FINANCE
FOR EXECUTIVES

Gabriel Rovayo Vera

IDE
BUSINESS SCHOOL

HBS
(Harvard Business School)

Prologo for
W. Carl Kester
Geroge Fisher Baker Jr. Professor of Business Administration
Harvard Business School

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Ph.D. in Business Administration

Roadmak
SOLUTIONS

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SUMMARY OF BUSINESS VALUATION

GABRIEL ROVAYO VERA

Ph.D. in Business Administration

He holds a Ph.D. Doctor of Philosophy in Business Administration from the University of Newport, California – USA; a Master´s Degree in Business Administration from ESPAE; a Master´s Degree in Management of Educational Centers from Universidad de la Sabana, Colombia; and Electrical Engineer, majoring in Electronics, from ESPOL.

At present, he is General Director of the IDE Business School of Ecuador and full-time Finance Professor at IDE. He has been invited to many countries to teach Operating Finance and Decision Analysis. He participates as guest lecturer in many of the Meetings of Directors of the international schools associated to IESE, and as anlyst in interviews at CNN in Financial shows.

His interest on mathematics has gained him honorable memberships worldwide, such as, Member of the Decision Sciences Institute, Georgia State University, USA, the National Council of Teachers of Mathematics, USA, Doctor Honoris Causa granted by the Latinamerican Council for Educational Quality 2002 in Uruguay, and the Naval War Academy as recognition of his valuable contribution to the training of Naval officials 2004.

He has been part of the panel of international experts in "America y Economía Intelligence" to choose the region's best Minister of Finance.

He has been and continues to be consultant of important companies in Ecuador, such as Coca Cola, Plásticos del Litoral, Flopec, Ponce Yépez, Grupo Egas, Codana, Nobis, Martinizing, Textiles Ecuador, Aifa, Azucarera Monterrey Malca, Textipiel, Repalco, Noroccidental, Servigrúas, Delcopr, Ecaugran, etc, in the fields of business valuation, financial analysis and diagnosis, financial strategy, new business development, mergers, negotiation, etc. He is member of several Boards of Directors of companies such as Roadmak Solutions Consulting, "América y Economía", Azucarera Monterrey Malca and Textipiel.

To my wife Ivonne, my children: Ma. Gabriela, Juan Pablo, Laura, Agustín, Ma. Verónica and Juan Miguel, and my parents: Beatríz and Marco

PROLOGO

We live in an age of great ferment as far as finance is concerned. The evolution in financial markets and financing techniques has been, for the most part, a great boon to businesses and individuals alike. But the worldwide credit crisis of 2008, with which we continue to cope even as I write these words, provides a stark reminder that even our greatest advances can become sources of distress if they are not understood, or worse, are applied without the moderating effect of good business judgment.

As we live through these turbulent times, I am delighted and honored to introduce you to this highly useful and effective new book on financial management by Dean Gabriel Rovayo of IDE Business School. Obviously, this book alone is not intended to solve the world's profound financial problems. But through its clear elucidation of the fundamentals of finance, it does us all the very great service of providing us with the strong foundation of understanding that is essential to successful financial management in the modern era. The lessons of this book are a vital first stage in understanding contemporary finance; in separating prudent, sound financial ideas from the merely fashionable ones; and in equipping business decision makers with the essential tools necessary for effective financial management.

This book is written for the general manager in a style that is at once highly precise and very lucid – a combination that is not always easy to achieve! It will introduce you to both standard techniques and recent advances in a manner that is fully accessible even to managers with limited exposure to finance. The careful reader who absorbs the lessons of this book will be well equipped to deal intelligently and effectively with most essential tasks of financial management. Whether you are an entrepreneur managing a young and still growing enterprise, or a senior executive assuming corporate-wide responsibilities of a large, mature company, you are sure to find this book helpful. Indeed, thanks to its comprehensiveness, its clear examples, and its concise writing, I am confident that this book will become an essential reference to those who use it.

Dean Rovayo's book is a much welcomed reminder that, for all the complexity of finance today, a clear understanding of it begins with a firm grasp of basic principles; and for all that has changed in the world of finance, the fundamentals of rational financial economics remain the same. This is an important lesson. We would all be better off today if more financial analysts and decision makers in positions of responsibility had adhered to basic principles of sound financial management. Society needs better thinking and greater care about finance. This book provides us with the tools to accomplish precisely that.

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Companies:

Roadmak Solutions Consulting

PREFACE

CONTENT AND ORGANIZATION

This book contains eight chapters and four appendixes. The first chapters discuss how to use operating financial tools to help businesspeople perform a deep analysis of their company's problems. One of the objectives of this work is to be used anywhere in the world in its present form.

This book is written in such a way that its concepts are relevant and understandable for any businessperson, university student or MBA student.

It does not aim to be a financial encyclopedia, or a technical treatise, but rather it aims to set the basic principles of financial management and apply them to the main decisions that financial executives face. It explains why managers want to increase value and it shows that financial executives value the investments that can generate returns at different moments or with different risk levels. It also sets out the main characteristics of financial markets and discusses why companies may prefer a particular financing source, as well as the level of indebtedness a company can acquire to make its operation efficient.

DIDACTIC FEATURES

This book includes an appropriate number of problems at the end of each chapter, classified by themes and degree of difficulty.

In all chapters, a section named "Knowledge Control" was added, so that students can monitor their learning.

A special set of excel templates for selected problems has been created. It includes a CD ROM and all Excel sheets for the examples presented.

LEVEL REQUIRED TO UNDERSTAND THE BOOK

The level of math knowledge required is elemental algebra; no other particular knowledge is required to understand it.

FINANCE
FOR EXECUTIVES

I

Fundamentals of Finance for Executives

Chapter I

Introduction

What is Finance?

Basically, Finance is a branch of Money Management, which in turn belongs to economic sciences due to the following reason (Figure 1.1):

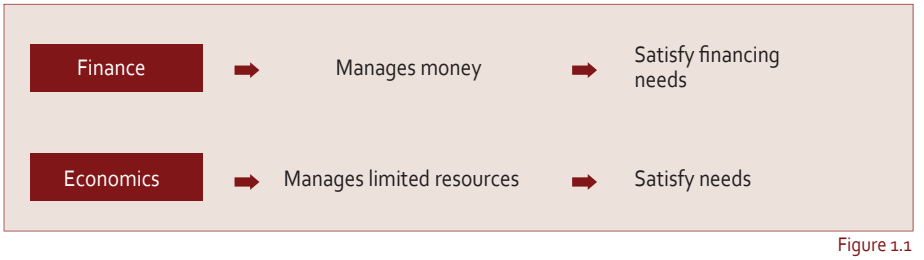
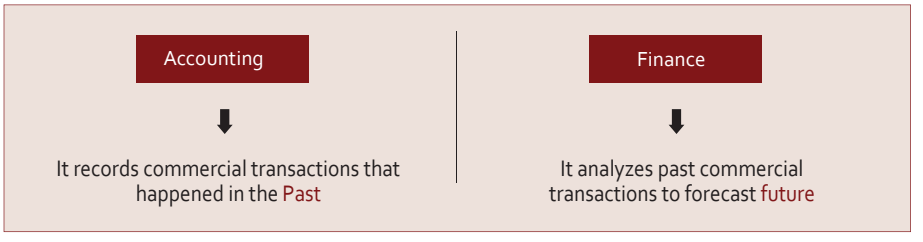


Figure 1.1

However, where is the necessary information to carry out the corresponding analysis for a correct Financial Management performance?

This information comes from another branch of economic sciences known as Accounting:



In this way, we introduce one of the most important concepts in finance: Time. Finance takes past information to predict and forecast the future in two specific aspects:

- **Short Term:** Known as Operational Finance, which involves the management for financing the company's current operations, that is, how to finance current assets.

- **Long Term:** Known as Structural Finance, which examines the management for financing fixed assets, investment decisions and the ideal financing structure (e.g. debt vs. equity)

Main Objectives of Finance

But why managing money? If there were an unlimited source of money to finance all short and long-term operations, would financial management still be necessary? The answer lies in the main objective of Finance: Value Creation.

Finance's objective is the maximization of shareholders' wealth. All financing and investing decisions should aim at creating value for the company and therefore increase shareholders' wealth, which will be reflected in an increase of their shares' value.

Therefore, we can already draw two basic conclusions:

- Having enough money does not necessarily mean creating value.
- Generating profit does not mean creating value either.

These two conclusions will be analyzed throughout all Chapters.

The accounting model to understand business

The easiest way to know the company's financial structure in a given time period is by means of its Balance Sheet (Figure 1.2). It shows how the company's resources (Assets) are used and where those resources come from (Liabilities + Equity).

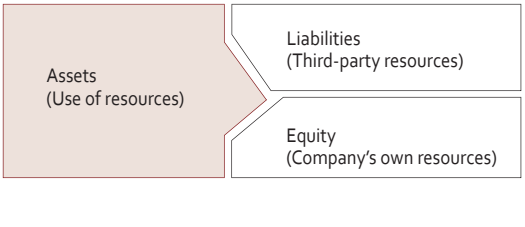


Figure 1.2

On the left side, we find Assets divided into:

a) Current Assets (CA): These are assets that can be easily converted into money. In this group we find:

- **Cash:** It represents cash (money in the treasury) and bank current accounts, that is, all "hard cash".
- **Accounts receivable (AR):** Money that customers and other people owe the company.
- **Inventory, stock or merchandise:** All material stored in warehouses that is necessary for operations. It can be raw material, work-in-process, finished or ready-for-sale goods, and they are valued at cost prices.

b) Fixed Assets or Property (FA): All assets that cannot be easily converted into money. In this group there are many accounts, such as:

- Land
- Buildings
- Facilities
- Machinery
- Furniture
- Office Equipment
- Computer Equipment
- Vehicles, etc.

Fixed assets are depreciated due to its use in the company. This depreciation accumulates in an account throughout the years. When fixed assets are presented in the balance sheet with accumulated depreciation, they are called Net Fixed Assets.

On the right side there are Liabilities, which are classified into:

a) Current or Short-term Liabilities: This refers to the resources the company owes to third parties, which should be paid as soon as possible. We will divide current liabilities into two categories:

a1. Spontaneous Liabilities (SL): They represent the financing that do not generate interest expenses for the company. They arise from the company's normal operation and involve the following accounts:

- Accounts Payable (AP): This is everything we have acquired by means of credit. It generally includes merchandise on credit.
- Accrued Expenses: This is the money that has to be paid to others, such as salaries, social security taxes, etc.
- Accrued Taxes: This is the money owed to the IRS (Internal Revenue Service).

a2. Negotiated Liabilities (NL): They represent short-term financing (generally less than 1 year) that generates interest expenses. They are usually negotiated with banks. They are also known as Short-term Debt (STD).

b) Long-term Liabilities: They represent the financing negotiated for a longer period, generally more than 1 year. They also entail interest expenses. They are known as Long-term Debt (LTD).

Interest-bearing Debt is defined as:

$$D_i = STD + LTD$$

c) Equity (E): This represents the money shareholders invest in the company. Retained earnings from previous years are also included. Therefore, our Balance Sheet is divided as follows:

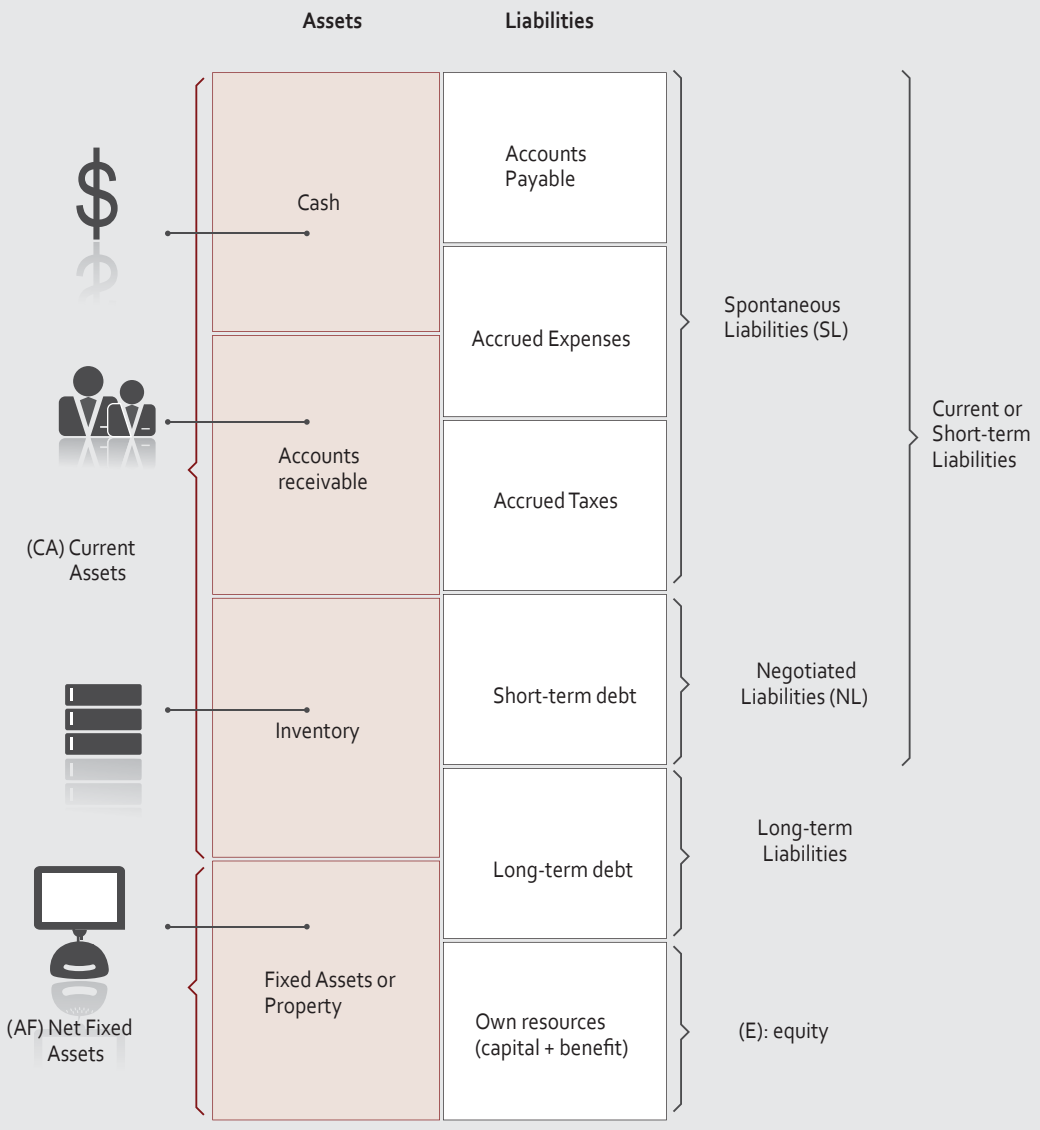


Figure 1.3

Next we have the balance sheet of Ixu S.A.
Figure. 1.4

Ixu S.A.
Balance Sheet
At December 31 2006

Assets		**Liabilities**	
Current Assets			
Cash	53,72	Accounts payable	322,29
Customers	1.208,59	Accrued Expenses	590,87
Accounts receivable	805,73	Accrued Taxes	752,01
Inventory	3.303,47	Short-term debt	214,86
T. Current Assets	5.371,51	**T. Short-term liabilities**	1.880,03
Fixed Assets		**Long-term liabilities**	
Land	1.500,00	Bank loans	2.050,11
Buildings	1.200,00	Mortgages	2.000,00
Furniture	302,00	**T. Long-term liabilities**	4.050,11
Office Equipment	320,09	**Total Liabilities**	5.930,14
Computer Equipment	360,00		
Vehicles	610,00	**Equity**	
Machinery	2.100,00	Share Capital	698,30
Accumulated Depreciation	-1.020,59	Reserves	3.483,42
T. Net Fixed Assets	5.371,50	*Income for the year *	631,15
		Total Equity	4.812,87
Total Assets	10.743.01	**Total Liab + Equity**	10.743.01

Figure 1.4

Note:

Depending on the operational needs and investments made by a company, other accounts may appear in the Balance Sheet, which can be put into other categories of assets, liabilities and equity not shown in the examples. For further information, refer to the Appendix.

Working Capital

Working Capital has always been a widely spread concept in Operational Finance, designed to perform a financial analysis of the company's operations. Basically, Working Capital is the difference between current assets and current liabilities (Figure 1.5).

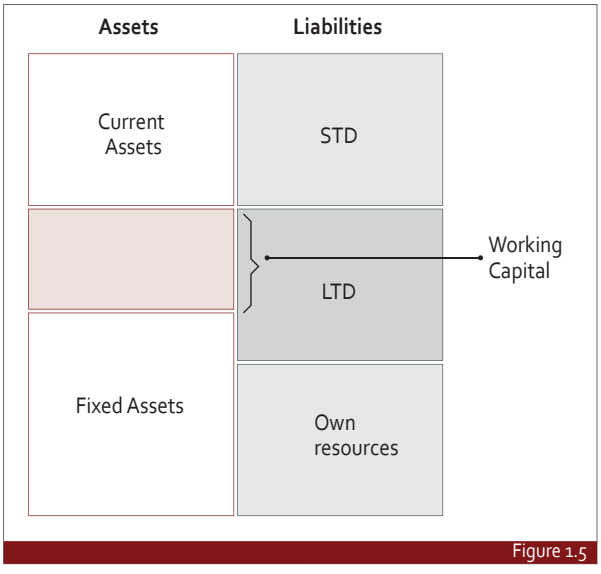


Figure 1.5

All money in cash and banks, accounts receivable and inventories has to be financed somehow and the working capital concept tries to explain a little this financing. Under this approach, current liabilities serve to finance part of current assets.

In general, a positive and increasing working capital is a synonym of good financial health. However, it has to be considered that working capital can increase spontaneously when sales increase and an increase in sales does not necessarily mean value creation.

On the other hand, a negative working capital is not always bad. Some supermarkets defer payments to suppliers, while collecting money from their sales in very short periods, selling almost everything in cash, which makes them maintain a negative working capital.

Unfortunately, this conceptualization is not the most appropriate since it includes short-term debt as financing for operations. This debt should not be included in the financing model since it is not generated from the company's operations. A more correct approach is presented below to explain how a company's operations are financed.

Need of Funds for Operations (NOF)

We can define NOF as the funds required by the company to operate. It is calculated as follows: (Figure 1.6).

NOF = (Cash + Accounts receivable + Inventory + . . .) – Spontaneous resources

NOF= (Current Assets) – Spontaneous Resources

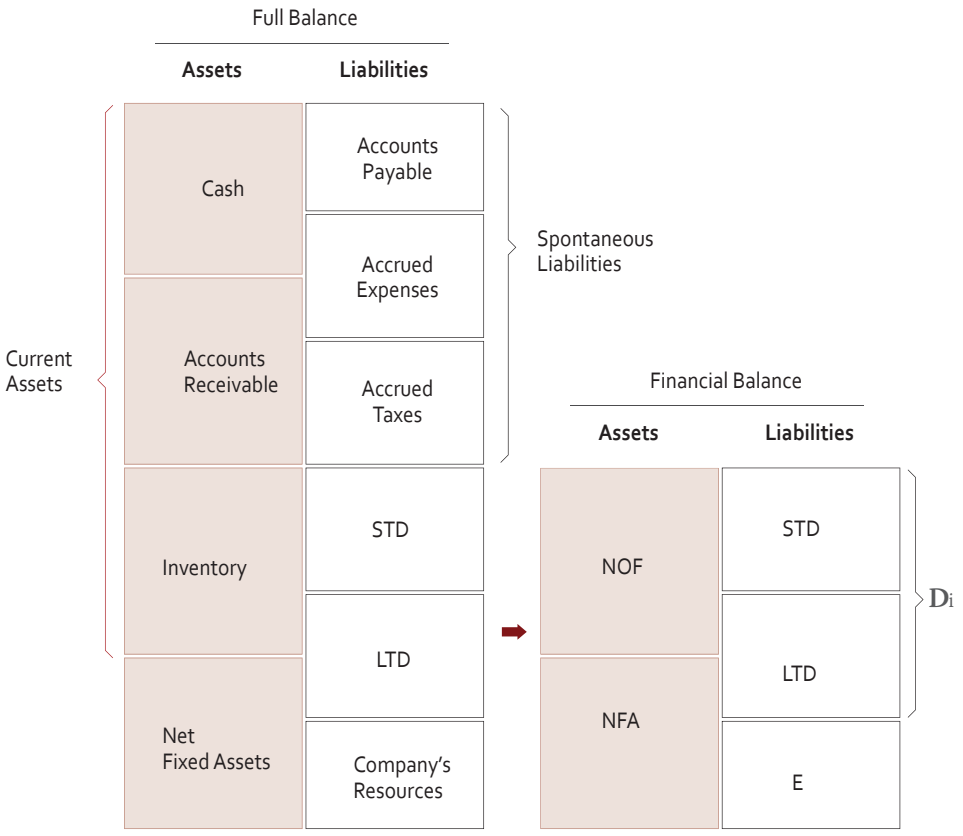


Figure 1.6

We can say that if the company operates, it will need to finance:

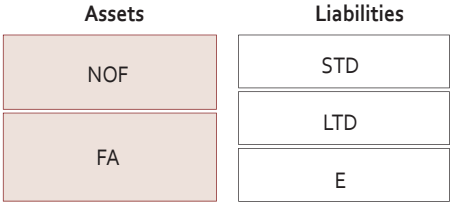
- Accounts receivable, since sales are completed but the money is not collected immediately
- Inventory to cover future sales,
- Cash to maintain the pace of operations

But in addition operations will finance part of current assets since the company will have:

- Accounts payable, because merchandise is bought on credit from suppliers.
- Other spontaneous liabilities, such as accrued taxes at the end of the month or next year.

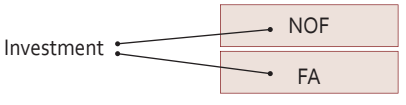
From the above, we can draw four general conclusions about NOF:

- The NOF represents the use of funds and should be on the assets side. The NOF is therefore an asset and it can be said that it is an investment, as important as and frequently more important than investments on fixed assets.



Therefore, a company's initial investment is equal to:

Investment in NOF + Investment in FA.



- NOF come directly from the company's daily operations; then they are a direct consequence of the company's operational policies.
- NOF can be modified any time by middle management; they usually do not require a decision from top management. For example: a saleswoman grants a longer credit term than usual to sell more, she will cause an increase in NOF due to the increase in Accounts Receivable.
- NOF are directly related to sales, since all their components are too. If there are increasing sales, there will be increasing NOF; if there are seasonal sales, there will be seasonal NOF.

$$\Delta SALES \Rightarrow \Delta NOF$$

Working Capital (WC)

The working Capital is the long-term funds available to finance NOF, once fixed assets have been financed. This definition is exactly the same in value to the above Working Capital, but its approach is different (Figure 1.7).

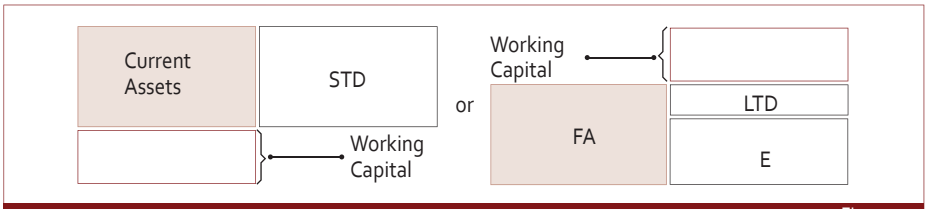


Figure 1.7

Working Capital can be defined from two different approaches:

- Current Approach: Although the mathematic definition is correct, it looks as if WC is a current asset and therefore very variable in nature, which is not correct

WC= Current Assets – Current Liabilities

- Fixed Approach: The working capital are surplus funds from long term debt, once all fixed assets were financed and they are therefore available to finance NOF.

WC= (LTD + E) – Fixed Assets

Under the fixed approach, the WC is a source of funds and not a movement of funds (Figure 1.8), as it would be under the current approach.

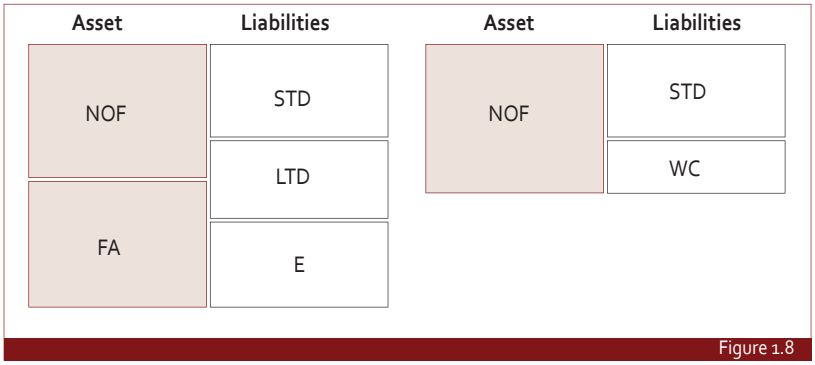


Figure 1.8

A higher WC means more financial stability, not because of surplus current assets, but because of surplus permanent resources available.

Financing NOF with WC

As it has been analyzed, NOF are financed with WC. If WC is not enough, there will be Need for Negotiated Resources (NNR) to overcome deficit; that is, credit from a bank will be needed (Figure 1.9).

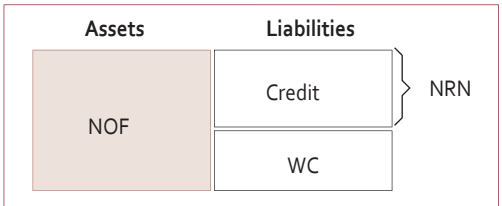


Figure 1.9

On the other hand, if WC is higher than NOF, there will be more funds than required and surplus will be treasury or cash surplus, but not as the cash needed for operations. For example: Supermarkets, Casinos, etc, (Figure 1.10).

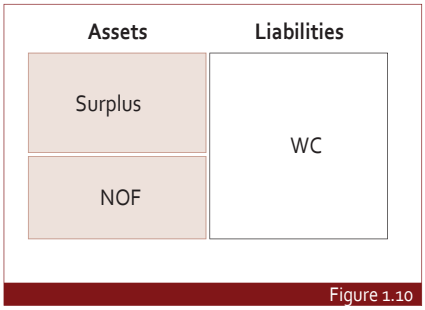


Figure 1.10

Real NOF Vs. accounting or forced NOF

We have pointed out that the difference between NOF and WC, when NOF > FM, gives as a result the need for negotiated resources (NNR). If short-term debt (STD) matched NNR, there would be perfect financial equilibrium, since everybody would be paid on time and the desired cash level would be maintained (Figure 1.11).

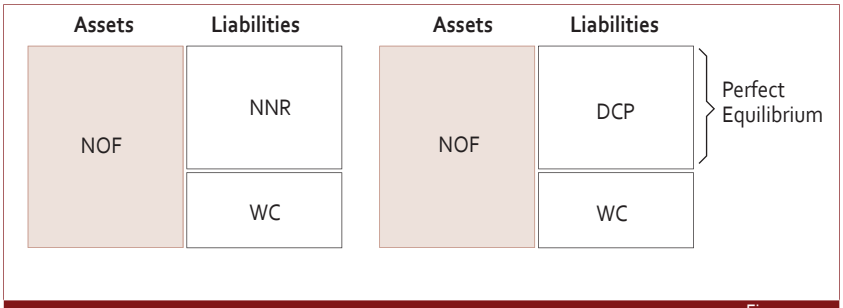


Figure 1.11

However, in practice this is not always the case. Usually, STD is lower than NNR, which gives rise to a difference that will have to be covered with forced resources (FR), as a treasury deficit or unpaid debts during the term established. (Figure 1.12).

