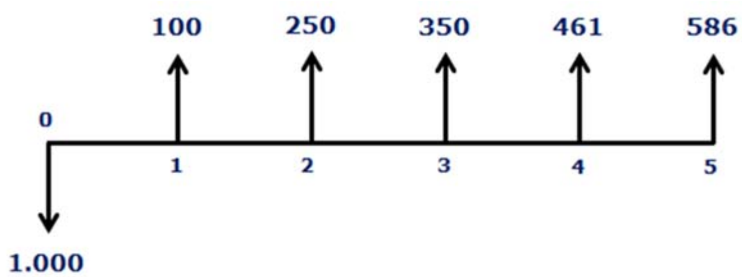

Figure 3

5.2. PERFORMANCE MEASURES (INVESTMENT DECISION)

PAYBACK (Pb)

Payback indicates the ***time it takes for the project to recover the investment made***. It is the time when the sign of the accumulated cash flow changes from negative to positive. In our case (Figure 3), the payback period would be between the third and fourth year:

Cumulative cash-flow (3) = -1.000 + 100 + 250 + 350 = -300

Cumulative cash-flow (4) = -1.000 + 100 + 250 + 350 + 461 = 161

The criterion looks for projects that recover quickly. But it has ***important theoretical problems***: it does not consider (adequately) the concept of 'time value of money' (it adds up cash flows at different times; therefore, projects that recover at the same time, although at different rates, are indifferent for the criterion) and it does not consider what happens after the investment has been recovered. It is a bad performance measure, which should not be used to accept or reject projects, although it may have other uses (to determine at what level of the organization certain projects should be studied or as a reference for deciding how many resources should be devoted to studying their interest).

CASH-FLOW PAYBACK (PAYBACK ON DISCOUNTED FREE CASH FLOWS)

This is a ***variant of the previous criterion***. It ***studies the accumulated flow in present values***: the idea is to 'discount' the figures reported by the project and study the accumulated flow with the resulting figures. In our case (project in Figure 3), and assuming that the risk-free interest rate is 10% (K=10%), the figures to be used would be those shown in Figure 4.

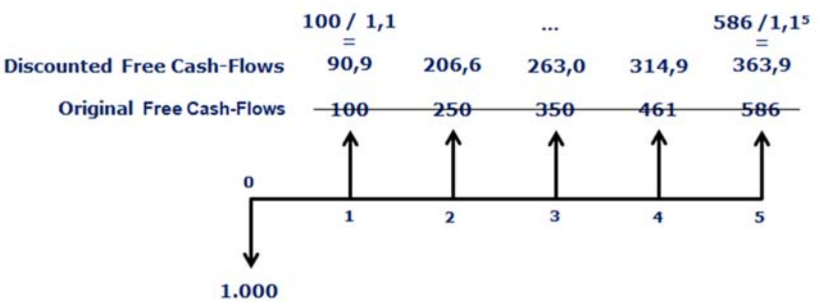

Figure 4

Cumulative discounted cash flow (4) = -1.000 + 90,9 + 206,6 + 263,0 + 314,9 = -124,6

Cumulative discounted cash flow (5) = -1.000 + 90,9 + 206,6 + 263,0 + 314,9 + 363,9 = 239,3

That is, in present value, the project recovers the investment in year five.

As can be seen, the criterion solves the problem related to the consideration of the time value of money, but it focuses only on a part of the project; as will be seen later, it is a 'miscalculated' NPV (in the sense that it is incomplete, it does not consider the whole project, but 'stops' at the moment when the investment is recovered).

NET PRESENT VALUE (NPV)

This is the ***financial criterion par excellence***. No performance measure can surpass the NPV when it comes to study the interest of an investment project; the most that alternative measures can aspire to is to equal the quality of the NPV (regardless of the fact that, on occasions, it may be appropriate to supplement the information provided by the latter with some additional element).

$$\mathrm{NPV_K} = -\mathrm{IO} + \frac{\mathrm{FCFF_1}}{(1+\mathrm{K})^1} + \frac{\mathrm{FCFF_2}}{(1+\mathrm{K})^2} + \cdots + \frac{\mathrm{FCFF_n}}{(1+\mathrm{K})^n} = -\mathrm{IO} + \mathrm{PV} \qquad (26)$$

where $\mathrm{FCFF_i}$ is the incremental cash flow reported by the project in year 'i'; 'n' is the useful life of the project (understood as the number of years that cause incremental effects on the company's cash flow); IO is the initial outlay, the money that must be invested to obtain the cash flows; and K is the cost of funds (always understood as opportunity cost, profitability of the best market alternative -of similar risk- that must be foregone to invest in the project).

As can be seen, the criterion consists of ***comparing, in present value, what the project asks for with what it gives***, so that ***projects with NPV > 0 are accepted***. In other words, it compares what the project is worth (PV, what it would cost to buy the cash flow it offers in the market) with what it costs (what has to be paid for the said flow 'in the project', the initial outlay), so the difference is 'the wealth we should have to buy the cash flow in the market and which is not necessary to have to do so in the project'. And it is a difficult criterion to beat because it ***indicates what the project contributes to the* company's *financial objective***: it is all about creating value; and NPV can always be interpreted, as we have seen, as ***value created by the project***.

INTERNAL RATE OF RETURN (IRR)

Also known as Cash-flow return on investment (CFROI), it is a ***measure of the return on the money invested in a project***. It is calculated by looking for a situation of indifference: what is involved is to ***clear the discount rate that makes the NPV equal to zero***.

$$\mathrm{NPV_{IRR}} = 0 = -\mathrm{IO} + \frac{\mathrm{FCFF_1}}{(1+\mathrm{IRR})^1} + \frac{\mathrm{FCFF_2}}{(1+\mathrm{IRR})^2} + \cdots + \frac{\mathrm{FCFF_n}}{(1+\mathrm{IRR})^n} \qquad (27)$$

where, to the defined nomenclature, IRR is added, which is the K value that makes the NPV zero.

As we have indicated, it can be interpreted as the return on the project: in a market where the opportunity cost (the discount rate used, the cost of funds) coincided with IRR, the project would be indifferent (NPV=0, i.e. indifferent in the sense of 'as good as the best market alternative that has to be foregone to invest in it'). Thus, the criterion for action under this criterion is to ***accept projects that perform better than the best foregone alternative*** (i.e., projects where IRR>K).

When it comes to ***accepting or rejecting*** a ***simple investment*** project, ***NPV and IRR cannot disagree***. Let's look at a simple example: let's assume an investment project with the fund profile shown in Figure 5.

If we now represent the relationship between the NPV obtained and the discount rate used (K), we have what we call the '***NPV profile***' of the project (Figure 6).

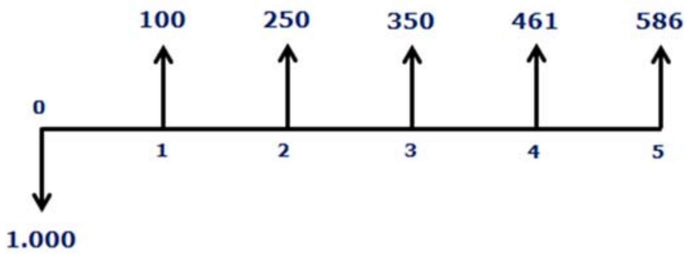

Figure 5

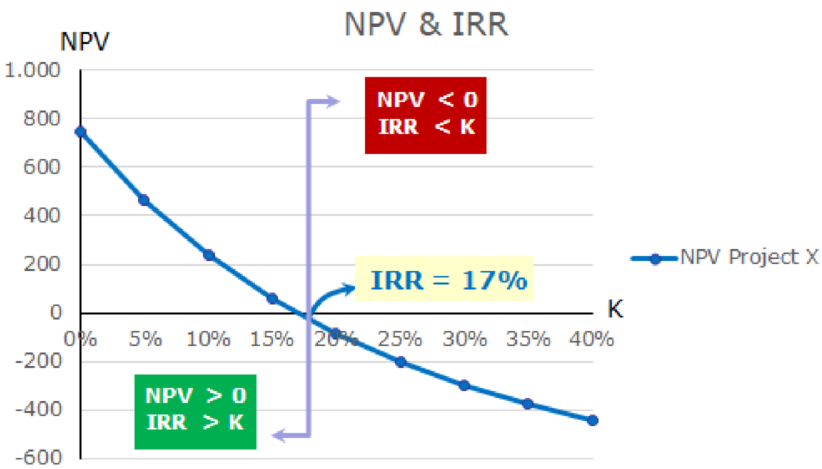

Figure 6

In view of Graph 6, it could be thought that the two criteria, NPV and IRR, are equally valid and that they simply show the interest of a project in different ways: NPV indicates the value it creates, the wealth it adds to the initial wealth; while IRR tells us whether the project yields more (or less) than the best market alternative. In both cases, we would be trying to detect projects that beat the market (create value because they yield more than the best alternative). The problem is that ***the criteria could differ when choosing between two investment projects***; and the IRR can also present other problems that we will see later.

Let us now assume the behaviour defined in Figure 7 for the mutually exclusive projects X and Y (it is necessary to choose one of the two; for reasons other than the existence of budget constraints).

Figure 8 shows the NPV profiles of the two projects described above.

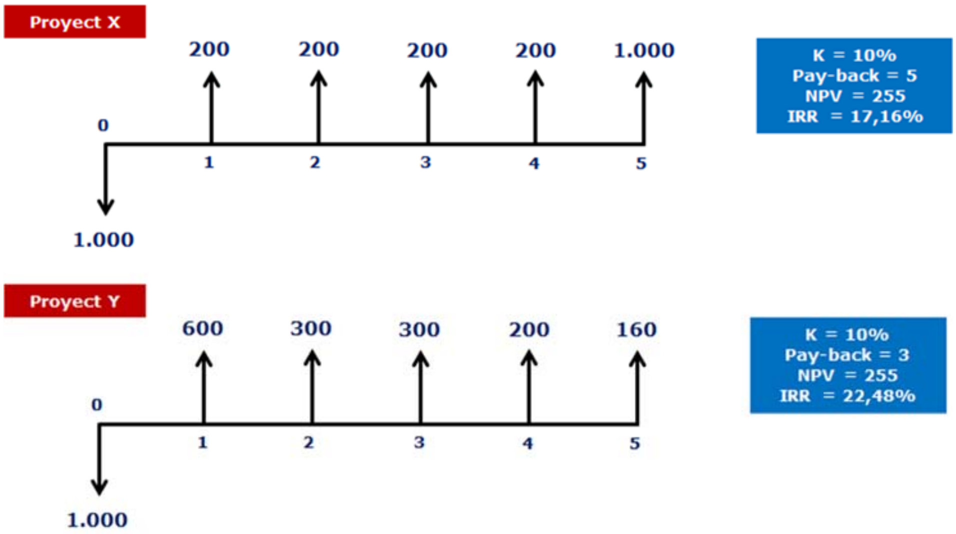

Figure 7

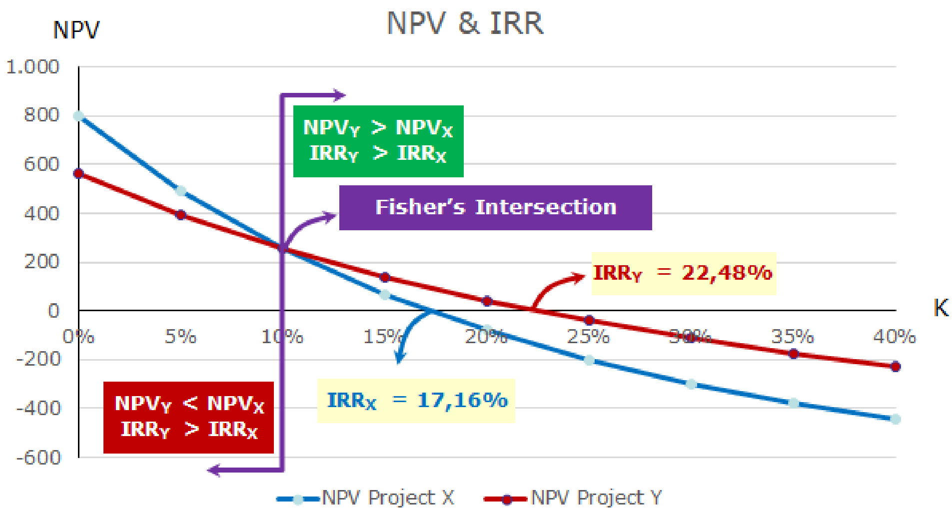

Figure 8

As can be seen in Figure 8, when the cost of funds is to the right of the one that corresponds to the cut-off point of the NPV profiles (this is what is known as 'Fisher's Rate of Return on Cost') there is no problem, the two criteria, NPV and IRR advise the same (choosing project Y); but if the cost of funds is far enough away from the IRRs, being located to the left of the mentioned rate, we have a ***problem of NPV-IRR discrepancy***.

In this case, the cause of the discrepancy is the ***different reinvestment assumption implicit*** in the two criteria: NPV assumes that the money released by the project is reinvested in the market at the rate K (logical assumption, since K is calculated as opportunity cost, profitability of the best alternative lost), while IRR assumes that the money that the project does not need is reinvested at the IRR itself (illogical assumption, except in the particular case that it coincides with K). Therefore, the decision must be taken on the basis of what the NPV advises. We will see later that there is another criterion related to both that solves the problem: the Modified Internal Rate of Return MIRR).

Let us now look at ***another case of NPV-IRR discrepancy*** (Figure 9), in this case caused by a ***reason other than the implicit reinvestment hypothesis***. Let us think of single-period projects, which are those that have only two positions, one in which money is invested and the other in which the results obtained are withdrawn, so that the cause of the discrepancy could not be the aforementioned implicit reinvestment hypothesis, since there is nothing to reinvest (all the money is always 'inside' the project).

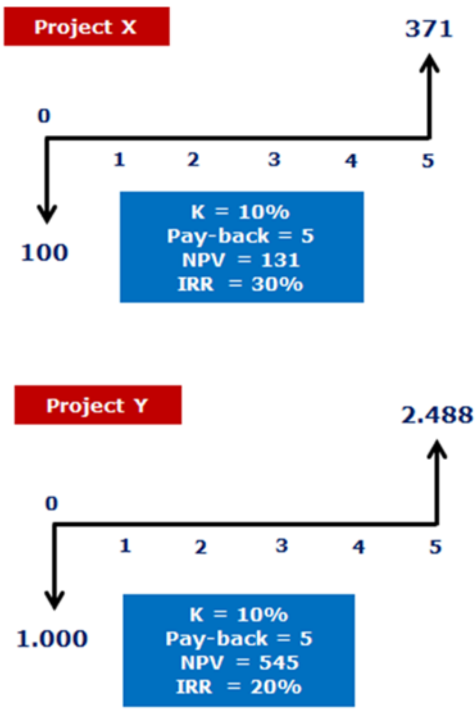

Figure 9

Figure 10 shows the NPV profiles of the two projects, X and Y; it can be seen that there is an NPV-IRR discrepancy for discount rates lower than the Fisher Rate of Return on Cost (the rate that corresponds to the point where both profiles intersect, the well-known Fisher Intersection, which in this case is 18,66%).

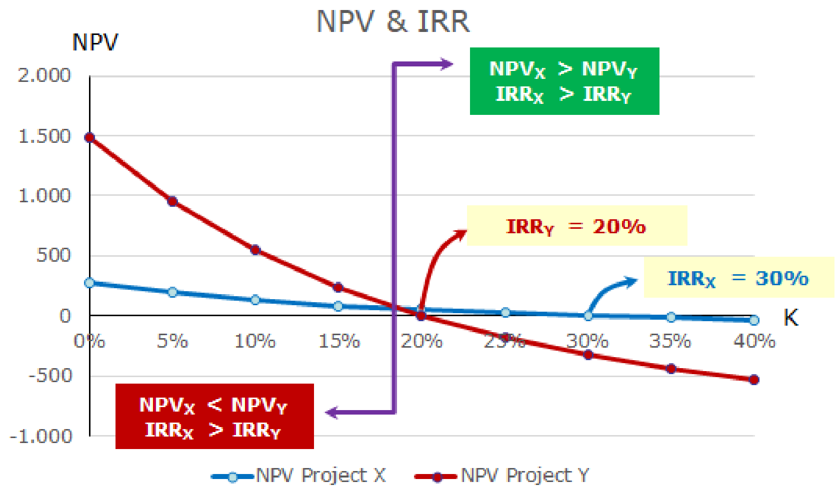

Figure 10

Again, what we should do in this case is 'what the NPV tells us'. The reason seems clear from an intuitive point of view: assuming that the profitability to beat is 10% (opportunity cost, profitability of the best market alternative), it seems clearly ***better to obtain 10 additional points for an invested capital of 1.000, than to obtain an extra 20 points for an investment of only 100***. If they were compatible, both would be accepted; but if they act as mutually exclusive projects, the second (the aforementioned Y) should be selected.

Later we will see another criterion that allows solving this problem (which in this paper we will identify as MIRRIIO).

Let us continue to raise issues related to IRR. Sometimes, the project to be studied may present a fund profile that deviates from the 'typical' or 'expected' behaviour of an investment. Consider the project shown in Figure 11.

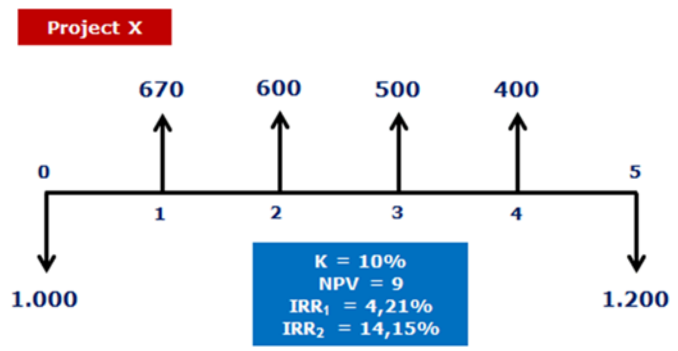

Figure 11

As can be seen, the project shows a strange behaviour in its fund profile: if we disregard the last year's flow, 'we see the typical Cash flow profile of an investment'; but if we disregard the first flow, 'we see the typical behaviour of a financing project'. This intuitive view of the ***mix of investment and financing behaviour in the project described above*** can also be obtained in the NPV profile of the project (Figure 12).

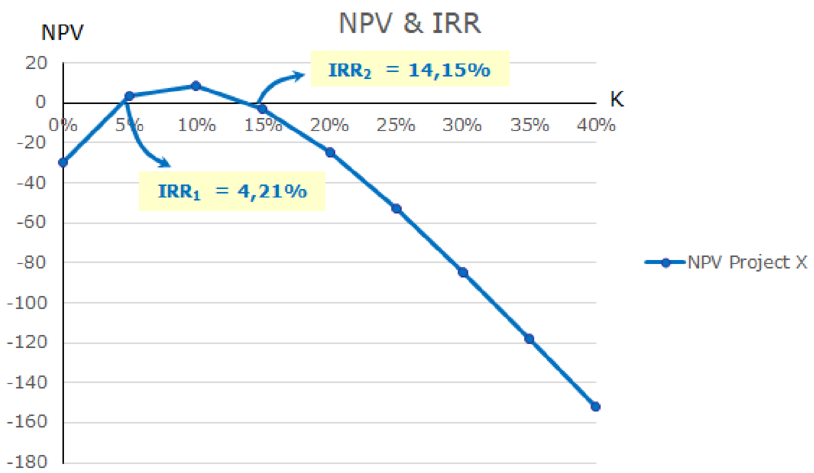

Figure 12

Indeed, it ***is typical of an investment that its NPV profile presents a negative slope***: its interest decreases as the applicable discount rate increases (it can become negative when the alternative return on the market, the opportunity cost represented by K, is sufficiently high). However, when we study a ***financing project, its interest increases the higher the opportunity cost*** (in this case, K acts as the cost of the alternative funds in the market: the more expensive these alternative funds are, the more interesting the financing is), so that the NPV profile of the project has a positive slope. Figure 12 shows that, for low rates, the project's NPV profile grows, but from the maximum (at a value of K close to 10%) the 'underlying' investment behaviour is stronger.

In any case, and assuming, for example, a cost of funds of 10%, we encounter the ***problem known as IRR inconsistency***: the project has two IRRs, one of which is above and the other below the cost of funds, so the criterion is inconsistent (it would advise doing one thing or the opposite depending on the value we take as a reference; both being correct).

The solution, as always, is to do what ***the NPV*** indicates, which ***offers only one solution*** (in this case, to accept the project, since the NPV calculated at 10% is positive, thus creating value).

One last problem of the IRR: when we study 'portfolios of projects', ***the NPV*** has an operational advantage, the ***additive property***. This means that the NPV of a portfolio is equal to the sum of the NPVs of the projects that compose it; a property that IRR does not have. In other words, to calculate the NPV of a portfolio it is not necessary to draw up the fund profile of the portfolio and make the corresponding estimate: it is enough to add up the NPVs of the projects that make up the portfolio; however, with the IRR I have no choice but to add up the fund profiles and calculate the IRR on the resulting profile.

Figure 13 shows the fund profiles and interest analysis of two projects A and B, taken first separately and then together. As can be seen, the NPV of the portfolio coincides with the sum of those corresponding to the separate projects; but the IRR of the portfolio cannot be obtained (except under very special conditions) from the IRRs of the original projects.

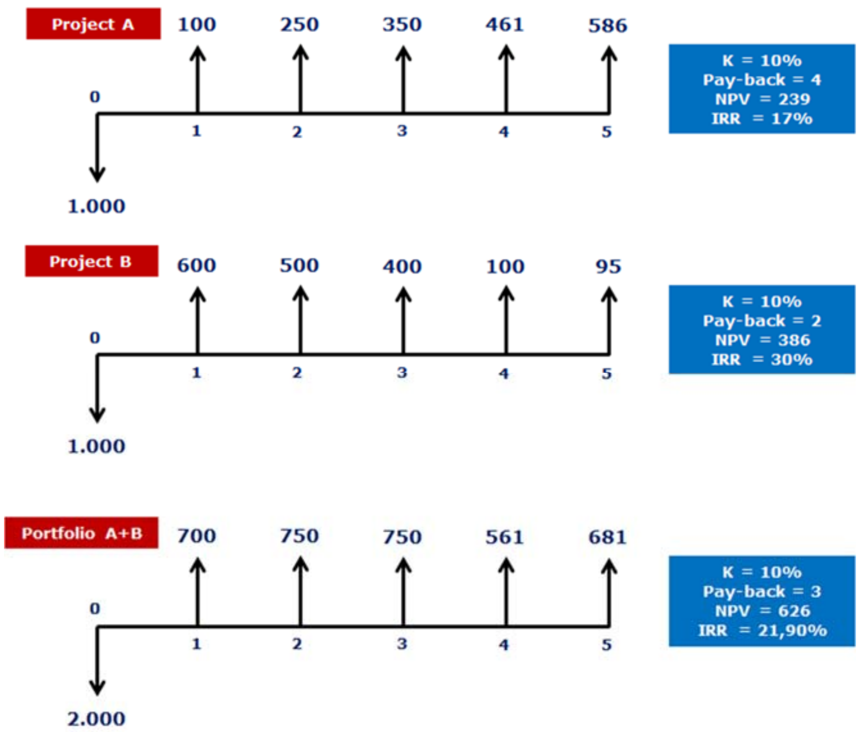

Figure 13

MODIFIED INTERNAL RATE OF RETURN (MIRR)

This is an interesting criterion that ***solves one of the problems posed by IRR*** (specifically, some NPV-IRR discrepancies). When a choice has to be made between mutually exclusive investment projects, with identical initial outlay, but which generate their cash flows at very different rates, their NPV profiles may be cut off, giving rise to the possibility of the NPV-IRR discrepancy problem mentioned above (see Figures 7 and 8, which present the problem mentioned). In these cases, it is true that there is a simple solution, which is to pay attention to the NPV; but the same conclusion can also be reached by reasoning in terms of IRR (which may be of interest, depending, for example, on the recipient of the information).