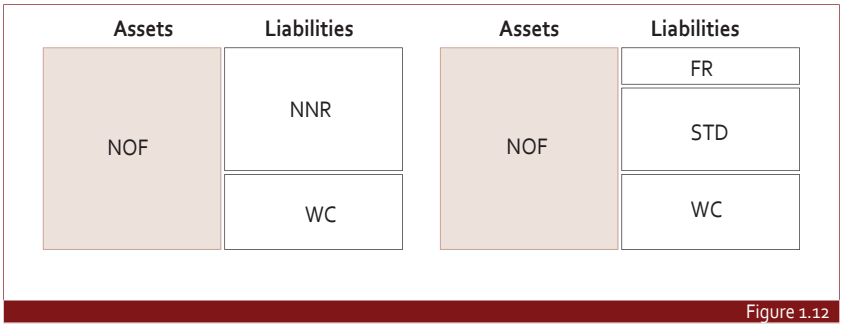
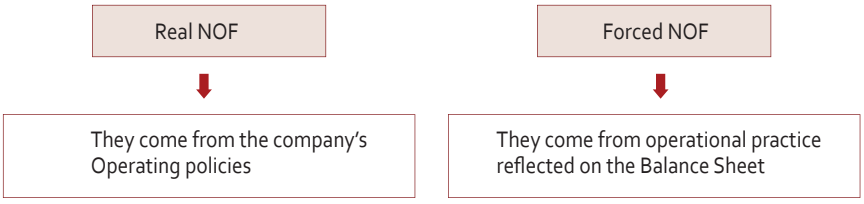


Figure 1.12

In this way, delays in payments are not spontaneous liabilities, but forced liabilities. If the payment policy is 30 days, but in practice debts are paid within 90 days, this delay will be reflected on the Balance Sheet, and at the moment of calculating NOF, an accounting or forced NOF will be obtained due to the existence of forced resources



Accounting or forced NOF that come from the Balance Sheet are calculated subtracting forced resources (FR) from real NOF. In this way, we have the following relationship (Figure 1.13):

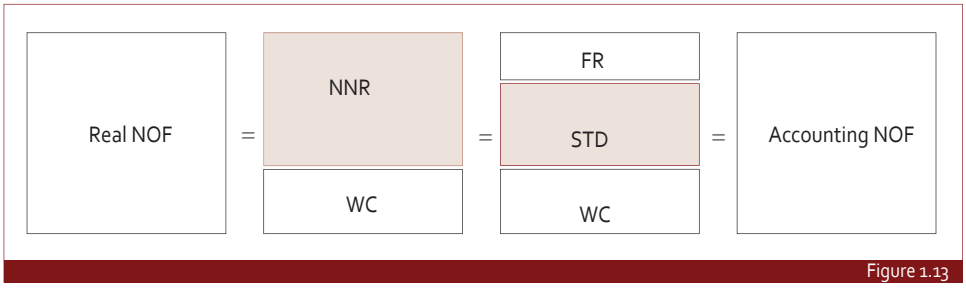


Figure 1.13

At the moment of performing any kind of financial analysis, we should be interested in analyzing real NOF and not accounting or forced NOF, since the latter do not reflect the company's optimal operation.

Now let's analyze Ixu S.A.'s full balance and calculate the NOF to present the Financial Balance.

NOF will be equal to:

NOF = Current Assets – Spontaneous Resources
NOF = 5.371,51 – 1.665,17

NOF = 3.706,34

WC will be equal to:

WC = (STD + E) – net FA
WC = 4.050,11 + 4.812,87 –5.371,50
WC = 3.491,48

And the need for negotiated resources (NNR) will be equal to:

NNR = NOF - WC
NNR = 3.706,34 – 3.491,48
NNR = 214,86 which is precisely STD

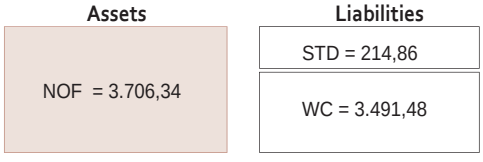
With this information, we can prepare the financial balance (Figure 1.14):

Ixu S.A.
Financial Balance

Assets		**Liabilities+Equity**		
NOF	3.706,34	STD	214,86	D_i
Net Fixed Assets	5.371,50	LTD	4.050,11	
		Equity	4.812,87	
Total Assets	**9.077,84**	**Total Liab + Equity**	**9.077,84**	

Figure 1.14

According to this analysis, we can draw the conclusion that:



- NOF are financed in 94.2% by WC and the remaining 5.8 % by short-term debt.
- In other words, Ixu S.A. has a solid financial position, since it needs less external financing for its operations.

Need-of-Funds-for-Operations Models

For the same company, NOF are not necessarily the same at any point of its life. Depending on its objectives and goals, NOF may vary somehow. We present some models below.

a) Growth Model

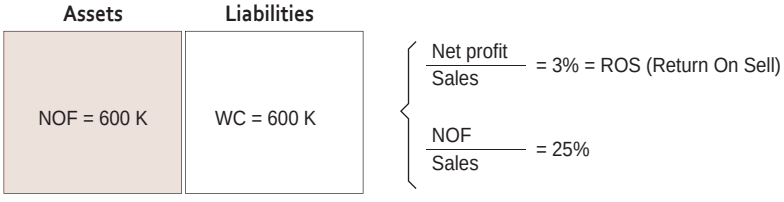
In most cases, for a growing company NOF increase in proportion to its growth pace. If sales increase 20% (g=20%), then current assets and spontaneous liabilities will tend to increase 20% as well, provided its policies on collection, payment and stock do not change.

On the other hand, WC will suffer variations coming from another side. If long-term debt (LTD), net fixed assets and the company's resources are kept constant, WC would only grow by means of retained earnings.

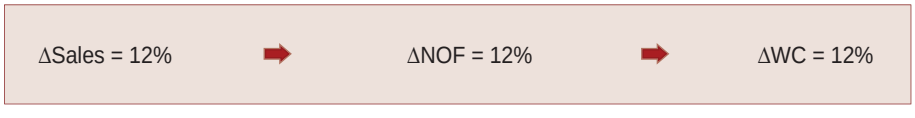
If the company wished to finance its growth without incurring in new STD, the sustainable growth percentage will be a direct function of the percentage of profit on sales, but also of the percentage of NOF over sales.

Let's see it in the following business case:

- Annual sales: $ 2.4 millions
- NOF: 25% of sales US$ 600 (K)
- The company does not have any treasury surplus nor NNR, that is WC = NOF = US$ 600 (K)
- Percentage of return on sales: 3% = US$ 72 (K)
- Perentage of retained earnings: 100%



If all earnings are retained and included as WC increase, then WC= 12% per year (US$ 72 (K)/US$ 600 (K)). Therefore we can infer the following relationship:



When NOF are equal to WC and fixed assets remain constant, the percentage of sustainable growth is equal to the return on sales (3%) divided by NOF over sales (25%). Then:

$$\frac{\text{Return on Sales}}{\text{NOF / Sales}} = \frac{3\%}{25\%} = 12\%$$

In other words, the maximum growth this company can achieve without needing more debt is 12%. If the company wished to grow more than 12%, it should incur in new debt.

Now, if the company manages to operate with higher operating efficiency (less NOF due to shorter collection terms, less inventory days, etc.), the percentage of NOF over sales will be lower and therefore growth will be higher.

$$\frac{\text{Return on Sales}}{\Downarrow \text{NOF/Sales}} = \Uparrow g$$

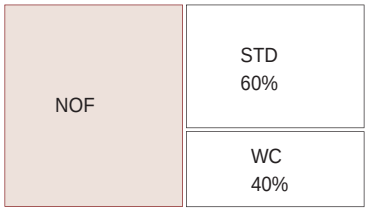
In the above case, NOF would have been reduced to half of it, then:

$$\frac{\text{Return on Sales}}{\text{NOF/Sales}} = \frac{3\%}{12.5\%} = 24\%$$

Which would have allowed that:

$\Uparrow$WC = 24% ➡ ΔNOF = 24% ➡ ΔSales = 24%

But sustainable growth will also be higher if the company uses short-term debt regularly in a given proportion to finance NOF. Let's imagine the following relationship between WC and STD to finance the company's NOF:



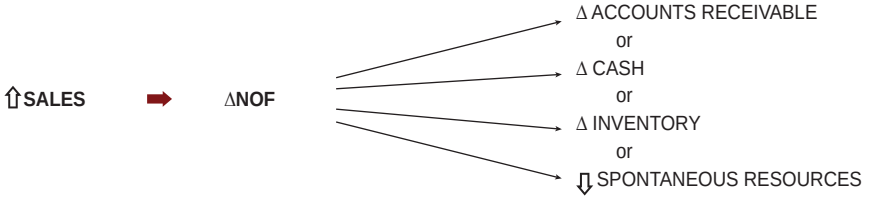
Under this structure, for every $ 4 of retained earnings, the company could obtain $6 of STD. If its retained earnings, now WC were 72 K$, the company could obtain 108 K$ (72 K$/40 x 60) of STD. Therefore, NOF could increase by 108 K$+72 K$= 180 K$, which means a 30% increase (180 K$/ 600 K$), instead of initial 12%.

The most important points we can infer are:

- If you want to grow, you have to try to reduce NOF or increase return on sales
- If you are planning to increase NOF, this model helps us determine the necessary funds to sustain such growth, especially since those funds should come from the WC increase, either from retained earnings or new capital contributions.

A sales increase results in a NOF increase. A NOF increase can result from:

An increase in accounts receivable (bad credits granted or a bad collection policy, etc), an inventory increase (a marketing campaign with no results or low product turnover, etc.), a cash increase or a reduction in spontaneous resources.



b) Seasonality Model

If sales are seasonal (high sales during some months and low sales during others, for example sales of bathing suits, toys, etc.) we will have to make a monthly calculation. For instance:

If collecting in:	Accounts receivable will be equal to:
• 30 days	This month's sales
• 60 days	This month's sales plus sales from the previous month
• 90 days	This month's sales plus sales from the two previous months

The same reasoning applies to other NOF components. Therefore, since the WC is relatively stable, NNR fluctuations will be mainly defined by NOF fluctuations.

This model will serve the company to set:

- A sufficient WC to cover at least minimum NOF throughout the year.
- A NNR for peak seasons to cover NOF fluctuations during seasonal months.
- If WC is higher than NOF, there will be cash surpluses during part of the year, which will reduce NNR for seasonal months.

c) Negative Working Capital

As mentioned earlier, there are companies that work with a negative working capital, as it is the case for supermarkets. They manage to have a negative WC because:

- Inventory stays in warehouses for very few days.
- Money is collected much earlier (almost everything in cash) than payments need to be made.
- The figures from suppliers are higher than those of accounts receivable and stock; therefore their NOF is negative and so is their WC.

By this we do not mean that a negative WC is always good. In general, this situation is not common and depending on the type of company, a negative WC could indicate important planning achievements or defects.

How to make a financial diagnosis?

With the NOF-FM model, it will be easier to make a financial diagnosis of your company. It should be clear that if the company has financial difficulties, this could be due to one of the following reasons:

a) Financial problems: or problems related to the Balance Sheet. The company makes money but it still needs more. Financial problems can be:

- Operational: Problems that arise due to a NOF increase. NOF can grow due to:
  - More sales
  - A generous credit policy
  - A different manufacturing process
  - Expensive raw materials, etc.
- Structural: They are due to an inadequate financial structure, caused by a lack of WC, due to:
  - High investment in fixed assets
  - Payment of high dividends
  - Important debt refund

b) Economic problems: or problems related with results. Basically, the company is losing money; therefore it is obviously running out of financing. Losses will cause the company's resources to decrease and needs for other financing sources to increase.

In the following chapters we will examine different methods to analyze income accounts and to define economic problems that may exist in a company.

Besides, we will analyze more thoroughly the Balance Sheet and other Financial Statements.

Aspects to be considered in sales growth

It is normal that as executives, we are enthusiastic about the idea that sales from our company grow from one year to the next. If the company is highly indebted, it is very difficult that its growth is based on acquiring new debt, whether long-term or short-term.

In order to calculate the growth a company should have, without increasing shareholders' capital and without acquiring debt both in the short and the long run, we should consider the following assumptions:

a) That if the company acquires new fixed assets, these must be equal to the depreciation.

b) That the Need of Funds for Operation (NOF) in relation to sales, should be kept constant, that is, that we can express NOF as a percentage of sales.

$$\frac{NOF}{Sales} = c$$

I CASE

Let's calculate the maximum growth a company should have, if it decides to grow only with retained earnings, without increasing its short and long-term debt.

That is, the company decides to grow assigning all its earnings to capitalize the business, without distributing dividends, ΔE=Retained earnings (increase in company's resources equal to retained earnings).

In order to understand, see the graph below, where the company's initial situation is represented (Figure A). We are going to increase sales, which implies a NOF increase (Figure B).

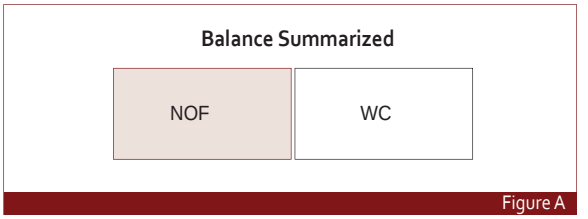


Figure A

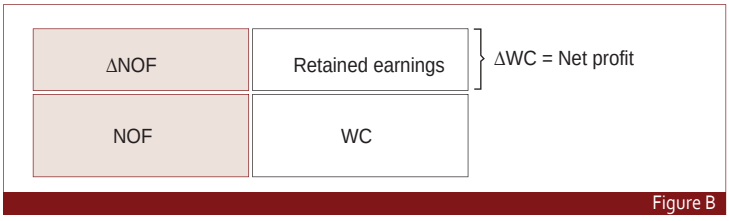


Figure B

In Figure B we will cover the new requirement of funds ΔNOF) with the earnings we will generate.

Therefore, we can say:

$$\Delta NOF = \Delta WC$$

Which means that the NOF increase will be financed by a Working Capital (WC) increase.

In the first case:

$$\frac{NOF}{Sales} = c$$

NOF = g • SALES

Then the NOF increase is given by:

ΔNOF = g • ΔSALES (1)

The WC increase

ΔWC = Net profit (2)

ROS = Return on Sales

$$ROS = \frac{\text{Net profit}}{SALES}$$

We can express income as follows:

Net profit = ROS • SALES (3)

Replacing equation (3) in (2) we obtain:

ΔWC = ROS • SALES

Therefore, we finance NOF increase or growth with the WC increase:

$$\Delta NOF = g \bullet \Delta SALES$$

$$\Delta WC = ROS \bullet SALES$$

$$g \bullet \Delta SALES = ROS \bullet SALES$$

$$\frac{\Delta SALES}{SALES} = \frac{ROS}{g}$$

The first fraction represents sales growth g.

And if we replace g for NOF/SALES, we can infer the following:

$$g = \frac{\Delta SALES}{SALES} = \frac{ROS}{g}$$

como: $g = \frac{NOF}{SALES}$; then

$$g = \left[\frac{ROS}{\frac{NOF}{SALES}} \right]$$

II CASE

Let's consider company's growth, but under the following conditions:

a) The company does not increase capital by shareholders.
b) There is no short-term debt increase.
c) There is no distribution of dividends.
d) The company keeps the long-term debt – equity ratio constant.

That is:

$$\left[\frac{LTD}{LTD + E} \right] = Constant = \lambda \qquad (1)$$

We can say that ΔE = Net profit= NI

If we decide to keep the LTD and E ratio constant, the following condition should be met:

$$\left[\frac{LTD + \Delta LTD}{LTD + \Delta LTD + E + NI}\right] = \text{Constant} = \lambda$$

$$\lambda LTD + \lambda \Delta LTD + \lambda E + \lambda NP = LTD + \Delta LTD$$

$$\lambda LTD + \lambda E + \lambda NP - LTD = \Delta LTD - \lambda \Delta LTD$$

$$\lambda(LTD + E) + \lambda BN - LTD = \Delta LTD (1 - \lambda) \quad (2)$$

If we work out the value of LTD + E from equation (1), we obtain:

$$\Lambda (LTD + E) = LTD$$

$$(LTD + E) = \frac{LTD}{\lambda} \quad (3)$$

If we replaceos (3) in (2)

$$\lambda \left(\frac{LTD}{\lambda}\right) + \lambda NP - LTD = \Delta LTD (1 - \lambda)$$

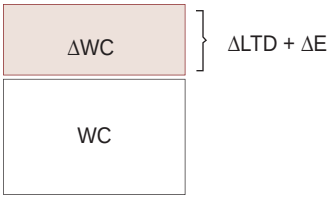
$$LTD - LTD + \lambda NP = \Delta LTD (1 - \lambda)$$

$$\lambda NP = \Delta LTD (1 - \lambda)$$

$$\Delta LTD = \frac{\lambda}{(1 - \lambda)} NP \quad (4)$$

If we have said that growth will take place due to working capital, then;

$$\Delta WC = \Delta LTD + \Delta E \quad (5)$$



We replace equation (4) in (5) and the result is:

$$\Delta WC = \left[\frac{\lambda}{(1-\lambda)}\right] NP + \Delta E$$

Since ΔE = Net profit = NP

$$\Delta WC = \left[\frac{\lambda}{(1-\lambda)}\right] NP + \Delta E$$

$$\Delta WC = \left[\frac{\lambda}{(1-\lambda)}\right] NP + NP$$

$$\Delta WC = \frac{\lambda\, NP + (1-\lambda)\, NP}{(1-\lambda)}$$

$$\Delta WC = \frac{NP}{(1-\lambda)}$$

Since ΔNOF = Net profit = NP= ΔWC

$$\frac{\Delta NOF}{NOF} = \frac{\Delta SALES}{SALES}$$

$$\Delta NOF = \left(\frac{NOF}{SALES}\right) \Delta SALES$$

ΔNOF = NP

$$NP = \left(\frac{NOF}{SALES}\right) \Delta SALES$$

Como NP = ΔWC

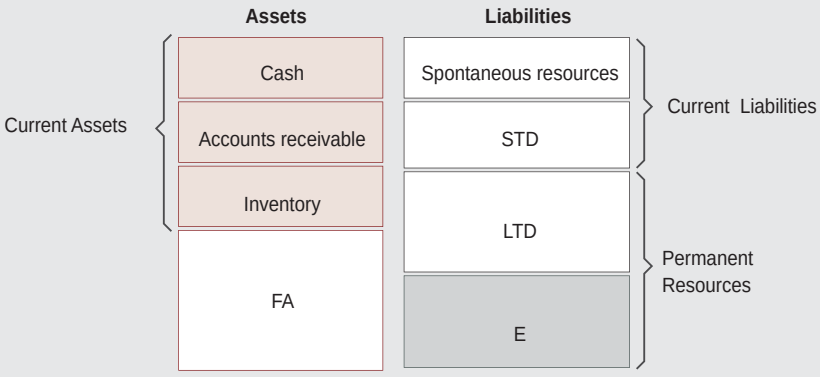
y ΔWC $\frac{NP}{(1-\lambda)}$

$$\frac{NOF}{SALES}\ \Delta SALES = \frac{NP}{(1-\lambda)}$$

$$\frac{\Delta SALES}{SALES} = \frac{NP}{(1-\lambda)} \times \frac{1}{NOF}$$

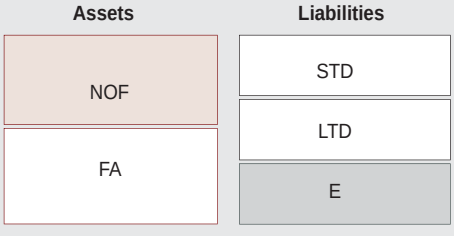
$$g = \frac{NP}{(1-\lambda)} \times \frac{1}{NOF}$$

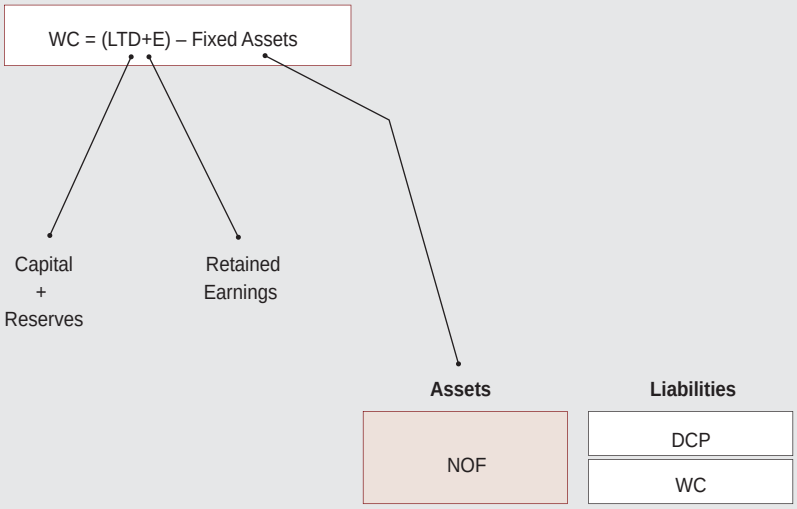
Summary



NOF - WC Model

NOF = (Cash + Customers + Inventory) – Spont. Res.
NOF= (Current Assets) – Spontaneous Resources





NOF = WC + STD

STD + LTD = Interest-bearing Debt

$$D_I = D$$

Butler Lumber Company

After a rapid growth in its business during recent years, the Butler Lumber Company in the spring of 1991 anticipated a further substantial increase in sales. Despite good profits, the company had experienced a shortage of cash and had found it necessary to increase its borrowing from the Suburban National Bank to $247,000 in the spring of 1991. The maximum loan that Suburban National would make to any one borrower was $250,000, and Butler had been able to stay within this limit only by relying very heavily on trade credit. In addition, Suburban was now asking that Butler secure the loan with its real property. Mark Butler, sole owner and president of the Butler Lumber Company, was therefore looking elsewhere for a new banking relationship where he would be able to negotiate a larger and unsecured loan.

Butler had recently been introduced by a friend to George Dodge, an officer of a much larger bank, the Northrop National Bank. The two men had tentatively discussed the possibility that the Northrop Bank might extend a line of credit to Butler Lumber up to a maximum amount of $465,000. Butler thought that a loan of this size would more than meet his foreseeable needs, but he was eager for the flexibility that a line of credit of this size would provide. After this discussion, Dodge had arranged for the credit department of the Northrop National Bank to investigate Mark Butler and his company.

The Butler Lumber Company had been founded in 1981 as a partnership by Mark Butler and his brother-in-law, Henry Stark. In 1988 Butler bought out Stark's interest for $105,000 and incorporated the business. Stark had taken a note for $105,000, to be paid off in 1989, to give Butler time to arrange for the financing necessary to make the payment of $105,000. The major portion of the funds needed for this payment was raised by a loan of $70,000, negotiated in late 1988. This loan was secured by land and buildings, carried an interest rate of 11%, and was repayable in quarterly installments at the rate of $7,000 a year over the next 10 years.

The business was located in a growing suburb of a large city in the Pacific Northwest. The company owned land with access to a railroad siding, and two large storage buildings had been erected on this land. The company's operations were limited to the retail distribution of lumber products in the local area. Typical products included plywood, moldings, and sash and door products. Quantity discounts and credit terms of net 30 days on open account were usually offered to customers.

Sales volume had been built up largely on the basis of successful price competition, made possible by careful control of operating expenses and by quantity purchases of materials at substantial discounts. Much of the moldings and sash and door products, which constituted significant items of sales, were used for repair work. About 55% of total sales were made in the six months from April through September. No sales representatives were employed, orders being taken exclusively over the telephone. Annual sales of $1,697,000 in 1988, $2,013,000 in 1989, and $2,694,000 in 1990 yielded after-tax profits of $31,000 in 1988, $34,000 in 1989, and $44,000 in 1990.[1] Operating statements for the years 1988-1990 and for the three months ended March 31, 1991, are given in Exhibit 1.

Mark Butler was an energetic man, 39 years of age, who worked long hours on the job. He was helped by an assistant who, in the words of the investigator of the Northrop National Bank, "has been doing and can do about everything that Butler does in the organization." Other employees numbered 10 in early 1991, 5 of whom worked in the yard and drove trucks and 5 of whom assisted in the office and in sales.

As part of its customary investigation of prospective borrowers, the Northrop National Bank sent inquiries concerning Mark Butler to a number of firms that had business dealings with him. The manager of one of his large suppliers, the Barker Company, wrote in answer:

The conservative operation of his business appeals to us. He has not wasted his money in disproportionate plant investment. His operating expenses are as low as they could possibly be. He has personal control over every feature of his business, and he possesses sound judgment and a willingness to work harder than anyone I have ever known. This, with a good personality, gives him a good turnover; and from my personal experience in watching him work, I know that he keeps close check on his own credits.

All the other trade letters received by the bank bore out this opinion.

In addition to owning the lumber business, which was his major source of income, Butler held jointly with his wife an equity in their home. The house had cost $72,000 to build in 1979 and was mortgaged for $38,000. He also held a $70,000 life insurance policy, payable to his wife. She owned independently a half interest in a house worth about $55,000. Otherwise, they had no sizeable personal investments.

[1] Sales in 1986 and 1987 amounted to $728,000 and $1,103,000, respectively; profit data for these years are not comparable with those of 1988 and later years because of the shift from a partnership to a corporate form of organization. As a corporation, Butler was taxed at the rate of 15% on its first $50,000 of income, 25% on the next $25,000 of income, and 34% on all additional income above $75,000

The bank gave particular attention to the debt position and current ratio of the business. It noted the ready market for the company's products at all times and the fact that sales prospects were favorable. The bank's investigator reported: "Sales are expected to reach $3.6 million in 1991 and may exceed this level if prices of lumber should rise substantially in the near future." On the other hand, it was recognized that a general economic downturn might slow down the rate of increase in sales. Butler Lumber's sales, however, were protected to some degree from fluctuations in new housing construction because of the relatively high proportion of its repair business. Projections beyond 1991 were difficult to make, but the prospects appeared good for a continued growth in the volume of Butler Lumber's business over the foreseeable future.

The bank also noted the rapid increase in Butler Lumber's accounts and notes payable in the recent past, especially in the spring of 1991. The usual terms of purchase in the trade provided for a discount of 2% for payments made within 10 days of the invoice date. Accounts were due in 30 days at the invoice price, but suppliers ordinarily did not object if payments lagged somewhat behind the due date. During the last two years, Butler had taken very few purchase discounts because of the shortage of funds arising from his purchase of Stark's interest in the business and the additional investments in working capital associated with the company's increasing sales volume. Trade credit was seriously extended in the spring of 1991 as Butler strove to hold his bank borrowing within the $250,000 ceiling imposed by the Suburban National Bank. Balance sheets ended December 31, 1988-1990, and March 31, 1991, are presented in Exhibit 2.

The tentative discussions between George Dodge and Mark Butler had been about a revolving, secured 90-day note not to exceed $465,000. The specific details of the loan had not been worked out, but Dodge had explained that the agreement would involve the standard covenants applying to such a loan. He cited as illustrative provisions the requirement that restrictions on additional borrowing would be imposed, that net working capital would have to be maintained at an agreed level, that additional investments in fixed assets could be made only with prior approval of the bank, and that limitations would be placed on withdrawals of funds from the business by Butler. Interest would be set on a floating-rate basis at 2 percentage points above the prime rate (the rate paid by the bank's most creditworthy customers). Dodge indicated that the initial rate to be paid would be about 10.5% under conditions in effect in early 1991. Both men also understood that Butler would sever his relationship with the Suburban National Bank if he entered into a loan agreement with the Northrop National Bank.

Exhibit 1

Exhibit 1 Operating Statements for Years Ended December 31, 1988-1990, and for First Quarter 1991 (thousands of dollars)

				First Quarter
	1988	**1989**	**1990**	**1991**
Net sales	1.697	2.013	2.694	718[a]
Cost of goods sold				
Beginning inventory	183	239	326	418
Purchases	1.278	1.524	2.042	660
	1.461	1.763	2.368	1.078
Ending inventory	239	326	418	556
Total cost of goods sold	1.222	1.437	1.950	522
Gross profit	475	576	744	196
Operating expense[b]	425	515	658	175
Interest expense	13	20	33	10
Net income before taxes	37	41	53	11
Provision for income taxes	6	7	9	2
Net income	31	34	44	9

[a]In the first quarter of 1990 sales were $698,000 and net income was $7,000.

[b]Operating expenses include a cash salary for Mr. Butler of $75,000 in 1988, $85,000 in 1989, $95,000 in 1990, and $22,000 in the first quarter of 1991. Mr. Butler also received some of the perquisites commonly taken by owners of privately held businesses.

Exhibit 2

Balance Sheets ended December 31, 1988-1990, and March 31, 1991 (thousands of dollars)

				First Quarter
	1988	**1989**	**1990**	**1991**
Cash	58	48	41	31
Accounts receivable, net	171	222	317	345
Inventory	239	326	418	556
Current assets	468	596	776	932
Property, net	126	140	157	162
Total assets	594	736	933	1.094
Notes payable, bank	-	146	233	247
Notes payable, Mr. Stark	105	-	-	-
Notes payable, trade	-	-	-	157
Accounts payable	124	192	256	243
Accrued expenses	24	30	39	36
Long-term debt, current portion	7	7	7	7
Current liabilities	260	375	535	690
Long-term debt	64	57	50	47
Total liabilities	324	432	585	737
Net worth	270	304	348	357
Total liabilities and net worth	594	736	933	1.094

Play Time Toy Company

Early in January 1991, Jonathan King, president and part owner of Play Time Toy Company, was considering a proposal to adopt level monthly production for the coming year. In the past, the company's production schedules had always been highly seasonal, reflecting the seasonality of sales. Mr. King was aware that a marked improvement in production efficiency could result from level production, but he was uncertain what the impact on other phases of the business might be.

Play Time Toy Company was a manufacturer of plastic toys for children. Its product groups included military toys, toy cars, trucks, construction equipment, guns, rockets, spaceships and satellites, musical instruments, animals, robots, and action figures. In most of these product categories the company produced a wide range of designs, colors, and sizes. Dollar sales of a particular product had sometimes varied by 30%-35% from one year to the next.

The manufacture of plastic toys was a highly competitive business. The industry was populated by a large number of companies, many of which were short on capital and management talent. Since capital requirements were not large and the technology was relatively simple, it was easy for new competitors to enter the industry. On the other hand, design and price competition was fierce, resulting in short product lives and a relatively high rate of company failures. A company was sometimes able to steal a march on the competition by designing a popular new toy, often of the fad variety. Such items generally commanded very high margins until competitors were able to offer a similar product. For example, Play Time's introduction of rock musician action figures in 1988 had contributed importantly to that year's profits. In 1989, however, 11 competitors marketed a similar product, and the factory price of the Play Time offering plummeted. In recent years, competitive pressures on smaller firms had also intensified with the rise of a number of large foreign toy manufacturers with low labor costs.

Company Background

Play Time Toy Company was founded in 1973 by Henry Richards after his release from naval service. Before his military service, he had been employed as production manager by a large manufacturer of plastic toys. Mr. Richards and his former assistant, Jonathan King, established Play Time Toy Company with their savings in 1973. Originally a partnership, the firm was incorporated in 1974, with Mr. Richards taking 75% of the capital stock and Mr. King taking 25%. The latter served as production manager, and Mr. Richards as president was responsible for overall direction of the company's affairs. After a series of illnesses, Mr. Richards's health deteriorated, and he was forced to retire from active participation in the business in 1987. Mr. King assumed the presidency at that time. In 1989 he hired Thomas Lindop, a recent graduate of a prominent eastern technical institute, as production manager. Mr. Lindop had worked during summers in the plastics plant of a large diversified chemical company and thus had a basic familiarity with plastics production processes.

Company Growth

Play Time Toy Company had experienced relatively rapid growth since its founding and had enjoyed profitable operations each year since 1976. Sales had been $7.4 million in 1990, and on the strength of a number of promising new products, sales were projected at $9.0 million for 1991. Net profits had reached $244,000 in 1990 and were estimated at $293,000 in 1991 under seasonal production. Tables A and B present the latest financial statements for the company. The cost of goods sold had averaged 70% of sales in the past and was expected to maintain roughly that proportion in 1991 under seasonal production. In keeping with the company's experience, operating expenses were likely to be incurred evenly throughout each month of 1991 under either seasonal or level production.

Table A. Condensed Income Statements, 1988-1990
(thousands of dollars)

	1988	1989	1990
Net sales	5.198	5.950	7.433
Cost of goods sold	3.586	4.284	5.203
Gross profit	1.612	1.666	2.230
Operating expenses	1.270	1.549	1.860
Profit before taxes	342	117	370
Federal income taxes	116	46	126
Net profit	226	71	244

Table B. Balance Sheet ended December 31, 1990 (thousands of dollars)	
Cash	175
Accounts receivable	2.628
Inventory	530
Current assets	3.333
Plant and equipment, net	1.070
Total assets	4.403
Accounts payable	255
Notes payable, bank	680
Accrued taxes[a]	80
Long-term debt, current portion	50
Current liabilities	1.065
Long-term debt	400
Shareholders' equity	2.938
Total liabilities and shareholders' equity	4.403

[a]The company was required to make estimated tax payments on the 15th of April, June, September, and December. In 1990 it elected to base its estimated tax payments on the previous year's tax. The balance of $80,000 was due on March 15, 1991.

Expanding operations had resulted in a somewhat strained working capital position for Play Time Toy Company. The year-end cash balance of $175,000 in 1990 was regarded as the minimum necessary for the operations of the business. The company had periodically borrowed from its bank of account, Bay Trust Company, on an unsecured line of credit. A loan of $680,000 was outstanding at the end of 1990. Mr. King had been assured that the bank would be willing to extend a credit line of up to $1.9 million in 1991, with the understanding that the loan would be completely repaid and off the books for at least a 30-day period during the year and would be secured by the accounts receivable and inventory of Play Time. Interest would be charged at a rate of 11%, and any advances in excess of $1.9 million would be subject to further negotiations.

The company's sales were highly seasonal. Over 80% of annual dollar volume was usually sold between August and November. Table C shows sales by month for 1990 and projected monthly sales for 1991. Sales were made mainly to large variety store chains and toy brokers. Although the company quoted terms of net 30 days, most customers took 60 days to pay; however, collection experience had been excellent.

The company's production processes were not complex. Plastic molding powder, the principal raw material, was processed by injection molding presses and formed into the

shapes desired. The plastic shapes were next painted at merry-go-round painting machines. The final steps in the process were assembly of the toy sets and packaging in cardboard cartons or plastic bags. Typically, all runs begun were completed on the same day, so that there was virtually no work in process at the end of the day. Purchases on net 30-day terms were made weekly in amounts necessary for estimated production in the coming week. Total purchases in 1991 were forecast at $2,700,000. It was the company's policy to retire trade debt promptly as it came due.

Table C. Monthly Sales Data
(thousands of dollars)

	Sales 1990	Projected 1991
January	70	108
February	88	126
March	98	145
April	90	125
May	88	125
June	95	125

	Sales 1990	Projected 1991
July	95	145
August	1.173	1.458
September	1.390	1.655
October	1.620	1.925
November	1.778	2.057
December	850	1.006

Mr. Lindop, the production manager, believed the company would be able to hold capital expenditures during the next year to an amount equal to depreciation, although he had cautioned that projected volume for 1991 would approach the full capacity of Play Time's equipment.

Play Time Toy Company's practice was to produce in response to customer orders. This meant only a small fraction of capacity was needed to meet demand for the first seven months of the year. Ordinarily, not more than 25%-30% of manufacturing capacity was used at any one time during this period. The first sizable orders for Christmas business arrived around the middle of August. From August to December the work force was greatly expanded and put on overtime, and all equipment was used 16 hours a day. In 1990 overtime premiums had amounted to $165,000.

Shipments were made whenever possible on the day an order was produced. Hence, production and sales amounts in each month tended to be equal.

As in the past, pro forma balance sheets and income statements based on an assumption of seasonal production had been prepared for 1991 and presented to Mr. King for his examination. These appear in Exhibits 1 and 2.

The Proposed Change to Level Production

Having experienced one selling season at Play Time, Mr. Lindop was deeply impressed by the many problems that arose from the company's method of scheduling production. Overtime premiums reduced profits; seasonal expansion and contraction of the labor force resulted in recruiting difficulties and high training and quality control costs. Machinery stood idle for seven-and-a-half months and then was subject to heavy use. Accelerated production schedules during the peak season resulted in frequent setup changes on the machinery. Seemingly unavoidable confusion in scheduling runs resulted. Short runs and frequent setup changes caused inefficiencies in assembly and packaging as workers encountered difficulty relearning their operations.

For these reasons, Mr. Lindop had urged Mr. King to adopt a policy of level monthly production in 1991. He pointed out that estimates of sales volume had usually proved to be reliable in the past. Purchase terms would not be affected by the rescheduling of purchases. The elimination of overtime wage premiums would result in substantial savings, estimated at $200,000 in 1991. Moreover, Mr. Lindop firmly believed that significant additional direct labor savings, amounting to about $235,000, would result from orderly production. But a portion of the savings would be offset by higher storage

and handling costs, estimated at $100,000 annually. Mr. King speculated on the effect that level production might have on the company's funds requirements in 1991. He assumed that except for profits and fluctuations in the levels of inventories, accounts receivable, and accounts payable, funds inflows and outflows would be approximately in balance. To simplify the problem, Mr. King decided to assume that gross margin percentages would not vary significantly by month under either method of production. That is, cost of goods sold would be 70% of sales in each of the 12 months under seasonal production and would be 65.16% of sales in each of the 12 months under level production. The increased storage and handling costs of $100,000 would be included in operating expenses.

Exhibit 1 Pro Forma Balance Sheets Under Seasonal Production, 1991 (thousands of dollars)

	Actual Dec. 31, 1990	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Casha	175	787	1.366	1.110	924	794	587	428	175	175	175	175	175
Accounts receivable[b]	2.628	958	234	271	270	250	250	270	1.603	3.113	3.580	3.982	3.063
Inventory[c]	530	530	530	530	530	530	530	530	530	530	530	530	530
Current assets	3.333	2.275	2.130	1.911	1.724	1.574	1.367	1.228	2.308	3.818	4.285	4.687	3.768
Net plant and equipment[d]	1.070	1.070	1.007	1.070	1.070	1.070	1.070	1.070	1.070	1.070	1.070	1.070	1.070
Total assets	4.403	3.345	3.200	2.981	2.794	2.644	2.437	2.298	3.378	4.888	5.355	5.757	4.838
Accounts payable[e]	255	33	38	43	38	37	38	44	438	496	577	617	302
Notes payable, bank[f]	680	0	0	0	0	0	0	0	437	1.611	1.608	1.541	880
Accrued taxes[g]	80	27	-24	-153	-235	-286	-369	-419	-334	-260	-128	18	25
Long-term debt, current portion	50	50	50	50	50	50	50	50	50	50	50	50	50
Current liabilities	1.065	110	64	-60	-148	-199	-281	-325	591	1.897	2.107	2.226	1.257
Long-term debt[h]	400	400	400	400	400	400	375	375	375	375	375	375	350
Shareholders' equity	2.938	2.835	2.736	2.641	2.542	2.443	2.343	2.248	2.412	2.616	2.873	3.156	3.231
Total liabilities and equity	4.403	3.345	3.200	2.981	2.794	2.644	2.437	2.298	3.378	4.888	5.355	5.757	4.838

[a] Assumed maintenance of minimum $175,000 balance and included excess cash in months when company was out of debt.

[b] Assumed 60-day collection period.

[c] Assumed inventories maintained at December 31, 1990, level for all of 1991.

[d] Assumed equipment purchases equal to depreciation expense.

[e] Assumed equal to 30% of the current month's sales and related to material purchases of $2,700,000 for 1991 as against sales of $9 million. This represented a 30-day payment period. Since inventories were level, purchases would follow seasonal production and sales pattern.

[f] Plug figure.

[g] Taxes payable on 1990 income were due on March 15, 1991. On April 15, June 15, September 15, and December 15, 1991, payments of 25% each of the estimated tax for 1991 were due. In estimating its tax liability for 1991, the company had the option of using the prior year's tax liability ($126,000) for its estimate and making any adjusting tax payments in 1992. Alternatively, the company could estimate its 1991 tax liability directly. Play Time planned to use its prior year's tax liability as its estimate and to pay $31,000 in April and September and $32,000 in June and December.

[h] To be repaid at the rate of $25,000 each June and December.

Exhibit 2 Pro Forma Income Statement Under Seasonal Production, 1991 (thousands of dollars)

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Net sales	108	126	145	125	125	125	145	1.458	1.655	1.925	2.057	1.006	9.000
Cost of goods sold[a]	76	88	101	87	87	88	102	1.021	1.158	1.348	1.440	704	6.300
Gross profit	32	38	44	38	38	37	43	437	497	577	617	302	2.700
Operating expenses[b]	188	188	188	188	188	188	188	188	188	188	188	188	2.256
Profit (loss) before taxes	-156	-150	-144	-150	-150	-151	-145	249	309	389	429	114	444
Income taxes[c]	-53	-51	-49	-51	-51	-51	-50	85	105	132	146	39	151
Net Profit	-103	-99	-95	-99	-99	-100	-95	164	204	257	283	75	293

[a]Assumed cost of goods sold equal to 70% sales.

[b]Assumed to be same for each month throughout the year.

[c]Negative figures are tax credits from operating losses, and reduced accrued taxes shown on balance sheet. The federal tax rate on all earnings was 34%.

KNOWLEDGE CONTROL:

1. For each of the following statements, indicate whether it has to do with Operating Finance (O) or Structural Finance (S)

		O	S
A	Finance research and development of a new product		
B	Raw Material acquisition		
C	Selling products		
D	Buying computers		
E	Buying a new plant		
F	Contracting long-term debt with the bank		
G	Shareholders' contribution to the company's equity		

2. For each of the following propositions, indicate whether it has to do with Finance (F), Accounting (A) or Economics (E)

		F	A	E
A	Recording the sale of goods of the day			
B	Contracting a 5-year loan			
C	Buying a car			
D	Recording an asset purchase transaction			
E	Increase the company's share capital			

3. For the following items, indicate whether it is an Asset (A), Liability (L) or Equity (E)

		A	L	E
A	Cash			
B	Reserves			
C	Bank loans			
D	Accrued property taxes			
E	Rent			
F	Debt with partner			
G	Income			
H	Computer			
I	Debt with internet supplier			
J	Raw material			
K	Brand registration			
L	Distribution car			
M	Accrued social security taxes			
N	Accounts receivable			
O	Raw material supplier			
P	Stored goods			

4. Are the following statements true (T) or false (F)?

		T	F
A	If company's sales increase, the NO F increase too		
B	If accounts receivable increase, the NOF decrease		
C	Working Capital is the surplus of company's resources that finance fixed assets		
D	It is recommended that the WC increases when a NOF increase is planned		
E	If the NOF decrease and the WC increase, long-term credit also increases.		
F	Any company in operation necessarily needs to finance Accounts Receivable from customers.		
G	If the company sells its offices, its working capital increases		
H	To grow, it is recommended to increase the return on sales and to reduce NOF		
I	For the case of grocery stores, NOF are negative.		

Applications

1. The company Icus sells clothes for $30.000 a month with a cost of sales equal to its purchases worth $25.000 a month.

   a. Calculate its NOF in $ and % of sales.

   b. In 2009, Icus sales have increased to $35.000 a month, but its NOF as a percentage of sales (%) are the same. What is the $ value of NOF?

2. The company Juan Portaca S.A., a book importer, has lost all its financial information due to a damage in its computer system. Its manager, Mr. Juan Portaca, asks you to check the existing documents. You checked the documents and found the following information:

Cash	$ 100,00	Machinery	$ 2.100,00
Bank loans	$ 43,00	Accumulated Deprec.	$ (1.020.59)
Mortgages	$ 300,00	Vehicles	$ 343,00
"Income of the year "	$ 57,00	Accounts payable	$ 345,00
Reserves	$ 555,00	Furniture	$ 2.345,00
Office Equipment	$ 6.654,00	Customers	$ 45,00
Share Capital	$ 456,00	Accounts receivable	$ 567,00
Accrued Taxes	$ 8.888,00	Computer Equipment	$ 1.122,00
Short-term Debt	$ 543,00	Accrued Expenses	$ 5.432,00
Inventory	$ 555,00	Land	$ 1.462,59
		Buildings	$ 2.356,00

a. Recover the company's Balance Sheet and Financial Balance

b. Mr. Juan asks you to calculate the % of NOF financing with short-term debt.

3. Jace S.A.is a rapidly growing textile company. Since its beginning in 2003, it has grown sustainably.

Jace S.A.
Balance Sheet

Assets	**2006**	**2007**
Current Assets	2.140	2.273
Fixed Assets	2.140	2.140
Total Assets	4.280	4.413
Liabilities		
Spontaneous Liabilities	856	835
Long-term Liabilities	2.140	2.140
Equity	1.284	1.438
Total Liabilities+Equity	4.280	4.413
Annual Sales	5.136	
Net profit	205	
Retention	100%	

During 2007, Jace S.A. hires Mr. José Rodríguez, financial analyst, to perform a company analysis. You are requested to help Mr. Rodríguez to analyze the company's growth based on the NOF/WC model and provide recommendations to the company about its potential growth in 2008, in case the company does not want to contract new debt.

4. Carlos Ordoñez, PRINCE S.A. financial manager, when to HL Bank to meet his credit manager. According to the financial documentation that Mr. Ordoñez presented, his NOF amount to $594.000 financed in 50% with short-term debt. Its profit for this year is $ 65.000, 30% of which will be distributed to shareholders. How much could you lend PRINCE?

5. How is the optimal capital structure calculated?

6. What is the relationship between NOF and WC?

7. Is it recommended to finance CA with STD and FA with LTD?

FINANCE
FOR EXECUTIVES

II

Statement of Cash Flows

Chapter II

Statement of Cash Flows

The Statement of Cash Flows (SCF) is an explanation of the variation of cash and equivalents1 during a given period, presented in a format expressly defined.

To explain why our money (cash, bank accounts and equivalents) have varied in a specific amount during a given period, it would be enough to enlist all "collections" and "payments" recorded in such accounts. The difference between collections and payments would be the cash variation during that period. Instead of presenting such flows of collection and payment in any form, they will be presented in a specific format that will be presented later.

The difference between this accounting statement and the flow of funds lies in the fact that in the SCF only the cash collected or paid for different concepts will appear. Therefore, the credibility of the figures presented is total: all figures that appear are "cash". There is no place for accounting "make-up". Any accountant making the calculations should obtain the same figures, whose total addition will match the variation between cash at the beginning and the end of the period under analysis.

Objectives of the Statement of Cash Flows

- To present clearly what the origins and uses of cash have been: where we have obtained "Cash" and where that "Cash" is.
- To value the company's capability to generate cash.
- When analyzing cash flows from the past, we can forecast future cash flows and therefore anticipate any liquidity problem that may arise.
- As we will see later on, through the information provided by the SCF we will understand the investing and financing policies a company has followed in the past and its probable consequences for the future.
- Another important advantage of the information collected in this statement is its objectivity and comparability, since it eliminates the effects of using different accounting treatments for the same transactions, which facilitates comparison between different companies.

[1]Cash equivalents are defined as those short-term investments of high liquidity, which are easily converted into given cash amounts, and subject to little risk of value changes. Besides, the regulation specifies that an investment will be equivalent to cash when its expiration date is close, for instance three months or less from the date of acquisition.
[2]Collection: cash inflow; Payment: cash outflow

Format of the Statement of Cash Flows

The SCF presents cash collections and payments divided into three big categories:

- Cash flow from operating activities
- Cash flow from financing activities.
- Cash flow from investing activities.

As it is logical, the addition of the three figures calculated previously should match the total cash variation during that period (difference between final and initial cash, bank accounts and equivalents). Therefore, when we prepare this statement, we always know the final "answer" in advance.

To calculate the three big flow groups previously named, we will have to follow the "criteria" stated in IFRS3, in order to know in what group of activities to include each cash collection or payment.

There are four "normal" ways to "increase" cash in a business:

1. Shareholders' contribution,
2. Lent by different people or institutions during a given time, charging an interest rate.
3. Generated by the business.
4. Obtained when selling part of our fixed assets.

The two first activities correspond to financing activities; the third one to operating activities; the fourth one to investment activities.

[3]IFRS: International Financial Reporting Standards

Cash flows from operating activities indicate the cash generated from operations, that is, the cash that the business is capable of creating "on its own", or without external aid from shareholders, banks, etc. This is a new figure, different from the income for the year and the resources from operations. (RFO).

Cash flows from financing activities indicate the cash flows generated by:

a) Capital increases contributed by shareholders in cash.

b) Debt increases (Liabilities), both short and long term with a financial cost.

c) Dividends paid to shareholders in cash.

As it is logical, when we talk about increases, it should be understood that it can also be decreases. Flows will be both positive: "collections", and negative: "payments".

Cash flows from investing activities, finally, the cash flows generated by the buying or selling of fixed assets, both tangible and intangible and financial, will be included. As it is natural, growing companies will usually have a negative cash flow from investment activities: every year they will invest in new fixed assets to increase their installed capacity.

Example

Ixu S.A. is a company that sells software for tax calculation. The balance sheet obtained by the company since its foundation in January year 1 is submitted below.

With the information in accounting statements and the explanations about certain transactions that took place in year 2, you are asked to prepare the Statement of Cash Flows for year 2.

BALANCE SHEET

	Year 1	Year 2	Variation
Cash	37.000	59.000	22.000
Accounts receivable	26.000	68.000	42.000
Inventory	0	54.000	54.000
Prepaid expenses	6.000	7.000	1.000
Land	70.000	45.000	-25.000
Buildings	200.000	200.000	0
Accum. Depreciation	-11.000	-21.000	-10.000
Equipment	68.000	193.000	125.000
Accum Deprec.	-10.000	-28.000	-18.000
Total Assets	386.000	577.000	191.000
Accounts payable	40.000	41.000	1.000
Accrued Bonds	150.000	110.000	-40.000
Capital	60.000	220.000	160.000
Retained Earnings	136.000	206.000	70.000
Total Liabilities	386.000	577.000	191.000

Income Statement Year 2	
Sales	890.000
Cost of Sales	465.000
Operating Expenses	188.000
Depreciations	33.000
Financial Expenses	12.000
Loss on sale of assets	2.000
Taxes	65.000
Net Profit	125.000

Additional information about year 2:

- Part of the land has been sold and collected at book value.
- 55.000 in dividends were paid.
- New equipment worth 166.000 was bought, paid in cash.
- Equipment worth 41.000 and a book value of 36.000 was sold for 34.000, collected in cash.
- Bonds were redeemed at book value and were paid in cash.
- New shares were issued for 160.000, collected in cash.

We are going to perform cash flow calculations from the three categories of activities previously mentioned. Before starting calculations, we already know that the final result of all cash flows during year 2 must be equal to the difference in cash and bank accounts between the final and the initial amount of that year, that is: +22.000

I.- Calculation of cash flows from operating activities.

Cash generated from operations can be calculated in two manners:

- Direct method.
- Indirect method, also called conciliation between net profit and the cash generated by operations.

Both methods should provide the same figure. The format of each method has its specific advantages to perform subsequent financial analyses.

Direct Method to calculate cash generated from operations

Cash generated from operations is the result of gathering all collections and payments caused by operating activities. Even though such flows could be presented in many ways, it is advised to summarize and gather all of them in at least the following groups:

1.- Cash received from customers.

2.- Cash paid to suppliers and employees.

3.- Interests paid.

4.- Taxes paid.

1.- Calculation of cash received from customers

To calculate cash received from customers we will first look at the sales figure of the Income Statement. After that, we will check whether in the balance sheet there are accounts receivable. If there is no accounts receivable, it would mean that all sales have been collected. If the final balance for customers has changed from the initial amount, this would be because not everything sold has been collected; therefore, this increase in accounts receivable would have to be subtracted from the total sales to obtain the amount of sales collected. On the other hand, if the accounts receivable balance has decreased, it would mean that we have collected sales made in previous years; therefore, that reduction of the accounts receivable balance would have to be added to the sales figure in order to calculate the total collection made from clients during that period.

During year two, Ixu S.A. achieved sales for 890.000 and accounts receivable increased in 42.000, therefore that increase corresponds to uncollected sales. The total collection from clients will be: 890.000 – 42.000 = 848.000.

2. Cash paid to suppliers and employees

Payments to Suppliers and Employees include all operational payments made, except for those corresponding to interests and taxes; these two last items will be presented separately.

Operating payments can be of two kinds:

- Operating payments that correspond to expenses accrued during that period. Therefore, they will be in the Income Statement as expenses of the period;
- Or operating payments that correspond to expenses that have not been accrued yet (expenses paid in advance) or not consumed yet (inventory bought and not sold); they both will appear in Current Assets.

Therefore, in order to calculate how much has come out from the Treasury as payments to suppliers and employees, we will look first at the Income Statement as well as at Current Assets.

For the case of Ixu S.A., we would accumulate first the accrued expenses that are present in the Income Statement:

Cost of sales	-465.000
Operating expenses	-188.000
Total	-653.000

In the previous figures we have not included the expenses that have not meant cash outflows during this period or in the future: depreciations and amortizations (33.000). We do not include the expenses due to the loss on sale of equipment either (2.000), since it does not represent a cash outflow; the cash flow that such sale generated (34.000) was not from the operation, but from investing (in this case divestment or divestiture) and therefore, we will have to include it within the investing and not operating activities. The amount paid for interests is not included either, since it will be presented separately.

However, besides the operating expenses that are already in the Income Statement because they have been accrued : -653.000, we will check current assets to see if we have made other operating payments that have not yet been accrued, and therefore remain in the Balance Sheet: prepaid expenses and inventory. If such accounts have increased their balance during this year, it will mean that we have made more payments for these two reasons.

At Ixu S.A., both Concepts have increased their final balance in comparison to the initial amount, therefore such increases will mean that we have made more operating expenses that have affected cash, even though they are not reflected in the Income Statement yet because they have not been accrued (for the case of prepaid expenses) or are not sold (for the case of inventories). Since there are more cash outflows they will also be accumulated to payments already shown in the Income Statement.:

Cost of sales	-465.000
Operating Expenses	-188.000
Increase in inventory:	-54.000
Increase in Prepaid Expenses:	-1.000
Total accumulated payments	**-708.000**

To complete our analysis we will consider that until now we have taken into account that all the cost of sales and operating expenses that appear in the Income Statement have been fully paid, which does not have to be necessarily true. We also included in our calculations the total inventory increase as if we had paid all our purchases from suppliers (which does not have to be true either). In order to know whether accrued expenses (in the Income Statement) and the inventory increase (in the Balance Sheet) are really paid we will check whether there are current liabilities such as: Accrued expenses, suppliers, etc. If there are no accrued expenses, it means all accrued expenses in the Income Statement are fully paid.

If accounts payable has suffered an increase in its final balance, it means that part of the inventory bought has not been paid: precisely the increase of such balance. As in previous calculations, we have included – subtracting Cash – both the inventory purchased and sold (increase in inventory balance of the Balance Sheet), now we would have to add the increase in accounts payable, since this corresponds to unpaid inventory which has therefore not reduced cash. If in current liabilities, we had had an increase in accrued expenses: salaries, services, etc., we would also add these increases to the total of accrued expenses noted previously in negative, in order to indicate that not much cash has "flowed out" as we had supposed in the beginning.

At Ixu S.A., there are no accrued expenses; therefore all expenses from the Income Statement are paid: we do not have to make any adjustment for unpaid accrued expenses. On the other hand, if there are accounts payable and its balance has been increased by 1.000, such increase has not come out of the treasury, therefore we add this amount to compensate all the inventory we have included previously in negative: inventory purchased and sold (in the cost of sales) and inventory bought but not paid (in the inventory account of the Balance Sheet).

If we add this adjustment to the figures calculated, we would have:

Cost of sales	-465.000
Operating Expenses	-188.000
Increase in inventory	-54.000
Increase in Prepaid Expenses	-1.000
Increase in Accounts payable	+1.000
Total payments to suppliers and employees	-707.000

To generalize, we would say that in order to calculate payments to suppliers and employees, we would do the following:

Cost of sales	-
Operating expenses	-
(Increase) Decrease in Operating current assets:	
Increase in inventory	-
Increase in prepaid expenses	-
Increase (Decrease) in operating current liabilities	
Increase in accrued expenses	+
Increase in accounts payable	+
Total payments to Supliers and Employees:	-

Accumulate with negative sign (as cash outflows) all the cost of sales and accrued expenses in the Income Statement (without including those that have not been paid or will never be paid: depreciations, etc.). Adjust the previous figures subtracting (as cash outflows) the increase in operating accounts of current assets: inventory and prepaid expenses; (or adding decreases in the balance of such accounts). Finally, adjust the previous figures by adding increases in operating current liabilities: suppliers and accounts payable (or subtracting reductions in those accounts).

3. Interest payments.

Primero nos fijaremos en los intereses devengados en la Cuenta de Resultados: -12.000. Para saber si se han pagado o no miramos si existe un pasivo corriente de intereses por pagar. Como no existe, significa que todos los intereses devengados se han pagado. Si hubiera habido una cuenta de intereses por pagar incrementada, dicho incremento tendríamos que haberlo sumado a los intereses devengados para descubrir así los intereses realmente pagados.