Since the IRR presents the problem of assuming the IRR of each project as the implicit reinvestment rate, we can eliminate the problem ***by forcing the reinvestment to be made at rate K*** (opportunity cost, the only reasonable reinvestment rate). To do this, the project flows (except for the initial outlay) must be capitalized at year 'n' (useful life of the projects to be compared) using the rate K as the capitalization rate; the next step consists of calculating the IRR on the resulting profile (which is the MIRR of the original project). It can be easily demonstrated that the decision to be taken with the MIRR will always coincide with the one proposed by the NPV, the discrepancy between the two criteria disappearing and the solution can be presented in terms of profitability. The process described is shown in Figures 14 and 15, which are constructed from the behaviour of the original projects proposed in Figure 7.

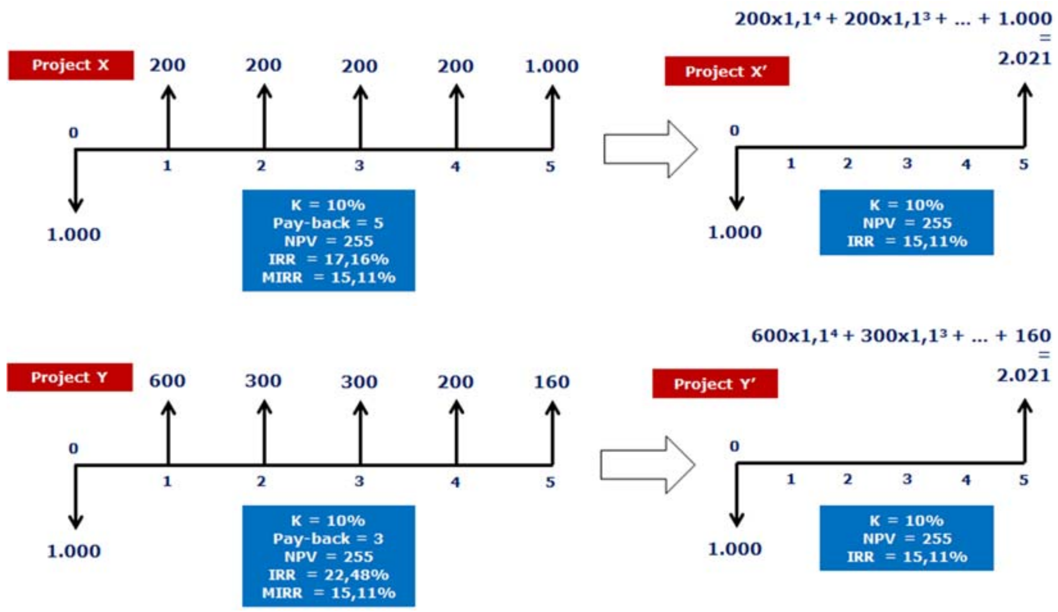

Figure 14

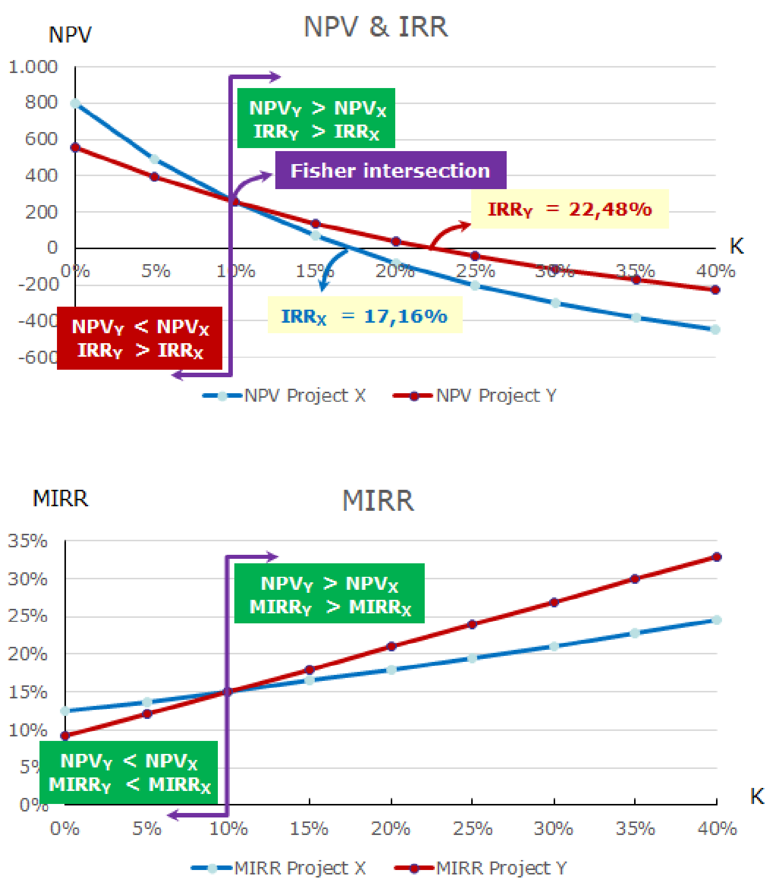

Figure 15

MODIFIED INTERNAL RATE OF RETURN WITH IDENTICAL INITIAL OUTLAY (MIRRIIO)

As seen above (Figures 9 and 10), another possible cause of NPV-IRR discrepancy is the existence of different initial outlays when comparing the interest of different investment projects; at the time, we pointed out that the correct solution is the one indicated by the NPV: since the criterion can always be interpreted as value created, the alternative that best contributes to the financial goal of the firm is the one indicated by this criterion.

But, again, we can arrive at the same solution by reasoning in terms of profitability. To do so, we will propose a ***criterion***, based on the logic of the MIRR, which we will refer to as '**MIRRIIO**', Modified Internal Rate of Return with Identical Initial Outlay. The idea is simple: ***in order for the mutually exclusive projects*** shown in Figure 9 ***to be comparable we must match pay-outs (initial outlays)***; the problem is that the projects could be non-divisible, so we 'force' their pay-outs to match the market support. The way to do this is to assume identical initial outlays for the projects to be compared, investing the money that does not require the one that requires less money at the rate k (cost of funds; always on the basis of converting the original multi-period projects into single-period to avoid the problem of implicit reinvestment rates). Figure 16 shows the first part of the process (in this case, simple, since originally the projects proposed were already single-period, so the only operation to be carried out consists of equalizing initial outlays and adding to the flow of the last year of the project with the lowest initial outlay the result of capitalizing the money not required by the project using the K rate).

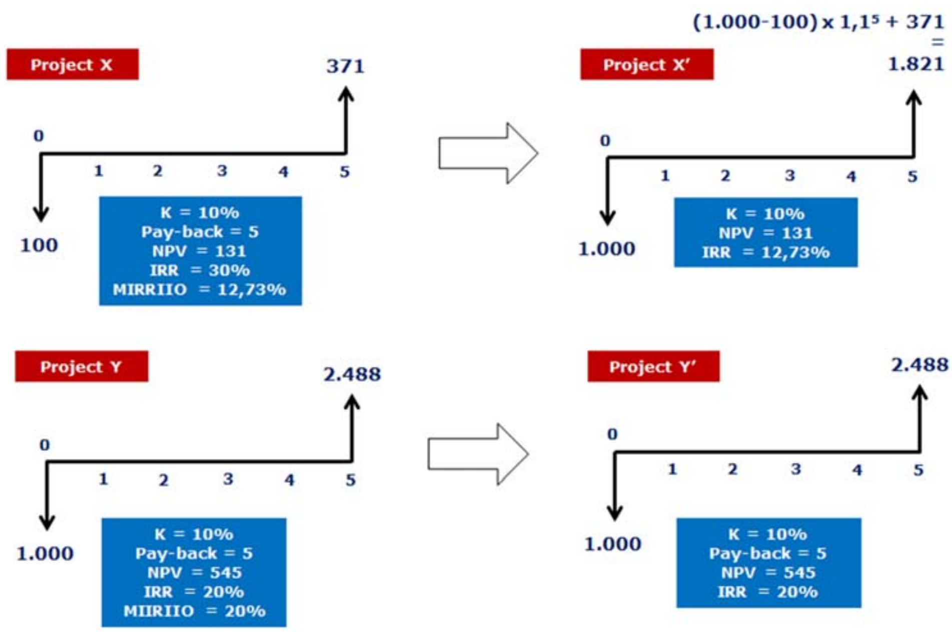

Figure 16

PROFITABILITY INDEX (PI)

The profitability index (PI) is a performance measure that ***puts in quotient form what the NPV studies in the form of a difference***: it consists of dividing the present value of the flows that the project brings (PV) by the initial outlay that it obliges to make (IO).

$$\mathrm{NPV_K} = -\mathrm{IO} + \frac{\mathrm{FCFF_1}}{(1+\mathrm{K})^1} + \frac{\mathrm{FCFF_2}}{(1+\mathrm{K})^2} + \cdots + \frac{\mathrm{FCFF_n}}{(1+\mathrm{K})^n} = -\mathrm{IO} + \mathrm{PV} \tag{26}$$

$$\mathrm{PI} = \frac{\mathrm{PV}}{\mathrm{IO}} = \frac{\frac{\mathrm{FCFF_1}}{(1+\mathrm{K})^1} + \frac{\mathrm{FCFF_2}}{(1+\mathrm{K})^2} + \dots + \frac{\mathrm{FCFF_n}}{(1+\mathrm{K})^n}}{\mathrm{IO}} \tag{28}$$

In view of the expressions presented, it is easy to infer that ***projects whose PI is greater than unity will be accepted***. Thus, it is ***impossible for the NPV and PI criteria to differ when it comes to accepting or rejecting a project***: proposals with a positive NPV will have associated profitability indexes higher than unity; but there may be differences when it comes to ranking the interest of several projects to choose from.

The criterion may be of particular interest when the company faces ***budget constraints***. For example, it may happen that 'there are more ideas than money', i.e. it may be necessary to allocate a limited budget among alternatives with positive NPV and whose required outlay exceeds the amount available for investment. In these cases, the logical thing to do is to ***try to optimize the scarce resource*** (money to invest), which would be achieved by ordering the projects according to their ***contribution to the financial objective per unit of scarce factor***. And it is easy to see that this is achieved through the criterion presented here.

If we subtract unity from the given definition of the criterion we arrive at the expression (29).

$$\mathrm{PI} - 1 = \frac{\mathrm{PV}}{\mathrm{IO}} - 1 = \frac{\mathrm{PV}}{\mathrm{IO}} - \frac{\mathrm{IO}}{\mathrm{IO}} = \frac{\mathrm{PV} - \mathrm{IO}}{\mathrm{IO}} = \frac{\mathrm{NPV}}{\mathrm{IO}} \tag{29}$$

It is obvious that the order of interest is maintained when ranking the projects with the original PI (expression 28) or with the new measure described in (29); but the latter expression shows that, when we rank the projects according to their Profitability Index, we do so in terms of the value they contribute per euro invested; so that, if we follow the hierarchy given by the criterion, we would always be allocating each euro of budget 'in the best possible way'.

The problem is that, for the above reasoning to be correct, ***the projects must be divisible***, which in the context of business decisions is not frequent; and if the projects cannot be divided, there is no guarantee that the ordering provided by the Profitability Index is correct. The criterion would also be unreliable if the projects require ***outflows at different points in time***, and there may be budgetary constraints at those points in time when payments occur.

5.3. CONSIDERATION OF RISK IN THE MEASURES PRESENTED (INVESTMENT DECISION)

As we indicated at the beginning of this section, ***everything pointed out so far is valid, whether we assume an environment of certainty*** (a hypothesis that is always unreal, insofar as we do not know with certainty the future behaviour of all the variables involved), ***or if we think of a real risk situation*** (an environment in which the probability distributions of these variables are assumed to be known). Thus, the usefulness, the criterion for action and the advantages and disadvantages presented are applicable in any situation.

The ***nuances to be made*** in real risk environments would be twofold: on the one hand, the ***fund profile*** we face is not the one shown in Figure 2, but the one shown in Figure 17; and, secondly, and given that Financial theory is based, among others, on the hypothesis of 'risk aversion', ***the return to be demanded*** will be different depending on the risk provided by the different investment alternatives (in markets in which agents behave as risk-averse, there will be rewards for those who assume them: this is what we call 'risk premiums'; therefore, the opportunity cost will be higher for riskier decisions).

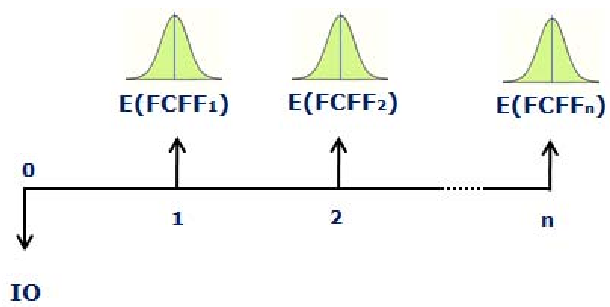

Figure 17

ADJUSTED NPV (DISCOUNT RATE ADJUSTMENT)

The logic presented is the one known in the financial literature as '***discount rate adjustment***', which is the most commonly used: the NPV is calculated by discounting the cash flows (expected, i.e., subject to risk) at a rate understood as the ***sum of the risk-free interest rate and the corresponding risk premium.*** The most common way of calculating the required return on an investment is by means of the 'Capital Asset Pricing Model', which is briefly presented in the following section (on the performance measures used in the capital markets). As will be seen in this section, the model proposes a calculation formula for estimating the return required for the project based on the relevant risk which, in the context of the model, is only that which cannot be eliminated by diversification.

$$K_e = R_f + (\mu^* - R_f) \text{ x } \beta_e \tag{30}$$

where K_e is the required return on the investment; R_f is the risk-free interest rate; μ^* is the expected market return; and β_e is the measure of systematic risk associated with the investment.

But the above ***is not the only way to consider risk in the investment decision***. We will see two other alternatives, identified with the names of 'Certainty Equivalent' and 'Penalized Present Value'.

ADJUSTED NPV (CERTAINTY EQUIVALENT)

The criterion proposes to calculate a risk-adjusted NPV, ***penalizing the interest of the projects through the numerator***. The idea is to replace the Expected Free Cash Flows to the firm ($E(FCFF_i)$, subject to risk) by the safe amounts ($FCFF'_i$) that give the individual the same utility (satisfaction), and then discount them at the risk-free interest rate: in general, this is achieved by applying a ***correction (penalization) coefficient 'α_i'*** to the expected flows, which will logically be less than unity if we start from the hypothesis of risk-averse individuals.

$$\mathrm{NPV_K} = -\mathrm{IO} + \frac{\mathrm{FCFF'}_1}{(1+\mathrm{K})^1} + \frac{\mathrm{FCFF'}_2}{(1+\mathrm{K})^2} + \cdots + \frac{\mathrm{FCFF'}_n}{(1+\mathrm{K})^n} \tag{31}$$

$$\mathrm{FCFF'}_i = \alpha_i \times \mathrm{E(FCFF_i)} \quad ; \quad \alpha_i < 1 \tag{32}$$

Although it is theoretically possible to calculate the correction coefficients (α_i) through the CAPM, in a manner consistent with the estimates needed to apply the Discount Rate Adjustment criterion, the usual way to analyse the interest of investment projects in risky environments is through the latter possibility.

PENALIZED PRESENT VALUE (PPV)

This is an original performance measure by Professor Fernando Gómez-Bezares. The general idea is to ***penalize the expected NPV with its risk***, measured by the standard deviation of the NPV itself. To avoid incurring a double penalization, the ***NPVs associated with the possible scenarios*** (those that allow the average and the corresponding standard deviation to be obtained) ***must be calculated at the risk-free interest rate***, since the penalization is calculated using this criterion in a later step.

There are ***many different ways of penalizing***. The one with the clearest interpretation is the ***linear penalization***.

$$\mathrm{PPV} = \mathrm{E(NPV)} - \mathrm{t} \times \sigma(\mathrm{NPV}) \tag{33}$$

where E(NPV) and σ(NPV) are, respectively, the expected value and standard deviation of NPV, and t is the parameter in which risk aversion is expressed; which will therefore be higher the greater the risk aversion.

The interpretation of the criterion can be seen in Figures 18 and 19. In the first one, the behaviour of four projects, A, B, C and D, has been represented. Assuming a linear penalization, the ***value of 't'*** is the ***slope of the line with ordinate at the origin equal to PPV*** on which the project can be placed: it is enough to clear E(NPV) in expression (33) to arrive at (34).

$$\mathrm{E(NPV)} = \mathrm{PPV} + \mathrm{t}\ \mathrm{x}\ \sigma(\mathrm{NPV}) \qquad (34)$$

As can be seen, projects A and D would have the same PPV, so they would be indifferent to each other; and they would also be indifferent to a hypothetical project whose behaviour would place it on the ordinate axis (the one with E(NPV) = $\mathrm{PPV_A}$ and σ(NPV) = 0), so ***PPV is a 'certainty equivalent NPV'***. And PPV can be understood as a ***utility measure***: when we try to find the projects with the highest PPV we try to place ourselves on the 'indifference line' as far as possible from the origin of coordinates (which will have the maximum level of utility associated with it). In our case, project B would be indifferent (certain equivalent NPV equal to zero), while project C, despite having a higher expected outcome than A or B, is not interesting (its PPV is negative, offering an insufficient reward for the risk it provides).

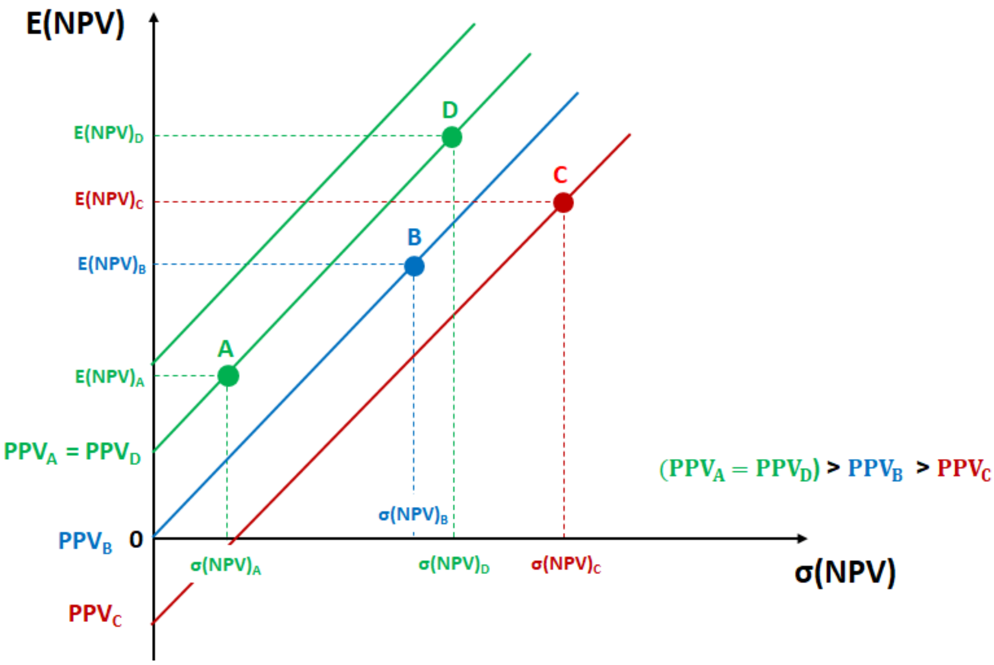

Figure 18

Let us now try to interpret the value of 't'. If we accept the ***hypothesis of normality*** of the NPV (which is somehow implicit when we reason considering only its expected value and its standard deviation), when we decide the value of 't' in the calculation of the PPV we are deciding '***how many standard deviations the PPV deviates from the average***' and, therefore, the probabilities to the left and right of that value. In this way, the PPV is the ***certainty equivalent NPV*** of the original average, and it is also the ***minimum guaranteed NPV with a probability that depends on the 't' value chosen***: the PPV calculated with a t=1 is the minimum guaranteed NPV with a probability of approximately 84%; while using a value t=2 means making the decision with the minimum guaranteed NPV with a probability of approximately 98%.

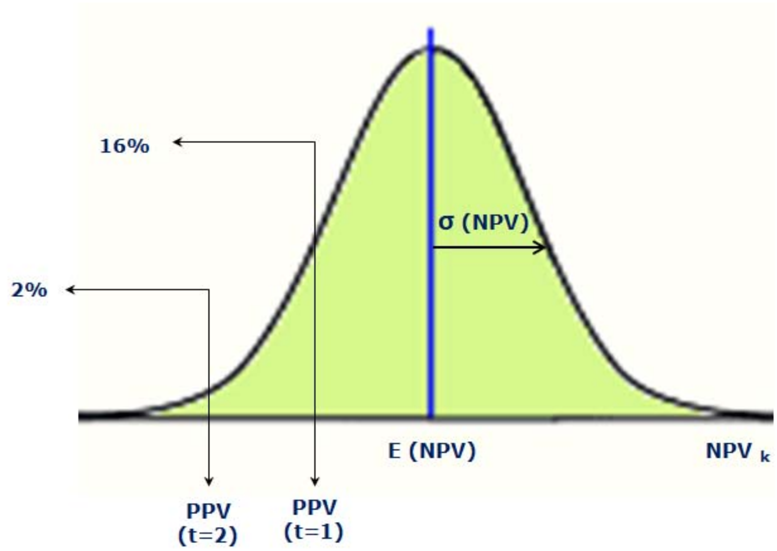

Figure 19

The above ***is not the only way to penalize the average NPV with its standard deviation***. In equations (35) and (36) ***two alternative ways*** are proposed:

$$\mathrm{PPV} = \frac{\mathrm{E(NPV)}}{\sigma(\mathrm{NPV})} \tag{35}$$

$$\mathrm{PPV} = \mathrm{E(NPV)} - \sigma(\mathrm{NPV})^{\mathrm{t}} \tag{36}$$

Both forms may be of interest in certain circumstances, but they also present some problems. The penalization by quotient has a clear interpretation: it indicates how many standard deviations the value 0 deviates from the average, so that maximizing the PPV thus defined actually implies trying to minimize the probability of obtaining an NPV<0 (which may seem suggestive, but implies focusing only on the negative part of the project and has the problems associated with performance measures defined as a quotient, which do not discriminate well, giving exaggerated advantages to some projects over others, when the denominators are small). And the exponential penalization (equation 36) has the advantage of assuming 'concave indifference curves from above', but the value of t is not as clearly interpreted as in the linear penalization.