Accrued interests	-12.000
Increase (Decrease) in Operating Current Asets:	
Variation in accrued interests	0
Total interests paid:	-12.000

4. Tax payments.

As in the previous case we will check at accrued taxes in the Income Statement: -65.000. As there are no liabilities from accrued taxes, this means that all accrued taxes have been paid.

Accrued taxes	-65.000
Increase (Decrease) in Operating Current Liabilities	
Variation in accrued taxes	0
Total taxes paid:	-65.000

Summarizing: cash generated by operating activities:

Cash received from customers	+848.000
Cash paid to suppliers and employees	- 707.000
Interest payments	-12.000
Tax payments	-65.000
Cash generated from operations: CGO:	+64.000

II.- Calculation of cash flows from investing activities

In this category we will include both payments for new investments in fixed assets as well as collections from divestments made. As in the SCF all figures are "Cash", when we buy a new fixed asset and it is not fully paid, we will include that purchase only for the value actually paid. In separate notes we will explain the full operation: outstanding balance and form of payment, etc.

We will have to obtain the necessary information for this category of cash flows from the company's accounting records since variations between final and initial balance of each item of Fixed Assets that appear in the Balance Sheet are "net" variations, that is, they could include both purchases and sales of fixed assets; to discover those details we will need to check the corresponding accounts of the General Ledger.

Although comparisons between the two balance sheets show the following:

Decrease in Land	+ 25.000 (sale: more Cash)
Increase in Equipment	-125.000 (purchase: less Cash)
Total	**-100.000**

[4]The 34.000 is not the book value of the asset sold but the money collected for selling that asset.

[5]Note that this amount matches the difference between the final and initial balance of Cash.

With the complementary information provided, we can explain the "full" story.:

Sale of Land	+ 25.000
Purchase of Equipment[4]	-166.000
Sale of Equipment	+ 34.000
Cash consumed by investing activities:	-107.000

III.- Calculation of cash flow from financing activities

In this category we will calculate the cash generated or consumed for three reasons that are not operational:

- Cash flows from variations in the capital contributed by shareholders.

- Cash flows from variations in liabilities, both short and long term with financial cost (those with no financial cost are operational: suppliers, etc.)

- Cash flows from dividend payment.

For Ixu S.A., we would present the following flows:

Bond returns	40.000
Capital increase	+160.000
Dividend payment	- 55.000
Cash generated from financing activities	+ 65.000

The total addition of the three groups of Cash Flows would represent the cash variation during the period. In this case, we would have:

Cash flows from operating activities	+ 64.000
Cash flows from investment activities	-107.000
Cash flows from financing activities	+ 65.000
Total cash flows of the period	+22.000[5]
Cash at the beginning of the period	+37.000
Cash at the end of the period	+59.000

Indirect method to calculate cash from operating activities: "Conciliation between net profit and cash from operating activities".

In this method we start our analysis from the figure of net income of the period. We will have to make the necessary adjustments to the profit figure in order to achieve the amount of cash from operating activities (GGO).

As it is known, profit includes all "earned" income (not necessarily collected) and all "accrued" expenses (not necessarily paid). Let's start thinking about how to know how much of accrued expenses (including profit subtracted) have actually been paid.

In the profit figure, there are three types of expenses included:

1.- Accrued expenses, which have also been paid (cash outflows). They do not need any adjustment because they also affected cash.

2.- Accrued expenses that have not yet been paid, but will be paid later. When an accrued expense is not paid, an account payable appears in current liabilities. Therefore, we will have to check whether accounts payable have increased during the period. Such increases will correspond to accrued expenses but not paid.

3.- Accrued expenses that have not been paid or will never be paid: depreciations, amortizations, provisions, loss on sale of assets, etc. Since this type of expenses does not affect cash, they will be the first adjustments to make to profit in order to uncover everything included that is not cash.

Therefore, our first adjustment would be to cancel the effect of expenses type 3 on profit (they reduced profit but not cash).

Net profit	+125.000
+Depreciations:	+ 33.000
+Loss on sale of assets:	+ 2.000

In order to know whether there has been expenses type 2 (to be paid in the future) we check whether there are accrued expenses: salaries, services, etc. If there is no account of such nature, we know that all expenses have been paid. If there had been an increase in accrued expenses, such increase would have to be added to the previous calculations, because it would mean that it corresponds to an expense that has not flowed out from cash. In subsequent sections we will comment on the treatment for accounts payable.

Once we have adjusted profit for accrued expenses included that have not affected cash (expenses type 2 and 3 above) we will think about whether we have made other operating payments that are not reflected as expenses on the profit figure yet. This could happen in case we have paid expenses in advance (they have been paid but not yet accrued), or if we have bought more inventory than we have sold: inventory bought but not sold will remain increasing the inventory account (profit is not affected yet by means of the cost of sales). Summarizing, if we see that inventory and expenses paid in advance increase (current assets accounts), such increases will mean other operating expenses (cash outflows) which are not included as accrued expenses in the profit figure. In our case, inventory and prepaid expenses have increased, therefore we will subtract those increases from the calculations we have made because they mean cash outflows that are not subtracted from profit.

Net profit	+125.000
+Depreciations:	+ 33.000
+Loss on sale of assets:	+ 2.000
(Increase) Decrease in Current Assets:	
Increase in inventory	-54.000
Increase in prepaid expenses	- 1.000

Until now, we have assumed that the entire inventory bought has been paid to suppliers. In fact, we have included both inventory sold (in the cost of sales that reduces profit) as well as the inventory bought and not sold (in the increase of the inventory account). If we did not have any accounts payable it would mean that all inventory bought has been paid. As in our case accounts payable have increased in 1.000, this figure corresponds to unpaid inventory and therefore we will have to add that increase to the inventory we subtracted previously.

Net profit	+125.000
+Depreciations:	+ 33.000
+Loss on sale of assets:	+ 2.000
(Increase) Decrease in Current assets:	
Increase in inventory	-54.000
Increase in Prepaid expenses	- 1.000
Increase (Decrease) in Current Liabilities:	
Increase in Accounts Payable:	+1.000

With all these adjustments we have managed to discover how many operating payments we have made. We still have to analyze revenues that are included in profit. What income from sales does profit contain? All of them; collected and not collected. How can I know whether there are uncollected sales? If there is no accounts receivable, it means all sales have been collected and therefore revenues are also collections. In our case, cash received from customers have increased, therefore such increase corresponds to income from uncollected sales and we will have to subtract them from our previous calculations.

Net profit	+125.000
+Depreciations:	+ 33.000
+Loss on sale of assets:	+ 2.000
(Increase)Decrease in Current Assets:	
Increase in cash received from clients	- 42.000
Increase in inventory	-54.000
Increase in prepaid expenses	- 1.000
Increase (Decrease) in Current Liabilities:	
Increase in accounts payable:	+1.000
Cash from operating activities	+ 64.000

The final figure of cash from operating activities that results from all adjustments made matches the figure calculated previously by the direct method.

Summarizing, we can say that the indirect method considers the following adjustments:

Profit of the period	xxx
+Depreciations, amortizations,	xxx
(Increase) decrease in operating current assets	xxx
Increase (Decrease) in operating current liabilities	xxx
Cash from operating activities	**xxx**

Finally, we state that the different accounts involved may increase or decrease during the period, and therefore such variations will have opposite sign and sense.

KNOWLEDGE CONTROL :

1. Are the following statements true (T) or false (F)?

		T	F
A	Can increasing credit for clients be considered a financing activity?		
B	Is distributing dividends an operating activity		
C	Is increasing cash level an operating activity?		

2. What is the difference between a flow of funds and the cash flow?

3. What are the advantages of the cash flow?

Applications

1. Brotax S.A. is a pharmaceutical company funded in 1996 by Mr. Julio Rodríguez. In 2009, his oldest son Paul Rodríguez takes charge of the company. In order to understand better Brotax financial movements, he asks you to prepare and analyze a flow of funds, a statement of change in equity based on the following information:

Brotax S.A.
Balance Sheet
For the period ending on December 31

Assets	**2005**	**2006**
Cash	$ 429,72	$ 53,72
Checks	$ 1.047,44	$ 1.208,59
Accounts receivable	$ 644,58	$ 805,73
Inventory	$ 2.229,17	$ 3.303,47
Land	$ 1.500,00	$ 1.500,00
Buildings	$ 1.200,00	$ 1.200,00
Furniture	$ 166,00	$ 302.00
Office Equipment	$ 140,64	$ 320,09
Computer Equipment	$ 150,00	$ 360,00
Vehicles	$ 350,00	$ 610,00
Machinery	$ 1.650,00	$ 2.100,00
Liabilities		
Accounts payable	$ 161,15	$ 322,29
Accrued Expenses	$ 322.29	$ 590,87
Accrued Taxes	$ 698,30	$ 752,01
Short-term debt	$ 214,86	$ 214,85
Bank loans	$ 1.115,45	$ 2.050,11
Mortgages	$ 2.000,00	$ 2.000,00
Share Capital	$ 698,30	$ 698,30
Reserves	$ 3.158,44	$ 3.483.42
Income of the year	$ 655,32	$ 631.15

Brotax S.A.
Estado de Resultados
Al 31 de diciembre de 2006

Gross sales	$ 33.195,87
Discount on sales	$ (10.743,00)
Return back on sales	$ (6.338,37)
Cost of sales (*)	$ (7.607.12)
Administrative expenses	$ (3.974,91)
Selling expenses	$ (2.470,89)
Depreciation	$ (537,15)
Financial expenses	$ (472,69)
Taxes (40%)	$ (420,59)

2. Jorso S.A. is a company that sells TVs. It has handed in the following information to you to prepare its flow of funds and analyze it:

   • A new office was bought for Management for $65.000; 70% was paid in cash and 30% with a bank loan

   • An employee was fired, his indemnity cost $19.000

   • Dividends were distributed for $ 123,400

   • New shares were issued for $ 100,000, 50% cash and 50% within a year

   • The old management office was rented for $ 1.300 a month, the first year was collected.

   • Suppliers were paid for $ 2.570

   • Inventory increased in $14.540

   • Property taxes were paid for $ 2.400

   • Bank interests were paid for $6000.

   • This year's amortizations amounted to $2.500

3. What can a company do with its profit? Explain

4. In case a company grants a discount for anticipated payment, is this considered as negotiated resources?

FINANCE
FOR EXECUTIVES

III

Financial Statement Analysis

Chapter III

Financial Statements Analysis

In the previous chapter we mentioned that Accounting provides all the necessary information to perform any kind of financial analysis. Now, the question is: How to perform financial analysis. Basically, we can do it in two ways:

- Studying each financial statement individually, or
- Studying the relationships between financial statements.

We will start analyzing the most important financial statements (Balance Sheet and Income Statement) individually and after that jointly.

Percentage Analysis

As its name suggests, the objective of this analysis is to identify the percentage share that each account of the financial statement has in relation to the total of a given base. For this reason, this type of analysis requires that each financial statement is analyzed separately.

Instructions to perform this analysis are as follows:

- **In the Balance Sheet:** the total amount of each account will have to be compared against (divided by) total assets (which should be exactly equal to total liabilities plus company's resources) in order to find out its percentage share in the Balance Sheet.

- **In the Income Statement:** the total amount of each account should be compared against (divided by) a specific base (net sales) in order to find out its percentage share in the Income Statement.

- Total Assets (Balance Sheets) and total Net Sales (Income Statement) will always be the divisors or denominators in each division and in terms of share they will always represent 100%.

Next, we present the percentage analysis of the full Balance Sheet (Figure 3.1), Income Statement (Figure 3.2) and Financial Balance (Figure 3.3) of Ixu S.A. and then we will draw some conclusions:

Ixu S.A. Balance Sheet Ended December 31, 2006		
Current Assets		
Cash	53,72	0,50%
Customers	1.208,59	11,25%
Accounts receivable	805,73	7,50%
Inventory	3.303,47	30,75%
T. Current Assets	5.371,51	50,00%
Fixed Assets		
Land	1.500,00	13,96%
Buildings	1.200,00	11,17%
Furniture	302,00	2,81%
Office Equipment	320,09	2,98%
Computer Equipment	360,00	3,35%
Vehicles	610,00	5,68%
Machinery	2.100,00	19,55%
Accumulated Deprec.	-1.020,59	-9,50%
T. Net Fixed Assets	5.371,51	50,00%
Total Assets	**10.743,01**	**100,00%**
Short term Liabilities		
Accounts payable	322,29	3,00%
Accrued Expenses	590,87	5,50%
Accrued Taxes	752,01	7,00%
Long-term debt	214,86	2,00%
T. Short-term Liabilities	1.880,03	17,50%
Long-term Liabilities		
Bank loans	2.050,11	19,08%
Mortgages	2.000,00	18,62%
T. Long-term Liabilities	4.050,11	37,70%
Total Liabilities	5.930,14	55,20%
Equity		
Share Capital	698,30	6,50%
Reserves	3.483,42	32,42%
Net income of the year	631,15	5,87%
Total Equity	4.812,87	44,80%
Total Liabilities + Equity	**10.743,01**	**100,00%**

Figure 3.1

Ixu S.A. Income Statement VFor the period ended December 31, 2006		
Gross Sales	33.195,87	
Discounts on sales	10.743,00	
Return back on sales	6.338,37	
Net Sales	**16.114,50**	**100,00%**
Cost of Sales		
Beginning Inventory	3.303,47	20,50%
Purchases	6.532,82	40,36%
Ending Inventory	2.229,17	13,83%
Cost of Goods Sold	7.607,12	47,21%
Gross Profit	**8.507,38**	**52,79%**
Expenses		
Administrative Expenses	3.974,91	24,67%
Selling Expenses	2.470,89	15,33%
Operating Expenses	6.445,80	40,00%
Earnings before interest, taxes, depreciation and amortization (EBITDA)	**2.061,58**	**12,79%**
Depreciation	537,15	3,33%
Earnings before interest and taxes (EBIT)	**1.524,43**	**9,46%**
Financial Expenses	472,69	2,93%
Earnings before taxes (EBT)	**1.051,74**	**6,53%**
Taxes (36.25%)	420,59	2,61%
Net Profit	**631,15**	**3,92%**

Figure 3.2

Ixu S.A. Financial Balance			
Assets		**Liabilitiess+Equity**	
NOF	3.706,34	STD	214,86
Net Fixed Assets	5.371,50	LTD	4.050,11
	_____	Equity	4.812,87
Total Assets	**9.077,84**	**Total Liab + Equity**	**9.077,84**

Figure 3.3

In the Balance Sheet we can see:

- **Asset Financing:** Assets are financed in 53% by the company's resources. The remaining 47% belongs to third parties.
- **Asset Composition:** 50% for current assets, 50% for fixed assets
- **Liability Composition:** 17,5% are short-term liabilities; 37,7% are long-term liabilities. Only 2% correspond to short-term debt, which serves to finance 50% of assets. Good sign.
- **Equity Composition:** 32% are reserves, which could be capitalized to provide more liquidity to the company or they can be allocated to future investments.

Looking at the Income Statement, we see

- **Gross Profit:** 52.79%; that is, almost half of net sales goes to costs. If there were not many competitors, sales price could be increased to raise this margin. If there were several suppliers, an option could be to have more competitive costs.
- **EBITDA:** 12,79%. Too much operating burden (40%). Process Reengineering should be considered for a more efficient distribution of personnel's functions.
- **EBIT:** 9,46%, which implies that only 3,33% are expenses that represent cash outflows, while we do have cash outflows in costs and expenses. The solution of problems in these two groups would cause an improvement in this percentage.
- **Financial Expenses:** 2,93%. Good indicator, since short-term debt is low (2%). However, the higher the debt, the higher the tax shield, even though this could also come from depreciations.
- Net Profit: 3,92%. This means that from total sales, only 3.92% is left. This is not very positive.

To summarize, we could conclude:

- From the Balance Sheet: There is good financing for the company's operations

• **From the Income Statement:** There are problems associated with high costs and expenses. We should try to increase prices or reduce costs and the company's operating burden. The company could give a return of more than 4%.

However, we should go deeper into our analysis in order to determine what needs to be improved and where to change. Next, we will make comparisons between several accounts that are interrelated, given the company's operation.

Ratio Analysis

Ratios are the result of comparing one account against another. Mathematically, they are the quotient between two figures. These figures are the balance of the accounts we want to analyze. These accounts can come from the Balance Sheet, the Income Statement or both.

In order to obtain a meaningful ratio, we have to confirm first that the accounts are interrelated given the company's operation. For instance, we can reveal the following relationships:

- Accounts receivable is related to sales, since this is the result of credit sales.
- Accounts payable is related to purchases, since this is generated from purchases on credit.
- Inventory is related to the cost of sales, since they represent the stock ready for sale but valuated at cost prices.

Once this relationship has been set, the next thing is to obtain the ratio we are interested in. In this way, depending on the relationship established, we can classify ratios into four groups:

1. Operating Ratios: These ratios help us assess the efficiency of the company's operations. The most important indicators within this group are:

1.1 Accounts receivable turnover =	$\frac{\text{Net Sales}}{\text{Accounts payable}}$	Óptimum: > Accounts payable rotation
Average Collection period =	$\frac{360}{\text{Accounts receivable turnover}}$	Óptimum: < payment period

If the collection period is shorter than the payment period, this means that the company collects money from customers first and then pays suppliers. But if the situation is opposite, in this case the company will have to acquire more debt.

Meaning: This ratio shows on average how many times we manage to collect money from our customers. For this reason, we make a relationship between accounts receivable and the account that generates it, that is net sales.

If we want to obtain the result in days (that is, how many days on average it takes us to collect money from our customers), we will have to divide the days of the year by the turnover obtained.

Ixu S.A. accounts receivable turnover	=	$\frac{16.114,50}{1.208,59}$ = 13,33 times a year	
Ixu S.A. average collection period	=	$\frac{360}{13,33}$	= 27,00 days
Ixu S.A. collection policy	=	Every 24 days	
Industry's average	=	Every 36 days	

Interpretation: Compared to the industry, Ixu S.A. has a relatively good position. However, its average collection period is above its own policies. We could then come to the following hypothesis:

- Customers are not paying on time; therefore more attention should be paid to collection management.
- We would be selling to bad customers, because they pay badly. Or,
- A bad economic situation is making everyone to delay payments.

We should remember that the lower the collection period, the lower the investment on accounts receivable, and therefore the less financing we will need.

1.2 Inventory turnover	=	$\frac{\text{Cost of sales}}{\text{Inventory}}$	Óptimum: < inventory policies
Días Promedio de Inventarios	=	$\frac{360}{\text{Inventory turnover}}$	

Meaning: This ratio shows on average how many times a year we manage to sell all the available inventory. For this purpose, we relate inventory to the cost of sales, which shows the inventory sold.

Likewise, if we want to obtain the result in days (that is, how many days on average we empty the warehouse because everything has been sold), we have to divide the days of the year by the turnover obtained.

Ixu S.A. Inventory turnover	=	$\frac{7.607,12}{3.303,47}$	2,30 times a year
Average inventory days:	=	$\frac{360}{2,30}$	156,33 days
Ixu S.A. Inventory policy	=	Cada 120 days	
Industry's average:	=	Cada 120 days	

Interpretation: Ixu S.A. has a bad inventory Management. Internal policies are not respected at all. Competitors are more efficient than us. The probable justifications are:

- A bad Management of the Procurement department, or
- The company is expecting to sell more and therefore is storing more stock for the peak season
- Or a bad acquisition.

As explained earlier for the collection period, we have to take into account that a shorter inventory period means less investment in stock, and therefore lower financing needs.

1.3 Accounts payable turnover	$= \frac{\text{Purchases}}{\text{Accounts payable}}$	Óptimum: < Accounts receivable turnover
Average Payment period	$= \frac{360}{\text{Accounts payable turnover}}$	Óptimum: > Collection days

Meaning: This ratio shows on average how many times a year we manage to pay our suppliers. For this purpose, we relate accounts payable to our suppliers against merchandise purchases. The result in days will tell us on average how many days it takes us to pay our suppliers.

As explained earlier, if the payment period is larger than the collection period, this would mean that the company collects money from customers first and then pays suppliers. If the situation is opposite, then more debt should be contracted.

Ixu S.A. Accounts payable $= \frac{6.503,82}{322,29} =$ 20,18 times a year

Average payment period: $= \frac{360}{20,18} =$ 17,84 days

Ixu S.A.Payment policy = Cada 32 días

Industry average = Cada 45 días

Interpretation: Ixu S.A. is doing well as compared to its policies and the industry. However, it is facing a dangerous situation since its average collection period (27 days) is longer than its payment period (18 days). This means that Ixu S.A. pays its suppliers first and then collects money from its customers.

The Collection policy (24 days) is well established in relation to the payment period (32 days). Ixu S.A. could take advantage of this situation to lengthen the payment period and thus obtain extra financing. This strategy may work if Ixu S.A. does not exceed its own 32-day policy.

If it takes the company too long to pay suppliers, this would be a clear sign that there are financial problems. It should be remembered that for longer payment periods, less investment is needed in accounts payable and therefore there is less need for financing.

1.4 Cash conversion cycle =	Collection Period	+	Days Inventory	–	Payment period

Meaning: It allows us to know the net delay in cash generation. In other words, how long it takes the company to generate cash.

The company's goal should be to shorten this cycle as much as possible without affecting operations. This would improve profit since the longer the cycle, the more we need financing, and that financing has a cost.

Cash Conversion Cycle	=	27 days + 156,33 days - 17,84 days = 165,49 days
Ixu S.A. General Policy	=	24 days + 120 days - 32 days = 112 days
Industry Average	=	36 days + 120 days - 45 days = 111 days

Interpretation: Ixu S.A. is well above its own policies and the industry. This means that it generates cash every 167 days. Therefore, it demands more financing for its operations than the average.

Analyzing all cycle components, we can determine that:

- Stocks are taking too long to sell (from 158 to 120 days). There is a lot of stock stored. There is bad inventory management, which is confirmed by the proportion of gross profit in relation to sales (cost of sales is high).
- Bad inventory management causes a short term for payments (from 18 to 32 days) since we request merchandise less frequently. Suppliers see us as non-frequent customers; therefore we have no power to negotiate payment terms.
- If inventory were managed better, inventory days would be reduced, which would make us request merchandise from our suppliers more frequently. By increasing frequency we could negotiate an extension of payment terms.

• If the company intends to increase sales, it will need more financing. However, part of this financing will be achieved by reducing inventory days and increasing payment days.

1.5 Asset turnover =	$\frac{\text{Net sales}}{\text{NOF + NFA}}$	Óptimum: > 1

Meaning: This ratio shows the capability of total assets to generate sales. With the four previous ratios we have assessed the performance of each NOF component and how they affect the generation of surpluses or the need to negotiate STD.

With this ratio we try to evaluate the productivity of investment in NOF and investment in Net Fixed Assets. The interpretation of this ratio can be read in two ways:

- The times total assets are sold during a year, or
- The sales in $ generated by every $ of investment in assets

The second reading is undoubtedly the most accurate, because we are considering sales generated by a certain amount of assets, which is true. We invest in NOF and NFA to generate sales that allow us to recover the investment and earn additional money.

Ixu S.A. Asset turnover	=	$\frac{16.114.50}{9.077.84}$	= 1,78
Industry Average:	=		2,0

Note: The information of (NOF + NFA) can be found in the financial balance

Interpretation: For every dollar invested in assets (NOF + NFZ), Ixu S.A. generates $1,78 of sales. This means that Ixu S.A. recovers its asset investment and in addition generates $0,78 of profit .

The company is very close to the industry average. It is efficient in its productivity. Now that we can see all ratios together, we could say that:

- The company is capable of covering its short-term liabilities and its assets are generating an acceptable return.

• However, the bad management of certain assets makes them have an insufficient return, which makes the company less efficient than it could be, if it had shorter inventory periods.

2. Profitability Ratios: These ratios help us assess a company's profitability. To obtain these ratios, we make a comparison between:

- The results obtained (losses and profits) during the period, and
- The sources or investments that should generate such results.

The main ratios of this group are:

$$\textbf{2.1 Gross Profit Margin} = \frac{\text{Gross Profit}}{\text{Net Sales}}$$

Meaning: This ratio allows us to know the percentage that gross profit represents in relation to net sales. This indicator does not establish a relationship of profitability with any type of capital invested.

The importance of this ratio lies in the comparison we can make against the industry average or other companies from the same sector or field. It is also useful if we analyze its evolution throughout several periods.

$$\text{Gross Profit Margin} = \frac{8.507{,}38}{16.114{,}50} = 52{,}79\ \%$$

$$\text{Industry Average} = 60\ \%$$

Meaning: Having a lower margin than average, Ixu S.A. could be in any of two situations:

- Having sales below average, or
- Having costs above average.

With the above ratios we have confirmed that the problem lies in higher costs; however, any of the two situations leads us to conclude that Ixu S.A. is not the industry leader.

If there were a sales problem, we could also conclude that there are too many competitors, which does not allow Ixu S.A. to increase the sales price of its merchandise, even if its costs remain the same or increase. Besides, if Ixu S.A. were the sector's leader, it would be capable of negotiating better costs that would allow them to have a higher margin.

$$\text{2.2 Net Profit Margin} = \frac{\text{Net Profit}}{\text{Net Sales}}$$

Note: It is also known as ROS (Return on Sales)

Meaning: Just like the previous ratio, this margin allows us to know what percentage net profit represents in relation to net sales. In other words, it allows us to know in percentage terms how much of our income is left once we have deducted all costs and expenses.

This ratio does not allow us to establish a profitability relationship with any type of capital invested. It is only useful to compare ourselves against the average or other companies from the same sector. It is also helpful if we analyze its evolution throughout several periods.

However, when comparing ourselves against competitors, we could obtain information about:

- Which company has more or less operating burden.
- If a company has less operating burden, it is probably more efficient.
- Therefore, we could imitate the strengths of that company in order to become as efficient or more efficient.

IXU S.A. Net margin = $\frac{631{,}15}{16.114{,}50}$ = 3,92 %

Industry Average: 5 %

Interpretation: Ixu S.A. is below average, which indicates that besides high costs, it also has a heavier operating burden than the average.

Another possibility is that the level of costs and expenses are equal to the average. However, sales are reducing which causes margins to be lower than the average.

$$\textbf{2.3 Return on Assets} = \frac{\text{EBIT}}{\text{NOF+NFA}} = \frac{\text{EBIT}}{\text{NET ASSETS}}$$

Note: also known as ROA (Return on Assets) or BEP (Basic Earnings Production)

Meaning: Similar to the asset turnover ratio, this ratio measures the capability of total assets to generate operating results (which differs from the turnover ratio which measures the capability of assets to generate sales).

This relationship between the EBIT and total assets is correct because NOF include spontaneous assets that represent part of the costs and expenses that will be deducted from sales, and NFA include depreciation, which will also be deducted from sales. All these deductions from sales give us EBIT as result.

However, interest-bearing debts (STD and LTD) are not considered because they are used to finance assets but they are not part of assets. Taxes are not considered either due to the tax shield that interest-bearing debts generate.

Return on assets Ixu S.A. =	$\frac{1.524,43}{9.007,84}$	= 16,79%
Industry Average:		18,15 %
Leader's return:		20,24 %

Interpretation: Investment in NOF and NFA generates a 16.79% return, lower than the industry average. Once again, it is demonstrated that Ixu S.A. is efficient, but not as efficient as competitors.

Higher costs, a heavier operating burden and a reduction in sales are the factors that could make Ixu S.A. not so efficient and therefore not as profitable as it wished. The optimum level this ratio should have is:

Average < ROA < Leader

If Ixu S.A. manages to occupy the ideal position, then it would be in condition to compete against the leader.

2.4 Return of company's resources =	Net Profit / Equity (E)

Note: also known as ROE (Return on Equity)

Meaning: This is undoubtedly the most important financial ratio of all since it offers a primary vision of the profitability of shareholders' investment and it is a preliminary calculation of how much they would like to earn if shareholders invested their money in a new project.

From the accounting point of view, ROE measures the profitability of shareholders' money, measured from the company's final result at the end of a period.

Let's remember that net profit belongs to shareholders and they are the ones to decide what to do with the earnings generated, whether to distribute them partially or totally.

Return on Equity Ixu S.A. =	631,15 / 4.812,87	= 13,11 %
Industry Average:		17,50%
Leader's return		21,85%

Interpretation: Shareholders' investment generates a 13,11% return. If shareholders decide to invest their money in a project, the return they would demand from such project in the beginning would be not less than 13.11%.

However, Ixu S.A.'s return is below the average. Similar to ROA, the ideal ratio would be:

Average < ROE < Leader

This means that if new investors appear in the market, they will want to invest in any company whose ROE is not below the average. Ixu S.A. will not be able to win such fresh capitals because its return is below the average.

3. Debt Ratios: These ratios help us determine the company's level of indebtedness. When a bank is going to grant a credit to a company, the first thing under analysis is debt.

External financing serves as "leverage" to raise operations and therefore it also raises sales, thus increasing profitability. For this reason, these ratios are also called "leverage" ratios. The main ratios in this group are as follows:

$$\textbf{3.1 Debt over Equity (D/E)} = \frac{DCP+DLP}{E}$$

As we know assets are financed with debt plus equity. If we relate assets to equity, this would be equal to relating:

- Debt with equity: $\left[\frac{DCP+DLP}{E}\right]$, and
- Equity with equity $\frac{E}{E}$, which would be equal to 1

Therefore, the relation of assets to equity would be equal to: $\left[\frac{LTD+STD}{E}\right]$, which is equal to the debt ratio (1 + Debt %).

There is no ideal measure for this ratio that works for all companies. In principle, companies that achieve stable returns could manage to have high debt levels.

There are companies that have very high debt ratios and work without problems and vice versa.

Indebtedness (D/E) Ixu S.A. = $\left[\frac{214,86+4.050,11}{4.812,87}\right]$ = 88,62 %

Industry Average: 75,00%

Interpretation: On average, the companies of this sector have a debt that represents 3/4 of their equity. Ixu S.A. exceeds that average, which means that it is more indebted than the average. Therefore, it could have difficulties to obtain more debt.

When analyzing NOF before, we found that 94.2% was financed by WC and the rest by STD. Comparing these results with debt level, we can deduct that most of the debt was negotiated for the long-term.

Despite the fact that Ixu S.A. is more indebted than the average, it does not have a very high non-liquidity risk since most of its debt is long-term, and the longer the term, the more the outgoing cash flow per period will be reduced, due to debt amortization payments.

$$\text{3.2 Debt/Assets ratio (D/A)} = \frac{\text{STD+LTD}}{\text{NOF+NFA}} = \left[\frac{\textbf{DI}}{\textbf{NET ASSETS}}\right]$$

Meaning: This ratio tells us the proportion of debt in relation to assets. That is, it tells us what proportion of assets is financed with debt.

The maximum value this ratio could achieve is 1 or 100% and this would mean that all assets are financed only with debt (A=D). If D/A is lower than 100%, this would mean that part of the assets is financed with equity. That part would be equal to what is left for D/A to reach 100%.

Indebtedness (D/A) Ixu S.A. $= \left[\frac{214{,}86+4.050{,}11}{9.077{,}84}\right] = 46{,}98\ \%$

Industry average: 41,00 %

Interpretation: 47% of total assets are financed with interest-bearing debt. The remaining 53% is equity contributed by shareholders.

Since D/A is lower than 50%, we can conclude that the proportion of liabilities is lower than the proportion of equity and therefore the D/E ratio is lower than 100%.

Besides, compared to industry average, we confirm that this company is more indebted than the average, which entails the above-mentioned consequences.

Integral Business Assessment: The Dupont Identity

Until now we have analyzed 11 financial indicators:

- 5 operating indicators
- 4 profitability indicators, and
- 2 debt or leverage indicators

We have also mentioned that from all indicators studied, the most important is ROE, because it shows the profitability earned by those who have invested in the company, that is, shareholders.

However, ROE is nothing more than the reflection of the results obtained by the three factors (profitability, operation and indebtedness) analyzed jointly and interacting with each other. In other words, we can say that:

ROE = Profitability x Operationx Indebtedness

Let's remember that the ROE formula is $= \frac{\text{Net Profit}}{\text{Equity (E)}}$

If we want to apply the previous equation, we have to multiply the three formulas to obtain ROE's formula. These formulas are:

- Profitability: $\frac{\text{Net Profit}}{\text{Net Sales}}$
- Operation: $\frac{\text{Net Sales}}{\text{NOF + NFA}}$
- Leverage: $\frac{\text{NOF + AFN}}{\text{E}}$

Replacing these formulas in the above equation, we have:

$$\text{ROE} = \left[\frac{\text{Net Profit}}{\text{Net Sales}}\right] \times \left[\frac{\text{Net Sales}}{\text{NOF + NFA}}\right] \times \left[\frac{\text{NOF + NFA}}{\text{E}}\right] = \left[\frac{\text{Net profit}}{\text{Equity (E)}}\right]$$

This formula is known as the DuPont Identity. This identity allows us to identify quickly where the main problems that may affect a business are.

Once the problem area is identified, we will be able to apply all ratios corresponding to a specific area, in order to determine the specific causes of such problems.

ROE de Ixu S.A.: $\left[\frac{631{,}15}{16.114{,}50}\right] \times \left[\frac{16.114{,}50}{9.077{,}84}\right] \times \left[\frac{9.077{,}84}{4.812{,}86}\right]$

ROE de Ixu S.A.: [3,92%] x [1,78] x [1,88] = 13,11%

Industry Average: 5,00% x 2,00 x 1,75 = 17,50%

Interpretation: Ixu S.A. has problems in the three areas, but we should be aware that many problems are "effects" of other problems that are "causes". When analyzing the three factors jointly, we find that:

- The company has profitability problems due to higher costs and a higher operating burden.
- These problems have a start in the company's operation. There is bad inventory management, which leads to longer inventory days and a shorter payment period than the industry's.
- The effect produced by these problems is that the company has got into debt to finance a longer cash cycle as compared to its internal policies and the industry.

After identifying the problems, causes and effects, we should work on the strategies to correct these problems and prepare a balance sheet and income statement projection to see how the company would look like if it were optimized. This will be discussed in the next chapter.

Exercise

Is it good or bad to get into debt?

Let's consider that we decided to acquire a franchise to sell cocadas (a very traditional candy made of coconut). The investment required is $ 100 and the assets to operate are also $ 100. Let's look at the balance sheet.

Now let's suppose that this is a one-year business and that there are no other investments. We sell $ 110 and the cost of sales is $ 100.

a) Let's consider the first case where we decide not to ask for any bank loans to finance this business but to do it with our own savings. The business generates $ 10 of net profit. If we managed to increase our profit by 20%, we would obtain $ 12 and if due to problems we reduced profit by 20%, we would obtain $ 8.

Let's calculate ROA and ROE for each case. ROA and ROE will be exactly the same and this is obvious because we have not considered debt to finance our NOF.

b) Now, let's consider that we do not invest all our $ 100 capital in the business, but only 50 % of our capital and for the remaining 50% we contract debt with a local bank at a 9% cost. ROE is better than ROA, therefore we can be more profitable putting less money in the business than all our savings.

What is leverage?
Cocada Project: no leverage

Cocadas 1	Base		Op. profit +20%	Op. profit -20%
Investmen in materials and rent		100		
with the company's own resources	100			
Sales		110		
Cost of Goods Sold		-100		
Net Profit		10	12	8
ROE		10%	12%	8%
ROA		10%	12%	8%

Leverage: If we ask money from a bank

Cocadas 1 with 50% debt	Base		Op.Profit +20%	Op. profit -20%
Investment in materials and rent		100		
With the company's own resources	50			
With a 9% debt	50			
Sales		110		
Cost of goods sold		-100		
EBT		10	12	8
9% Interest		-4,5	-4,5	-4,5
Net Profit		5,5	7,5	3,5
ROE		11,0%	15,0%	7,0%
ROA = EBT / NA		10,0%	12,0%	8%

It is not that bad to get into some debt

	Cocadas 2		Project Cocadas 3		Actual Cocadas 3	
Investment in materials and rent		200		300		300
With the company's own resources	100		100		100	
With debt	100		200		200	
Sales		220		330		330
Cost of goods sold		-200		-300		-300
EBT		20		30		30
Debt interest	9%	-9	9%	-18	11%	-22
Net Profit		11		12		8
ROE		11%		12%		8%
ROA = EBT/ NA		10,0%		10,0%		10%
Interest coverage (EBT/ Int.)		2,22		1,67		1,36
Solvency (CR./3rd.party resources)		1,0		0,5		0,5

SHAREHOLDERS' RETURN

$$ROE = \frac{NP}{E} = \left[\frac{\text{NET PROFIT}}{\text{REC. PROPIOS}}\right]$$

$$ROE = \left[\frac{NP}{E}\right] = \left[\frac{NP}{SALES}\right] \times \left[\frac{SALES}{NA}\right] \times \left[\frac{NA}{E}\right]$$

MARGIN TURNOVER INDEBTEDNESS

NA = NET ASSET = NOF + FA
NET ASSET = D + E

$$ROE = \left[\frac{NP}{SALES}\right] \times \left[\frac{SALES}{NA}\right] \times \left[\frac{D+E}{E}\right]$$

$$ROE = \left[\frac{NP}{SALES}\right] \times \left[\frac{SALES}{NA}\right] \times \left[1 + \frac{D}{E}\right]$$

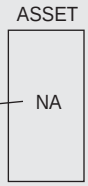
ASSET RETURN
Extended Dupont Model

$$ROE = ROA + \frac{D}{E}(ROA - K_d) \text{ (BEFORE TAX)}$$

$$\frac{BN}{E} = \left[ROA + \frac{D}{E}(ROA - K_d)\right](1-t) \text{ (BEFORE TAX)}$$

$$ROA = \frac{EBIT}{NA} = \left[\frac{EBIT}{SALES}\right] \times \left[\frac{SALES}{NA}\right]$$

MARGEN TURNOVER



Deduction Dupont

$$ROE = \left[ROA + \frac{D}{E} (ROA - K_d) \right]$$

ROE = Return on equity after taxes
ROA = Return on net assets before taxes
Kd = Average debt interest rate
t = Tax rate
D = Debt or accounting value
E = Equity

We start from:

BAT = (EBIT – interest) • (1 - t)
BAT = Profit after taxes
EBIT = Earnings before interests and taxes

Replacing:

$ROE \bullet E = (ROA \bullet NA - D \bullet Kd) \bullet (1 - t)$ (1)
Since:
$NA = E + D$

If we divide both parts of the equation (1) by E we have:

$$ROE = \left[\frac{E + D \bullet ROA}{E} - \frac{D}{E} \bullet K_d \right] \bullet (1 - t)$$

$$ROE = \left[ROA + \frac{D}{E} (ROA - K_d) \right] \bullet (1 - t)$$

This formula means that the return on the company's resources is equal to the return on net assets after taxes plus a leverage factor which will be positive if the return on net assets is higher than the cost of debt, or otherwise negative.

It is obvious that a company destroys value when it accepts an investment with a lower return than the cost of its resources, which certainly happens if that return is lower than the cost of the cheapest resource, that is, debt.

But from this perspective, the problem is about investment or growth, or rather, about whether the company should or not survive, but it is not a financing structure problem itself.

The company destroys value, but it is possible that without debt, destruction would be greater.

Etiquetas Salvadoreñas S.A de C.V. (ETISAL)

Etisal was a company located in San Salvador that manufactured self-adhesive labels. The company used to sell its products as merchandise for stationery stores. In addition, they manufactured pre-printed labels for different containers, both for the food and the beauty industry. At the beginning of 2006, its owner, Ricardo Artavia, was worried about its financial situation. For this reason, he hired you as financial advisor to help him diagnose the problem and identify his alternatives. In order to carry out this task, he provided you with the financial statements shown in annexes 1 and 2.

After your meeting with Ricardo, you have drawn the following conclusions:

- Due to the economic situation, 2006 sales are forecasted to decrease 35% and costs of sales will be 74% of sales. On the other hand, administrative expenses will be reduced to 13% of sales, but selling expenses will remain the same as in 2005 in proportion to sales. Financial expenses will be 3% of sales. Depreciation in 2006 will be 60.000 dollars. Taxes will be 40% of EBT.

- Given suppliers' size, it is known that it is not possible to ask them for more than 75 days. A research performed showed that competitors have 120 inventory days and that they offer customers 70 days of credit.

- For non-operating assets and liabilities, he assumes that they will remain the same as a percentage of total assets.

Perform a financial analysis and diagnosis for Etisal:

1. hort balance sheet and COAF between 2002 and 2005. What are your conclusions about it?

2. Analyze the Income Statement and the Balance Sheet, as well as ratios.

3. Project the Balance Sheet and the Income Statement for 2006

4. Diagnose the company's problem. Does it make a profit or a loss? Does it need more money? If it does, why does it need it?

5. What could you recommend to Mr. Artavia to improve his financial situation?

Annex 1 Balance Sheet at December 31 (in dollars)

	2002	2003	2004	2005
Cash	1.681	3.028	4.127	54.685
Accounts receivable	212.561	205.059	257.648	211.228
Inventory	282.581	344.200	301.718	341.796
Other operating accounts receivable	4.985	8.696	4.275	17.186
Prepaid taxes	22.423	17.196	30.647	29.106
Prepaid operating expenses	-	16.129	6.429	12.197
Research, patent				
and other non-operating deferred expenses	-	-	-	20.540
Total Current Assets	524.231	594.308	604.843	686.739
Fixed Assets	820.249	1.395.028	1.350.911	1.372.333
(-) Accumulated Depreciation	-	-531.780	-556.745	-600.321
Net Fixed Asset	820.249	863.248	794.167	772.012
Exchange rate difference				
Before changing colon to dollar	109.092	109.092	109.092	109.092
Total Assets	1.453.572	1.566.647	1.508.102	1.567.843
Current Bank Loans	201.827	360.037	355.951	398.094
Accounts payable	209.733	248.284	271.415	193.322
Accrued taxes	12.223	10.593	16.790	13.831
Social Security Taxes	-	1.724	1.677	1.624
Other accrued operating expenses	2.325	6.929	2.150	182
Non-operating accrued expenses	29.653	28.142	30.030	27.715
Total current liabilities	455.761	655.710	678.012	634.767
Long-term Liabilities	207.531	130.984	-	105.000
Total liabilities	663.292	786.694	678.012	739.767
Share Capital	28.000	28.000	28.000	420.000
Reserves	713.105	744.454	748.259	389.702
Income of the year	49.175	7.499	53.831	18.373
Total Equity	790.280	779.953	830.090	828.076
Total Liabilities + Equity	1.453.572	1.566.647	1.508.102	1.567.843

Annex 2 Income Statement (in dollars)

	2002	2003	2004	2005
Net Sales	1.066.435	1.135.069	1.180.974	1.166.653
Cost of Sales	696.066	778.620	760.492	787.213
GROSS PROFIT	370.369	356.449	420.481	379.441
OPERATING AND FINANCIAL EXPENSES				
Selling Expenses	125.381	139.810	127.617	142.133
Administrative Expenses	135.250	152.725	152.770	170.132
Financial Expenses	28.467	48.580	41.709	37.783
TOTAL OPERATING AND FINANCIAL EXPENSES	289.099	341.115	322.095	350.048
PROFIT (LOSS)	81.271	15.334	98.386	29.393
OTHER DEFERRED EXPENSES	-	71.310	6.696	-
Other revenues-Other expenses	285	109	80	115
NET PROFIT (LOSS)				
BEFORE TAXES	81.555	-55.867	91.770	29.508
Taxes (-) tax credit	32.380	-63.366	37.939	11.134
NET PROFIT	49.175	7.499	53.831	18.373
Depreciation	109.683	109.683	112.021	119.826
Purchases	978.647	840.238	718.010	827.291

CASO EFORT S.A

EFORT S.A manufactures orange juice concentrates. Its manager, Mr. James Giter, is worried about determining the amount of equity it will have to assign EFORT next year. Giter has defined the policy that any asset's increase will have to be financed with equity.

EFORT is the market leader with a 60% market share. Consider the following points where the Manager bases his analysis upon.

a) He has launched an aggressive promotional campaign and is expecting a 30% sales increase.
b) Fixed assets depreciation will be US $ 50, including the new investment of US $ 300 to be made during 2008 to expand EFORT facilities.
c) He is not considering an increase in LTD and STD (we assume the projection). New financing will take place by means of equity.

d) The same level of sales contribution will remain the same as in 2007.

e) Fixed or operating assets will remain the same.

f) He is expecting a good negotiation with suppliers, in order to increase payment period by 5 days

g) 2007 Indicators: inventory days= 60 days, Collection period = 60 days and cash period= 20 days. The Board of Directors has decided to maintain them on the same level for next year.
h) The cost of money for long-term debt (LTD) is 12% and 11% for short-term debt (STD) (these rates will be used by the Manager for his projection).

i) Given the business' nature, there is no seasonality. Therefore it can be considered the same throughout the year.
j) The IRS rate to be charged will be 30%. During 2008, taxes are accrued according to that year's profit, but 30% of the previous year's profit (2007) is paid. The difference, <<accrued taxes>> remains as a liability in the balance sheet to be paid in 2009.
k) For projections, use 365 days a year.

Giter has to project the Income Statement and the Balance Sheet for 2008.

INCOME STATEMENT (in thousand dollars)

	2007	Ratios	2008
Gross sales	700		
Discount on prompt payments	0		
Net sales	700		
Beginning inventory	20		
Purchases	633		
Ending inventory	93		
Cost of goods sold	560		
Administrative Expenses	50		
Depreciation	40		
EBIT	50		
Financial Expenses	29		
Earnings before taxes (EBT)	21		
Taxes (30 %)	6		
Net Profit	15		

BALANCE SHEET (in thousand dollars)

ASSETS	2007	Ratios	2008
Cash	39,9		
Accounts receivable	116,7		
Inventory	93,3		
Total current asset	250		
Fixed asset	300		
Total Assets	550		

LIABILITIES	2007		2008
Accounts payable	53		
Accrued taxes	0		
Short-term debt	100		
Short-term share of long-term debt	25		
Total current liabilities	178		
Long-term debt	125		
TOTAL LIABILITIES	303		
EQUITY	247		
TOTAL LIABILITIES + EQUITY	550		

You have to ask Mr. James Giter, General Manager, to calculate the following:

a) How much will NOF be for 2008?

b) How much will working capital be for 2008?

c) In theory, what is the minimum working capital for EFORT S.A, if its manager does not like risk and the country where he operates has credit restrictions?
d) Determine working capital, under a conservative financial structure, if this company operated in Chile.

e) Do not consider cash, inventory and payment period information for 2007 and with the DUPONT formula analyze the company's profitability for 2008. According to you: From the list below, what would be the most serious problem for EFORT S.A in 2008?

i. Turnover is too low
ii. Margin is too low
iii. It should not have debt
iv. Debt contribution is negative
v. Fixed assets grow

f) From the list below, choose the 3 more important recommendations you would give to your Manager.

i. To reduce indebtedness level
ii. To increase leverage level
iii. To reduce inventory days
iv. To reduce working capital
v. Not to invest in new fixed assets
vi. Not to ask for 5 more days from suppliers and accept discounts on prompt payments.
vii. To increase NOF
viii. To increase WC
ix. Not to grow so much in order to avoid liquidity problems.

American Home Products Corporation

I just don't like to owe money," said William F. Laporte when asked about his company's almost debt-free balance sheet and growing cash reserves.1 The exchange took place in 1968, four years after Laporte took over as chief executive of American Home Products (AHP). The subsequent 13 years did not improve his opinion of debt financing. During Laporte's tenure as chief executive, AHP's abstinence from debt continued, while the growth in its cash balance outpaced impressive growth in both sales and earnings. At the end of 1980 AHP had almost no debt and a cash balance equal to 40% of its net worth. In 1981, after 17 years as chief executive, Laporte was approaching retirement, and analysts speculated on the possibility of a more aggressive capital structure policy.

The Company

AHP's 1981 sales of more than $4 billion were produced by over 1,500 heavily marketed brands in four lines of business: prescription drugs, packaged (i.e., proprietary or over-the-counter) drugs, food products, and housewares and household products. Consumer products included a diversity of well-known brand names, such as Anacin, Preparation H, Sani-Flush, Chef Boyardee, Gulden's Mustard, Woolite, and the Ekco line of housewares. AHP's largest and most profitable business—prescription drugs—included sizable market shares in antihypertensives, tranquilizers, and oral contraceptives. AHP's success in these lines of business was built on marketing expertise. Whether the product was an oral contraceptive or a toilet bowl cleaner, "they sell the hell out of everything they've got," said one competitor.[2]

AHP's Corporate Culture

AHP had a distinctive corporate culture that, in the view of many observers, emanated from its chief executive. This culture had several components. One was reticence. A poll of Wall Street analysts ranked AHP last in corporate communicability among 21 drug companies. A second element of AHP's managerial philosophy was frugality and tight financial control. Reportedly, all expenditures greater than $500 had to be personally approved by William Laporte, even if authorized in the corporate budget.

Other important components of AHP's culture were conservatism and risk-aversion. AHP consistently avoided much of the risk of new-product development and introduction in the volatile drug industry. Most of its new products either were acquired or licensed after their development by other firms or they were copies of new products introduced by competitors. A substantial number of AHP's new products were clever extensions of existing products. AHP thus avoided risky gambles on R&D and new-product introductions and used its marketing prowess to promote acquired products and product extensions. When truly innovative products were introduced by competitors, AHP responded with "me-too" products and relied on its marketing clout to erode competitors' head start.

Finally, an integral part of AHP's corporate philosophy was the firm's long-standing policy of centralizing complete authority in the chief executive. The current incumbent was described by a former colleague as a "brilliant marketer and tightfisted spender."[3] Laporte's management style was characterized as management from the top, unparalleled in any firm of comparable size. Though reticent in discussing operations, Laporte was emphatic in stating the objective underlying his use of this authority: "We run the business for the shareholders."[4] The author of a Business Week article on the firm commented, "One of the most common business platitudes is that a corporation's primary mission is to make money for its stockholders and to maximize profits by minimizing costs. At American Home, these ideas are a dogmatic way of life."[5]

AHP's Performance

The managerial philosophy described above produced impressive results. AHP's financial performance was characterized by stable, consistent growth and profitability. The firm had increased sales, earnings, and dividends for 29 consecutive years through 1981. This growth had been consistent and steady, ranging in recent years between 10% and 15% annually (see Exhibit 1 for 10 years' review of AHP's performance). Under Laporte's stewardship, AHP's return on equity had risen from about 25% in the 1960s to 30% in the 1980s. Because of its passion for parsimony, AHP had been able to finance this growth internally while paying out almost 60% of its annual earnings as dividends.

During Laporte's reign as chief executive, AHP's price/earnings ratio had fallen by about 60%, reflecting the marketwide collapse of P/E ratios of growth companies. Nonetheless, AHP's more than sixfold growth in earnings per share had pushed up the value of its stock by a factor of three during his tenure. AHP's stock was widely held by major institutional investors. Its popularity among investors reflected analysts' assessment of AHP's management. In the opinion of one analyst, "When you think of American Home Products, you think of the best-managed company in the whole pharmaceutical field."6 Nevertheless, AHP's excess liquidity and low degree of leverage were criticized by many analysts. Others wondered whether it would be a good idea to tinker with success.

AHP's Capital Structure Policy

Many drug firms were relatively unleveraged, but none matched AHP's conservative capital structure. Because of AHP's diversified operations, it was difficult to find a truly comparable firm for comparative analysis. However, Warner-Lambert Company was about the same size as AHP and competed in roughly similar lines of business (see Exhibit 2 for a comparison of AHP and Warner-Lambert). Warner-Lambert had a debt

ratio of 32% and its bond rating was on the borderline between AAA and AA in 1980.

For many years analysts had speculated on the impact of a more aggressive AHP capital structure policy. An example of a pro forma recapitalization analysis is presented in Exhibits 3 and 4. Exhibit 3 shows actual 1981 performance and pro forma restatements of the 1981 results under three alternative capital structures: 30% debt, 50% debt, and 70% debt. As described in Exhibit 4, these restatements assume that AHP issued debt and used the proceeds plus $233 million of excess cash to repurchase stock in early 1981 at the then prevailing stock price of $30 per share. Though this approach is only one of several ways to achieve a higher debt ratio, it illustrates in approximate terms the impact of higher debt on AHP's financial performance.

In view of AHP's firmly rooted financial conservatism, it was premature to consider the details of a realistic recapitalization plan. However, the likely imminent retirement of the firm's strong-willed chief executive fueled speculation concerning an appropriate capital structure policy for AHP and the magnitude of the payoff from such a policy.

Exhibit 1 Selected Financial Data for American Home Products Corporation, 1972–1981 ($ in millions except per share and ratio data)

	1972	1.973	1.974	1.975	1.976	1.977	1.978	1979	1980	1981
Sales	1.587,10	1 .784,40	2.048,70	2.258,60	2.471,70	2. 685,10	3.062,60	3.406,30	3.798,50	4.131,20
Cash	-	-	-	-	358,8	322,9	436,6	493,8	593,3	729,1
Total debt	-	-	-	-	7,8	10,3	13,7	10,3	13,9	16,6
Net worth	-	-	-	_	991,50	1 .035,30	1.178,00	1 .322,00	1.472,80	1.654,50
Total assets	1 .042,00	1.126,00	1.241,60	1.390,70	1.510,90	1.611,30	1.862,20	2.090,70	2.370,30	2.588,50
Net income	172,7	199,2	225,6	250,7	277,9	306,2	348,4	396	445,9	497,3
Earnings per share	1,08	1,25	1,42	1,58	1,75	1,94	2,21	2,51	2,84	3,18
Dividends per share	0,59	0,625	0,777	0,9	1	1,15	1,325	1,5	1,7	1,9
Annual growth in sales										
Annual growth in EPS										
		12,4	14,8	10,2	9,4	8,6	14,1	11,1	11,7	8,8
		15,7	13,6	11,3	10,8	10,9	13,9	13,6	13,1	12
Dividend payout ratio	54,6	50	54,7	57	57,1	59,3	60	59,8	60	59,7
After-tax profit margin	10,9	11,2	11	11,1	11,2	11,4	11,4	11,6	11,7	12
Return on equity	25,9	28,2	28,2	27,9	28	29,5	29,6	30	30,3	30,1

Exhibit 2 Comparison Data for American Home Products and Warner-Lambert, 1980 ($ in millions except per share and ratio data)

	American Home Products Corporation	Warner-Lambert Company
Sales	3.798,50	3.479,20
5-year compound annual growth rate	11	9,9
Profit after tax	445,9	192,7
5-year compound annual growth rate	12,2	3,3
Cash and equivalents	593,3	360,3
Accounts receivable	517,3	541,5
Inventory	557,3	645,8
Net property, plant and equipment	450,5	827,1
Other	251,9	582,5
Total assets	2.370,30	2.957,20
Total debt	13,9	710,1
Net worth	1.472,80	1.482,70
Earnings per share	2,84	2.41
5-year compound annual growth rate	12,4	3
Dividends per share	1,7	1,32
5-year compound annual growth rate	13,6	8
Stock price (end of 1980)	30	20
Price/earnings ratio	10,6	8,3
Profit margin (profit after tax/sales)	11,7	5,5
Return on equity	30,3	13
Interest coverage	436,6	5
Ratio of total debt to total capital	0,9	32,4
Bond rating	AAA	AAA/AA

*Warner-Lambert's debt was rated triple A but analysts felt the firm was close to being downgraded to double A.

Exhibit 3 Pro Forma 1981 Results for Alternative Capital Structures
($ in millions except per share data)

	1981 Real	Proforma 1981 para distintos porcentajes de deuda frente a capital total		
		30	50	70
Sales	4.131,20	4.131,20	4.131,20	4.131,20
Earnings before interest and taxesa	954,8	922,2	922,2	922,2
Interest	2,3	52,7	87,8	122,9
Profit before taxes	952,5	869,5	834,4	799,3
Taxes	455,2	417,4	400,5	383,7
Profit after tax	497,3	452,1	433,9	415,6
Dividends on preferred stock	0,4	0,4	0,4	0,4
Earnings available to common shareholders	496,9	451,7	433,5	415,2
Dividends on common stock	295,3	271	260,1	249,1
Average common shares outstanding (millions)	155,5	135,7	127,3	118,9
Earnings per share	3,18	3,33	3,41	3,49
Dividends per share	1,9	2	2,04	2,1
Beginning of Year		**Principio de ejercicio después de recapitalización**		
Cash and equivalents	593,3	360,3	360,3	360,3
Total debt	13,9	376,1	626,8	877,6
Net worth	1.472,80	877,6	626,9	376,1
Common stock price	30	—	—	—
Aggregate market value of common stock	4.665,00	—	—	—

[a]EBIT is reduced in pro forma results due to the loss of interest income from the $233 million in excess cash used to repurchase stock.