6. PERFORMANCE MEASURES IN THE CONTEXT OF PORTFOLIO AND INVESTMENT FUND MANAGEMENT

We will begin by recalling some fundamental elements of ***Markowitz'***s ***Portfolio Theory*** (also known as the '***Mean-Variance Model***'). In the fifties of the last century, the aforementioned author proposed a model that could serve as a guide for portfolio managers in the financial markets, which subsequently also had an important impact on Corporate finance, insofar as the assets of any company can be seen as a 'project portfolio'. ***The fundamental assumptions*** on which the model is based can be summarized as follows:

- Perfect markets are assumed, in which information is public and available to all agents, who interpret it in the same way (hypothesis of 'concordance' or 'homogeneous expectations').
- A single identical time horizon is assumed for all agents in which they make their decisions and adjust their portfolios (single-period projects, with only two positions, one in which they invest and the other in which they withdraw the investment results).
- There is a risk-free interest rate at which agents can lend or borrow on an unlimited basis.
- In their decisions individuals are risk-averse, behave rationally and consider only the expected return and the risk of the different investment options (which implies, 'de facto', accepting the normality of return distributions).

Under the conditions described above, the agents will plot the behaviour of the equity securities in the μ-σ map (where μ_i is the expected return and σ_i is the total risk, measured by the standard deviation of return, of the security or portfolio in question). The next step is to study the behaviour of the portfolios that can be formed starting from the original securities: it can be shown that the combinations of return and risk achievable on the basis of each pair of original securities lie on convex arcs viewed from the vertical axis and whose degree of 'convexity' depends on the ratio existing between both (the lower the ratio, the greater the convexity); in this way the 'Possible opportunities map' shown in Figure 20 (the area enclosed in that sort of umbrella represented in orange; which assumes that short selling of risk securities is not allowed) is gradually woven.

If we now add the riskless security (whose yield we will denote R_f), we have a new point appearing on the vertical axis. It can be shown that the combinations between a riskless security and a risky security or portfolio are located on the straight line joining them in the μ-σ map; if we assume that agents can lend or borrow in an unlimited way at that rate, the ***map of possible opportunities*** expands to the right open triangle shown in the aforementioned Figure 20, defined by the tangent lines to the previous map at the top and bottom, respectively, and arising from the riskless interest rate.

Of this new map of possible opportunities, only the upper part is relevant, the straight line that starts at the risk-free interest rate and is tangent to the map of possible opportunities formed by securities and portfolios with risk (at a point that we call '***market portfolio***', characterized by the binomial μ^*-σ^* of return): this is what we call the '***efficient frontier***' (Figure 21). Indeed, the line includes the '***efficient portfolios***', which are those that have associated with them the maximum expected return for each level of risk; and the minimum risk for each level of expected return (remember that we assume individuals who 'prefer to have more rather than less' and behave as risk-averse). This line is also known as the 'Capital Market Line' (CML; see expression 37).

$$\text{CML:} \quad \mu_i = R_f + \frac{(\mu^* - R_f)}{\sigma^*} \text{ x } \sigma_i \tag{37}$$

On the other hand, and in Figure 20 itself (or in Figure 21), the so-called '***Tobin's separation theorem***' can be intuited: depending on their degree of risk aversion, agents will invest different proportions of their wealth in fixed income and equities; but the composition of the part of the portfolio invested in the latter will be the same for all: and the fact is that all efficient portfolios have a fixed-income portion and a '***market portfolio***' portion (the one associated with the tangency point) which includes all the existing risky securities and in the proportions that they actually show. Thus, the concept of '***diversification***' appears: given that it can be shown that the risk of a portfolio decreases as securities are added to it and that individuals are assumed to be risk-averse, agents will eliminate all possible risk by diversification, so that only the non-eliminable risk will remain, the so-called ***systematic risk***, related to the general course of the economy.

Based on the above, some authors constructed the ***CAPM*** (***Capital Asset Pricing Model***). Based on the ideas of Markowitz's model, they propose the calculation of a measure of the systematic risk (non-diversifiable) that any investment contributes to a portfolio (assumed to be fully diversified), the so-called ***beta***, which measures the ***degree of relationship between the security or portfolio under study and the market as a whole***: beta is the slope of the straight line that best fits the cloud of points resulting from studying the behaviour of the security and the market at different times during a period considered sufficiently significant (formed, for example, by the monthly returns obtained over the last five years; this is the well-known ***Security Characteristic Line, SCL***, shown in Figure 22).

Thus, the ***relevant risk of a security or portfolio is not its total risk (σ_i), but only that which it contributes to a diversified portfolio*** (the systematic risk, measured by beta), so that the return to be demanded is calculated by adding to the risk-free interest rate a premium obtained by multiplying the premium offered by the market per unit of systematic risk (the difference between the expected return for the market portfolio (μ^*) and the risk-free interest rate (R_f); since, by definition, the market beta is equal to unity) and the amount of (systematic) risk provided by the security or portfolio in question (β_i). We thus have the well-known ***'Security Market Line', SML***, shown in Figure 23.

Theoretically, and ***in equilibrium, all stocks and portfolios should lie on the two aforementioned lines, the CML and the SML***. In the real world, agents will try to detect securities and portfolios that are undervalued, that beat the market: they will be those that are above both, those whose expected return is higher than what would be required of them based on their risk.

The performance measures shown below are included in the proposed line, and consider the total risk or only the systematic risk, depending on whether or not the portfolio to be constructed is understood to be responsible for diversifying the risk for its owner.

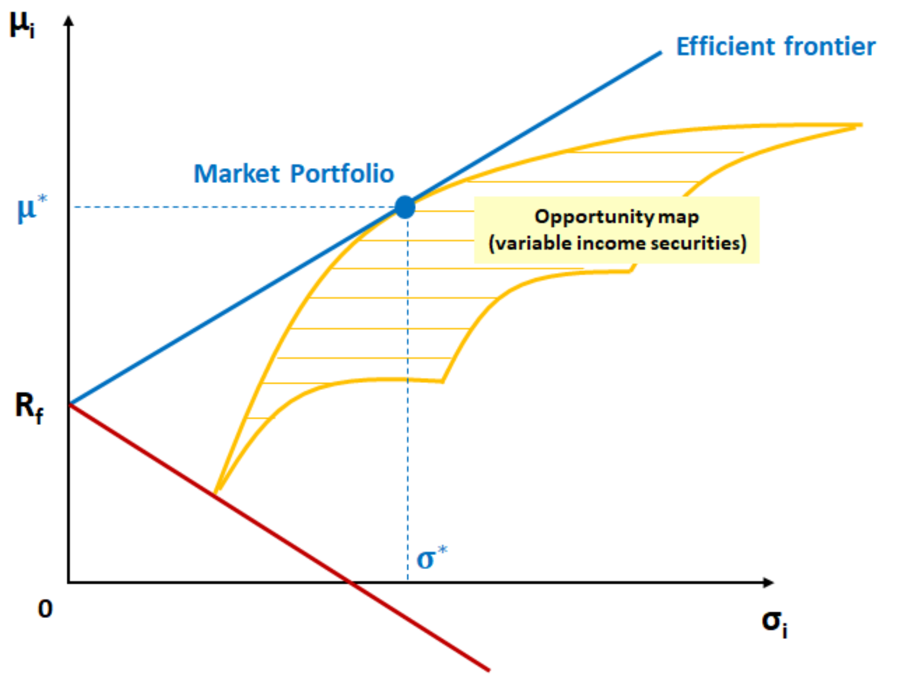

Figure 20

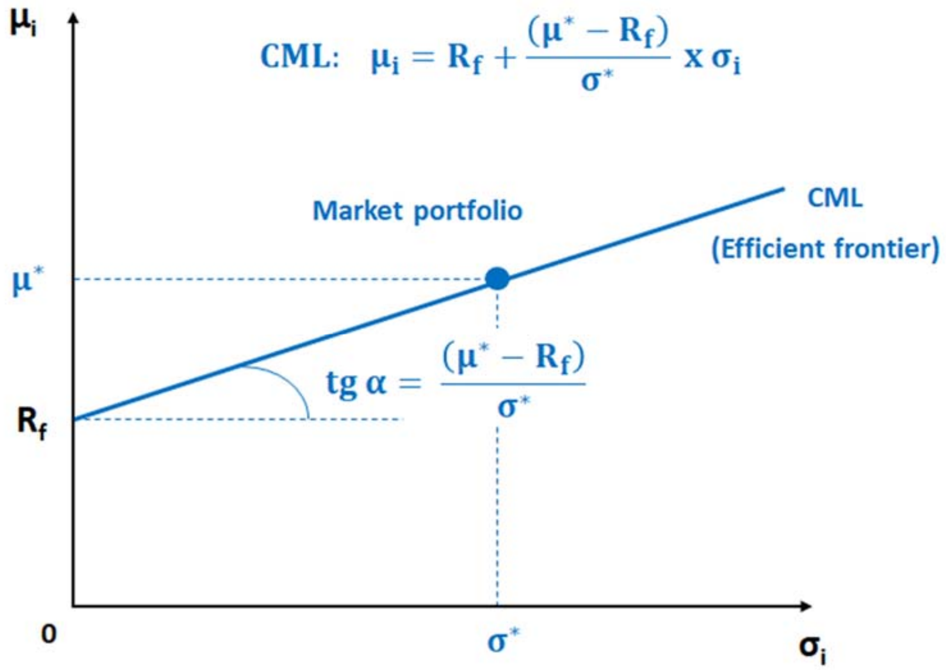

Figure 21

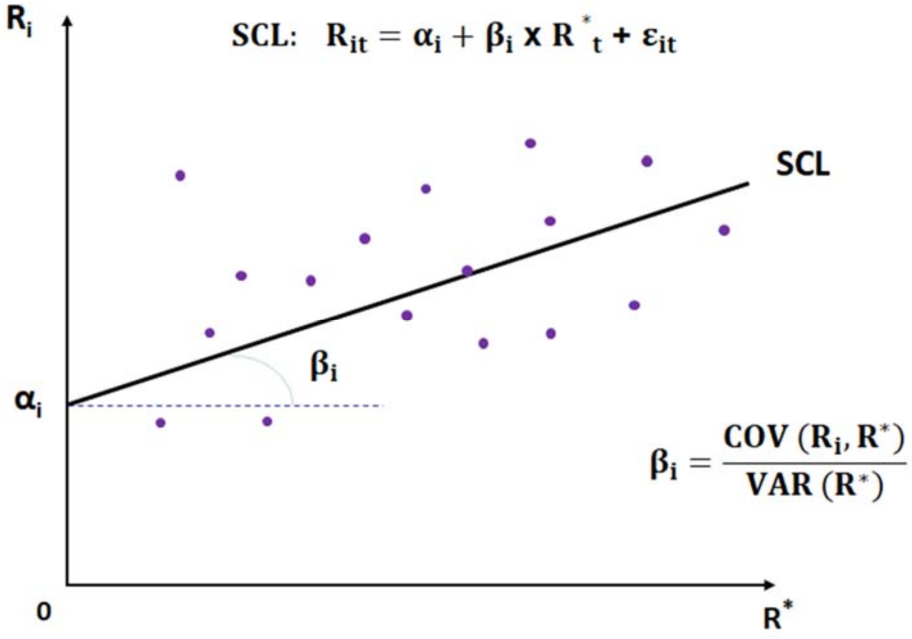

Figure 22

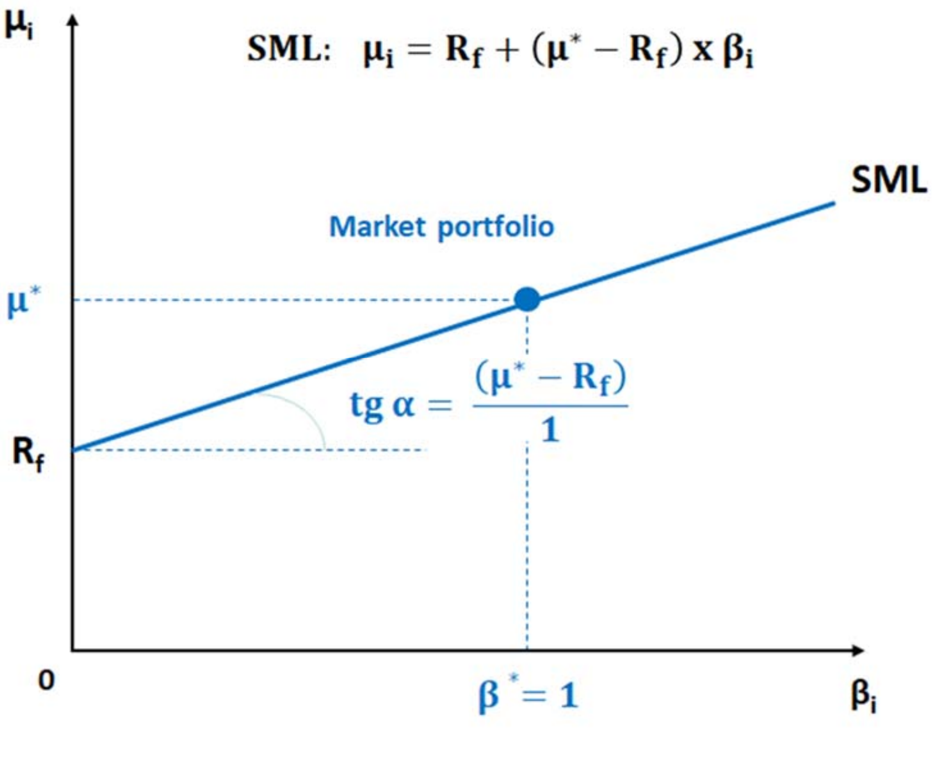

Figure 23

SHARPE RATIO (S_i)

It measures the ***return premium*** offered by the security or portfolio studied 'i' ***per unit of total risk*** assumed:

$$S_i = \frac{\mu_i - R_f}{\sigma_i} \tag{38}$$

where μ_i and σ_i are, respectively, the expected return and the total risk of the security or portfolio under study and R_f is the risk-free interest rate. It is easy to see that the Sharpe ratio coincides with the slope of the straight line that starts from the risk-free interest rate and 'passes through' the behaviour of the studied security or portfolio in the μ-σ map of return. As can be seen in Figure 24, security A (in green) beats the market (represented in blue in the graph) and this in turn beats security B (in red); despite the fact that the latter is the one with the highest expected return, it has the worst performance in the Sharpe index (since in the conditions in which we reason, the important thing is the risk-return binomial).

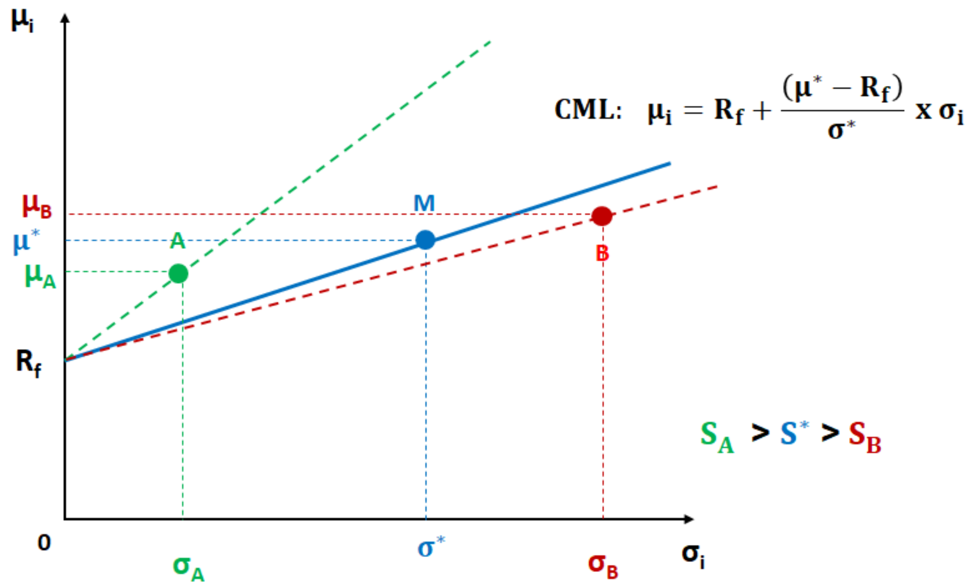

Figure 24

The criterion has a problem, common to all measures that are defined in the form of a ratio: its value is triggered when we analyse securities or portfolios with low risk, causing exaggerated differences between alternatives with small differences in terms of total risk.

In any case, it is an interesting measure to analyse the interest of investments ***when a sufficiently diversified starting situation cannot be assumed*** (i.e., when it is the decision itself that implies the responsibility of diversifying risks, in which case the relevant risk is the total risk).

TREYNOR INDEX (T_i)

It is defined as the ratio between ***the risk premium*** associated with the security or portfolio under study and the ***amount of systematic risk*** measured with beta (equation 39).

$$T_i = \frac{\mu_i - R_f}{\beta_i} \tag{39}$$

where μ_i and β_i are, respectively, the expected return and the systematic risk of the security or portfolio studied and R_f is the risk-free interest rate. As can be seen in Figure 25, the Treynor index coincides with the slope of the straight line that starts from the risk-free interest rate and 'passes' through the behaviour of the security or portfolio studied in the μ-β map. Thus, those securities or portfolios with a slope greater than the difference between the expected market return (μ^*) and the risk-free interest rate (R_f) will be of interest, i.e. greater than the slope of the SML, since the market beta is equal to 1.

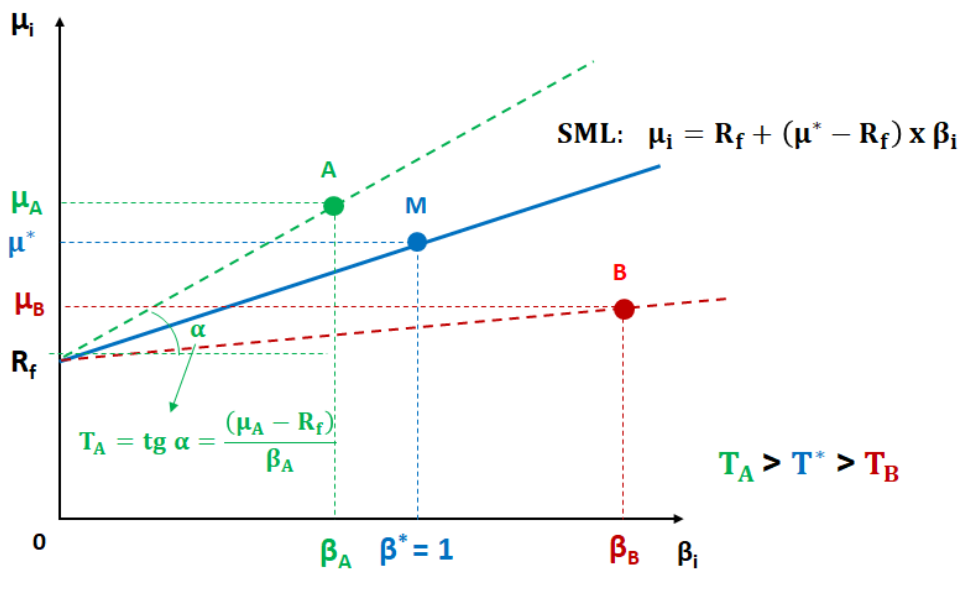

Figure 25

Figure 25 also shows that security A is interesting (it beats the market, being 'above the Security Market Line (SML)', it yields more than what would be required of it based on its systematic risk); while security B, although it yields above the risk-free interest rate, is not interesting (the risk premium it offers is insufficient).

The measure is interesting for judging the interest of securities or portfolios when there is no diversification need (i.e., ***when we assume that the security or portfolio studied is incorporated into a fully diversified portfolio***); and it presents the problem of any ratio (it shows exaggerated differences for investments with different risks when such risks are low).

JENSEN'S INDEX (J_i)

Jensen's index is defined as the ***difference between the risk premium offered*** by the security or portfolio under study ***and that which it should have given according to its systematic risk*** measured by beta. The formulation can be seen in equations (40) and (41); perhaps in the latter expression it is clearer that what is measured is the vertical distance between the behaviour of the security or portfolio studied and the straight line that delimits the area of interesting opportunities from those that are not (the Security Market Line, SML; all this can be seen in Figure 26).

$$J_i = (\mu_i - R_f) - (\mu^* - R_f) \text{ x } \beta_i \qquad (40)$$

$$J_i = \mu_i - [R_f + (\mu^* - R_f) \text{ x } \beta_i] \qquad (41)$$

where μ_i and β_i are, respectively, the expected return and the systematic risk of the security or portfolio under study, μ^* is the expected return of the market portfolio and R_f is the risk-free interest rate.

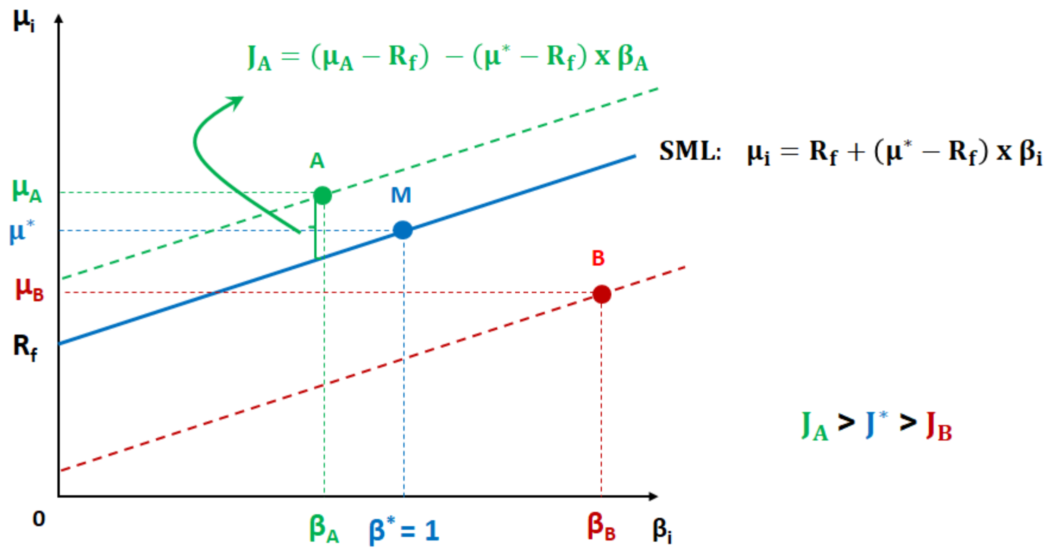

Figure 26

In the aforementioned Figure 26 it can be seen again that security A is interesting (it beats the market, it is above the SML, it yields in expected terms more than what would be demandable in terms of its risk), while security B is not. Moreover, Jensen's index does not have the problem of performance measures expressed in terms of quotient; and it considers systematic risk as the only relevant risk (so it is applicable in situations where we assume that the securities or portfolios studied will be incorporated into sufficiently diversified portfolios).

JENSEN'S ALPHA DIVIDED BY BETA (J/β_i)

Dividing by beta in expression (40), the so-called Jensen index divided by beta compares the premium per unit of (systematic) risk associated with the security or portfolio in question and that corresponding to the market (see expression 42): in other words, it is the ***difference between the Treynor indexes*** corresponding to the ***security studied and to the market portfolio***. Therefore, it compares the slope of the straight line that starts from the risk-free interest rate and 'passes' through the behaviour of the security or portfolio studied in the μ-β map with the slope of the Security Market Line (SML). It presents the same usefulness and problems as those indicated for the Treynor index.

$$\frac{J_i}{\beta_i} = \frac{\mu_i - R_f}{\beta_i} - \frac{(\mu_i - R_f) \times \beta_i}{\beta_i} = T_i - T^* \qquad (42)$$

These are the ***classic measures***. In recent years, some ***new measures*** have been added to the above, which, in most cases, simply add ***interesting nuances*** to what has been presented so far. Let us look at the most important ones.