Exhibit 4 Detailed Assumptions for Pro Forma Recapitalizations Presented in Exhibit 3

1. Debt is assumed to be added to the capital structure by issuing debt and using the proceeds to repurchase common stock. All purchases are assumed to be executed in January 1981.
2. Stock is assumed to be repurchased at a price of $30 per share, which was the prevailing stock price in early January 1981.
3. The minimum cash balance is assumed to be $360.3 million (equal to Warner-Lambert's 1980 cash balance); thus $233 million in excess cash is available for use in repurchasing stock.
4. A tax rate of 48% is used.
5. The common dividend payout ratio is 60%.
6. Interest rate on all debt in all recapitalizations is assumed to be 14% before tax.
7. Interest forgone on excess cash is assumed to be at a rate of 14% before tax, so with recapitalization EBIT falls by .14 times excess cash of $233 million, or $32.6 million. Thus, pro forma EBIT is $922.2 million (actual EBIT of $954.8 million minus $32.6 million reduction in interest from excess cash).
8. Details of recapitalizations are ($ millions):

	30% Debt Ratio	50% Debt Ratio	70% Debt Ratio
Excess cash	$233.0	$233.0	$233.0
Additional debt	362.2	612.9	863.7
Total repurchase	$595.2	$845.9	$1,096.7
Reduction in common shares outstanding (millions of shares)	19.8	28.2	36.6

KNOWLEDGE CONTROL:

1. Are the following statements true (T) or false (F)?

		T	F
A	The total debt/NFA ratio tells us the proportion of assets financed with debt		
B	Receivables turnover is the number of customers that enter the company per month		
C	The value of asset turnover tells us how much each $ of asset investment has generated.		
D	It is recommended that a company has a longer payment period than its collection period.		
E	In order to perform a percentage analysis of a balance sheet, total equity is used as divisor.		
D	The company's profit is the one given to the shareholder.		
F	A year's profit is the cash flow that has entered the company during that year.		
G	Cash flow is the cash received by the company's shareholder.		
H	Amortization is the loss of value in company's assets		
I	ROE is the best profitability measure for shareholders.		
J	A company's equity is its accumulated savings.		

2. Can a company have a negative equity?

3. Give 2 options where a company can suspend its payments.

4. What is the cash conversion cycle? What is it for?

5. If ROE increases in a company, this means that:
   a. Equity has been reduced
   b. Net profit has been reduced
   c. Debt has been reduced
   d. None of the above

6. Short-term credit can be reduced by means of:
   a. Increasing fixed assets
   b. Reducing accounts receivable
   c. Increasing NOF
   d. None of the above

7. If the variation between Gross Profit and EBITDA is high, this means that:
   a. The company has low costs
   b. The operating burden increases
   c. The cost of debt is very high.
   d. None of the above

8. If the variation between EBIT and EBITDA is minimum, this means that:
   a. The company is spending little on NOF
   b. Financial expenses are low
   c. Expenses that do not represent cash outflows are minimum
   d. None of the above.

9. If net assets increase, this means that:
    a. There is more cash surplus
    b. NOF have decreased.
    c. There was a sale of fixed assets
    d. None of the above.

10. If there is cash surplus, this means that:
    a. NOF > WC
    b. WC > NOF
    c. There are more sales
    d. None of the above.

11. If profit increases, then
    a. The margin % increases b. OCF increases
    c. ROA increases
    d. None of the above.

12. If ROE increases, this could be the result of:
    a. More reserves
    b. Less employees
    c. More debt
    d. None of the above.

13. ROE is a fuction of
    a. Profitability, Operation, Leverage
    b. Profit, Debt, Equity
    c. Return on assets. Net margin. Leverage
    d. None of the above.

14. The Dupont model tells us that we can increase debt until
    a. ROA=Kd
    b. ROA = t
    c. ROS = Kd
    d. None of the above.

15. The cash conversion cycle is:
    a. Accounts receivable turnover – Accounts payable turnover – Asset turnover
    b. Collection period + Payment period - Inventory days
    c. Inventory days + Collection Period – Payment Period
    d. None of the above.

16. For each of the indicators below, state what element they are related to:

		Sales	CMV	EBIT	Gross Profit	NP	Accounts receivable	Inventories	E	D	NA	amortization
A	ROE											
B	ROA											
C	ROS											
D	% Margin											
E	OCF											
F	Indebtedness											
G	Return on Equity											
H	Inventory turnover											
I	Accounts receivable turnover											

Applications

17. Bruno Cale C.A., a company well-known for software development, has provided you with its balance sheets in order to make a financial diagnosis. Its manager asked for a percentage analysis.

a- With the information in the Balance Sheet, perform the following analysis:
- Asset composition
- Liability composition
- Asset financing
- Equity composition

b- With the information in the Income Statement, identify and analyze:
- Gross Profit
- EBITDA
- EBIT
- Financial Expenses
- Gross Profit

Bruno Cale S.A. **Balance Sheet** **At December 31**		**2.009**
Assets		
Cash	$	2.009
Accounts receivable	$	143.349
Inventory	$	221.720
T. Current Assets	$	23.200
	$	125.429
Fixed Assets	$	513.698
Land		
Buildings		
Furniture	$	95.525
Office Equipment	$	123.841
Computer Equipment	$	19.787
Vehicles	$	19.105
Machinery	$	15.284
Accumulated Deprec.	$	24.768
T. Net Fixed Assets	$	110.809
Total Assets	$	245.769
Liabilities		
Accounts payable	$	759.467
Accrued Expenses		
Accrued Taxes	$	92.445
Short-term Debt	$	1.815
T. Short-term Liabilities	$	10.092
	$	216.989
Long-term Liabilities	$	321.341
Bank loans		
Mortgages		
T. Long-Term Liabilities	$	181.754
Total Liabilities	$	56.265
	$	238.019
Equity	$	559.360
Share Capital		
Reserves		
"Income of the Year "	$	123.200
Total Equity	$	44.800
Total Liabilities + Equity	$	24.729

Bruno Cale S.A. **Income Statement** **At December 31**		**2.009**
Gross Sales	$	1.114.557
Discount on Sales	$	(71.264)
Return back on sales	$	(11.110)
Net Sales	$	1.032.184
Cost of Sales		
Beginning Inventory	$	3.424.760
Purchases	$	711.326
Ending Inventory	$	2.571.957
Cost of goods sold	$	(1.564.129)
Gross Profit	$	(531.946)
Expenses		
Administrative Expenses	$	(58.777)
Selling Expenses	$	(117.300)
Total operating expenses	$	(176.077)
EBITDA	$	(708.023)
Depreciation	$	(5.750)
EBIT	$	(713.773)
Financial expenses	$	(417)
EBT	$	(714.190)
Taxes (40%)	$	285 676
Net Profit	$	(428.514)

With the information from the Balance Sheet and the Income Statement, calculate and analyze ratios.

c- Operating Ratios

Accounts receivable turnover =
Accounts payable turnover =
Inventory turnover =
Average collection period =
Average payment period
Average inventory days =
Cash conversion cycle =
Asset turnover =

d- Profitability Ratios

Gross Profit Margin =
Net Profit Margin =
Return on Assets =
Return on Equity =

e- Debt Ratios

Debt/ Equity ratio =
Debt index =
STD/NOF=
WC/NOF=
Debt/Assets=

f- Integral Business Evaluation: Use the Dupont Model

$$ROE = ROA + \frac{D}{E} (ROA - K_d)$$

18. Unsatisfied with one-year analysis, Mr. Bruno Cale asks you for a comparative analysis of the three last years and provides you the Balance Sheet and the Income Statement of the two last years.

Bruno Cale S.A.
Income Statement
Ended December 31

	2.007	2.008	2.009
Assets			
Cash	$ 2.007	$ 2.008	$ 2.009
Customers			
Accounts receivable	$ 96.242	$ 129.864	$ 143.349
Inventory	$ 319.803	$ 297.805	$ 221.720
T. Current Assets	$ 29.974	$ 32.712	$ 23.200
	$ 162.213	$ 129.131	$ 125.429
Fixed Assets	$ 608.232	$ 589.512	$ 513.698
Land			
Buildings			
Furniture	$ 109.494	$ 94.856	$ 95.525
Office Equipment	$ 141.951	$ 122.974	$ 123.841
Computer Equipment	$ 22.681	$ 19.649	$ 19.787
Vehicles	$ 21.899	$ 18.971	$ 19.105
Machinery	$ 17.519	$ 15.177	$ 15.284
Accumulated Deprec.	$ 28.390	$ 24.595	$ 24.768
T. Net Fixed Assets	$ 127.013	$ 110.032	$ 110.809
Total Assets	$ 317.697	$ 248.953	$ 245.769
Liabilities			
Accounts payable	$ 925.929	$ 838.465	$ 759.467
Accrued Expenses			
Accrued Taxes	$ 121.834	$ 91.045	$ 92.445
Short-term debt	$ 1.210	$ 1.452	$ 1.815
T. Short-Term Liabilities	$ 8.746	$ 7.668	$ 10.092
	$ 391.919	$ 307.340	$ 216.989
Long-term liabilities	$ 523.709	$ 407.504	$ 321.341
Bank loans			
Mortgages			
T. Long-term Liabilities	$ 142.934	$ 167.429	$ 181.754
Total Liabilities	$ 62.920	$ 58.080	$ 56.265
	$ 205.854	$ 225.509	$ 238.019
Equity	$ 729.563	$ 633.013	$ 559.360
Share Capital			
Reserves			
"Income of the Year "	$ 123.200	$ 123.200	$ 123.200
Total Equity	$ 44.800	$ 56.000	$ 44.800
Total Liab. + Equity.	$ 20.662	$ 18.551	$ 24.729

Bruno Cale S.A. **Balance Sheet** **At December 31**	**2.007**	**2.008**	**2.008**
Gross Sales	$ 1.114.557	$ 1.114.557	$ 1.114.557
Discount on Sales	$ (83.520)	$ (80.655)	$ (71.264)
Return back on sales	$ (13.020)	$ (12.574)	$ (11.110)
Net Sales	$ 1.018.017	$ 1.021.328	$ 1.032.184
Cost of Sales			
Beginning Inventory	$ 126.500	$ 3.677.735	$ 3.424.760
Purchases	$ 708.145	$ 662.305	$ 711.326
Ending Inventory	$ 3.709.715	$ 3.454.540	$ 2.571.957
Cost of goods sold	$ 2.875.070	$ (885.499)	$ (1.564.129)
Gross Profit	$ 3.893.087	$ 135.829	$ (531.946)
Expenses			
Administrative Expenses	$ (78.671)	$ (67.500)	$ (58.777)
Selling Expenses	$ (119.324)	$ (130.284)	$ (117.300)
Total Operating Expenses	$ (197.995)	$ (197.784)	$ (176.077)
EBITDA	$ 3.695.091	$ (61.955)	$ (708.023)
Depreciation	$ (5.750)	$ (5.750)	$ (5.750)
EBIT	$ 3.689.341	$ (67.705)	$ (713.773)
Financial Expenses	$ (278)	$ (334)	$ (417)
EBT	$ 3.689.063	$ (68.039)	$ (714.190)
Taxes (40%)	$ (1.475.625)	$ 27.216	$ 285 676
Net Profit	$ 2.213.438	$ (40.824)	$ (428.514)

FINANCE
FOR EXECUTIVES

IV

Financial Forecasts

Chapter IV

Financial Forecasts

In previous chapters we analyzed Financial Statements in order to diagnose a company's problems.

Now that we know them, we have to solve them. In order to do that, we will set specific objectives in relation to the ratios previously obtained (NOF, WC and financial ratios).

Setting Objectives

The first thing we have to do is to focus on real-scope objectives. These could be as follows:

- General Objective: Improve profitability and debt level
- Specific Objectives: Make adjustments to the company's operations in order to achieve and/or exceed preset standards.

Next, there is a summary of the results obtained and where our objectives should aim at:

Ratios	Ixu S.A.	Policies	Industry	Leader	Objective
Operating:					
Collection Period	27	24	36		Reduce
Inventory days	156,33	120	120		Reduce
Payment Period	18	32	45		Extend
Cash Cycle	167	112	111		Reduce
Asset Turnover	1,78		2,00		Improve
Profitability:					
Profit Margin	52,79%		60,00%		Maintain
ROS	3,92%		5,00%		Improve
ROA	16,79%		18,15%		Improve
ROE	13,11%		17,50%		Improve
Leverage:					
D/E	88,62%		75,00%		Improve

Therefore, our efforts will be addressed towards these points:

- Collection: Reduce collection period from 27 to 24 days (current collection management is excellent and not much effort will be required to improve this ratio).
- Stock: Reduce inventory days from 158 to 120 days (current procurement management is bad. Most efforts have to be devoted here to optimize processes).
- Payments: Extend payment period from 18 to 32 days (once inventory days have been improved, we will have more bargaining power for a longer term as suppliers will see us as better clients).
- Cash Cycle: Reduce cycle from 167 to 112 days (once the ratios above are improved, this ratio will automatically improve).
- Gross Profit Margin: Maintain this margin at current levels (if we want sales to increase, so will our suppliers and our competitors).

If we manage to adjust these five ratios, the other ratios will automatically improve.

First the Income Statement

The income statement projection should always be the first step. The reason is that this statement will define the company's level of activity. If we make a variation in sales, all other items will be affected.

As we have analyzed previously, in the Balance Sheet there are also entries directly related to sales, and these are precisely the ones that make up NOF. Therefore, we cannot specify a NOF variation without having defined a sales variation first.

In order to make a projection, it is good to have a matrix where we can enter values and in this way analyze changes. Therefore, we are going to use an Excel matrix to make all the necessary adjustments and projections.

	A	B	C	D	E	F	G
1		2006	2007	2008			
2	**Income Statement**	**Real**	**Forecast**	**Forecast**			
3	**Net Sales**	16.114,50				**Conditions:**	
4	Cost of Sales	7.607,12					
5	**Gross Margin**	8.507,38					
6	Administrative Expenses	3.974,91					
7	Selling Expenses	2.470,89				It increases with sales	
8	**EBITDA**	2.061,58				It increases with sales	
9	Depreciation	537,15					
10	**EBIT**	1.524,43				It is invested as much as	
11	Financial Expenses	472,69				it is depreciated	
12	**EBT**	1.051,74					
13	Taxes (40%)	420,59				10% of debts	
14	**Net Profit**	631,15					
15							
16	**Income Statement Ratios**					**Formulas**	
17	Sales growth (g)		10,00 %	10,00 %		Sales x (1+g)	
18	Gross Margin %	52,79 %	52,79 %	52,79 %		Gross Margin / sales	
19	ROS	3,92 %				Net Profit / Sales	
20	ROA	16,89 %				EBIT / (NOF+NFA)	
21	ROE	13,11 %				Net Profit /E	
22							
23		2006	2007	2008		2006-2007	2007-2008
24	**Full Balance Sheet**	**Real**	**Forecast**	**Forecast**		**Variation**	**Variation**
25	**Assets**						
26	Cash	53,72					
27	Customers	1,208,59					
28	Accounts receivable	805,73					
29	Inventory	3,303,51					
30	**Total Current Assets**	5,371,50					
31	Net Fixed Assets (NFA)	5,371,51					
32	**Total Assets**	10,743,01					
33							
34	**Liabilities**						
35	Accounts payable	322,29					
36	Accrued Expenses	590,87					
37	Accrued Taxes	752,01					
38	Short-term debt (STD)	214,86					
39	**Total Current Liabilities**	1.880,03					
40	Long-term Debt (LTD)	4.050,11					
41	**Total Liabilities**	5.930,14					
42							
43	**Equity**						
44	Share Capital	698,30					
45	Reserves	3.483,42					
46	Income of the Year	631,15					
47	**Total Equity**	4,812,87					
48	**Total Liabilities and Equity**	10,743,01					
49							
50		2006	2007	2008		2006-2007	2007-2008
51	**Financial Balance**	**Real**	**Forecast**	**Forecast**		**Variation**	**Variation**
52	Surplus Cash	53,72					
53	NOF	3.652,62					
54	NFA	5.371,50					
55							
56	STD	214,86					
57	LTD	4.050.11					
58	E	4.812,87					

60	**Financing Analysis**				**Cash Flow**
61	NOF	3.652,62	-	-	
62	WC	3.491,48	-	-	- -
63	Cash Surplus (WC-NOF>0) o				
64	Resources to be negotiated (WC-NOF<0)	-161,15	-	-	
65	STD – Cash verification	161,15	-	-	
66					
67	**Balance Ratios**				**Formulas:**
68	Collection period	27	25	24	360/(sales/accounts receivable)
69	Inventory days	156	140	120	360/(cost of sales/inventory)
70	Payment Period	18	24	30	360/(purchases/accounts payable)
71	Cash cycle	165	141	114	
72	Asset Turnover	1,78			Sales/(NOF+NFA)
73	Financing NOF with WC	94,20%			WC/NOF
74	Leverage	88,62%			D/E

The Assumptions: subjective factors

We should remember that any forecast is subject to subjectivity from the person executing it or setting parameters. Thus, we can set different assumptions according to:

The past: variables will follow the same behavior of previous periods. For example: sales have been increasing at a 5% annual rate during the last four years.

The future: variables will be affected by future conditions. For example: It is expected that the new government grants tax incentives to the industry, therefore demand could grow 4% during the next three years.

Sales: the triggering item

As we have mentioned, the Income Statement should be the first to be forecasted and from this statement our first question should be about sales.

Now, how do we forecast sales? Even when we have enough reliable historical information, the subjective factor will always be present in our forecasts.

If we know that past conditions will remain without important changes, then we can use past information to make projections.

A way to do this would be to take a macroeconomic variable (e.g. GDP) that is related to sales (that is, our sales have a very similar evolution– almost equal- to that variable) and forecast sales based on the future evolution that we could project for that variable.

If there are no macroeconomic variables related to our sales, we could forecast sales following the historical evolution of sales. This could only be done if:

- Past information is reliable and sales have had a clearly predictable behavior.
- Also, top management's opinion and their business vision should be taken into account.

For Ixu S.A., we know that historical information is reliable and that sales have been growing at an annual 10% rate in relation to last year. Therefore, for the next 2 years, we will forecast sales considering a 10% annual growth rate (g). This will be the horizon to achieve the objectives set.

Start: Income Forecast

Now we start forecasting and setting the following assumptions:

- **Sales:** 10% growth rate in relation to last year.

$$Sales2007 = Sales\ 2006 \bullet (1+g)$$

- **Gross Margin:** It remains the same.

$$Gross\ Margin = Sales \bullet Margin\ (\%)$$

- **Administrative and Selling expenses:** they grow at the same pace than sales.

$$Expenses2007 = Expenses\ 2006 \bullet (1+g)$$

- **Depreciation expenses:** the company invests as much in fixed assets, as they depreciate, therefore this remains the same.
- **Financial expenses:** this corresponds to 10% of debt (STD+LTD)
- **Tax:** 40% of the tax base (EBIT)

The cost of sales is obtained subtracting sales from gross profit. The depreciation and financial expense cells are blank until the corresponding values from the Balance Sheet are completed (Figure 4.1).

	A	B	C	D
1		Real	2007	2008
2	**Income Statement**	2006	Forecast	Forecast
3	**Net Sales**	16.114,50	17.725,95	19.498,55
4	Cost of sales	7.607,12	8.367,83	9.204,62
5	**Gross Margin**	8.507,38	9.358,20	10.293,93
6	Administrative Expenses	3.974,91	4.372,40	4.809,64
7	Selling Expenses	2.470,89	2.717,98	2.989,78
8	**EBITDA**	2.061,58	2.267,74	2.494,51
9	Depreciation	537,15	537,15	537,15
10	**EBIT**	1.524,43	1.730,59	1.957,36
11	Financial Expenses	472,69	355,01	305,01
12	**EBT**	1.051,74	1.375,58	1.652,35
13	Taxes (40%)	420,59	550,23	660,94
14	Net Profit	631,15	825,35	991,41
15				
16	**Income Statement Ratios**			
17	Growth rate (g)		10,00%	10,00%
18	Gross Margin %	52,79%	52.79%	52.79%

Figure 4.1

Projected Balance Sheet

Now we project the full balance sheet:

Cash: For the time being, we start with no value on this cell. We will also use this cell and STD cell to tally the balance sheet:

- If total assets > (liabilities + equity= the difference will go to STD. This will mean that we need money to finance assets.
- If total assets < (liabilities + equity=, the difference will go to cash as a surplus. This will mean that we will have more available funds.

Customers: this will be calculated according to the new turnover desired.

- Collection period = $\frac{360}{\text{sales/customers}}$; working out the value of customers:

- Customers 2007 = $\frac{\text{Sales}}{360}$ • Collection period = $\frac{17.725,95}{360}$ • 25 = 1.230,97

Something interesting about this calculation is that it allows us to determine the customers' figure as a fixed percentage of sales:

$$\bullet\ \textbf{Customers}_{2007} = \frac{\text{Collection period}}{360} \bullet \text{sales} = \frac{25}{360} \bullet \text{sales} = 6.94\ \%\ \text{sales}$$

This proves that the customers' figure is a percentage of sales and can be calculated and even forecasted in this way.

Accounts receivable: it grows at the same pace as expenses; that is, it grows like sales. Calculation:

$$\textbf{Accounts receivable}_{2007} = \text{Accounts receivable}_{2006} \bullet (1+g)$$

Inventory: this will be calculated based on the new turnover desired.

$$\bullet\ \textbf{Inventory days} = \frac{360}{\text{Cost of sales/inventory}}\ ;\ \text{working out the value of:}$$

$$\bullet\ \textbf{Inventory}_{2007} = \frac{\text{costo ventas}}{360} \bullet \text{Inventory days} = \frac{8.367{,}83}{360} \bullet 140 = 3.254{,}16$$

Inventory can be calculated as a percentage of sales too. Since the cost of sales = Sales. (1-Margin %), we can replace it with this expression and then work out the value of:

$$\bullet\ \textbf{Inventory}_{\textbf{2007}} = \frac{\text{Inventory days} \bullet (1\text{-Margin})}{360} \bullet \text{sales}$$

$$\bullet\ \textbf{Inventory}_{\textbf{2007}} = \frac{140 \bullet (1\text{-}0.5279)}{360} \bullet \text{days} = 18.36 \text{ of sales}$$

Fixed Assets: the company invests as much in fixed assets as they depreciate, therefore they remain the same. When completing asset cells, depreciation cells will be automatically filled.

Accounts payable: this will be calculated based on the new turnover desired.

$$\bullet\ \textbf{Payment Period} = \frac{360}{\text{purchases / accounts payable}}\ ;\ \text{purchases are obtained from:}$$

$$\text{Inventory}_{2007} - \text{Inventory}_{2006} + \text{Cost of Sales}_{2007} =$$

$$3.254{,}16 - 3.303{,}51 + 8.367{,}83 = 8.318{,}48$$

$$\bullet\ \textbf{Accounts payable}_{\textbf{2007}} = \frac{\text{Purchases}}{360} \bullet \text{Purchases period} = \frac{8.318{,}48}{360} \bullet 24 = 554{,}57$$

As we can see, the difference between current and last year's inventories is insignificant. To simplify our calculation we could assume that purchases are equivalent to the cost of sales. Many companies try to maintain the Payment Period equal to Inventory days, so that suppliers finance purchases.

Accrued Expenses: This is 10% of administrative and selling expenses.

Accrued Taxes: The Company pays the tax generated during the previous year, which accumulates to the outstanding balance from the previous year. Tax originated last year accumulates to this year's outstanding balance

- Accrued taxes $_{2007}$ = Outstanding payment $_{2006}$ – Tax generated 2006 + Tax generated $_{2007}$
- Accrued taxes 2007 = 752,01 – 420,59 Tax generated$_{2007}$

Until now we do not know exactly how much 2007 taxes will be. We will know this when we complete debt values.

STD: We leave this cell blank. We will use this cell and the cash cell to tally the balance sheet.

LTD: We assume that every year $500,00 of capital debt are paid. When completing this cell, a value for financial expenses will automatically appear. This value may or not be definitive.

Share Capital: it remains the same throughout the years.

Reserves: Dividends from profit are not distributed. Therefore, all income of the year becomes this year's reserves.

- **Reserves$_{2007}$** = Reserves2006 + Profits2006
- **Reserves$_{2007}$** = 3.483,42 + 631,15 = 4.114,57

Income of the year: this will be this year's net profit.

Now, we only have to tally the balance sheet with cash or with STD. Since at the moment, our total assets should be less than liabilities plus equity, we will use cash to tally the balance sheet.

In Excel, we go to the cash cell and to the insert/function menu; in the dialog box we choose the "statistics" option and we look for the MAX function. We specify as Number1 the cells that follow: (Figure 4.2).

Total assets – customers – accounts receivable – inventory – fixed assets

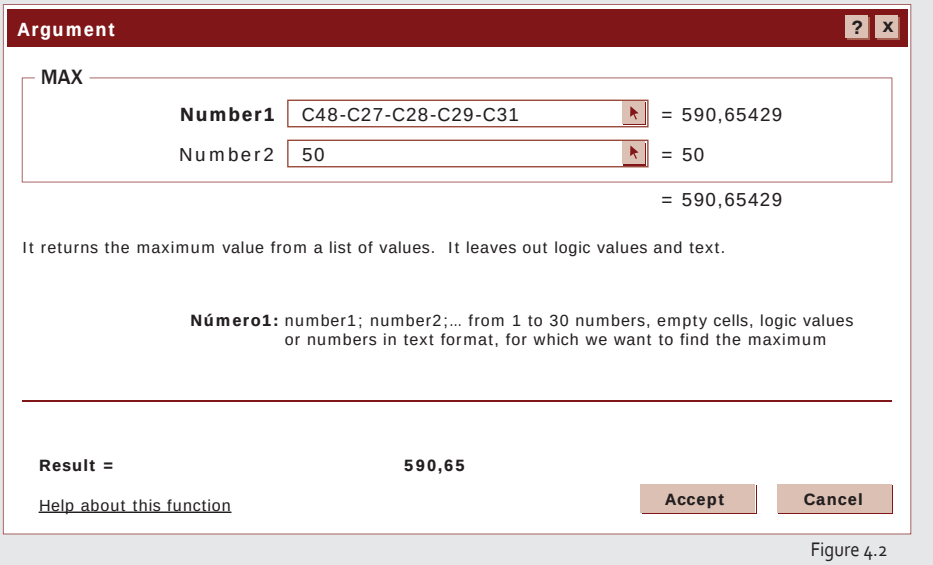


Figure 4.2

We use the total assets and equity cell because if we use the total assets cell, we would cause a circular reference.

As Number2 we can specify a minimum cash value required for operations; in this case we specify 50. The formula will return the maximum value between two options; Number1 and Number2.

Since there is a cash surplus, the value this formula will return will be the cash surplus (590.65), which will obviously be higher than the necessary minimum cash. In this way, our balance sheet will be tallied (Figure 4.3).

23		2006	2007	2008
24	**Full Balance Sheet**	**Real**	**Forecast**	**Forecast**
25	**Assets**			
26	Cash	53,72	590,65	1.489,05
27	Customers	1,208,69	1.230,97	1.299,90
28	Accounts receivable	805,73	886,30	974,93
29	Inventories	3,303,47	3.254,16	3.068,21
30	**Total Current Assets**	5,371,50	+5.962,08	6.832,09
31	Net Fixed Assets (NFA)	5,371,50	5.371,50	5.371,50
32	**Total Assets**	10,743,00	11.333,58	12.203,59
33				
34	**Liabilities**			
35	Accounts payable	322,29	554,57	751,56
36	Accrued expenses	590,87	709,04	779,94
37	Accrued Taxes	752,01	881,65	992,36
38	Short-term debt (STD)	214,86	-	-
39	**Total Current Assets**	1.880,03	2.145,26	2.523,86
40	Long-term debt (LTD)	4.050,11	3.550,11	3.050,11
41	**Total Liabilities**	5.930,14	5.695,37	5.573,97
42				
43	**Equity**			
44	Share Capital	698,30	698,30	698,30
45	Reserves	3.483,42	4.114,57	4.939,92
46	Income of the Year	631,15	825,35	991,41
47	**Total Equity**	4,812,87	5.638,22	6.629,63
48	**Total Liabilities + Equity**	10,743,01	11.333,58	12.203,59

Figure 4.3

Projected Financial Balance

What we are going to do next is simple: To project the financial balance. As we already know, NOF are equal to current assets minus spontaneous liabilities. NOF do not include cash surplus since this is obtained when WC > NOF. Therefore:

NOF =1.230,97 + 886,30 + 3.254,16 - 554,57 - 709,04 - 881,65 = 3.226,17

Therefore, once we have calculated NOF, we only have to copy the remaining information to prepare the financial balance (Figure 4.4).