MODIGLIANI AND MODIGLIANI M^2 INDEX

It is ***directly related to the Sharpe ratio***. But instead of measuring the slope of the straight line that starts from the return of the risk-free security and passes through the behaviour of the security on the μ-σ map, it calculates the ***expected return of a leveraged*** (or deleveraged) ***portfolio***, ***consisting of a risk-free security and the security or portfolio under study in such proportions that the risk of the resulting portfolio coincides with that associated with the market portfolio***, thus making the return of the portfolio under study directly comparable with that of the market portfolio. As can be seen, it is impossible for the measure to disagree with the ranking obtained from the Sharpe ratio, since in reality the two measures study the same thing, although they present results in a different way.

In any case, this is an interesting measure, as it ***makes the returns of securities and portfolios directly comparable*** (by placing their expected returns in the vertical that corresponds to the risk of the market portfolio). All this can be seen in Figure 27.

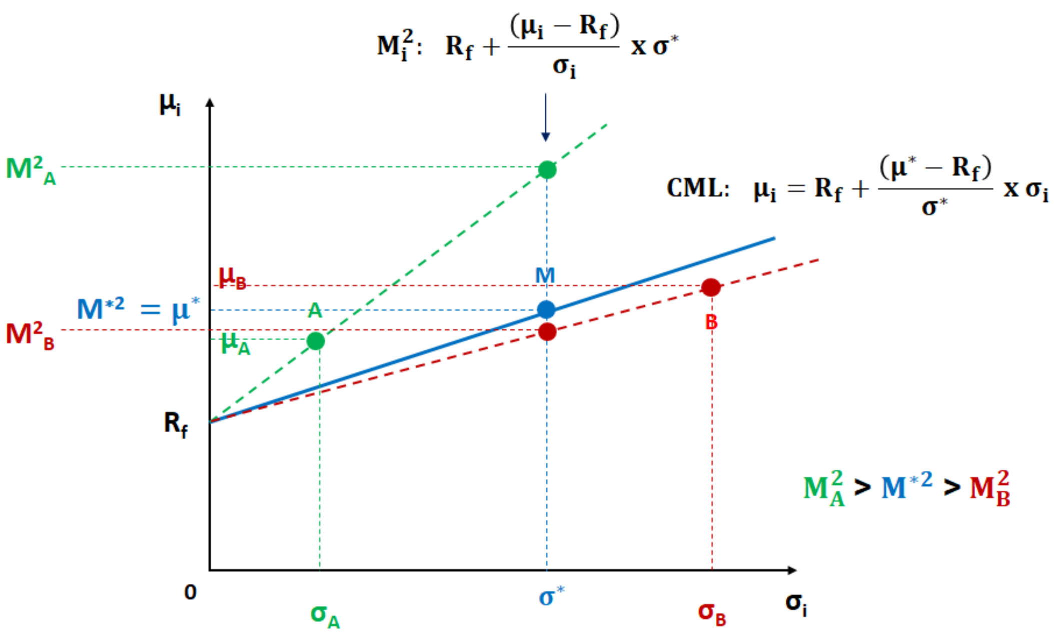

Figure 27

PENALIZED INTERNAL RATE OF RETURN (PIRR)

The Penalized Internal Rate of Return (PIRR) is a criterion ***based on the original idea of Professor Gómez-Bezares***, consisting of ***directly penalizing the average NPV with its standard deviation***, but applied to the IRR criterion. It can be defined as an ***alternative to the Sharpe Ratio*** (i.e., to judge the interest of securities or portfolios, assuming insufficient prior diversification), in which case, the relevant risk would be the total risk (measured with the standard deviation of return):

$$\mathrm{PIRR}_i = \mu_i - t \times \sigma_i \tag{43}$$

(where μ_i and σ_i are, respectively, the expected return and total risk of the security or portfolio studied and t is the penalization parameter that converts the expected return of the security or portfolio studied into the 'certainty equivalent return'); or as an ***alternative to the Treynor Index***, in which case the relevant risk would be only the systematic risk (measured with β):

$$\mathrm{PIRR\ beta}_i = \mu_i - t \times \beta_i \tag{44}$$

The interpretation in both cases is the same (***certainty equivalent return***), but the reasoning takes place on different maps: the PIRR reasons on the μ-σ map, so the value to be given to the parameter t is the Sharpe ratio corresponding to the market portfolio (i.e. the slope of the Capital Market Line, CML); while the PIRR-beta does so on the μ-β map, the value to be given to t being the slope of the Security Market Line (SML). All this can be seen in Figures 28 and 29, respectively.

As can be easily intuited, the rankings provided by the Sharpe Index do not always coincide with those reported by the PIRR; nor do the rankings obtained from the Treynor Index and the one corresponding to the PIRR-β necessarily coincide (although the latter will always do so with the one provided by the Jensen index).

The ***advantage*** of the PIRR is that it performs the penalization in a linear manner, ***overcoming the problems associated with ratios*** (an advantage it shares with the Jensen Index).

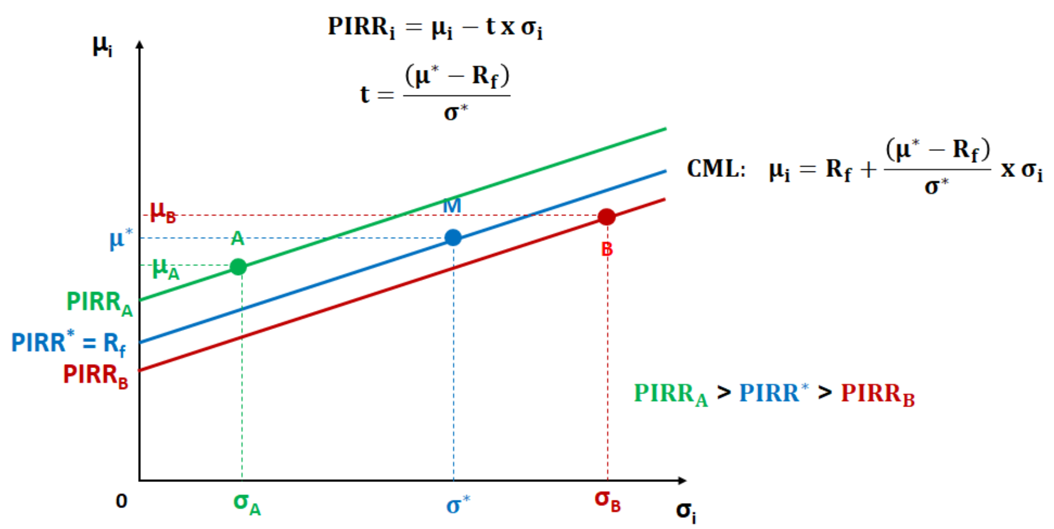

Figure 28

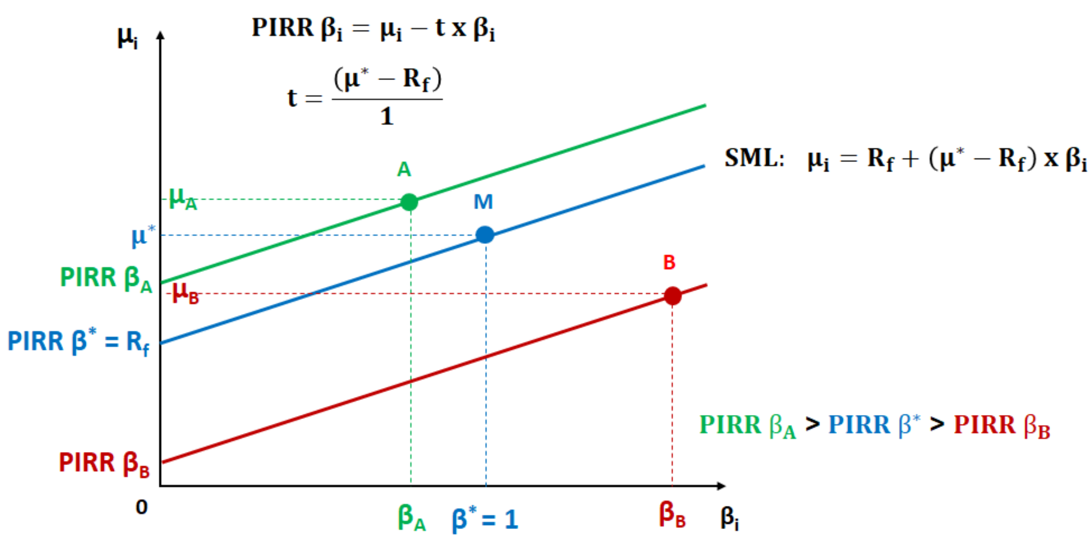

Figure 29

TRACKING ERROR (t_e)

The tracking error is the ***difference between the return obtained by the security or portfolio*** studied in a specific period ***and that associated with the portfolio taken as a benchmark*** (for example, the market portfolio we have been using so far). It will therefore take positive values when the security or portfolio beats the market; and vice versa.

Once the values associated with a set of periods that can be considered as sufficiently representative have been obtained, it is interesting to study the ***distribution of the tracking error***, calculating its average and standard deviation. Assuming normality of this distribution, we can connect it to the next performance measure, the Information Ratio.

INFORMATION RATIO (IR)

The Information Ratio is defined as the ***ratio between the average tracking error (μ_{TE}) and its standard deviation (σ_{TE})***. If it is reasonable to accept the hypothesis of normality of the tracking error, the ratio that we now present is related to the ***probability of beating the benchmark*** with the security or portfolio studied (the higher the value of the ratio, the further the zero is from the average, so the probability of beating the benchmark will be higher).

$$\mathrm{IR} = \frac{\mu_{TE}}{\sigma_{TE}} \tag{45}$$

7. A BRIEF REFERENCE TO MULTIPLES

Although ***multiples are not strictly speaking 'performance measures'***, but rather methods used in the ***valuation of companies*** (in the context of the technique known as 'valuation by comparables'), we will present here the most frequent ones, since they are sometimes used to try to find overvalued or undervalued companies. The procedure consists of taking the value of the multiple observed as an average in the corresponding sector, applying it to the company in question and comparing the resulting value with that observed in the market. One or other multiples are used depending on what is understood to best define the behaviour in each sector and at each specific time, so we will limit ourselves to defining the most commonly used ones.

PRICE EARINGS RATIO (PER)

$$\mathrm{PER} = \frac{\text{Equity (market value)}}{\text{Expected Net Profit}} = \frac{E_M}{E(NP_1)} \tag{46}$$

MARKET VALUE ADDED

$$\frac{\text{Equity (market value)}}{\text{Equity (book value)}} = \frac{E_M}{E_A} \tag{47}$$

TOBIN Q-RATIO

$$\frac{\text{Assets (market value)}}{\text{Assets (book value)}} = \frac{TA_M}{TA_A} \tag{48}$$

PRICE / EBIAT

$$\text{PER (Assets)} = \frac{\text{Enterprise Value (EV)}}{\text{EBIAT}_1} \tag{49}$$

where Enterprise Value (EV) is the market value of the sum of equity and borrowed funds and $EBIAT_1$ is the expected return on the sum of equity and borrowed funds (earnings before interest and after tax).

PRICE / EBIT

$$\frac{\text{Enterprise Value (EV)}}{\text{EBIT}_1} \tag{50}$$

where Enterprise Value (EV) is the market value of the sum of equity and borrowed funds and $EBIT_1$ is the earnings expected to meet tax obligations and to return the sum of equity and borrowed funds (earnings before interest and taxes).

PRICE / EBITDA

$$\frac{\text{Enterprise Value (EV)}}{\text{EBITDA}_1} \tag{51}$$

where Value (EV) is the market value of the sum of equity and debt and $EBITDA_1$ is the expected earnings before interest, taxes, depreciation and amortization.

PRICE / SALES

$$\frac{\text{Enterprise Value (EV)}}{S_1} \tag{52}$$

where Enterprise Value (EV) is the market value of the sum of equity and debt and S_1 is the expected sales.

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A (GENTLE) INTRODUCTION TO BUSINESS VALUATION: DISCOUNTED CASH FLOW, PENALIZED PRESENT VALUE AND COMPARABLES

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1. INTRODUCTION

1.1. RATIONALITY AND VALUATION 'BY FUNDAMENTALS'

A short time ago I had an ***interesting conversation with a student*** who was nearing the end of his undergraduate financial education. After having taken most of the common subjects related to Accountings, Financial Mathematics and Corporate Finance, and with the prospect of working in Investment Banking (where he was already doing an internship, which included asset valuation tasks), he told me about a conversation he had had with an interviewer in the context of the corresponding recruiting process. In it, the interviewer asked him to defend what he had done in a valuation activity, and asked him for '***arguments to justify his calculations and results and that allowed the interviewer not to worry about the thing***'.

Naturally, in communication processes there is often noise, and the messages we want to convey are not always understood exactly. My first thought was simply to try to clarify what the interviewer's intention was: he was certainly someone with extensive experience and who could not demand that a candidate who had not yet finished his degree give him 'definitive' (or 'unsettling') arguments: by simple *reductio ad absurdum*, what he was probably looking for was a certain attitude, that sufficient starting knowledge combined with an ability to argue why to use the techniques applied in a given context was evident, trying to detect whether what had been done was a mere application of learned recipes or the result of a process of reflection, an attempt to adapt cited recipes to a specific situation and with sufficient criteria.

Once we reached agreement on this point, the student's concern (he was a solvent person, with interest in the subject and a sufficient background, both in compulsory subjects and in other electives, which meant a reasonable knowledge background from a theoretical point of view) had to do with what could await him in a job like this: in a simplified way, the big question could be ***'will I be able to sleep peacefully at night?'***. Deep down, ***his concerns reminded me quite a bit of the questions raised by Immanuel Kant*** and which he always tried to answer in his works:

- ***What can we know?***

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- ***What should we do?***
- ***What can we expect?***

I suppose that, in some way, the reflection I proposed at this point was inspired by the questions posed by the brilliant philosopher; applied to our case, they would have to do with our possibilities of knowing 'the true value' of things (companies in this case); the path we must follow to try it; and the consequences to be expected if we 'get the process right'.

If in order to 'have a clear conscience' we need to have the '***guarantee of getting it right***', the truth is that things do not look good. And the fact is that, no matter how much we know the technique and no matter how much time we devote to the process of valuing a company; no matter how intelligent and intuitive we are in relation to an uncertain future; we will never have a guarantee of 'getting it right' (which, in a logic of 'justice', should result in the corresponding prize). And I reminded him of an anecdote that he had probably heard in one of the parallel courses that I knew he had attended: that of the ***reflection on capital markets that Keynes proposed*** about a hundred years ago.

Apparently, in the twenties of the last century there was a ***contest*** in the United States of America that consisted of choosing the six most beautiful faces from a group of 100 proposed by a newspaper of the time. The contestant's opinion was compared with that of the other participants: in the end, the winner was the person whose choice was closest to those chosen by the whole group.

The intelligent person who wants to win (although perhaps the very fact of participating in a game of these characteristics could cast doubt on this starting hypothesis) quickly realizes that the contest is not aimed at trying to approach or guess the objective and indisputable canons of beauty: what it is about, as long as we want to win, is to guess or anticipate the preferences of the other participants. Thus, the logical strategy would not be to choose the faces that I think are the most beautiful, but those on which I think the votes of the other participants will be concentrated. The problem is that, if I think that the others will realize the same as me and will act rationally, they will not choose the ones they prefer either, but the ones they think will be preferred by the rest.

If we apply this logic to the markets, trying to 'bet' on the winning companies, what we are trying to do is to invest in those securities that we think will seem to others that the rest of the 'participants' believe they will succeed, so that the skilled investor is not the one who best calculates the 'fundamental variables' that give value to the listed companies, but the one who best intuits which companies will be especially valued because others believe that it will seem so to the rest.

Years later, a well-known financial newspaper proposed an experiment closely related to the previous reflection, and which made it possible to study some interesting aspects of the behaviour of its readers in terms of rationality. The contest consisted of selecting a number between 0 and 100; with the numbers chosen by the participants, the average would be calculated, and a correction coefficient of 2/3 would be applied to this average: the winner of the contest would be the one that came closest to the result of the described operation (two thirds of the average of the selected numbers).

What is the strategy that an intelligent person who wants to win should follow? Well, the truth is that it is not clear, it depends in an important part on the degree of rationality that he attributes to the rest of the participants (whom he probably does not know at all). Let's dedicate a few lines to think about some possible strategies.

If we think that no participant is going to spend a moment thinking about his strategy and we have some information or intuition that makes us think that 'there is a clear preference for high numbers', we could bet that the average will coincide with the maximum possible value (100); applying the factor 2/3 we find that a number higher than 66,6 has no chance of being right, so we would choose a value equal to or lower than that figure. If we now replace the preference for high numbers by pure chance, that is, if we think that nobody thinks for a minute about his strategy and lets himself be carried away by chance, the expected average would be 50, which would become 33,3 when applying the correction factor; but this would mean that nobody notices what I see.

In short, and so as not to lengthen the story unnecessarily, our strategy must take into account what we think the other participants are going to do; so, the more rationality we assign to the decisions of the rest, the lower the number we will choose (in the extreme, if we think that everyone else is going to reason with the same logic as me, the number we should choose is zero; a situation in which no one would win -or, seen in another way, we would all win; 'fair', what is won in a world in which no one has an advantage over the rest-).

Decisions in the capital markets have something (quite a lot) to do with the previous reflection, especially if we think of a ***speculative type of investor***, one who is not interested in 'participating in the real progress of the company', but simply wants to detect interesting opportunities to achieve extraordinary returns in the short term, anticipating the movements that will occur in the market (that is, detecting before others the securities that are 'over' or 'under' valued, and that will go down or up in their price when the rest realize what we have seen today). This type of investor starts from a concept that some identify with the '**accepted value'**, the important thing is not to discern if there are 'objective' reasons that justify the 'true' value of something, but simply to detect what is the value assigned (and the one that will be assigned in the future) to the asset in question. And the techniques used by this type of investor in his decision making do not have to do with the study of the consequences caused by the behaviour of the most important variables in his economic activity, but with the psychological reasons that explain the behaviour of investors.

The reflection proposed in this reading is intended to be useful for a ***long-term investor***, i.e. it assumes that what we want is to calculate the value of a company 'that is justified by the real activity that it will carry out in the future'. For this investor, ***the important thing is to detect and adequately estimate the behaviour of what are known as 'fundamental' variables***, those that justify, in the real activity of the company, its value. And connecting again with the first question posed by Kant (what can we know?), bearing in mind that valuing from the proposed perspective requires 'imagining the future' (a process that is powerfully influenced by the expected behaviour of the rest of the world -not only investors, but also consumers, authorities, etc.-), it is possible that what we are looking for does not exist: this in turn may refer us to another great philosopher. Perhaps the only thing we can really know is the price, which can be understood as a distorted image of the true value ('objective value' or 'intrinsic value' are terms commonly used in this field); however, my limitations as a prisoner who can only see the projected images of ideas on the wall of the cavern in which I am chained should not discourage me in my attempt to know the true value... with due humility.

In other words: the fact that the price at which a deal closes does not match my estimate of the company's value does not (necessarily) mean that my calculations are wrong; ***in the real world, good work is not always rewarded***. But it also seems reasonable to think that, in the long run, the more knowledge and experience I have, and the more time and resources I devote to the work involved, the better my chances of getting it right will be.

1.2. VALUATION BY COMPARABLE TRANSACTIONS

Before starting the complex process of valuing a company using the discounted cash flow technique, let us make a brief reflection on an alternative that may seem suggestive (especially because of its simplicity in relative terms compared to discounted cash flow). We refer to ***multiples***, a tool that is part of a broader logic known as '***valuation by comparable transactions***' (and which is proposed, among others, in the conceptual framework of our General Accounting Plan, more specifically in the area of calculating the 'fair value' of certain elements for which there is an active market).

Valuation by comparables is a technique that we use on a regular basis in our (even personal) decisions. ***An example can be seen in the scales used in the appraisal of real estate***, which conditions, for example, the maximum amount that a financial institution will normally be willing to lend to a potential buyer. The appraisers apply the corresponding scale, once the relevant measurements have been made and a good deal of relevant information has been collected, which attempts to put the measurement made into context: in which street the property is located, existence or not of elevator, availability or not of garage (and conditions of access to it), number of bedrooms and bathrooms, general state of conservation, community expenses (related to the corresponding additional services), availability or not of terrace (shared or common), swimming pool or sports facilities available, distance in relation to schools or parks, ease of access to public transport, difficulty of entry/exit from the city, etc. Thus, a square meter of house in a given street can have completely different prices depending on a large number of factors that may be different, the square meter is not a totally homogeneous measure (not even for two apartments located in the same neighbourhood).

Something similar occurs with the use of 'comparable operations' in the valuation of companies. In this context, it is common to use one of the so-called 'multiples'; perhaps the best known is the ***PER*** (***Price Earnings Ratio***), which, as its name suggests, relates the price of a company to the profit obtained (or expected). Thus, the usual way of proceeding in this context is to calculate the average PER of the sector in which the company I want to value falls (which is normally estimated from the information provided by listed companies) and then apply the multiple obtained to the profit of the company under study. It is not necessary to go into great depth to criticize a valuation obtained in this way, which implicitly assumes the ***'ceteris paribus' clause*** (all else being equal), when we are certainly not talking about 'homogeneous square meters'.

However, this cannot be seen as an 'amendment to the whole' in relation to multiples (or, in general, to 'valuation by comparables'): ***the profitability to be demanded from any business project must have its reference in the market***, it is always an 'opportunity cost'; thus, for example, the moment we use models such as the CAPM to calculate the profitability to be demanded from a company based on its risk (we will see this in greater detail later), we enter into the logic of comparable operations; and even more so if, as usual, we calculate the beta (a measure of the relevant risk) by means of a 'deleveraging and post-leveraging' procedure of that calculated for a listed company that can be taken as a reference: in the whole process we are reasoning in the key of 'comparable operations'.

In short, ***multiples 'are not an aberration', but they should be used with caution***: they should not be conceived as a quick (and very convenient) alternative to discounted cash flow valuation (which is the technique we advocate in this reading and which involves a significant effort to estimate a multitude of variables). As we will see later, there are circumstances in which a multiple can coincide with the result of applying the valuation technique by fundamental variables; but short paths are not always justified in the real world (valuation by multiples is easier; but it does not imply, as some suggest, accepting fewer demanding assumptions than those implicit in the discounted cash flow valuation, which is indisputably the most logical from a conceptual point of view).

2. VALUATION BY FUNDAMENTALS: DISCOUNTED CASH FLOW

In this section we are going to define the process to be used to value a company using the best possible technique from a theoretical point of view, the discounted cash flow, which is summarized in expression 1 (where V_0 is the value sought, Q_i is the expected cash flows of the company and k is the return required as a function of its risk).

$$V_0 = Q_1 / (1+k) + Q_2 / (1+k)^2 + Q_3 / (1+k)^3 + ... \quad (1)$$

In brief, ***the process consists of five steps***:

- ***Determination of the 'most accurate estimation period'***. This consists of deciding the time horizon over which we will make the 'accurate' estimate of the future behaviour of the most important variables that condition the company's performance: these are what are known as '***fundamental variables***', such as sales or expected costs, the investments that the development of the activity will require, the impact that inflation will have on the different variables involved, collection and payment terms, fiscal policies (tax on profits, value added tax) or the foreseeable evolution of interest rates (which will influence the cost of the debt that will be used to finance part of the company's assets to be valued); among many others. The time horizon over which 'we dare to estimate the (expected) behaviour of these variables' must therefore be decided in advance. Normally, it is not advisable to work with periods longer than five years, since our ability to make reliable estimates of a future that is increasingly subject to a process of continuous change is certainly limited.

- ***Estimation of the behaviour of the variables indicated within the defined time horizon*** (the aforementioned period of more precise estimation).
- ***Preparation of the corresponding financial projections*** (balance sheets and income statements based on the behaviour of the variables defined above), which, through the application of the corresponding technique (study of the sources and uses of funds), allow the calculation of the so-called '*free cash flows*', which constitute the estimate of the money that the owners of the business will have to put in and will be able to withdraw from it in the previously defined time horizon.
- ***Estimation of the 'terminal value'***. Once the flows corresponding to the most accurate estimation period have been calculated, we must estimate the liquidation value of the business at the end of that period. Insofar as we assume, as is usual, that the company to be valued has a corporate purpose that is 'indefinite in time', the amount for which the business could theoretically be sold at that time must be calculated, and which may have very little to do with the price at which each of its parts could be liquidated separately. If we defend the logic of discounted cash flow valuation, this value would also be calculated by trying to estimate what a potential buyer will obtain from the business from that time onwards: in this context it is usual to use more or less sophisticated formulas of financial mathematics, which assume some kind of regularity in the expected behaviour of future flows; it is common to refer to this as '**continuation value**'.
- ***Calculation of the 'cost of funds'***, an estimate of the profitability that should be required from the company to be valued according to its risk. It is common in this context to use a logic based on the CAPM model, which will be presented later.

Based on the above, ***we would be able to calculate the value of the company*** by simply applying the ***discounted cash flow technique***, which consists of discounting (calculating the present value) of the estimated cash flows (which include the 'continuation value' in the last year of the estimation period considered) using the previously calculated risk-adjusted rate (the aforementioned cost of funds; you can review formula 1 again) as the discount rate.

This approach follows the logic of what is known in finance as the '***discount rate adjustment***' criterion, which is defined as the process of discounting the expected cash flows of an asset (subject to variability) at a rate suitably adjusted for risk (understood as the sum of the risk-free interest rate and the corresponding risk premium). But there are other ways of valuing, logically consistent with the technique described above (i.e. based on discounted cash flow), but which 'look' at things from slightly different points of view. Thus, we will also propose the application of a logic related to what Fernando Gómez-Bezares calls '***Penalized Present Value***' ***(PPV)***; and we will complete all this with the convenient '***sensitivity analysis***', trying to detect those variables to which the value obtained is particularly sensitive, as well as with the use of ***multiples*** at different levels, which allow us to better contextualize the value obtained through the discounted cash flow valuation technique.

2.1. Determination of the most accurate estimation period

As we indicated earlier, this decision has to do with our ability (or rather, ***the ability we attribute to ourselves) to foresee the future***. In the near past, periods of five to ten years were relatively common. As the speed of change has grown (and will continue to grow) exponentially, it seems clear that our ability to imagine even such a distant future is diminishing.

Although ***the decision is influenced by the sector in which the company operates*** (it is not the same to think of an activity related to the manufacture of cars as it is to think of one that has to do with the production of cheese from sheep's milk; although the change in the way of doing things in the primary sector has been spectacular in recent years, our ability to imagine the future in this field is probably greater than in the first), it does not seem sensible, in general, to consider periods of more than five years; thus, we could be thinking of periods of between three and five years.

The problem lies in the fact that when we set a time frame as described above, we are not avoiding the problem of 'trying to imagine the more distant future': remember that, if we start from the hypothesis of companies that are incorporated with an indefinite corporate purpose in time, 'shortening' the period of more accurate estimation implies dumping an increasing part of the value to be estimated in the so-called 'continuation value'; thus, ***we do not escape from performing the complicated task of making estimates in the future*** (although doing so in the continuation value gives us that false sensation of simplicity).

As you may also have guessed, all of ***the above is related to the applicable discount rate***: indeed, it is true that the longer the more precise estimation period chosen, the lower the relative importance of the continuation value; as is the fact that the weight of the continuation value will be, all other things being equal, lower the higher the discount rate used, which in turn is influenced by the ***interest rate environment*** in which we work and the ***risk of the business activity*** of the company under study.

2.2. Compilation of the information necessary for financial forecast

In terms of the information needed to value a company, the discounted cash flow technique requires estimating the behaviour of all the variables that may have an impact on the activity being carried out. It is common to carry out a ***top-down analysis***, which consists of starting with the most general (expected global evolution of the most important macroeconomic variables, such as economic growth or inflation; also those related to key geopolitical factors or those related to economic cycles), and then moving down to the level of the company in its immediate environment (passing through the estimation of variables at country and sector level, before 'landing' on those corresponding to the company in question). The reflection process will give rise to what in the context of financial forecasting we call the '***operating budget***', which reflects the expected behaviour of all the variables that have an impact on the company's future financial statements, and which ultimately determine its ability to generate funds.

2.3. Calculation of *free cash-flows* (Fund profile of the asset to be appraised)

Based on the financial forecasts made on the basis of the behaviour of the key variables defined in the operating budget, the ***calculation of cash flows*** is simple: it is sufficient to apply the logic of the Cash Flow Statement, as summarized in Figure 1.

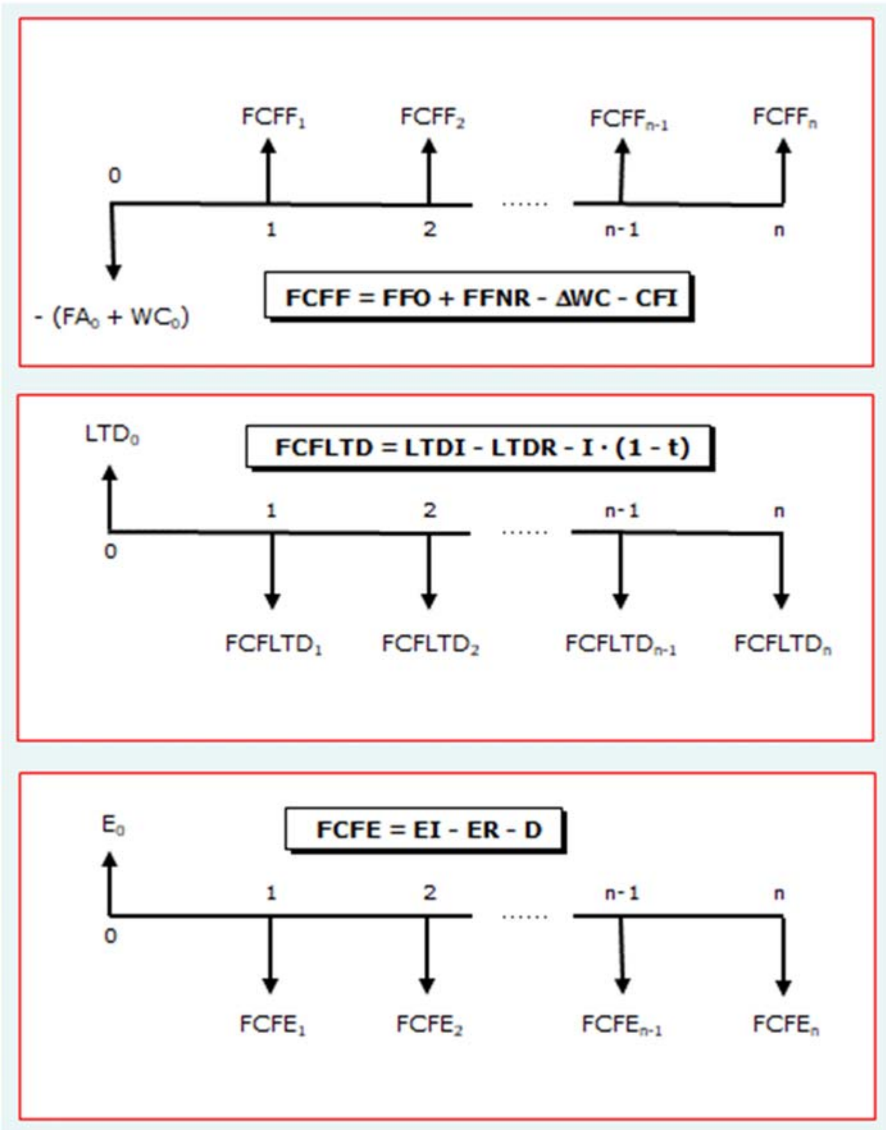


Figure 1

Following the ***logic and nomenclature described by Fernando Gómez-Bezares in his book Elementos de Finanzas corporativas***, the figure shows the three fund profiles that define the cash impact of asset operations (FCFF), and of the relationship between the company and the contributors of funds (FCFLTD and FCFE). In this context, it is usual to calculate cash flows on an annual basis.

- ***Free Cash Flow to the Firm (FCFF)*** indicates the cash impact caused by asset (permanent) operations, regardless of how they are financed. It is calculated by adding the cash that the asset yields from recurring (FFO, Fund flow from Operating activities) and Non-recurring (Fund flow from Non-recurring activities, FFNR) operations and subtracting from the sum the investments that the asset requires in working capital (ΔWC) and fixed assets (CFI). The concept indicates the money required (when it is negative) or 'released' (if it is positive) at each moment of time. The characteristic of an investment is that it 'first asks and then gives', which is represented by downward arrows (the asset is not able to generate all the money it needs) or upward arrows (the asset generates more money than it needs).
- The ***Free Cash Flow to the Long-Term Debt (FCFLTD)***. It indicates the cash impact caused by the relationship between the company and debt suppliers (long-term): cash inflows occur when the company issues debt (borrows money, LTDI) and cash outflows when it repays all or part of the amount previously borrowed (LTDR) and when it pays interest (which should be considered net of taxes, since the payment of interest entails a tax saving that is not considered in FCFF).
- ***Free Cash Flow to the Equity (FCFE)***. It includes the part of the asset requirements that are financed by recourse to shareholders (through capital issuances, EI) and the part of the cash flow released by the asset that is not directed to lenders (and that is paid to shareholders through capital redemptions, ER, and/or the payment of dividends, D).

It is easy to intuit (and demonstrate) that ***the sum of the three items must necessarily be equal to zero every year***: someone has to put in the money that the business needs (when FCFF is negative, the sum of contributions from suppliers of borrowed and own funds, FCFLTD and FCFE, must have the same value with opposite sign); and vice versa.

Figure 2 defines in detail the specific way of calculating each of the components indicated and shown in Figure 1 (model taken directly from the aforementioned book, *Elementos de Finanzas Corporativas*, by Fernando Gómez-Bezares, Desclée de Brouwer, Bilbao, 2012).

2.4. Calculation of the residual value (terminal value or continuation value)

As mentioned above, companies are usually incorporated with a corporate purpose that is indefinite in time; in other words, although the time horizon over which we 'dare' to make precise estimates of the behaviour of all the variables is normally reduced, this does not mean that the company will disappear at that moment. And what is usually done is to '***imagine a simplified future***' in terms of such behaviour: basically, to assume some regularity of the expected cash flows of the business from that moment and to infinity. On the basis of the above, we calculate the '***Continuation Value***', which can be understood as an approximation to the market value of the company at that time.

		+ S_t	*Sales*
		- C_t	*Operating Costs (Cash charge)*
		- AM_t	*Depreciation and Amortization (Non-Cash charge)*
		= $EBIT_t$	*Earnings Before Interest and Taxes*
		x (1-t)	*Taxation (t = Corporate Tax rate)*
		= $EBIAT_t$	*Earnings Before Interest and After Taxes*
		+ AM_t	*Depreciation and Amortization (Non-Cash charge)*
	+ FFO_t		*Fund flow from Operating Activities*
		+ NRS_t	*Non-Recurring Sales*
		- BV_t	*Book Value of Fixed Assets sold*
		= $NREBT_t$	*Non-Recurring Earnings Before Taxes*
		x (1-t)	*Taxation*
		= $NREAT_t$	*Non-Recurring Earnings After Taxes*
		+ BV_t	*Book Value of Fixed Assets sold*
	+ $FFNR_t$		*Fund flow from Non-Recurring Activities*
		+ CA_0	*Opening Current Assets*
		- CL_0	*Opening Current Liabilities*
		- CA_n	*Closing Current Assets*
		+ CL_n	*Closing Current Liabilities*
	- ΔWC_t		*Increase in Working Capital*
	- CFI_t		*Cash flow from Investing Activities*
+ $FCFF_t$			*(Long-Term) Free Cash-flow to the Firm*

	+ $LTDI_t$		*Long-Term Debt Issuances*
	- $LTDR_t$		*Long-Term Debt Repayments*
		+ I_t	*Interest on Long-Term Debt*
		x (1-t)	*Taxation*
	- (1-t) x I_t		*Net Cost of Long-Term Debt*
+ $FCFLTD_t$			*Free Cash-flow to the Long-Term Debt*
	+ EI_t		*Equity Issuances*
	- ER_t		*Equity Redemptions*
	- D_t		*Dividend*
+ $FCFE_t$			*Free Cash-flow to the Equity*
$\Sigma = 0$	**$\Sigma = 0$**		*CHECK*

Figure 2

As indicated above, this Continuation Value sometimes has a lower relative importance in the overall value: in fact, it is easy to deduce that the longer the more accurate the estimation period (the more distant in time the Continuation Value is) and the higher the applicable discount rate (influenced by high interest rates and/or by a significant risk associated with the company's activities), the lower the weight that the Continuation Value will have in the total value of the company.

In the following lines we will make ***some simple assumptions on which to base the estimation of the Continuation Value***, providing the corresponding calculation formulas. We will assume at this point that what we are calculating is what is usually known as ***'Enterprise Value' (EV)***, i.e. the ***value of the assets*** of the company in question (and not its net worth); and that the perspective of our analysis, consistent with that shown in Figures 1 and 2, is ***long-term*** (we value the permanent assets, understood as non-current assets + working capital).

- **Constant cash flow**

This is the ***most conservative assumption***. It consists of assuming that the cash flow will remain constant from year 'n+1' (where 'n' is the duration, in years, of the most accurate estimation period). It is based on the assumption that the income generated by the asset and which serves to remunerate the liabilities as a whole coincides with EBIAT (Earnings Before Interest and After Taxes): under conditions of absolute stability, there would be no change in sales and costs and no need to invest in working capital; as for fixed assets, ***it would be sufficient to invest an amount equivalent to the depreciation*** to replace the impaired asset and maintain its capacity to generate funds in the future. Thus, the Continuation Value would be calculated from the formula of the sum of an indefinite geometric progression of ratio less than unity, which would result in the expression (2), where WACC is the weighted average cost of capital (which will be justified later).

$$\mathrm{CV_n} = \frac{\mathrm{EBIAT_{n+1}}}{\mathrm{WACC}} = \frac{\mathrm{EBIAT_n}}{\mathrm{WACC}} \tag{2}$$

- **Growing cash flow at a constant rate**

In this case it is assumed that, from the end of the most accurate estimation period, the free cash flow of the asset will grow at a constant rate ‘g’ up to infinity. We must be very careful with two elements: firstly, it must be remembered that ‘g’ will now be considered as constant growth to infinity, so that high values would not be credible (in general, it is difficult to accept as logical values above real GDP growth, say 2% per year); and, secondly, it must be borne in mind that, ***to grow, it is necessary to invest above the replacement investment***. Thus, if we call ‘ROA’ the return on assets (the ratio between EBIAT and permanent investments), the formula (3) would apply.

$$\mathrm{CV_n} = \frac{\mathrm{EBIAT_n} \cdot (1+\mathrm{g}) \cdot \left(1-\frac{\mathrm{g}}{\mathrm{ROA}}\right)}{\mathrm{WACC}-\mathrm{g}} \tag{3}$$

The problem with this formula is that it assumes that the profit for year n+1 will grow at the rate ‘g’ without the need to invest above the replacement investment (which would normally not have been considered in the calculation of the cash flow associated with the last year of the more accurate estimation period), so that the flow for recurring operations in year ‘n’ should be corrected with the corresponding new investment.

Another possibility would be to assume that growth will occur only from year ‘n+2’ onwards, i.e., since there is no new investment in year ‘n’, the profit of year ‘n+1’ coincides with that of the previous year, which would leave the formula in the terms described in equation (4).

$$\mathrm{CV_n} = \frac{\mathrm{EBIAT_n} \cdot \left(1-\frac{\mathrm{g}}{\mathrm{ROA}}\right)}{\mathrm{WACC}-\mathrm{g}} \tag{4}$$

- **Regularity of expected flows different for different time horizons starting at the end of the most accurate estimation period**

Finally, in this section we will discuss on the possibility of considering different growth and asset yields in ***two different periods***: a period of duration ‘N’ years starting from ‘n’ (number of years corresponding to the most accurate estimation period), in which growth would be g_A and asset return ROA_A (both of which can be high in sectors where strong growth can be expected over a limited period of time); and a second period that would begin in year 'n+N', with expected growth g_B and return on assets ROA_B (logically more reduced values, since these figures would be maintained from then until infinity). Applying financial mathematics, we would arrive without difficulty at formula (5).

$$CV_n = \frac{EBIAT_{n+1} \cdot \left(1 - \frac{g_A}{ROA_A}\right) \cdot \left[\frac{(1+g_A)^{N\text{-}1}}{(1+WACC)^{N\text{-}1}} - 1\right]}{g_A - WACC} + \frac{\frac{EBIAT_{n+1} \cdot (1+g_A)^{N\text{-}1} \cdot \left(1 - \frac{g_B}{ROA_B}\right)}{WACC - g_B}}{(1+WACC)^{N\text{-}1}} \quad (5)$$

2.5. Calculation of the cost of funds (discount rate applicable)

As we have seen, discounted cash flow valuation requires the estimation of two fundamental elements, the cash flow profile (which indicates the cash flows that can be expected from the asset in question, the so-called *free cash flows*) and the return required by the contributors of funds, which will depend on the risk assumed and which is always an opportunity cost (return of the best market alternative, of similar risk, which can be waived to acquire the asset to be valued).

We will now focus our attention on the second element, starting again from the assumption that ***what we want to value is the assets of the company*** in question (in the very common case that we are ultimately interested in valuing only what is known as '*equity*' -net worth-, we can choose to subtract from the value obtained for the assets the value corresponding to the debt at the present time; or value this *equity* directly with the same discounted cash flow technique, using the *free cash flows* corresponding to the shareholders and the return demanded by them; we will return to this later); and we will also assume that we are working with a long-term perspective, i.e. that what we want to calculate is ***the value of the permanent investments*** of the aforementioned company, which will logically correspond to the market value of the equity and borrowed funds that would have to be acquired to take ownership of the aforementioned asset (see Figure 3).

The first idea that seems clear from an intuitive point of view is that the cost of funds has to be a ***weighted average*** that considers the shareholders' requirement, the lenders' requirement and the proportions that the two types of funds present in the total (formula 6):

$$WACC = k'_d \cdot (1\text{-}t) \frac{LTD}{LTD+E} + k_e \frac{E}{LTD+E} = k_d \frac{LTD}{LTD+E} + k_e \frac{E}{LTD+E} \quad (6)$$

where:

k'_d	Yield required by long-term lenders
k_d	Cost of long-term debt net of taxes
k_e	Cost of equity (understood as the *a priori* required return)
WACC	Weighted Average Cost of Capital
t	Tax rate (Corporate tax, CT)

LTD Market value of long-term debt
E Market value of shareholders' equity

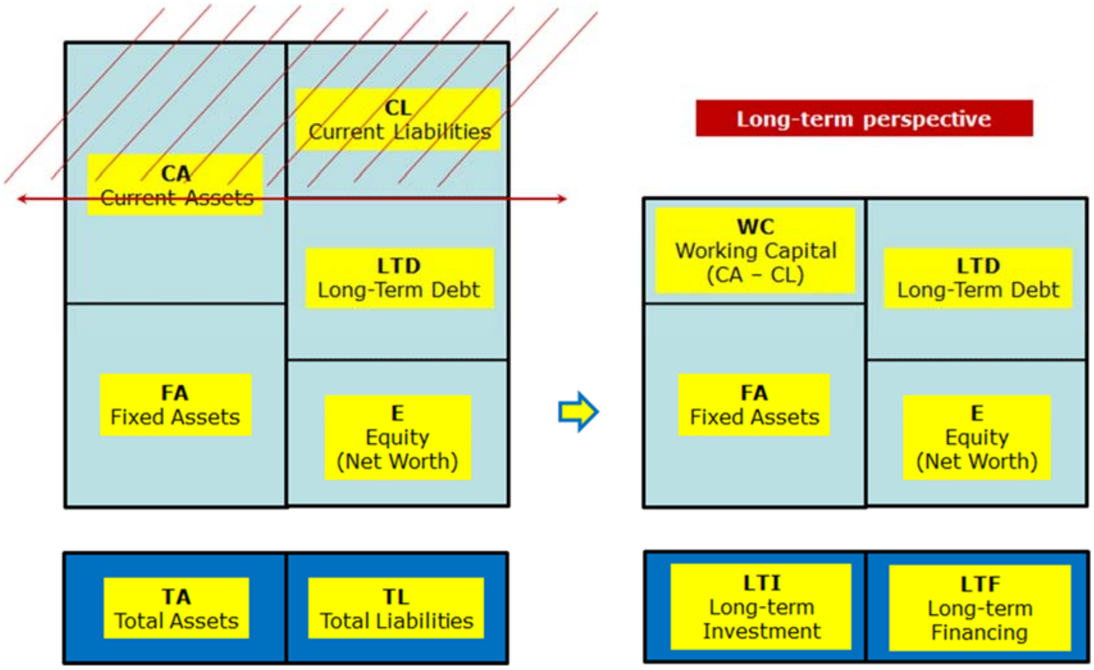


Figure 3

Thus, to calculate the discount rate applicable to the *free cash flows* of the asset, we need to ***estimate the requirement of borrowed funds and shareholders' equity***, taking into account that these will be ***influenced by the proportions that each of the two has in the total***: given that, from a commercial (legal) point of view, the risk of the asset is not shared equally between the two (shareholders assume by definition a greater risk than lenders, who have the right to collect what they have agreed with them regardless of the good or bad performance of the business), an increase in indebtedness always implies a greater risk (per euro invested) for shareholder; and for high levels of indebtedness, it is also reasonable to think that the risk assumed by the lenders is also affected. All in all, it seems clear from an intuitive point of view that ***the risk of the asset does not change with the level of indebtedness***, it is simply distributed in different ways between the two types of contributors who, depending on the amount assumed by each of them, will demand one return or another.

The ***procedures commonly used*** in this field find their justification in ***the ideas of different authors***, some (many) of whom have been recognized by the scientific community with the award of a ***Nobel Prize in Economics***. In this sense, we could distinguish two particularly fruitful fields of research:

- The one related to a premise that seems incontestable from a rational point of view: if the return demandable on an asset depends on the risk it forces to take, the proportions of equity and borrowed funds used in its financing will determine the amount of risk assumed by each of them, but will not influence the return demanded by the whole (i.e., if the risk does not change with the 'financial structure' -which is what we call the proportions of equity and borrowed funds with which the asset is financed- the weighted average cost should be the same for any given financial structure). ***Franco Modigliani and Merton Miller*** were each awarded Nobel Prizes in 1985 and 1990, mainly for contributing this idea.