50		2006	2007	2008
51	**Financial Balance**	**Real**	**Forecast**	**Forecast**
52	Cash Surplus	53,72	590,65	1.489,05
53	NOF	3.652,62	3.226,17	2.819,18
54	NFA	5.371,50	5.371,50	5.371,50
55				
56	STD	214,86	-	-
57	LTD	4.050.11	3.550,11	3.050,11
58	E	4.812,87	5.638,22	6.629,63

Figure 4.4

Now, let's verify the veracity of results. We mentioned that cash surplus is the result of WC > NOF. But we also know that WC is equal to equity plus LTD, minus net fixed assets, which represent the funds available to finance NOF, once fixed assets have been financed.

Therefore, WC should cover NOF and there would not be need to obtain more STD. The difference between WC and NOF should be exactly the cash surplus.

WC_{2007} = 5.638,22 + 3.550,11 – 5.371,50 = 3.816,83
Cash Surplus $_{2007}$ = WC - NOF = 3.816,83 – 3.226,17 = 590,65

How can we verify the result? The difference between STD and cash should give us exactly the same result as the difference between WC and NOF (Figure 4.5).

60	**Financing analysis**			
61	NOF	3.652,62	3.226,17	2.819,18
62	WC	3.491,48	3.816,83	4.308,24
63	Cash Surplus (WC-NOF>0) o			
64	Resources to be negotiated (WC-NOF<0)	-161,14	590,65	1.489,05
65	Verification STD – Cash	161,14	-590,65	-1.489,05

Figure 4.5

In this way, for 2006 we have:

$$\textbf{Verification}_{2006} = STD_{2006} - Cash_{2006}$$
$$\textbf{Verification}_{2006} = 214.86 - 53.72 = 161.14$$

And for 2007 we have:

$$\textbf{Verification}_{2007} = STD_{2007} - Cash_{2007}$$
$$\textbf{Verification}_{2007} = 0{,}00 - 590{,}65 = -590{,}65$$

Income Statement Ratios

When setting our initial objectives, we said that there were ratios that would be automatically improved once NOF components were adjusted and our cost and sales growth defined.

Let's examine now how these ratios have evolved. We should remember that in our matrix, the ratios directly adjusted were in intense color (Figure 4.6) (Sales growth and Gross Margin). The other ratios will be those automatically modified.

Net Margin (ROS): it increases gradually because profit grows at a faster pace than sales.

$$\bullet\ \mathbf{ROS_{2007}} = \frac{\text{Net Profit}}{\text{Sales}_{2007}}$$

$$\bullet\ \mathbf{ROS_{2007}} = \frac{825{,}35}{17.725{,}95} = 4{,}66\ \%$$

Return on Assets (ROA): it increases gradually because EBIT grows to a higher level than net assets.

$$\bullet\ \mathbf{ROA_{2007}} = \frac{\text{EBIT}_{2007}}{(\text{Caja} + \text{NOF} + \text{AFN})_{2007}}$$

$$\bullet\ \mathbf{ROA_{2007}} = \frac{1.730{,}59}{(590{,}65 + 3.226{,}17 + 5.371{,}50)} = 18{,}83\ \%$$

Return on Equity (ROE): it increases gradually because net profit grows to a higher level than Equity. However, it does not grow as fast as ROS or ROA, since equity also includes net profit.

$$\bullet\ \mathbf{ROE_{2007}} = \frac{\text{Net Profit}_{2007}}{\text{E2007}}$$

$$\bullet\ \mathbf{ROE_{2007}} = \frac{825{,}35}{5.638{,}22} = 14{,}64\ \%$$

In this way, we have obtained the profitability ratios. Figure 4.6 presents a summary of the ratios that will be in our matrix

16	**Income Statement Ratios**			
17	Sales growth (g)		10,00 %	10,00 %
18	Gross Margin %	52,79 %	52,79 %	52,79 %
19	ROS	3,92 %	4,66 %	5,08 %
20	ROA	16,79 %	18,83 %	20,22 %
21	ROE	13,11 %	14,64 %	14,95 %

Figure 4.6

Asset Turnover: it increases gradually because sales grow at a faster pace than assets.

$$\text{• Asset Turnover}_{2007} = \frac{\text{Sales}_{2007}}{(\text{Cash + NOF + NFA})_{2007}}$$

$$\text{• Asset Turnover}_{2007} = \frac{17.725,95}{590,65 + 3.226,17 + 5.371,50} = 1,93$$

Financing NOF with WC: this increases gradually because WC grows and NOF decrease. The reason is that reserves and profit increase while NOF components decrease.

$$\text{• • NOF- WC Financing}_{2007} = \frac{\text{WC}_{2007}}{\text{NOF}_{2007}}$$

$$\text{• • NOF- WC Financing}_{2007} = \frac{3.816,83}{3.226,17} = 118,31\ \%$$

Leverage (D/E): it decreases gradually because debt decreases and equity increases.

- **Leverage $(D/E)_{2007}$** = $\frac{(STD + LTD)_{2007}}{E_{2007}}$

- **Apalancamiento$(D/E)_{2007}$** = $\frac{0{,}00 + 3.550{,}11}{5.638{,}22}$ = 62,97 % o 1,6297

Now we have completed the operating and leverage ratios, as follows (Figure 4.7):

67	Balance Sheet Ratios			
68	Collection period	27	25	24
69	Inventory days	156	140	120
70	Payment Period	18	24	30
71	Cash cycle	165	141	114
72	Asset Turnover	1,78	1,93	2,01
73	Financing NOF with WC	94,20 %	118,31 %	152,82 %
74	Leverage	88,62 %	62,97 %	46,01 %

Figure 4.7

Statement of Cash Flows

As we studied in last chapter, the Statement of Cash Flows is prepared using the variations generated in the Balance accounts between two periods.

Therefore, we are going to obtain the variations between the accounts (Figure 4.8), considering the principles explained previously:

- An increase in assets (except cash) goes with a negative sign and vice versa (in the matrix 2006 is subtracted from 2007)
- An increase in liabilities and equity go with a positive sign and vice versa (in the matrix 2007 is subtracted from 2006)

23		2006	2007	2008	Variation	Variation
24	**Complete General Balance**	**Real**	**Forecast**	**Forecast**	**2006-2007**	**2007-2008**
25	**Assets**					
26	Cash	53,72	590,65	1.489,05	536,93	898,40
27	Customers	1,208,59	1.230,97	1.299,90	-22,38	-68,93
28	Accounts receivable	805,73	886,30	974,93	-80,57	-88,63
29	Inventory	3,303,51	3.254,16	3.068,21	49,09	185,96
30	**Total Current Assets**	5,371,51	5.962,08	6.832,09		
31	Net Fixed Asset (NFA)	5,371,50	5.371,50	5.371,50	-	-
32	**Total Assets**	10,743,01	11.333,58	12.203,59		
33						
34	**Liabilities**					
35	Suppliers	322,29	554,57	751,61	232,28	196,99
36	Accrued Expenses	590,87	709,04	779,94	118,17	70,90
37	Accrued Taxes	752,01	881,65	992,32	129,64	110,71
38	Short-term debt (STD)	214,86	-	-	-214,86	-
39	**Total Current Liabilities**	1.880,03	2.145,26	2.523,86		
40	Long-term Debt (LTD)	4.050,11	3.550,11	3.050,11	-500,00	-500,00
41	**Total Liabilities**	5.930,14	5.695,37	5.573,97		
42						
43	**Equity**					
44	Share Capital	698,30	698,30	698,30		
45	Reserves	3.483,42	4.114,57	4.939,92		
46	Income of the Year	631,15	825,35	991,41		
47	**Total Equity**	4,812,87	5.638,22	6.629,63		
48	**Total Liabilities and Equity**	10,743,01	11.333,58	12.203,59		

Figure 4.8

Three important considerations to prepare the cash flow:

1. Como las NOF son igual a los activos corrientes menos los pasivos espontáneos, podemos definir las variaciones de las NOF como la diferencia de las variaciones entre ambos grupos. Así:t

ΔNOF2007 = ΔCurrent Assetss2007 - ΔSpontaneous Liabilities 2007
ΔNOF2007 = -22,38 -80,57 +49,31 +232,28 +118,17 +129,60= 426,45

2. One of the forecast assumptions stated that the company invested as much in assets as they depreciated. In that case, there will be an increase in fixed assets equal to the amount of depreciation.

3. Since profit has to be adjusted by adding depreciation, the addition between depreciation (with + sign) and the increase in fixed assets (with – sign) will have a null effect on the cash flow; therefore, we could reduce cash variation to the following expression:

Cash variation = Net Profit + ΔNOF +ΔSTD +ΔLTD + Δcapital

Since there are no variations in capital and NOF decrease from one year to the other (that is, variation will be recorded in the cash flow with a + sign), cash variation for 2007 will be:

Cash variation$_{2007}$ = 825,35 +426,45 -214,86 -500,00 = 536,93

This result will have to be equal to the difference between cash in 2006 and cash in 2007 (Figure 4.9). Therefore:

Cash variation 2007 = Cash2007 - Cash2006
Cash variation 2007 = 590,64 – 53,72 = 536,93

50		2006	2007	2008	Variation	Variation
51	**Financial Balance**	**Real**	**Forecast**	**Forecast**	**2006-2007**	**2007-2008**
52	Cash Surplus	53,72	589,89	1.487,89	536,93	898,40
53	NOF	3.652,62	3.226,58	2.819,60	426,45	406,99
54	NFA	5.371,50	5.371,50	5.371,50	-	-
55						
56	STD	214,86	-	-	-214,86	-
57	LTD	4.050.11	3.550,11	3.050,11	-500,00	-500,00
58	E	4.812,86	5.637,86	6.628,88		
59						
60	**Financing Analysis**				**Cash flow**	
61	NOF	3.652,62	3.226,58	2.819,60		
62	WC	3.491,48	3.816,47	4.307,49	536,18	898,00

Figure 4.9

Therefore in the matrix we will record the following formula in cell F62: C46+F53+F56+F57; which will have to be equal to the one in cell F26.

Now we have finished doing our matrix with projections for 2007 and 2008, considering the desired objectives. The only thing left is to evaluate the results obtained

	A	B	C	D	E	F	G
1		2006	2007	2008			
2	**Income Statement**	**Real**	**Forecast**	**Forecast**			
3	**Sales**	16.114,50	17.725,95	19.498,55		**Conditions:**	
4	Cost of goods sold	(7.607,12)	(8.367,83)	(9.204,62)			
5	Gross Profit	8.507,38	9.358,12	10.293,93			
6	Administrative Expenses	(3.974,91)	(4.372,40)	(4.809,64)			
7	Selling Expenses	2.470,89	2.717,98	2.989,78		It grows with sales	
8	**EBITDA**	2.061,58	2.267,74	2.494,51		It grows with sales	
9	Depreciation	(537,15)	(537,15)	(537,15)			
10	**EBIT**	1.524,43	1.730,59	1.957,36		Invested as much as	
11	Financial Expenses	(472,69)	(355,01)	(305,01)		As it depreciates	
12	**EBT**	1.051,74	1.375,58	1.652,35			
13	Taxes (40%)	(420,59)	(550,23)	(660,94)		10% of debt	
14	Net Profit	631,15	825,35	991,41			
15							
16	**Income Statement ratios**					**Formulas**	
17	Sales growth (g)		10,00 %	10,00 %		Sales x (1+g)	
18	Gross Profit margin %	52,79 %	52,79 %	52,79 %		Gross Margin / Sales	
19	ROS	3,92 %	4,66 %	5,08 %		Net Profit / Sales	
20	ROA	16,79 %	18,83 %	20,22 %		EBIT / (NOF+NFA)	
21	ROE	13,11 %	14,64 %	14,95 %		Net Profit /E	
22							
23		2006	2007	2008		2006-2007	2007-2008
24	**Full Balance Sheet**	**Real**	**Forecast**	**Forecast**		**Variation**	**Variation**
25	Assets						
26	Cash	53,72	590,65	1.489,05		536,93	898,40
27	Customers	1,208,59	1.230,97	1.299,90		-22,38	-68,93
28	Accounts receivable	805,73	886,30	974,93		-80,57	-88,63
29	Inventory	3,303,51	3.254,16	3.068,21		49,09	185,96
30	**Total Current Assets**	5,371,51	5.962,08	6.832,09			
31	Net Fixed Assets (NFA)	5,371,50	5.371,50	5.371,50		-	-
32	**Total Assets**	10,743,01	11.333,58	12.203,59			
33							
34	**Liabilities**						
35	Accounts payable	322,29	554,57	751,61		232,28	196,99
36	Accrued expenses	590,87	709,04	779,94		118,17	70,90
37	Accrued taxes	752,01	881,65	992,32		129,64	110,71
38	Short-term debt (STD)	214,86	-	-		-214,86	-
39	**Total Current Assets**	1.880,03	2.145,26	2.523,86			
40	Long-term debt (LTD)	4.050,11	3.550,11	3.050,11		-500,00	-500,00
41	**Total Assets**	5.930,14	5.695,37	5.573,97			
42							
43	**Equity**						
44	Share Capital	698,30	698,30	698,30			
45	Reserves	3.483,42	4.114,57	4.939,92			
46	Income of the Year	631,15	825,35	991,41			
47	**Total Equity**	4,812,87	5.638,22	6.629,63			
48	**Total Liabilities + Equity**	10,743,01	11.333,58	12.203,59			
49							
50		2006	2007	2008		2006-2007	2007-2008
51	**Financial Balance**	**Real**	**Forecast**	**Forecast**		**Variation**	**Variation**
52	Surplus Cash	53,72	590,65	1.489,05		536,93	898,40
53	NOF	3.652,62	3.226,17	2.819,18		426,45	406,99
54	NFA	5.371,50	5.371,50	5.371,50		-	-
55							
56	STD	214,86	-	-		-214,86	-
57	LTD	4.050.11	3.550,11	3.050,11		-500,00	-500,00
58	E	4.812,87	5.638,22	6.629,63			

Financing Analysis				Cash Flow	
NOF	3.652,62	3.226,17	2.819,18		
WC	3.491,48	3.816,83	4.308,24	536,93	898,40
Cash Surplus (WC-NOF>0) o					
Resources to be negotiated (WC-NOF<0)	-161,14	590,65	1.489,05		
Verification STD – Cash	161,14	-590,65	-1.489,05		

Balance Sheet Ratios				Formulas:
Collection period	27	25	24	360/(sales/accounts receivable)
Inventory days	156	140	120	360/(cost of sales/inventory)
Payment Period	18	24	30	360/(purchases/accounts payable)
Cash cycle	165	141	114	
Asset Turnover	1,78	1,93	2,01	Sales/(NOF+NFA)
Financing NOF with WC	94,20 %	118,31 %	152,82 %	WC/NOF
Leverage	88,62 %	62,97 %	46,01 %	D/E

Analysis of Results

The last process is to analyze the results obtained. Let's remember briefly the five ratios that were specifically adjusted to achieve the objectives set. The other ratios would be modified as a consequence of the new measures adopted.

Now let's see how these last ratios would evolve for 2008, considering that everything else remains the same:

Ratios	Ixu S.A.	Policies	Industry	Leader	Improved
Operation:					
Collection Period	24	24	36		
Inventory days	120	120	120		
Payment period	30	32	45		
Cash cycle	114	112	111		
Asset turnover	2.01		2.00		Si
Profitability:					
Gross Profit Margin	52,79 %		60,00%		Si
ROS	5,08 %		5,00%	20,24 %	Si
ROA	20,22 %		18,15%	21,85 %	No
ROE	14,95 %		17,50%		
Leverage:					
D/E	46,01 %		75,00%		Si

Now we can draw the following conclusions:

- Asset turnover is higher. Therefore we are as efficient as the industry.
- ROS is better than the industry. More efficient and therefore with lower costs.
- ROA is almost equal to the leader's. Our assets' return is higher.
- Leverage has been reduced. We could get into more debt.

However, ROE (still the most important indicator) has not increased as much as we wished. We are still below the industry. However, the company is now in a better financial position.

Financial objectives, just like every financial decision made inside the company, were set with the purpose of creating value. The company is in better conditions, however its ROE has not increased. This is a clear example that a ROE increase does not necessarily mean value creation.

We are interested in knowing what happened, why ROE has not grown much. Let's use the Dupont Identity to find the problem:

$$\bullet\ ROE_{2008} = \left[\frac{\text{Net Profit}}{\text{Net Sales}}\right] \times \left[\frac{\text{Net Sales}}{\text{NOF + NFA}}\right] \times \left[\frac{\text{NOF + NFA}}{\text{E}}\right]$$

$$\bullet\ ROE_{2008} = \left[\frac{991{,}41}{19.498{,}55}\right] \times \left[\frac{19.498{,}55}{8.190{,}68}\right] \times \left[\frac{8.190{,}68}{6.629{,}63}\right] = 14{,}95\ \%$$

$$\bullet\ ROE_{2007} = \left[\frac{825{,}35}{17.725{,}95}\right] \times \left[\frac{17.725{,}95}{8.597{,}67}\right] \times \left[\frac{8.597{,}67}{5.638{,}22}\right] = 14{,}64\ \%$$

From the three indicators analyzed, only one has decreased: the debt ratio. The rest have increased due to the following reasons:

Ratio	Ratio
ROS	ΔNP > ΔSales
Asset turnover	ΔSales > ΔNOF+NFA
ROE	ΔBN > Δ Equity
Debt index	ΔNOF+NFA<ΔE

If assets have increased, so has equity, but the D/E ratio has decreased (ΔDebt < Δ Equity), which means that equity has increased more rapidly than assets. This is due to the fact that the assumptions indicated that the company did not distribute dividends, that is, all profit went to reserves.

Δ Net Profit = 20%	**ROE_{2008} =** 5,08% x 2,38 x 1,24
Δ Net Sales = 10%	**ROE_{2007} =** 4,66% x 2,06 x 1,52
Δ (NOF+NFA) = 5%	ΔProfitability = 9,20%
Δ E = 18%	ΔOperating = 15,47%
	ΔDebt =18,98%

Now we face a structural problem. LTD has decreased but the interest rate the bank charges, has not. If LTD decreases, financial expenses are reduced, this causes the tax base to increase, therefore taxes increase.

Since NOF+NFA = LTD+E, when paying dividends to shareholders, E will decrease, therefore we will have to increase LTD to maintain the equality. But a question arises: What amount of profit should I distribute?

The more profit is distributed; the more you will have to increase LTD. If LTD is increased, financial expenses will also increase, but taxes will decrease. However, interests should not increase much, because otherwise if taxes decrease, so will profit.

The present objective would be to look for a new proportion of Debt and Equity in order to reach a maximum profit level. What would then be the best debt and capital structure? This question takes us to the second section of this book: Structural Finance.

FINANCIAL FORECASTS

KNOWLEDGE CONTROL:

1- In a projected balance sheet, if total assets are higher than liabilities + equity:
- a-The difference would go to Accounts Payable
- b- The difference would go to Cash
- c- The difference would go to Short-term Debt
- d- None of the above.

2- The company could increase its debt level until:
- a. The interest rate is equal to ROI
- b. Interest rate is equal to ROS
- c.Interest rate is equal to ROA
- d.None of the above.

3. If a company is lacking resources at December 31, this would be because:
- a. NOF have increased
- b. Suppliers are not getting paid
- c. Sales have not increased
- d. None of the above.

4. If a company has a $500 Net Profit in 2009 and $600 in 2010 and margins are the same, it can be concluded that:
- a. WC increases and NOF decrease
- b. WC decreases and NOF increase
- c. WC remains the same and NOF increase
- d. None of the above.

5. Dalo S.A. has had a high sales increase and has not been able to pay all its debts. It could be concluded that this was caused by:
- a. A NOF increase
- b. A WC decrease
- c. A NOF decrease
- d. None of the above.

6. Dalo S.A. has invested US $ 5 million in 2009 for purchasing new machinery.

It requested a loan from SOJOUR bank for 4 million and invested US $ 1 million in equity. If before the investment, WC was US $ 800.000 and NOF was US $ 1 million. What will happen to Dalo S.A. in 2010? What would you recommend?

7. An annual projection of the balance sheet is not recommended for:
- a. Seasonal businesses
- b. High accounts-receivable turnover businesses
- c. Low inventory turnover businesses
- d. None of the above.

8. If Dalo S.A. has sales for US $ 500.000, buying-selling policies do not change and we increase investment in land for US $ 100.000:
- a. NOF will decrease by US $ 100.000
- b. NOF will increase by US $ 100.000
- c. NOF will remain the same
- d. None of the above.

9. Determine WC variation if Fixed Assets (FA) in 2009: US $ 500.000, Equity 2009: US $ 650.000, Long-term debt: 0, Net Profit: US $ 50.000, and dividend payment: 40%.

10. If Dalo S.A. has a US $ 400.000 sales level per month and a CGS=Purchases=70%. Calculate the necessary financing if the company:
    a Increases collection policy by 3 days
    b. Decreases payment policy by 5 days
    c. Increases inventory policy by 4 days

11. If Dalo S.A. does not change its policies and increases sales by 25%, how much would NOF increase?

12. If Dalo S.A. increases the accounts receivable policy by 40%, other policies and sales do not change: how much would NOF increase?

Applications

13. For each of the following cases, what would you recommend to the company:

Ratios	Dalo S.A.	Polícies	Industry	Leader	Recommendation
Operation					
Collection period	20	25	28	21	
Inventory days	9	11	7	6	
Payment period	19	20	35	60	
Cash cycle					
Asset Turnover	1,9		1,9	2,5	
Profitability					
Gross Profit	33%		40%	45%	
ROS	8%		7%	9%	
ROA	20%		16%	20%	
ROE	17%		15%	17%	
Leverage					
D/E	75%		80%	60%	

14. Dalo S.A., a well-known clothes store is preparing forecasts for year 2009-2010. Aware of the world crisis situation, Dalo S.A. hires an external consultant to help with this task. The Financial Manager has provided the following information:

Ratios	Policies	Industry
Ratios		
Operating:	26	32
Collection Period	120	120
Inventory Days	33	35
Payment Period	130	140
Cash cycle		2,00
Asset turnover		
Profitability		55,00%
Gross Profit		6,00%
ROS		17,00%
ROA		16,00%
ROE		
Leverage		
D/E		75,00%

Income Statement	Real 2009
Net Sales	$ 18.400,00
Cost of goods sold	$ (8.648,00)
Gross Profit	$ 9.752,00
Administrative expenses	$ (4.416,00)
Selling expenses	$ (2.760,00)
EBITDA	$ (2.576,00)
Depreciation	$ (635,30)
EBIT	$ 1.940,70
Financial Expenses	$ (595,40)
EBT	$ 1.345,30
Taxes (40%)	$ (538,12)
Net Profit	$ 807,18

Full Balance Sheet	Real 2009
Assets	
Cash	$ 22,82
Customers	$ 1.543,00
Accounts receivable	$ 933,36
Inventory	$ 3.943,00
T. Current Assets	$ 6.442,18
Net Fixed Assets (NFA)	$ 6.353,00
Total Assets	$ 12.795,18
Liabilities	
Accounts payable	$ 434,00
Accrued Expenses	$ 435,00
Accrued Taxes	$ 346,00
Short-term Debt	$ 554,00
T. Short-term Liabilities	$ 1.769,00
T. Long-term Liabilities	$ 5.400,00
Total Liabilities	$ 7.169,00
Equity	
Share Capital	$ 865,00
Reserves	$ 3,954,00
"Income of the year"	$ 807,18
Total Equity	$ 5.626,18
Total Liabilities + Equity	$ 12.795,18

Additional information:

a. Historical growth has been 12% for 2010 and a 10% growth rate is expected for 2011
b. 2008 inventory has been $ 4,320
c. The cost of goods sold and administrative and selling expenses depend directly on the sales level
d. Investments are taking place at the same pace as amortization
e. Financial interests are directly related to total debt.
f. Long-term debt capital is paid in $ 600 annual installments
g. Share capital remains the same throughout the years
h. 20% will be distributed as dividends during the next 2 years
i. We aim at achieving the operating indicators policy objectives: 50% in 2010 and 50% in 2011.
j. We aim at achieving the industry profitability ratios: 50% in 2010 and 50% in 2011

The company needs:

1. A forecast of the Balance Sheet ratios
2. A forecast of the Income Statement
3. A Projected Balance Sheet
4. A Projected Financial Balance
5. The Statement of Cash Flows
6. An Analysis of Results: Do you consider feasible the company's objectives? ("g" y "h")
7. The Dupont Analysis

FINANCE
FOR EXECUTIVES

V

Structural Finance

Chapter V

Structural Finance

In the previous chapter we raised the question: What should be the ideal proportion of debt and equity in order to increase profitability?

Now: What is exactly profitability? Whose profitability do we want to increase? And, what factors are implicit in obtaining a higher profitability?

The company's structure

In chapters 1 to 4, we studied that a Balance Sheet could be expressed financially, summarizing its elements in the Need of Funds for Operations (NOF), Net Fixed Assets, Debt and Equity (Figure 5.1):

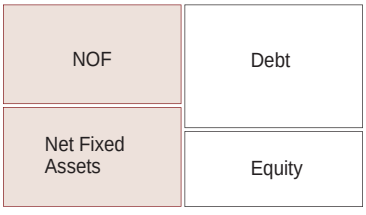


Figure. 5.1

We have analyzed NOF in detail, so now we have to examine the other three elements of the Balance Sheet that do not vary as frequently as NOF; moreover, the decisions regarding these elements are made by the General Management or even by the Board of Shareholders.

They make up what could be called as the company's permanent structure. We know that every company invests in NOF+NFA and that such investment is financed with debt plus equity (Equity), therefoe:

$$NOF + NFA = D + E$$

We also determined investment in NOF; now let's analyze investment in fixed assets and how total investment is financed.

- **Investment in Fixed Assets:** What return should these assets generate? How can we measure this return? What criteria could we use to decide about our investments?

- **Financing with debt:** What return would lenders want to earn? How do lenders measure such return? What is the ideal debt level the company should maintain?

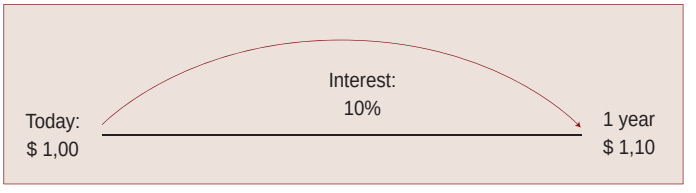
- **Financing with Equity:** What return would shareholders want to earn? How do shareholders measure such return? How does the market measure shares' return in case they are out for sale?

The Time Value of Money

In the first chapter it was mentioned that Finance acquired accounting information (from the past) to forecast the future in two scales: the short-term, which applied to Operating Finance (that is, NOF) and the long-term, which involves the three elements under analysis.

Let's consider a long-term situation: let's suppose we have $1 and there is an opportunity to invest it in a bank that pays a 10% interest for a 1-year term. At the end of one year, we would have a $1.10 capital.

The $0.10 earned in the operation represents the time value of money, which could be defined as the payment received for reassigning the availability of capital today in order to obtain a higher capital in the future:



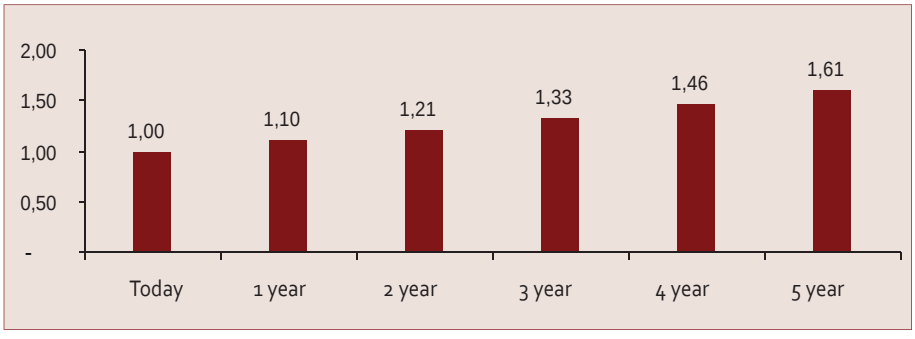
What is interest? For someone making a deposit, interest represents the compensation received for lending the bank the capital he could use today, in order to generate a greater capital in the future.