- The field initiated by ***Harry Markowitz*** (Nobel Prize in 1990) with his 'Portfolio Theory'. The model argues that the rational thing for a risk averse person to do is to avoid all possible risks, so that he is expected to invest in fully diversified portfolios (in the extreme, those that include all existing securities). This is where the CAPM comes in, developed by ***William Sharpe*** (Nobel Prize winner in 1990), among others, which makes it possible to calculate the profitability premium required of an investment according to its relevant risk (systematic or non-diversifiable), for the estimation of which a specific measure is proposed: the well-known 'beta', which evaluates the degree of relationship between the company's performance and the general performance of the economy.

Their importance is fundamental in the formulation used in the calculation of the cost of funds, so it seems reasonable to note, albeit briefly, the logic behind them (and, where appropriate, the assumptions on which they are based, the premises that must be met for their application to make sense).

Let us begin with the overwhelming logic proposed by Modigliani and Miller regarding the relationship between cost of funds and financial structure. As we have said, according to these authors, in competitive and efficient markets, the weighted average cost of funds is not affected by the proportions of borrowings and equity with which we decide to finance a specific asset; this has an important consequence: the value of the company (of its assets, known as ***'Enterprise Value', EV***) does not depend on the level of indebtedness and it is not possible to create value through the financial structure decision; it can only contribute to the financial objective (value creation) with the investment decision.

The authors put forward their theory at a time (1958) when the so-called '***traditional position***' was generally accepted, according to which the relationship between the cost (return requirement) of equity and the leverage ratio is increasing (little for low levels of indebtedness and a lot for high levels); the cost of borrowed funds may be constant for low levels of indebtedness, but will grow from a certain level at which lenders perceive their risk to be increasing; and the weighted average cost would decrease for low levels of indebtedness (the 'cheapening effect' associated with the substitution of expensive for cheap funds is stronger), but starts to grow from a certain point (which would be the optimum, since it is the cheapest possible level; you can see all this in the upper left-hand side of Figure 4). ***Modigliani and Miller's critique of the 'traditional position' is brilliant***, as well as simple: if the above were true, the same asset could be quoted at different prices in the market (two identical assets could have different prices), thus creating an arbitrage possibility that, when exploited, would eliminate the above anomaly (two perfect substitutes cannot have different prices in a well-functioning market).

Thus, ***the cost of funds must be constant with indebtedness*** (if the assets are the same, the risk assumed by the liabilities as a whole is identical, so there is no reason for the aforementioned set to ask for a different return), so that the requirement for equity and borrowed funds will conform to this logical premise (e.g., if we assume secured debt, which would cause a constant ***cost of*** borrowed funds with ***indebtedness, the cost of equity*** would grow linearly, so that it exactly compensates for the 'cheapening effect' associated with the substitution of expensive equity for cheap borrowed funds). The complete reflection can be seen in Figure 4.

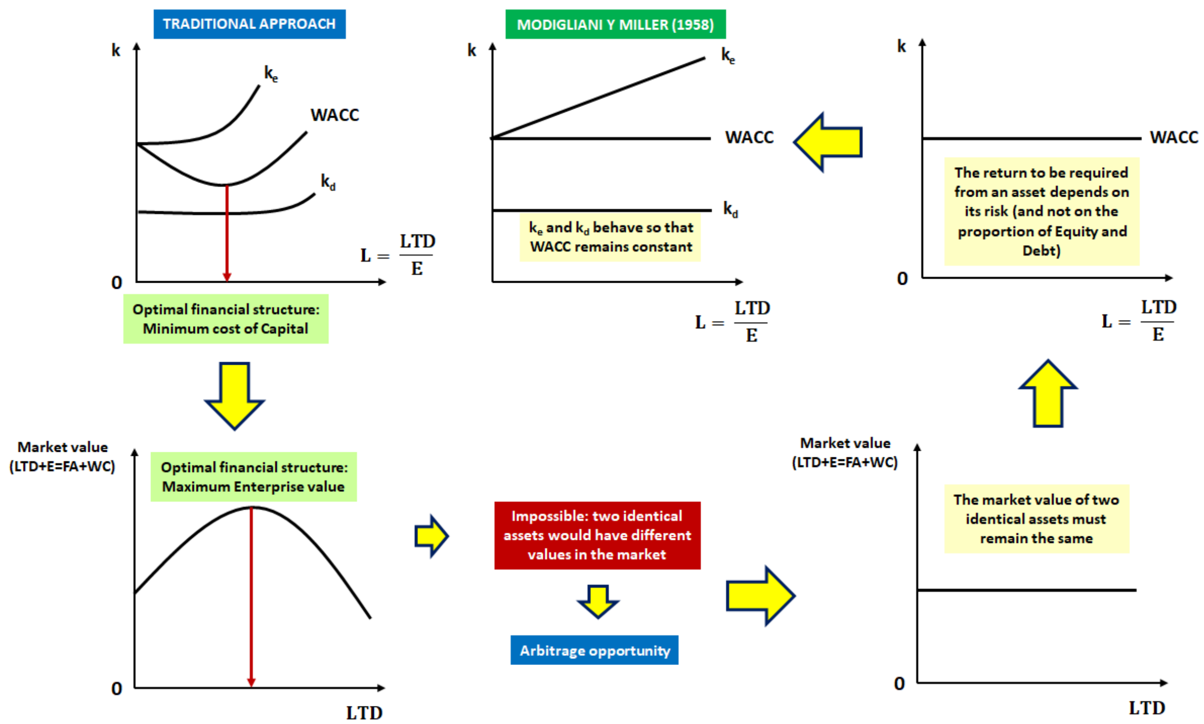


Figure 4

Under these conditions, the WACC of formula (6) would be the same for any level of indebtedness. But there is a ***problem***: the theory is impeccable in 'perfect markets', but real markets present distortions that make it necessary to qualify its initial proposal. The usual methodology in this field considers one of these distortions: ***the non-neutrality of the tax system***.

Indeed, Modigliani and Miller corrected their initial 1958 proposal in 1963, when they included the effect of corporate tax (CT). The argument is again simple: of the income generated at source by the asset (the well-known EBIT, earnings before interest and taxes), a portion is taken by the Tax authority, and what remains is distributed among the 'owners' of the asset (shareholders and lenders); since interest (the return on borrowed funds) is deductible from Corporate tax and dividends are not, the higher the indebtedness, the smaller part of the original income is appropriated by the Tax authority, which thus reaches the contributors of funds to a greater extent. In this way, ***the same asset is 'worth more' the higher the indebtedness because the Tax authority 'takes' a smaller part of what it generates***, as can be seen in the formula (7) which is easy to derive from the above.

$$\mathrm{LEV} = \mathrm{NLEV} + \mathrm{LTD} \cdot \mathrm{t} = \frac{\mathrm{EBIAT}}{\mathrm{R}} + \mathrm{LTD} \cdot \mathrm{t} \tag{7}$$

where:

LEV	Levered Enterprise Value
NLEV	Non-Levered Enterprise Value[18]
R	Required return on assets of the non-indebted company

This means that, even accepting the overwhelming logic proposed by Modigliani and Miller, ***we cannot disregard the level of indebtedness*** when calculating the weighted average cost of funds. It is easy to show that, under these conditions, the weighted average cost considering the possibility of indebtedness must be calculated with the formula (8).

$$WACC = R \cdot \left(1 - t \cdot \frac{LTD}{LTD+E}\right) \tag{8}$$

Let us now turn to the ***fundamental ideas of the CAPM***. The model is based on the logic proposed by Markowitz in his ***Portfolio Theory***. Originally, the author tries to help anyone faced with an immense number of possibilities in the market to select the best possible portfolio of securities. The starting elements are difficult to criticize from a rational point of view:

- It seems clear that individuals in general have a '***risk-averse***' attitude. Markowitz identifies risk with variability, an asset is riskier the wider the range of possible returns; and being 'risk averse' means that we will only be willing to take risks if we 'expect' a premium for doing so (for example, we prefer a sure million to a 0 or 2 million game at 50% probability; but if the same game is offered with 30%-70% probabilities, the expected wealth would be 1.400.000, greater than the million we would have to give up to play, so there is a premium of 400.000; under these conditions, a risk averse person could give up the safe million, since the game has a positive risk premium associated with it).
- ***A risk averse person who acts rationally will not take risks that can be avoided***. In this sense, it seems intuitively clear (and this is empirically proven) that the variability associated with the profitability of a portfolio decreases as we include securities in it: a certain 'compensation' effect is produced, which is what we call in Finance the '***diversification effect***'. If we take this idea to the extreme, the sensible thing to do would be to invest in a fully diversified portfolio, one that includes all existing securities, so that the only risk that remains would be the one that has to do with the general performance of the market: this is the so-called '***systematic risk***'. This has a very important consequence: if no one considers buying a single asset, but always includes it in a diversified portfolio, the relevant risk ceases to be the total risk and becomes that which it contributes to the portfolio (the systematic risk of the security itself). ***The CAPM proposes a measure of this relevant risk, the so-called 'beta'***, which measures the direction and intensity of the relationship between the return on the security and that of the whole (see expression 9, which quotients the covariance of the return of security 'j' -R_j- with that of the market -R_m- and the variance of the return of the latter).

[18] The proposed formulation assumes, for simplification purposes, conditions of absolute stability. However, what is fundamental is the logic of the proposed reasoning.

$$\beta_j = \frac{\mathrm{COV}\,(R_j\,, R_m)}{\mathrm{VAR}\,(R_m)} \tag{9}$$

- Under the conditions described above, the only risk that remains, and therefore the only one that will be remunerated, is the systematic risk; and a '***Discount Rate Adjustment***' formula is proposed, which is embodied in equation (10), which is the well-known ***Security Market Line (SML)***: in equilibrium, all securities (assets, investments) would be located on this line, which means that they would yield what corresponds to them according to their systematic risk.

$$E\,(R_j) = R_f + \text{Market risk-premium} \cdot \beta_j \tag{10}$$

where:

$E\,(R_j)$ Yield to be required on security 'j'
R_f Risk-free interest rate
Market risk-premium Return premium that the market offers per unit of risk (systematic). It is the difference between the expected return of the market as a whole -$E(R_m)$- and the risk-free interest rate -R_f-

The last step is to ***reconcile the (brilliant) ideas of the above-mentioned authors***. This involves including their logic in the original formula for calculating the weighted average cost of funds (expression 6). The simplest way to proceed is as follows.

Suppose I want to value a company in a particular industry, say the automobile industry. The first step that the application of the CAPM would require is to ***calculate the beta of this activity***, the degree to which the sector is influenced by the general performance of the market, for which I should choose a listed company belonging to this sector; we would compile the returns obtained by the shareholders of this company in a period that can be considered representative (let us say the monthly returns of the last five years) and we would relate them to those of a market index that we can understand as sufficiently representative of the whole (for example, the Ibex-35) by applying the formula (9).

The problem is that ***the level of indebtedness of the reference company may not coincide with that of the company we want to value***; that is, in reality, what the two companies have in common is the beta of the asset (sensitivity of the activity to general performance), and not (necessarily) that of the '*equity*' (which is the one we can estimate, since what is listed on the market is not the asset, but the equity, the shares of the listed company). This requires the corresponding ***beta 'deleveraging***' procedure, i.e. a procedure that eliminates the effect of indebtedness on the value of beta. This is achieved by applying formula (11), where β_a is the asset beta, and β_d and β_e are those corresponding to debt and equity, respectively:

$$\beta_a = \beta_d \cdot \frac{LTD \cdot (1\text{-}t)}{LTD \cdot (1\text{-}t) + E} + \beta_e \cdot \frac{E}{LTD \cdot (1\text{-}t) + E} \tag{11}$$

which, as can be seen, is based on the fact that the beta of a portfolio is calculated as a weighted average of the betas of the portfolio's components; and therefore, requires estimating the beta of debt (of the reference company), which is simple to calculate.

Indeed, it is easy to make explicit the long-term lenders' profitability requirement, which is defined by contract (and which we have called 'k'_d'); if we consider, moreover, that in a CAPM logic, this profitability is justified by the formula (10), we arrive at the expression (12).

$$k'_d = R_f + \text{Market risk-premium} \cdot \beta_d \tag{12}$$

where 'k'_d' is the cost of debt (before considering tax effects). Just clear β_d in formula (12) and combine it with that previously estimated for equity, together with the proportions of debt and equity held by the benchmark company (formula 11).

Once the asset beta has been calculated, we apply the general formula proposed by the CAPM (expression 10) and obtain R, which, as you will recall, is defined as the return to be demanded on the assets of the unlevered company (formula 13):

$$R = R_f + \text{Market risk-premium} \cdot \beta_a \tag{13}$$

All that remains is to include the logic proposed by Modigliani and Miller when considering the fiscal distortion caused by the Corporate Tax, for which we would apply the formula (8) proposed above:

$$WACC = R \cdot \left(1 - t \cdot \frac{LTD}{LTD+E}\right) \tag{8}$$

The result obtained would be that ***applicable to the discount of the free cash-flows of the assets*** (what we have called Free Cash Flow to the Firm, FCFF); from which we would have to subtract the current value of the Long-Term Borrowed Funds (which, under conditions of interest rate stability, and assuming that neither the expected risk of the company's activities nor its solvency rating changes, would coincide with its book value).

As mentioned above, ***all this is also perfectly applicable to the case in which we want to calculate the value of equity directly***. To do this, we would discount the shareholder's *free cash flows* (FCFE in Figures 1 and 2) using the cost of equity (k_e). Recall that the information we have is the beta of the reference company's equity, from which we had obtained that corresponding to the assets with expression (11). Based on expression (11), what we would have to do now is to clear the beta of the *equity of* the company to be valued (equation 14):

$$\beta_e = \beta_a \cdot \left[1 + (1\text{-t}) \cdot \frac{\text{LTD}}{\text{E}}\right] - \beta_d \cdot (1\text{-t}) \cdot \frac{\text{LTD}}{\text{E}} \tag{14}$$

expression that requires calculating the debt beta and the debt ratio of the company to be valued. A particular case of the above is to consider fully guaranteed debt ($\beta_d = 0$), which gives rise to the well-known Hamada formula, which simplifies the above calculation somewhat more (expression 15).

$$\beta_e = \beta_a \cdot \left[1 + (1\text{-t}) \cdot \frac{\text{LTD}}{\text{E}}\right] \tag{15}$$

Applying now formula (10) we would have the cost of funds applicable (k_e) to the FCFE.

Finally, it may be of interest to make a last ***reference to the fact that the proposed formulation considers only the Corporate Tax***, when in fact, there is also the ***Personal Income Tax***. It is not difficult to include the effect of this tax in the proposed formulation, as Miller himself proposed in 1977. The above logic implies a correction to formula (7), which in the presence of the two taxes indicated (Corporate and Personal Income) would be in the terms of expression (16):

$$\text{LEV} = \text{NLEV} + \text{LTD} \cdot \text{T} = \frac{\text{EBIAT}}{\text{R}} + \text{LTD} \cdot \text{T} \tag{16}$$

where T can be seen as a ***measure of the degree of imperfection (understood as 'non-neutrality') of the tax system*** as a whole in relation to the level of indebtedness. Indeed, it is usual for the tax system to be aware of the advantageous treatment of debt in Corporate tax, and to try to avoid (or at least limit) the double taxation of dividends (profits have been taxed in Corporate tax and are taxed again in the Personal Income Tax); this would be achieved by giving dividends an advantageous treatment in Personal Income Tax in relation to interest. Calling 'm' the tax rate levied on dividends and 'n' that corresponding to interest (always in Personal Income Tax), and assuming, logically, that $m<n$, we would arrive at the expression (17).

$$\text{T} = \left[1 - \frac{(1-\text{t}) \cdot (1-\text{m})}{(1-\text{n})}\right] \tag{17}$$

And it would be sufficient to use T instead of t throughout the proposed formulation[19]. Why is the formulation that also considers Personal Income Tax not normally used? For two reasons: ***m***

[19] The formulation presented here is compatible with any fiscal context: in the case of the existence of only the Corporate tax (m=n=0), T would coincide with t (this is the hypothesis implicit in the formulation normally used by practitioners); and if the fiscal system were neutral, the fiscal advantage associated with indebtedness would disappear, as Miller indicates (T=0 if (1-t) x (1-m) = (1-n)).

and n are not easy to calculate; added to this is the fact that ***not all dividends and interest paid by the company are received by individuals***.

3. ANALYSIS OF THE RESULTS OBTAINED AND CONNECTION WITH OTHER FORMS OF ASSESSMENT

In the previous section we have seen the usual way of performing the calculations necessary to obtain the value of a company by applying the discounted cash flow technique. As we indicated, the process is based, by definition, on 'imagining an uncertain future', a process in which there are some ***variables that may be particularly relevant*** (those to which the value obtained is especially sensitive, which makes it advisable to take special care in estimating their behaviour). This is where the technique known as '***Sensitivity Analysis***' can help us, which consists of studying how the behaviour of a result variable (the value of the company, in our case) changes when the behaviour of one of the starting variables changes.

Related to the above, it may also be of interest to ***connect the results obtained*** by applying the valuation logic defended so far with those derived from applying different techniques, such as ***multiples*** or ***penalizing the expected result with its risk***.

3.1. Sensitivity analysis

At this point, we will focus our attention on the study of the impact of changes in two variables (which are logically related):

- ***Applicable discount rate*** (cost of funds).
- ***Continuation Value***. Importance that this element has in the total value of the company; related in turn to the length of the most accurate estimation period.

Let us assume a fund profile (expected cash flows of an asset in the most accurate estimation period, which has been set at five years) such as the one proposed in Figure 5.

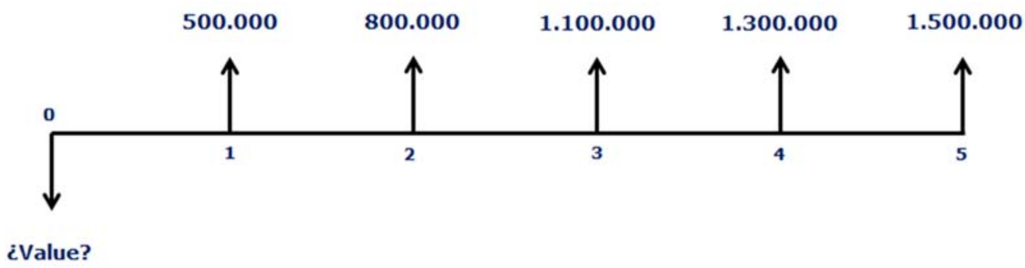


Figure 5

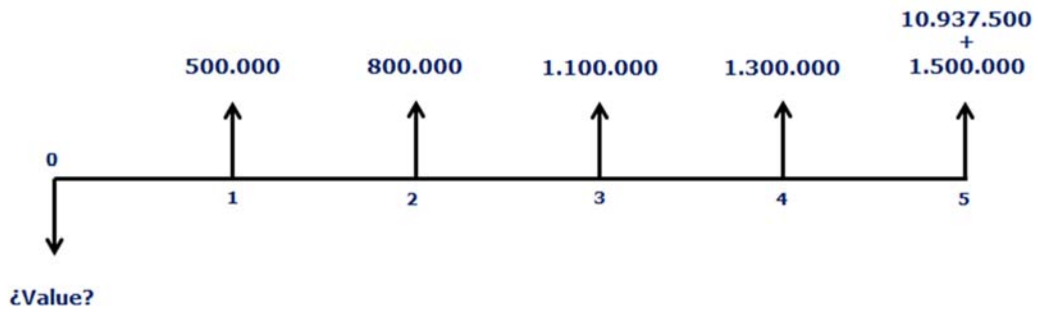
Let us now assume that the Earnings Before Interest and After Taxes (EBIAT) for the fifth year is equal to 1.050.000 euros, and that for the calculation of the Continuation Value it has been decided to use a growth formula, which assumes that this profit will increase at a rate of 2% per year, with the expected return on assets, ROA=12% (from year 7 to infinity). Finally, let us assume that the applicable WACC has been estimated to be 'around' 10%. With the information presented, it is easy to justify the resulting Continuation Value, applying the formula (4):

$$CV_5 = \frac{EBIAT_5 \cdot \left(1-\frac{g}{ROA}\right)}{WACC - g} = \frac{1.050.000 \cdot \left(1-\frac{0,02}{0,12}\right)}{0,10 - 0,02} = 10.937.500$$

We can present the graph relating the value of the company to the discount rate used and study the sensitivity of the former to changes in WACC (see Figure 6).

If we now assume that the most accurate estimation period is reduced to only four years, keeping the above cash flow estimate and assuming that the EBIAT for year 4 is 910.000; and that we continue to apply the same calculation logic for the Continuation Value (leading to a CV_4 = 9.479.167), we can repeat the above process to arrive at Figure 7.

Summary assumptions: n = 5; $EBIAT_5$ = 1.050.000; g = 2%; ROA = 12% → CV_5 = 10.937.500



WACC	Present value PV without CV	Present value PV with CV	Weight PV without CV	Weight CV
0,0%	5.200.000	16.137.500	32,2%	67,8%
3,3%	4.643.415	13.927.003	33,3%	66,7%
6,7%	4.168.761	12.089.659	34,5%	65,5%
10,0%	3.761.448	10.552.775	35,6%	64,4%
13,3%	3.409.875	9.259.523	36,8%	63,2%
16,7%	3.104.742	8.165.134	38,0%	62,0%
20,0%	2.838.542	7.234.078	39,2%	60,8%

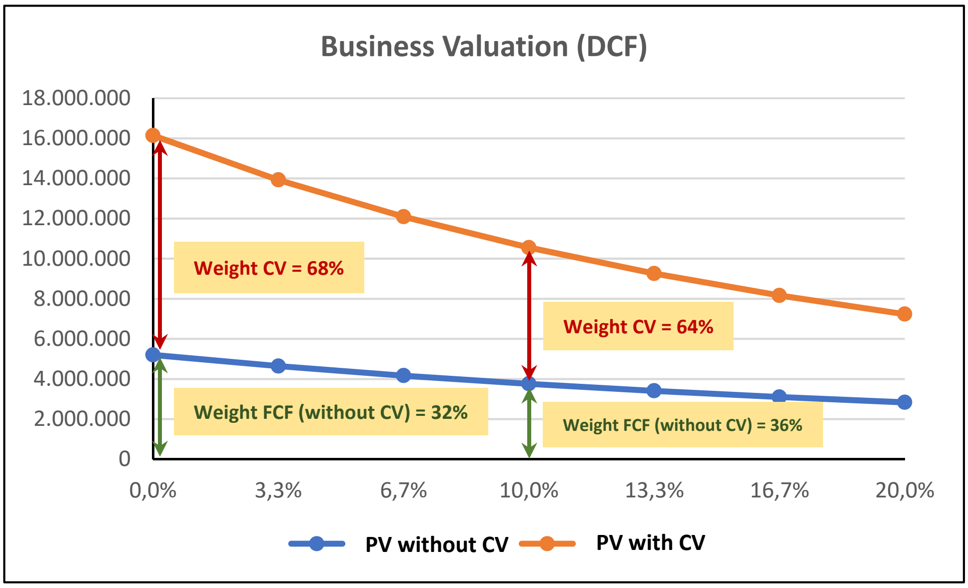
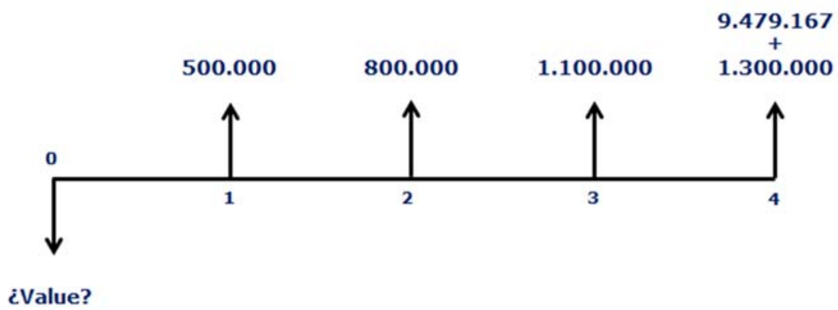


Figure 6

As can be seen, under the starting conditions described above (five-year most accurate estimation period, as shown in figure 6), the weight of the continuation value is very large: for a zero cost of funds, it would represent 68% of the total value; it is only reduced to 61% with a WACC of 20%.

Increases in the cost of funds result in significant value reductions in the two elements: a move from 0% to 10% results in a 28% loss in the present value of recurring cash flows and a 38% loss in the present value of CV_5. The next 10% increase in WACC cuts an additional 18% of the present value of cash flows and 22% of the present value of CV_5.

Summary assumptions: n = 4; $EBIAT_4$ = 910.000; g = 2%; ROA = 12% → CV_4 = 9.479.167



WACC	Present value PV without CV	Present value PV with CV	Weight PV without CV	Weight CV
0,0%	3.700.000	13.179.167	28,1%	71,9%
3,3%	3.370.237	11.684.206	28,8%	71,2%
6,7%	3.082.466	10.404.897	29,6%	70,4%
10,0%	2.830.066	9.304.465	30,4%	69,6%
13,3%	2.607.638	8.353.292	31,2%	68,8%
16,7%	2.410.746	7.527.364	32,0%	68,0%
20,0%	2.235.725	6.807.083	32,8%	67,2%

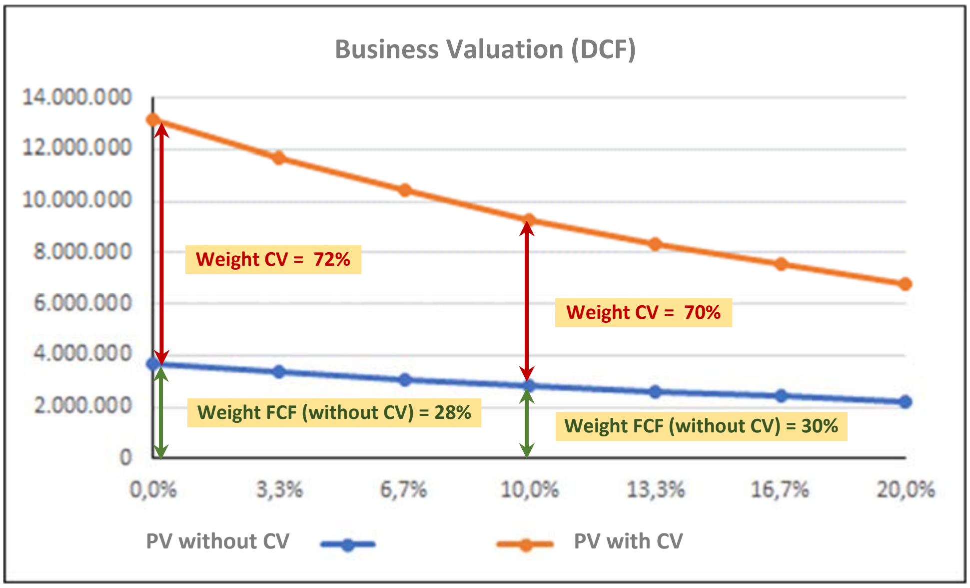


Figure 7

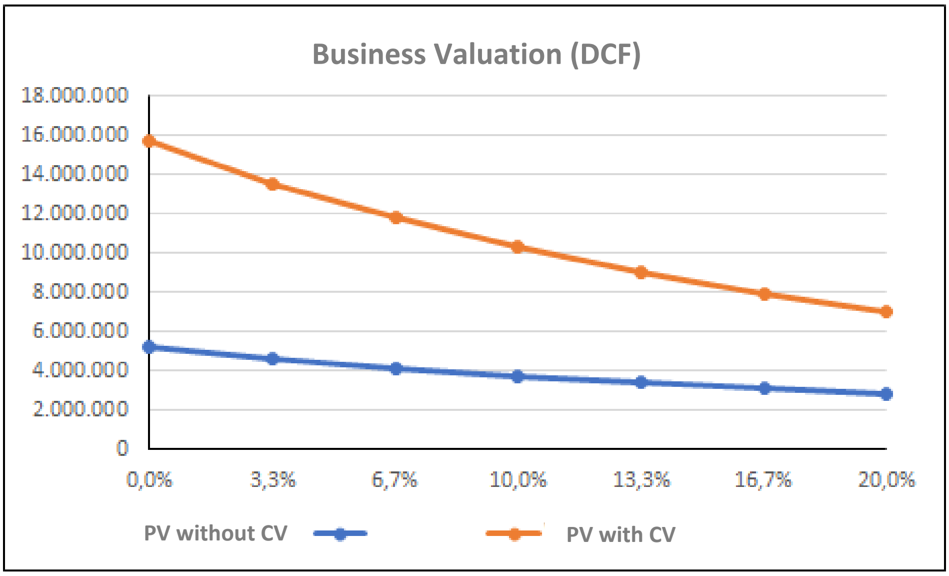
Logically, when we shorten the most accurate estimation period (figure 7), the problem concerning the importance of the Continuation Value becomes more acute: assuming the same assumptions of asset growth and performance, the weight of this element increases to 72% for WACC=0; and is reduced by only two points (to 70% for a WACC of 10%).

On the other hand, the relative 'anticipation' of flows compared to the previous hypothesis reduces the 'interest rate risk', i.e. it makes the value of the company less sensitive to the discount rate used: moving from 0% to 10% in WACC now implies a loss of value of 23,51% in recurring flows and 31,70% of the Continuation Value; and moving to a WACC of 20% would imply an additional loss of 16,07% in ordinary flows and 20,07% in CV[4].

Let us now see (Figure 8) the results that would be achieved by recovering the more accurate estimation period of five years, but assuming a constant flow from the sixth year onwards (g=0).

Summary assumptions: n = 5; $EBIAT_5$ = 1.050.000; g = 0%; ROA = 12% → CV_5 = 10.500.000

WACC	Present value PV without CV	Present value PV with CV	Weight PV without CV	Weight CV
0,0%	5.200.000	15.700.000	33,1%	66,9%
3,3%	4.643.415	13.555.660	34,3%	65,7%
6,7%	4.168.761	11.772.823	35,4%	64,6%
10,0%	3.761.448	10.281.122	36,6%	63,4%
13,3%	3.409.875	9.025.537	37,8%	62,2%
16,7%	3.104.742	7.962.718	39,0%	61,0%
20,0%	2.838.542	7.058.256	40,2%	59,8%



Value lost /original WACC=0	PV of FCF	PV of CV(5)	Total PV
0-10%	27,66%	37,91%	32,81%
10%-20%	17,75%	21,90%	19,84%

Figure 8

As can be seen, things do not change much in this case with respect to the initial assumption of 2% growth from year 7 onwards. The reasons for this have to do with the cautious value of ‘g’ chosen in principle, which is combined with a relatively long ‘most accurate estimation period’.

As you can imagine, dear reader, the analysis proposed in this section can be extended to the behaviour of all the variables involved in the process of drawing up the initial fund profile (sales, costs, etc.).

3.2. Connection with the Penalized Present Value

From what has been seen so far, it can be inferred that the estimates required to value a company using the discounted cash flow technique are complicated; and one of the most complex elements to justify is the applicable cost of funds, which requires assuming a number of assumptions that are not always met and that underlie, as we have seen, the formulation usually used.

Professor ***Fernando Gómez-Bezares proposes to*** carry out the valuation process in a manner consistent with the ***logic of discounted cash flow, but using the risk-free interest rate***, which is much easier to approximate than the Weighted Average Cost of Capital, and to apply the ***risk penalization in a manner different*** from that proposed in the 'Discount rate adjustment'. The problem, as Professor Maurice Phipps pointed out in the unforgettable movie '*Higher education*', is that 'nothing is for free in the free world': as we shall see later, in the calculation of the Penalized Present Value (PPV) it is not necessary to know the required risk premium (it is sufficient to use the risk-free interest rate when discounting the cash flows); although it is necessary to estimate the parameter 't' in which, with this criterion, the 'degree of risk aversion of the decision-maker' is expressed. Let us see, albeit briefly, the idea proposed by the author and the way in which we can use it in the present context.

PPV proposes to penalize the value of the company based on risk in a different way than in the 'Discount rate adjustment (DRA)'. To use it, we must estimate the 'Expected Value' and the 'Total Risk' (measured with the standard deviation of the value), which in turn requires a scenario analysis that was somehow already present in the sensitivity analysis proposed above. Sometimes it may be sufficient to get an idea of these two parameters by defining only two extreme scenarios, known as WCS (worst-case scenario) and BCS (best-case scenario), from which we would obtain the minimum and maximum possible values of the company in question, using the risk-free interest rate as the discount rate. If we also assume that the value of the company follows a normal distribution, we can approximate the average and standard deviation of the value with a simplified formulation (expressions 18 and 19).

$$\text{E (Value)} = \text{Expected value} = \frac{\text{Maximum value} + \text{Minimum value}}{2} \tag{18}$$

$$\sigma\ \text{(Value)} = \text{Risk (Standard deviation of value)} = \frac{\text{Maximum value - Minimum value}}{6} \tag{19}$$

From the above, what is involved is to penalize the average (which, remember, has been calculated at the risk-free interest rate) with its standard deviation; and among the infinite ways of doing so, ***the linear penalization presents important advantages***, insofar as it allows a clear and simple interpretation of the penalization parameter used. Thus, the applicable formulation assuming a linear penalization would be the one proposed in equation (20).

$$\text{PPV} = \text{E (Value)} - \text{t x } \sigma \text{ (Value)} \tag{20}$$

It is easy to conclude that, if we represent the behaviour of the company in a μ-σ map of value, all the projects (companies) whose behaviour (expected value-risk) lies on the slope line 't' would share the PPV obtained (companies A, B and C); including a hypothetical project (company) with no risk (company D): thus, ***PPV can be understood as a 'Certainty Equivalent Present Value'***, the certain amount for which the individual would be willing to change the average subject to risk studied (you can see all this graphically in Figure 9). The problem lies in deciding the value of 't' that we should apply.

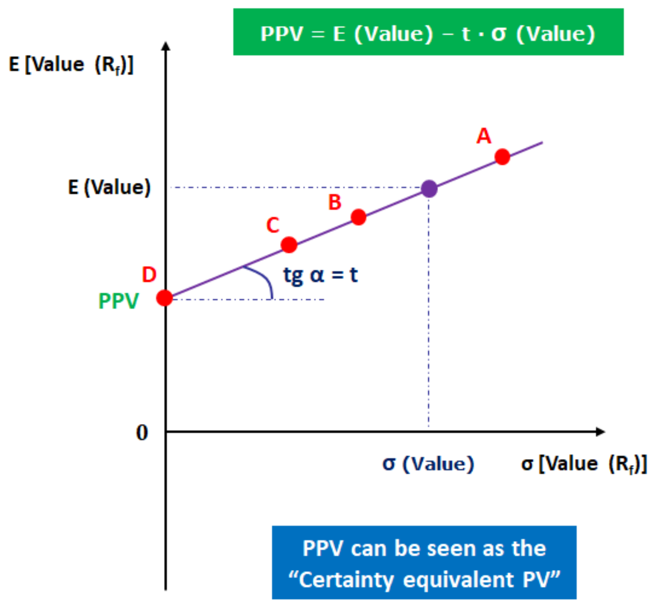


Figure 9

If we assume normality in the distribution of the value of the company, the choice of value for the indicated parameter is easy to justify (or, at least, to interpret). Indeed, when in a normal distribution we subtract 't' standard deviations from the average, the value obtained (the PPV) can be understood as 'minimum guaranteed with a certain probability' (which depends on the value of 't' itself chosen). Thus, ***PPV can be interpreted as 'Certainty equivalent present value'*** and also as ***'Guaranteed minimum present value with probability 1- α'***.

But we still do not know what value of 't' would be applicable in this context. ***What we propose in this reading is to use the criterion***, as well as the multiples (valuation by comparable operations), ***as a contrast test***, as a reference that allows us to interpret the value obtained with the usual discounted cash flow technique and place it better in context, also detecting possible exaggerated or absurd values (which could in turn be caused by behaviours assigned to certain variables).

Thus, let us assume that the complete valuation process proposed in section 2 has been carried out, giving rise to the EV (*Enterprise Value*) that we have identified with the acronym DRA (discount rate adjustment). Let us also assume that the process of defining the extreme scenarios has been completed, for which the corresponding values have been calculated, discounting cash flows at the risk-free interest rate. We can now represent the two points on a μ-σ value map, as shown in Figure 10.

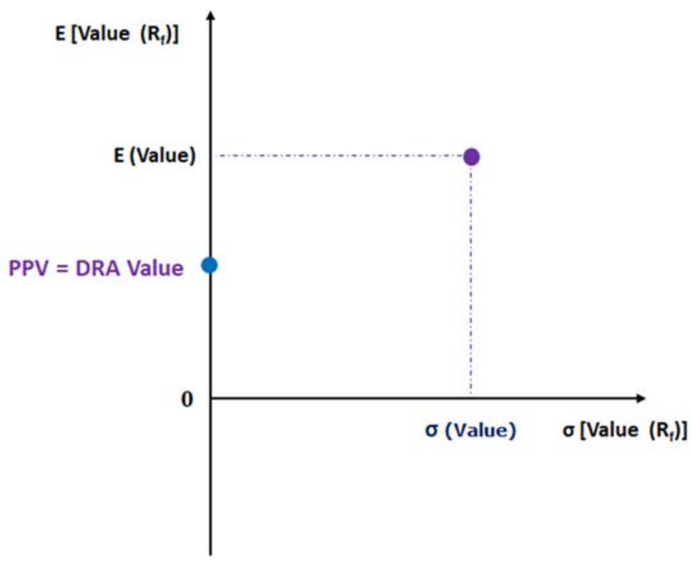


Figure 10

The next step consists of drawing the line joining the two points and clearing the slope of the line (the ***value of 't' that would allow us to obtain, by means of PPV logic, the same value as that of the Discount Rate Adjustment, 'DRA Value'***); we look for the probability associated with the left tail that corresponds to the value of 't' obtained and deduct the required guarantee (by subtracting the previous figure from the unit). The process can be seen graphically in Figures 11 and 12.

In our example, let us assume that the extreme values of Enterprise Value (using the risk-free interest rate, say 6%), are 6.181.247 and 35.027.069; applying the proposed formulation, the expected value and standard deviation of the value would be 20.604.158 and 4.807.637, respectively. Given that the value obtained with the Discount Rate Adjustment was 10.552.775, the mentioned DRA Value is 2,09 standard deviations away from the average, so it is 'the minimum guaranteed value with an approximate probability of 98%'.

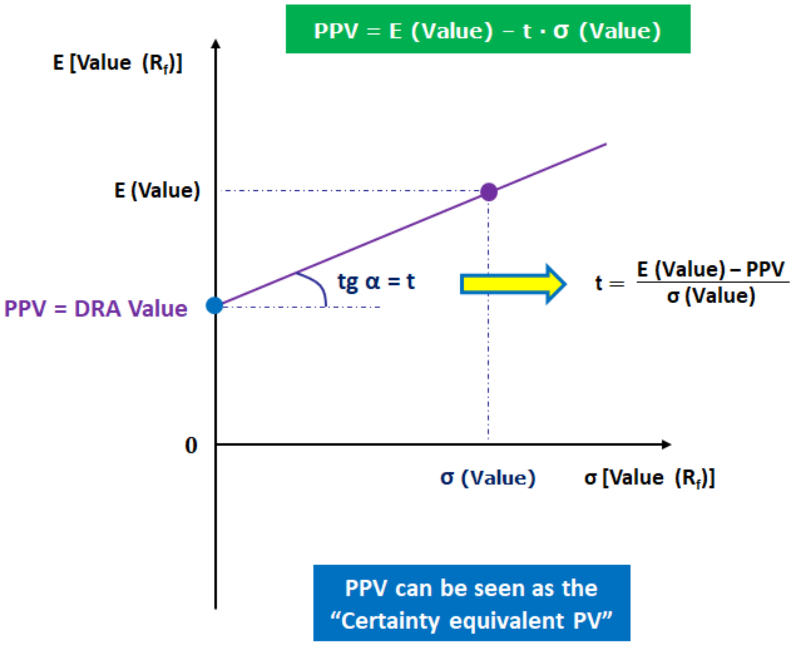


Figure 11

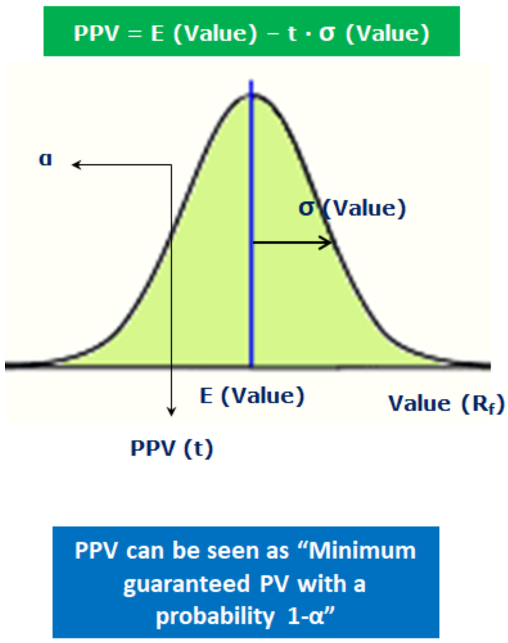


Figure 12

This seems to be a somewhat exaggerated guarantee. It probably has to do with the fact that the Continuation Value soars when the discount rate is very low (which could perhaps lead us to revise the expected growth in this context).

3.3. Connection with main multiples

We propose here a logic similar to that used in the previous subsection, relating to the Penalized Present Value (PPV). The idea is to calculate the ***average value in the sector of the main multiples*** used in this context and apply them to the company to be valued, in order to ***compare the values thus obtained with the previously calculated value (DRA Value).***

Let us briefly reflect on the ***relationship between some of the main multiples*** commonly used ***and discounted cash flow valuation***. Let us begin by recalling the basic formula for discounted cash flow valuation (equation 1, now reformulated considering the nomenclature used later in the reading):

$$\text{Enterprise Value (EV)} = \frac{\text{FCFF}_1}{(1+\text{WACC})} + \frac{\text{FCFF}_2}{(1+\text{WACC})^2} + \frac{\text{FCFF}_3}{(1+\text{WACC})^3} + \dots \quad (21)$$

where:

FCFF_i	Free cash flow to the firm in year 'i'
WACC	Weighted average cost of capital

If we assume that the flow generated by the company grows at a constant rate 'g' up to infinity (a particular case would be the scenario of absolute stability, in which case g=0), the formula (21) becomes (by the magic of financial mathematics) the expression (22):

$$\text{Enterprise Value (EV)} = \frac{\text{FCFF}_1}{\text{WACC}-\text{g}} \quad (22)$$

However, assuming a constant return on assets, ***it is impossible to grow without investing more than is necessary to replace the assets used*** (the impairment of which is recognized through depreciation), a consideration that must be considered when defining FCFF_1. Let us recall the ratio that measures the return on assets:

$$\text{ROA} = \frac{\text{EBIAT}_1}{\text{PI}_\text{A}} \quad (23)$$

where:

ROA	Return on Assets (Return on Assets)
EBIAT_1	Earnings (expected) before interest and after taxes
PI_A	Book (or accounting) value of assets (of permanent investments)

If we want the profit (and cash flow) to grow, we must subtract a part of this profit to dedicate it to ‘new investment’, so that, applying the corresponding formulation, it is easy to arrive at expression (24).

$$\text{Enterprise Value (EV)} = \frac{\text{FCFF}_1}{\text{WACC}-\text{g}} = \frac{\text{EBIAT}_1 \cdot \left(1 - \frac{\text{g}}{\text{ROA}}\right)}{\text{WACC}-\text{g}} \qquad (24)$$

Let us now introduce a common multiple, the *PER (Price Earnings Ratio)*, which is usually used to value *equity* (net worth), but can also be defined for assets (permanent investments, in our case), which is the main perspective we have chosen in this reading:

$$\text{PER (Assets)} = \frac{\text{Enterprise Value (EV)}}{\text{EBIAT}_1} \qquad (25)$$

Thus, we can clear in (24) and arrive at (25), so that:

$$\frac{\text{Enterprise Value (EV)}}{\text{EBIAT}_1} = \text{PER (Assets)} = \frac{1-\frac{\text{g}}{\text{ROA}}}{\text{WACC}-\text{g}} = \frac{\text{ROA}-\text{g}}{\text{ROA} \cdot (\text{WACC}-\text{g})} \qquad (26)$$

It is easy to deduce from the above that ***the PER (Assets) of a company depends at least on the following variables***:

- Return on assets (ROA).
- The weighted average cost of capital (WACC), which in turn depends (at least in part, remember the incidence of corporate tax) on the level of indebtedness.
- The growth potential of the company in question (expressed as ‘g’).

This means that there are many reasons why two companies in the same sector may have different values for this ratio, so the multiple should not be used to detect well or poorly valued companies, although it can help to find possible reasons for different values. By performing a simple procedure of analysis of expression (26) (by calculating the corresponding partial derivatives), it is also easy to conclude the following:

- PER (Assets) increases if ROA increases (provided that WACC > g).
- PER (Assets) decreases if WACC increases (provided that ROA > g).
- PER (Assets) grows if g increases (provided that ROA > WACC).

All of which has a reasonable explanation from an intuitive point of view. Thus, ***some important consequences*** can be drawn from the above reflection:

- A company's PER (Assets) can be interpreted in a way that is entirely consistent with the concept of intrinsic value.
- There are various reasons why two companies in the same sector are correctly valued but have different PER (Assets) values.
- In efficient markets, PER (Assets) is not useful for detecting poorly valued companies, but it is useful for gaining a better understanding of these companies.
- The average industry PER ratio is not a determining factor when valuing an unlisted company: applying the Enterprise Value (EV) / EBIAT multiple of one company to another requires ensuring that the two are truly comparable.

Let us now consider another interesting multiple, the well-known '***Tobin's Q Ratio***', which relates the market value of the asset (of permanent investments, PI_M, in a long-term perspective) to its book value (PI_A):

$$\frac{\text{Market value of PI}}{\text{Accounting (Book) value of PI}} = \frac{PI_M}{PI_A} \tag{27}$$

It is easy to see that, if we multiply and divide expression (27) by the expected EBIAT, we arrive at the product of ROA and PER (Assets):

$$\frac{PI_M}{PI_A} = \frac{PI_M}{EBIAT_1} \cdot \frac{EBIAT_1}{PI_A} = \text{PER (Assets)} \cdot \text{ROA} \tag{28}$$

Finally, it is also not difficult to ***connect PER (Assets) with other multiples*** widely used in this context (see expressions 29, 30 and 31).

$$\frac{\text{Enterprise Value (EV)}}{EBIT_1} \tag{29}$$

$$\frac{\text{Enterprise Value (EV)}}{EBITDA_1} \tag{30}$$

$$\frac{\text{Enterprise Value (EV)}}{S_1} \tag{31}$$

If we now recall some definitions, we can see the relationships that some multiples have with respect to others:

$$\mathrm{EBITDA} = \mathrm{S} - \mathrm{C} \tag{32}$$

$$\mathrm{EBIT} = \mathrm{S} - \mathrm{C} - \mathrm{AM} = \mathrm{EBITDA} - \mathrm{AM} \tag{33}$$

$$\mathrm{EBIAT} = (\mathrm{S} - \mathrm{C} - \mathrm{AM}) \cdot (1 - \mathrm{t}) = \mathrm{EBIT} \cdot (1 - \mathrm{t}) \tag{34}$$

where:

S	Sales
C	Operating costs (excluding financial costs) with cash impact
AM	Amortization (and, in general, non-cash charges)
t	Tax rate (Corporate tax)
EBITDA	Earnings before interest, taxes, depreciation and amortization
EBIT	Earnings before interest and taxes (EBIT)
EBIAT	Earnings Before Interest and After Taxes (EBIAT)

Let us also define:

$$\mathrm{x} = \frac{\mathrm{AM}}{\mathrm{S} - \mathrm{C}} \tag{35}$$

$$\mathrm{y} = \frac{\mathrm{C}}{\mathrm{S}} \tag{36}$$

so, it is easy to arrive at the following relationships:

$$\mathrm{EBIAT}_1 = \mathrm{EBIT}_1 \cdot (1 - \mathrm{t}) = \mathrm{EBITDA}_1 \cdot (1 - \mathrm{x}) \cdot (1 - \mathrm{t}) = \mathrm{S}_1 \cdot (1 - \mathrm{y}) \cdot (1 - \mathrm{x}) \cdot (1 - \mathrm{t}) \tag{37}$$

and, therefore:

$$\frac{\text{Enterprise Value (EV)}}{\mathrm{EBIAT}_1} = \frac{\text{Enterprise Value (EV)}}{\mathrm{EBIT}_1 \cdot (1-\mathrm{t})} = \frac{\text{Enterprise Value (EV)}}{\mathrm{EBITDA}_1 \cdot (1-\mathrm{x}) \cdot (1-\mathrm{t})} = \frac{\text{Enterprise Value (EV)}}{\mathrm{S}_1 \cdot (1-\mathrm{y}) \cdot (1-\mathrm{x}) \cdot (1-\mathrm{t})} \tag{38}$$

with what:

$$\frac{\text{Enterprise Value (EV)}}{\text{EBIAT}_1} = \frac{\text{ROA}-\text{g}}{\text{ROA} \cdot (\text{WACC}-\text{g})} \tag{39}$$

$$\frac{\text{Enterprise Value (EV)}}{\text{EBIT}_1} = \frac{\text{ROA}-\text{g}}{\text{ROA} \cdot (\text{WACC}-\text{g})} \cdot (1-\text{t}) \tag{40}$$

$$\frac{\text{Enterprise Value (EV)}}{\text{EBITDA}_1} = \frac{\text{ROA}-\text{g}}{\text{ROA} \cdot (\text{WACC}-\text{g})} \cdot (1-\text{x}) \cdot (1-\text{t}) \tag{41}$$

$$\frac{\text{Enterprise Value (EV)}}{\text{S}_1} = \frac{\text{ROA}-\text{g}}{\text{ROA} \cdot (\text{WACC}-\text{g})} \cdot (1-\text{y}) \cdot (1-\text{x}) \cdot (1-\text{t}) \tag{42}$$

The final conclusion of all this reflection connects with the consequences that we had pointed out for the PER (Assets), since, as can be seen, it is easy to relate the new multiples with the previous one (and with the intrinsic value): ***the multiples should not be used to value companies, but to put the valuation obtained by other means*** (discounted cash flow) ***in an appropriate context***, allowing the corresponding comparisons with the sector average to detect variables that may be justifying values different from those obtained by applying these multiples.

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APPENDIX

Simplified graphical overview of the discounted cash flow valuation logic

❶ CALCULATION OF THE 'FREE CASH-FLOWS' OF THE COMPANY'S ASSETS TO BE VALUED

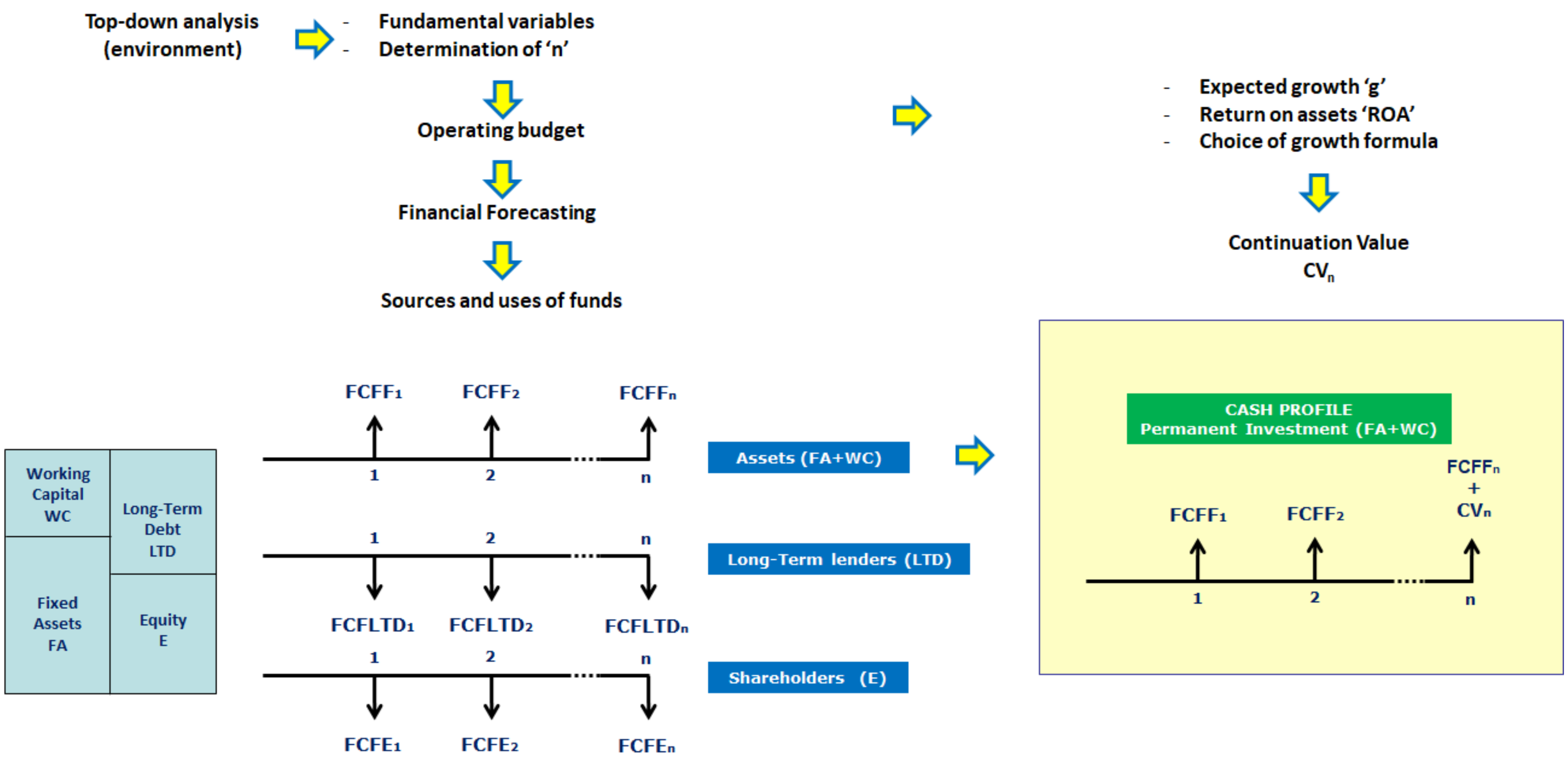

Figure A-1

❷ CALCULATION OF THE APPLICABLE DISCOUNT RATE (WEIGHTED AVERAGE COST OF FUNDS)

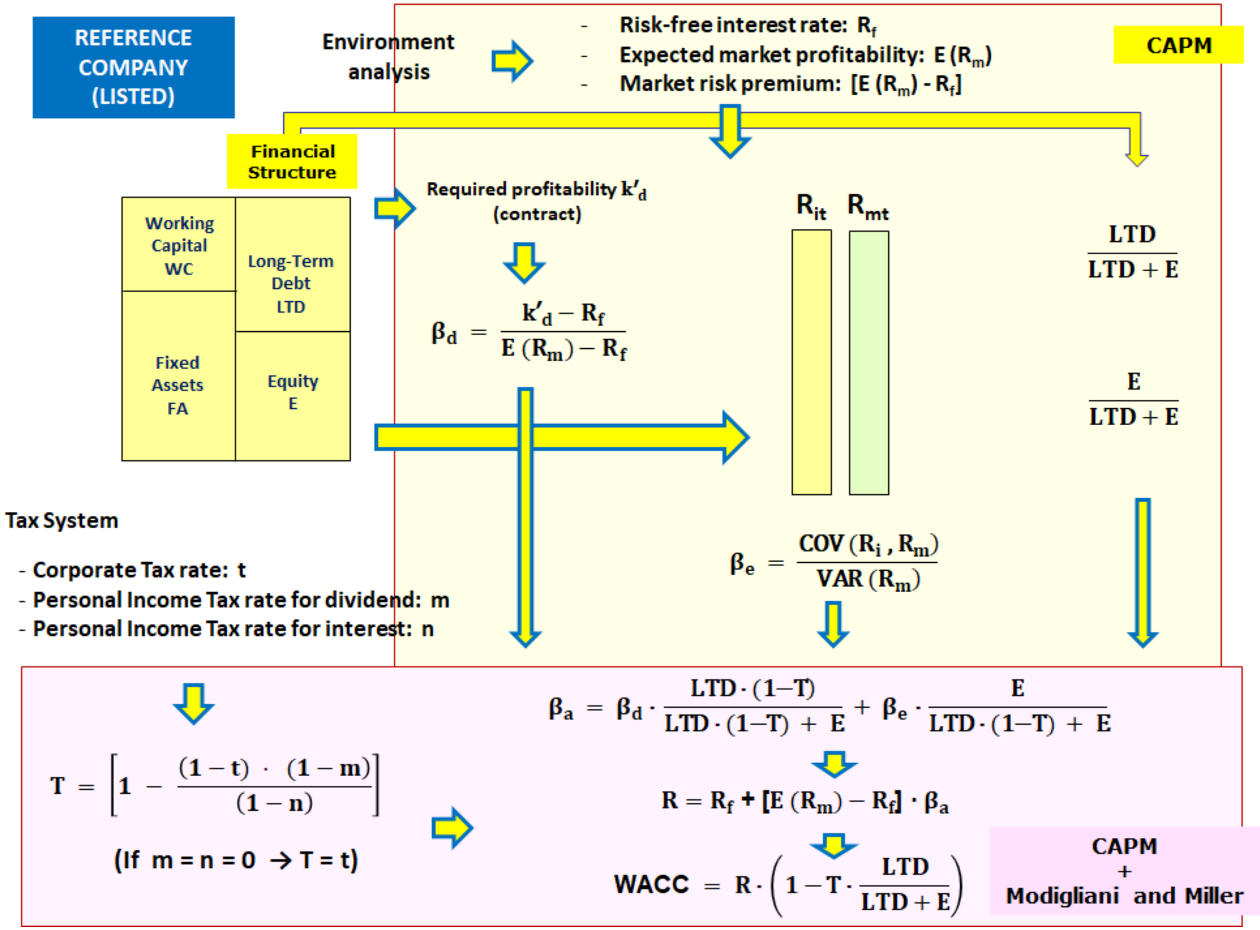

Figure A-2

❸ ENTERPRISE VALUE (EV, PERMANENT ASSET VALUE) AND SENSITIVITY ANALYSIS OF THE VALUE OBTAINED

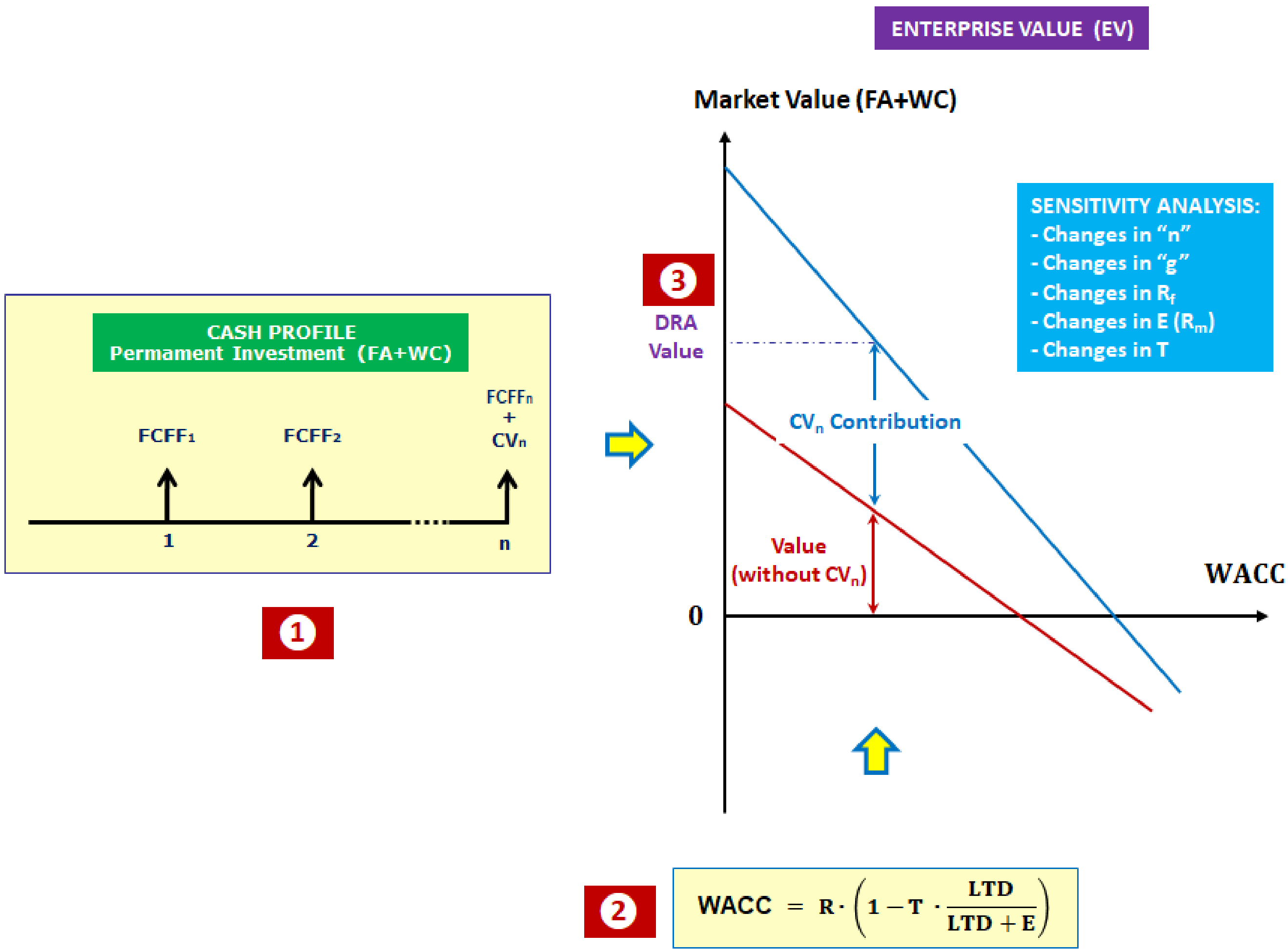

Figure A-3

❹ ANALYSIS OF THE CONSISTENCY OF THE VALUE OBTAINED WITH THE 'PENALIZED PRESENT VALUE'

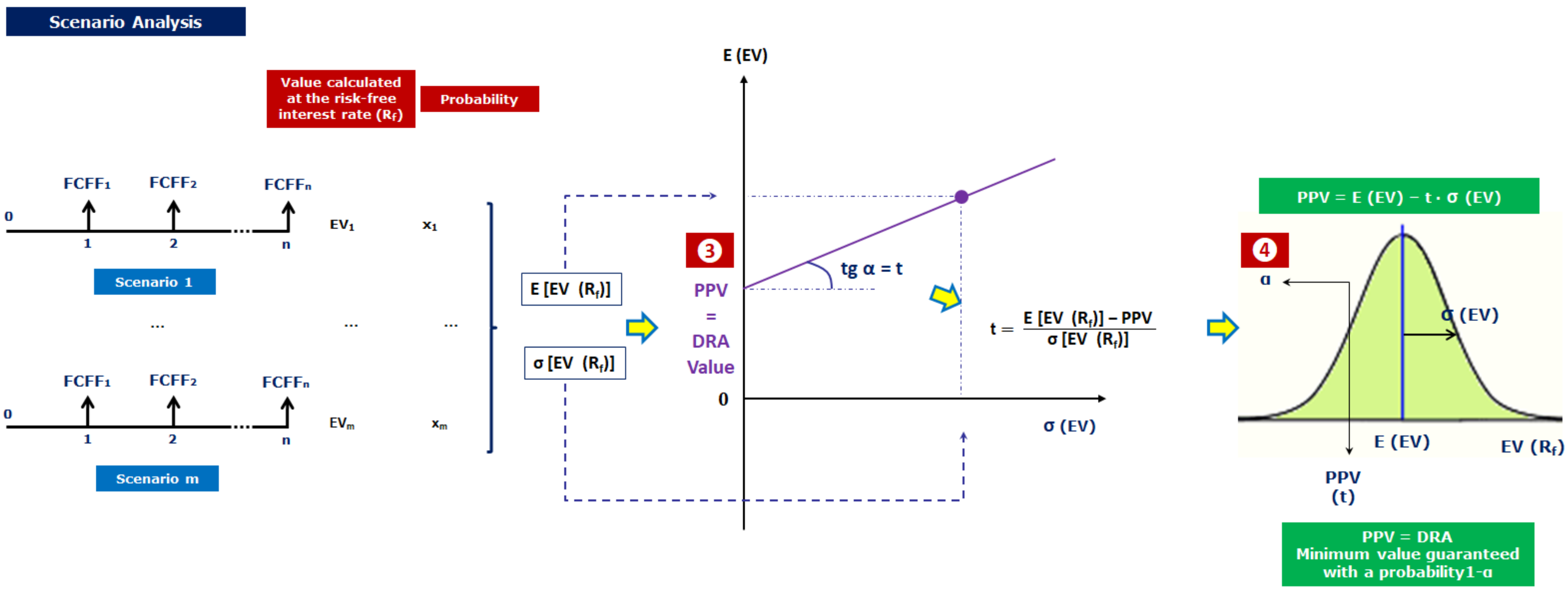

Figure A-4

❺ ANALYSIS OF THE CONSISTENCY OF THE VALUE OBTAINED WITH THE MOST COMMON MULTIPLES

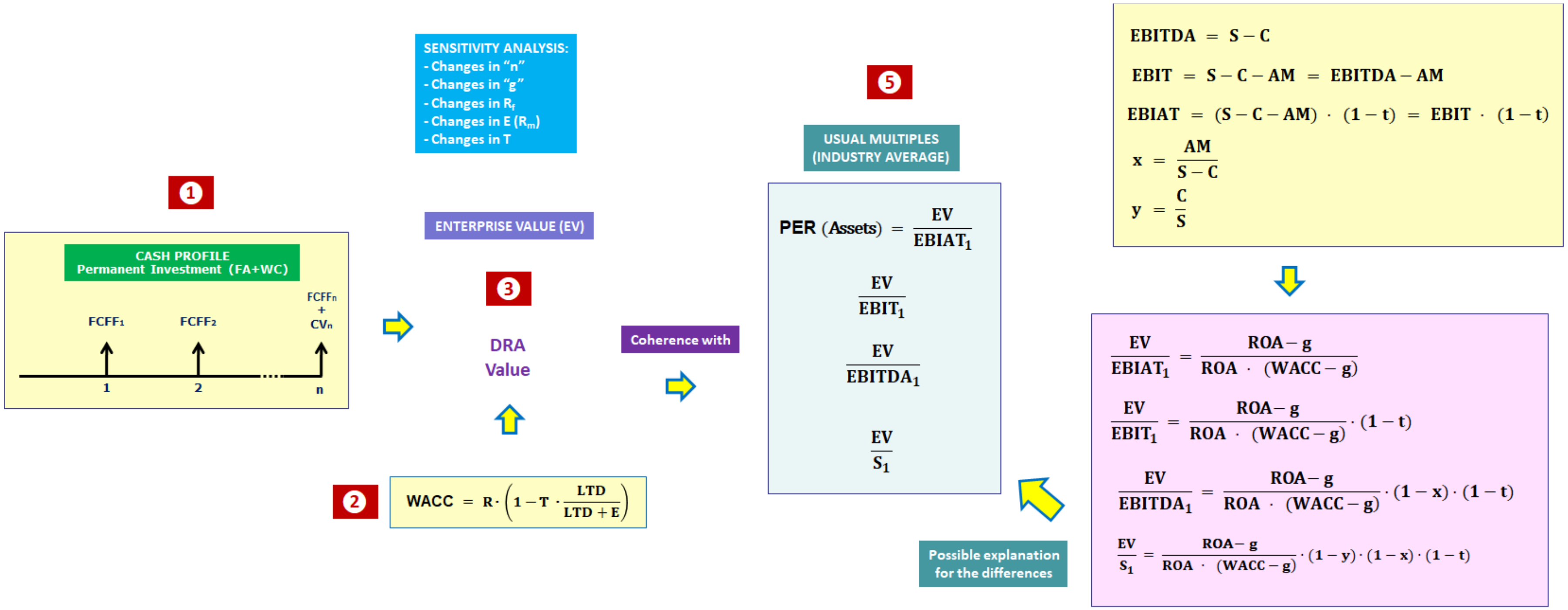

Figure A-5

Finance is a discipline that we all habitually handle intuitively in our everyday lives; many of our personal decisions have a financial dimension that, more or less explicitly, we incorporate into our processes of selecting the most advantageous alternatives. However, learning the technique is often harder than desirable. This may be due, at least in part, to the fact that Double-Entry Accounting, which is a fundamental source of information for financial decision-making in business, requires familiarity with a logic that has some counterintuitive elements (which we could identify with the implicit grammar of any language); to this is added a relatively extensive vocabulary that is sometimes used differently than usual in our daily lives.

This book is primarily aimed at those with no prior training in this discipline, who wish to acquire a sufficiently solid framework for reasoning, and who have limited time to do so. It is conceived as a series of readings, theoretically independent of each other, although it is advisable for those approaching the world of Accounting and Corporate Finance for the first time to adhere to the order in which they are presented in the book. Thus, the first two readings provide a sufficient framework for reasoning in the two disciplines mentioned; while the remaining six readings delve into some of the concepts presented in the previous ones, with varying levels of difficulty and requiring prior understanding of the first readings to ensure proper use of them.

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