At the end of the year we will receive $0.10 for investing $1. However, if we want to leave it in the bank for more years, would we like to receive the same $0.10 every year without being able to use our $1? Of course not.

And what would we do with the $0.10 we earned, would we spend it or invest it to increase our wealth? We would choose the second option. But now interests would be part of the new capital.

In this way we introduce another financial concept: capitalization, which is defined as the process whereby interests earned become part of the new capital; therefore, interests would be earned over interests and capital would be increasingly bigger.

To illustrate this, let's suppose that we invest our $1 again every year plus the interests earned for five years. At the end of the fifth year we would have:



If the first year we earn $1+(1x10%)=$1,10; then the second year we will earn $1+($1x10%)+[$1+($1x10%)]x10%=$1,21 and so on. Therefore, we can define the future value formula as:

$$F = PV\,(1 + i)^n$$

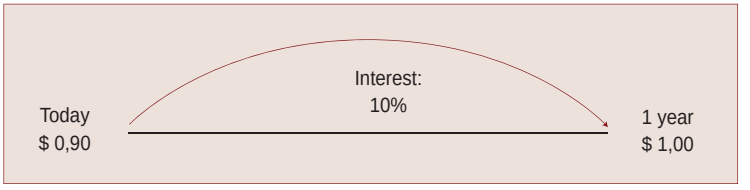
Where:

F = Future flow of money or profit
PV = Present value (Capital invested today)
i = Interest rate
n = time expressed as a number of periods

The Present Value

Now let's look at the opposite situation. Let's suppose we are entitled to collect $1 within a year. The interest rate the bank pays us today is 10%. If we wanted to use that money today, that availability has a price, which would be again the time value of money.

If we do not want that money within a year and we want to use it today, then we would not earn $0.10 and instead this would become a cost because of the use of that money now. Therefore, future money is worth less today.



In this way, we have given up having $1 within a year to immediately use $0,90. The present value is undoubtedly the most important concept of Finance and it has a wide variety of applications.

Just like we stop receiving interests when using the money a year before, if we want to use the money many years ahead, we will not earn the interest generated from capitalized interests either. Therefore, the present value formula can be defined as follows:

$$PV = \frac{F}{(1+i)^n}$$

Where:
PV = Present Value (capital invested today)
F = Future flow of money or profits
i = Interest rate
n = time expressed as a number of periods

Present value of a temporary flow of fixed payments.

Let's suppose that a specific investment will pay us the same amount of money, F, every year. The number of periods is n years and the interest rate to be paid would be i. If we wanted to use all that future money today, what we would receive would be equal to the present value of each payment C (Figure 5.2).

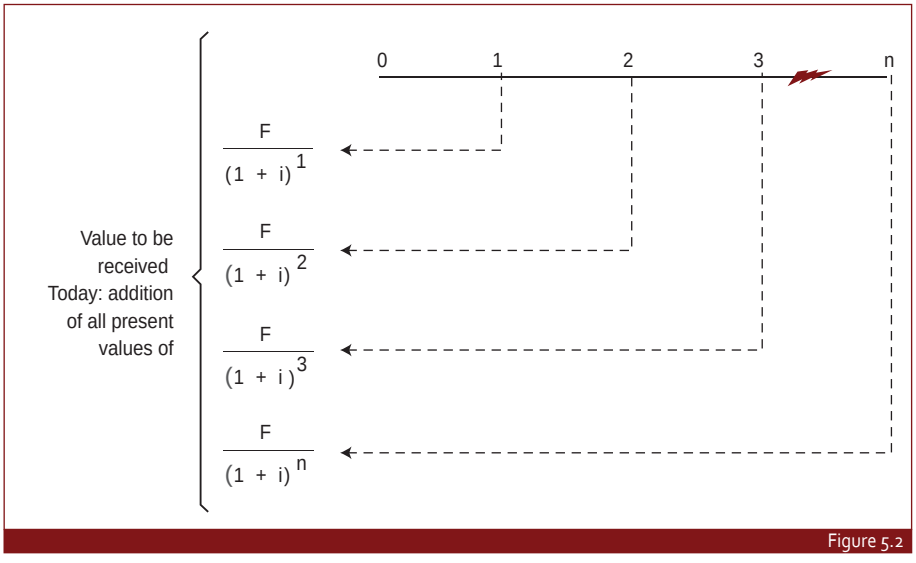


Figure 5.2

Present Value of a perpetual flow of payments

Another example: now let's suppose that a specific investment pays the same amount of money F, every year. But this time, the time period will not be in years, but we will receive the same amount for ever, without time limit. Interest rate continues to be i (Figure 5.3):

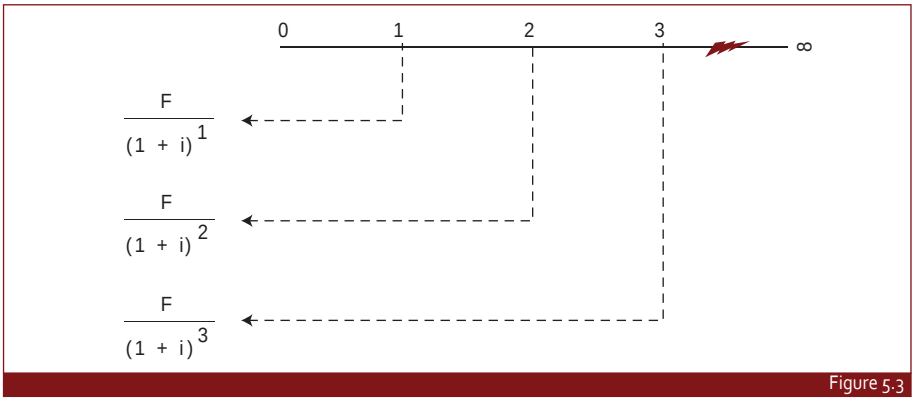


Figure 5.3

We know that every flow that comes from an interest payment will be equal to the capital invested multiplied by the interest rate and multiplied by time. If time is infinite, we can assume that there is no time and therefore the flow would be equal to:

$$F = PV \cdot i$$

Then, it would be a matter of working out the present value and we would obtain:

$$PV = \frac{F}{i}$$

This is the logic way (the simplest) to arrive to the present value of a perpetuity. Actually, to work out the above value we would need to combine the present value formula with geometric progressions, and we do not want to lose time on that.

As we mentioned, it is clear that we would not want to receive the same every year, but that the flow increases every year, so let's consider a scenario with flow growth.

Present Value of a perpetual flow of growing payments.

Now let's suppose that our investment will pay growing flows, that is, this time F will not be the same every year, but instead:

$$F_1 < F_2 < F_3 < \ldots < F_n$$

The number of periods is infinite and the interest rate is i (Figure 5.4):

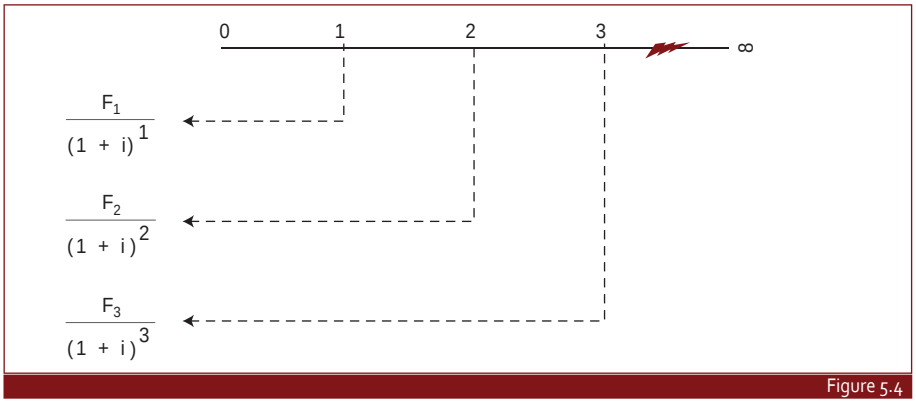


Figure 5.4

If growth (g) is constant, we could say that:

- $F_2 = F_1 \times (1+g)^1 = F_1 \cdot (1+g)$
- $F_3 = F_1 \times (1+g)^2 = F_2 \cdot (1+g)$
- $F_4 = F_1 \times (1+g)^3 = F_3 \cdot (1+g)$

If on the one hand, flow grows because there is a constant growth g, and on the other hand it decreases because we bring it to value with a time cost of money i (to identify it with the cost concept, it will be called K), the net cost effect would be K-g.

Therefore, if we want to forecast a perpetual payment stream with a constant growth, the formula would be:

$$PV = \frac{F_n}{K-g}$$

Fn is the last projected flow and n the number of periods we have forecasted. However, the main quality of present values is that they are always a period before the start of flows.

If we want to project a perpetuity, we have to consider that flows will always be a period after the perpetuity. Therefore, the correct formula for a perpetuity is:

$$PV = \frac{F_n\,(1+g)}{K-g}$$

Again, Fn is the last projected flow, with this adjustment we are only projecting one flow more ahead the perpetuity. By the way, all these formulas require mathematical demonstrations that we are not going to go into now. We have arrived to them by simple logic.

Explanation of the Present Value function

Present value is an equation whose result is given as a function of three factors:

- Future flow;
- Time; and
- Interest rate

In this way, if we maintain a constant flow throughout a fixed time period, present value would be a function of the interest rate only, which represents the cost of money, K.

Let's see it this way: present value is a quotient that results from dividing a numerator (the future flow f) by a denominator (composed by time and interest rate). If we suppose that flow and time remain the same and interest rate increases, then the denominator increases and therefore present value decreases.

$$PV\Downarrow = \frac{F}{(1+K\Uparrow)^n}$$

In other words, the higher the cost of money, the lower the present value (Figure 5.5). Such value could be so small that it could turn out to be insignificant. The same thing happens with the time factor. If we keep constant both the flow as well as the cost, the longer the time, the lower the present value will be.

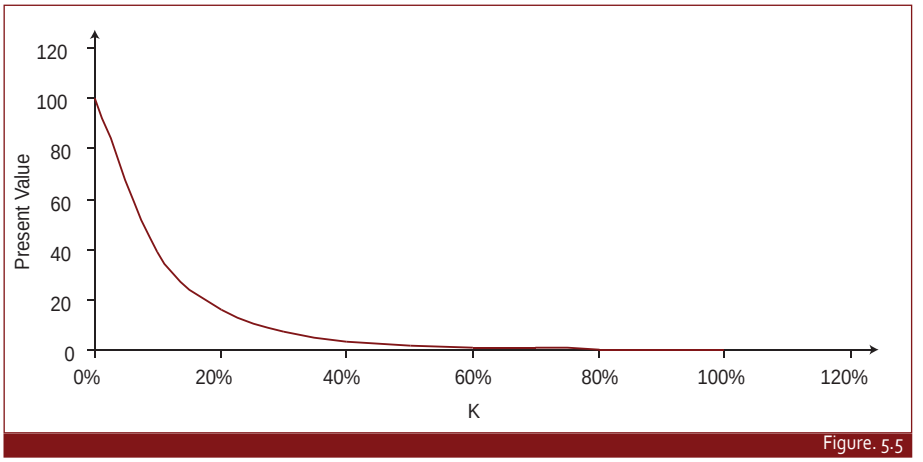


Figure. 5.5

It is most convenient to project some periods (let's say from 5 to 10) and then fix a perpetuity, before losing time projecting 50 or 100 periods. Why so many projections if as there are more periods, present value becomes more insignificant? No matter the method we use, the present values obtained will be similar.

Perpetuity also gives us another advantage: is it correct to think that there will be constant growth g for all the eternity? Of course not, but it does not matter. As in a perpetuity the present value becomes insignificant, the same will happen with any type of error.

For these reasons, at the moment of planning an investment project, analysts prefer to fix an exact number of periods. In other words, time becomes an irrelevant factor for analysis, so the sensitivity of present value will be a measure as a function of the cost of money assigned to a project.

For example: let's suppose we make an investment that generates a stream of future flows F during a fixed term of 10 years. How much will the present value of flows be? It all depends on the cost we estimate as time value of money.

But no matter how high the interest rate we use may be, there will always be a positive result. In Figure 5.5 the present value function appears to touch the horizontal axis, but it is not true. In fact, the present value as a function of a very high rate, could be between 0 and 1 but never be 0 because there is no division that equals 0 while the numerator is higher than 0.

Then, would we be happy knowing that 10 future flows of $1.000 million each only represents $0.01 today? Let's suppose that the necessary investment to earn these flows was $100. Would we be willing to invest $100 to earn $0.01? How could we know what present value is really good for an investor?

Net Present Value (NPV)

In Finance, it is not possible to add or subtract two flows that correspond to two different periods. For example, we cannot add the flow of period 2 with that of period 1. But with the present value function we could bring the flow of period 2 to period 1 and once both flows are on the same period, we could make any calculation.

How do we compare the investment we make in the beginning with the flows it generates? We cannot consider it as individual flows, but we have to put them on the same period. By means of present value, we could put all flows on the investment period (period 0) and in this way we could see how much is left net.

This is what is called Net Present Value (NPV). NPV is defined as the difference between the present value of expected future flows and the initial investment. The mathematical expression of NPV is as follows:

$$NPV = -F_0 + \frac{F_1}{(1+k)^1} + \frac{F_2}{(1+k)^2} + \frac{F_3}{(1+k)^3} + \ldots + \frac{F_n}{(1+k)^n}$$

Where –F0 represents the initial investment and F1, F2, F3 are the future flows brought to present, that is, to period 0 (–F0 does not have to be brought to present because it is already in present). The present value of future flows is discounted from the initial investment and this gives us NPV as a result.

NPV Interpretation

As mentioned earlier, depending on the rate we use as cost of Money, we can obtain a very big or small present value. But now that we have added initial investment, the rate we use could make the present value of flows to be higher, equal to or lower than the investment, so we could obtain a positive, negative or a 0 NPV. Considering that the cost of money is a function of what we want to earn as investors, we could interpret NPV as follows:

- **NPV > 0:** This means that as investors we recover our investment, earn everything we want to earn (that is, we earn a return equivalent to K) and in addition we earn a little more (that is, total return is higher than K).

- **NPV = 0:** This means that we recover our investment and we earn everything we wanted to earn (K). NPV is equal to 0 when the present value of future flows is equal to the investment, but this does not mean that we only recover our investment, since flows are discounted at a K rate, which represents what we want to earn.

- **NPV < 0:** This could mean two things: a) We recover our investment but we do not earn what we wanted to earn; b) we do not even recover investment.

From this analysis, the following questions may arise:

- If I earned more than I wanted, then how much did I actually earn?

- If NPV is < 0, then do I recover my investment or not?

The Internal Rate of Return (IRR)

Let's suppose that we have invested $1,000, which will make us receive 5 flows of $300 each. Since we thought we would earn 10%, but we would like to have that future money in our hands today, then we would stop earning that 10%, which would represent our cost of money.

Therefore NPV would be equal to:

$$NPV = -1.000 + \frac{300}{(1+0{,}10)^1} + \frac{300}{(1+0{,}10)^2} + \frac{300}{(1+0{,}10)^3} + \frac{300}{(1+0{,}10)^4} + \frac{300}{(1+0{,}10)^5} = 137{,}24$$

This means that we earned more than 10%, but how much exactly? Let's suppose that we have actually earned what we wanted, that is 10%. How much would our NPV be? 0.

As a consequence, if we use the return that we have actually obtained in this investment as the cost of money, then NPV would have to be 0. But if our return is 15%, with the same return as the cost of money, NPV would also be 0.

Depending on the rate we use, our NPV could be higher, equal to or lower than zero (Figure 5.6), so the return we have actually obtained would be the one that would make our NPV be equal to 0, if we used it as the cost of money.

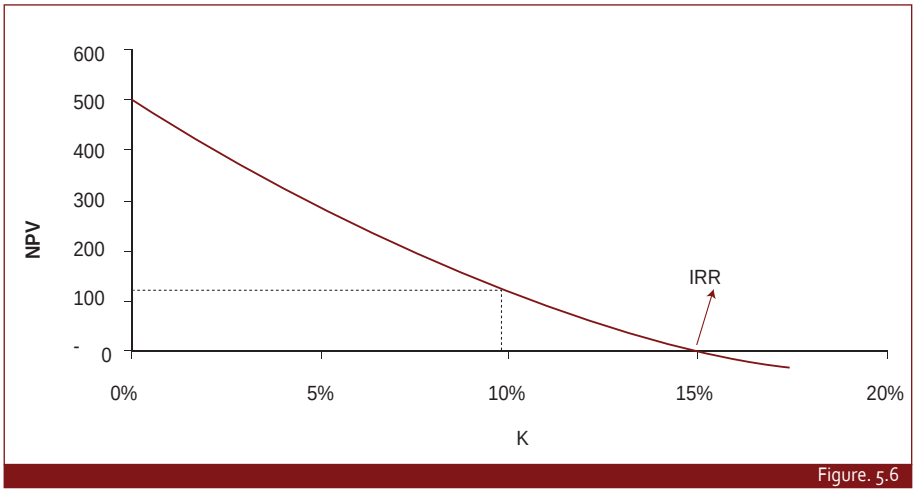


Figure. 5.6

The rate that takes us to a NPV equal to zero is known as the Internal Rate of Return (IRR). The IRR basically tells us how much we have earned. And if we lose, the possibility to recover investment.

There is a disadvantage with the IRR: the mathematical formula of NPV (when NPV = 0) is a function of the IRR; therefore this rate is an independent variable (NPV is a variable that depends on K or the IRR) and it does not have a mathematical formula of its own.

Therefore, the IRR is not easy to calculate without a financial calculator or Excel. Mathematically, the IRR can be expressed as follows:

$$0 = -F_0 + \frac{F_1}{(1+IRR)^1} + \frac{F_2}{(1+IRR)^2} + \frac{F_3}{(1+IRR)^3} + \ldots + \frac{F_n}{(1+IRR)^n}$$

Once again, it should be stressed that the IRR is, in mathematical terms, the rate that makes NPV be equal to zero and the maximum return that can be earned in a project.

IRR Interpretation

Depending on the result, we can interpret the IRR in three cases:

- **IRR > 0:** It means that we recover our investment and in addition we earn a return (which can be more or less than the cost of money K)
- **IRR = 0:** It means that we only recover our investment. There is no profit at all.
- **IRR < 0:** It means that we do not even recover our investment.

Joint analysis of both variables

The IRR is not a good indicator to evaluate investments because it assumes that future flows are reinvested at the same IRR and therefore it is preferable to use NPV. This author shares this opinion.

Summarizing, it could be said that:

If NPV	and the IRR	Then…	Therefore
NPV > 0	IRR > 0	We recover our investment and we earn more than what we wanted to earn	IRR > K
NPV = 0	IRR > 0	We recover our investment and we obtain the profit desired.	IRR = K
NPV < 0	IRR > 0	We recover our investment, but we earn less.	IRR < K
NPV < 0	IRR = 0	We recover our investment but with no profit.	IRR < K
NPV < 0	IRR < 0	We do not even recover our investment.	IRR < K

NPV provides us additional information that is highly valuable for investors: how much value is created with the investment. Since chapter one we have said that any decision (including investment decisions) should be made with the purpose of creating value and the NPV helps us measure that value.

NPV as a measure of value creation

NPV represents the absolute value of wealth that is added when making an investment decision. In our example, if the company makes a $1,000 investment and for this decision it obtains a NPV of $137.24, then the company will have increased its value today by that amount.

And assuming there is an efficient capital market, it would mean that since a positive NPV investment has been added, the share price should increase by that amount (Figure 5.7). Therefore,

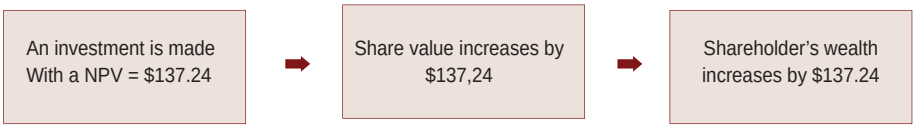
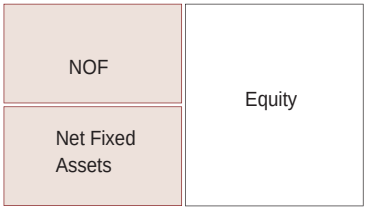


Figure 5.7

Why do we say that the share price should increase by this amount? Because we do not know how our investment is financed. Shares should increase by that amount if investment is fully financed with equity.

If an investment has been made in a personal capacity, it is very likely that it will be financed with equity. But if an investment is made by a company, part of it will certainly be financed with debt and part with equity.

In personal investments, an amount of money is usually deposited on a financial institution that will pay us an income. For the case of company investments, they are made up of NOF + NFA. If the company financed an investment with money from shareholders, then:



If this condition is met, the NPV obtained from investing in NOF + NFA would increase to the same extent as share value.

This teaches us an important lesson: every investment project will always have to be evaluated regardless of the way it is financed, as if it came fully from equity. In this way, we will know whether the project is good or bad itself, no matter how it is financed.

NPV and IRR calculation with Excel

We mentioned before that the IRR, as opposed to NPV, is hard to calculate because it does not have a mathematical expression of its own. It is possible to calculate it by means of interpolations, but it is a waste of time.

Therefore, we will use Excel. We are going to create a template (Figure 5.8) where we will write the example we have used.

	A	B	C	D	E	F	G
1		Initial	Periods				
2		Investment	1	2	3	4	5
3	Flows	-1.000	300	300	300	300	300
4	K	10,00%					
5	NPV						
6	IRR						

Initial Investment
-1.000
10,00%

Figure. 5.8

We have a $1,000 initial investment which gives us five annual flows of $300 each. Let's consider a cost of money of 10% (K=10%). Let's start calculating the NPV.

We go to cell B5 and then to the Insert menu, Function option. In the dialog box that appears, we choose the Financial category and we look for the NPV function.

A new dialog box appears (Figure 5.9). On the Rate field we enter the cell that contains the cost of money we specified; after that on the Value1 cell we enter the five future flows. Once this process has ended, we accept.

Excel will provide us the present value of all future flows, but this is not the NPV we are looking for, since we are not including initial investment in Value1, which also assumes this is a future value and will bring it to present value.

As we know, that is not necessary because the initial investment is in the present, that is, in period 0.

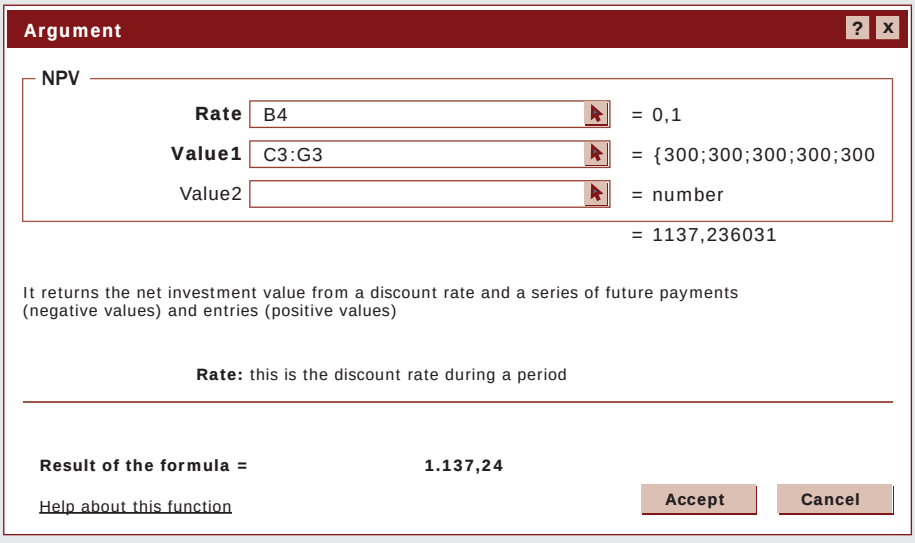


Figure. 5.9

How do we fix this problem? Once we accept, we go again to cell B5 and we press F2 to edit the cell's information. We will see that the pointer goes automatically to the end of the function. From there, we enter the cell that contains the initial investment.

We notice that the initial investment's value is negative and we want this value to be subtracted from the present value of future flows. Therefore, to enter this value we do as follows: +B3. Therefore the complete formula written in Excel will be: =NPV(B4;C3:G3)+B3.

By making this adjustment we will obtain the NPV of the whole investment, which will be exactly $137.24. This will mean that as NPV > 0, we have recovered our investment and we have earned more that we wanted. The surplus over the expected amount will be $137,24.

Now let's calculate the IRR. Again, we go to the Insert menu, Function option. We choose the Financial category and we look for the IRR function. A dialog box will appear (Figure 5.10) and in the Value field we enter all the values we have, now including the initial investment.

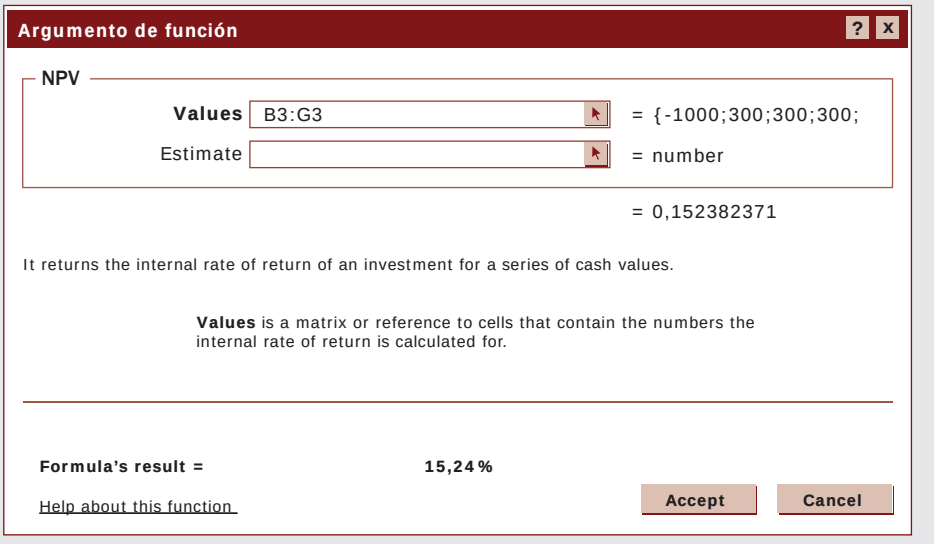
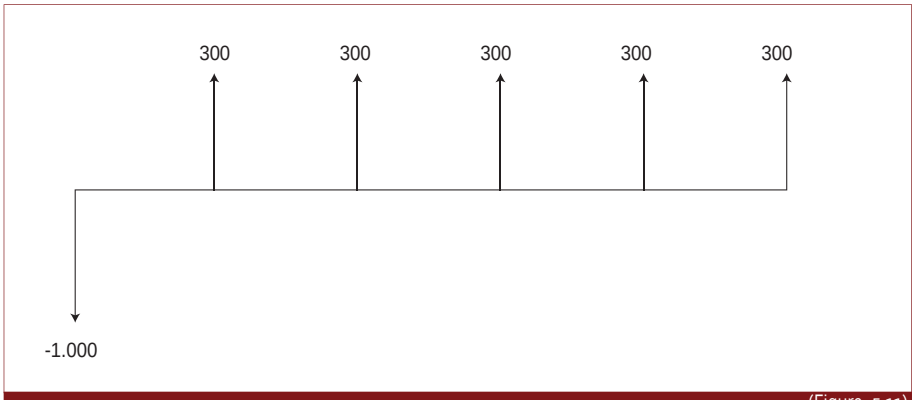


Figure. 5.10

Very important: for the IRR function to work correctly, there should be a negative value and several positive values, or vice versa. For this reason, we initially enter investment as a negative value, so that the IRR function can be calculated.

In Finance, all payments or money outflows have a negative sign and a downward arrow (Figure 5.11). Likewise, all revenues or money inflows have a positive sign and an upward arrow. The IRR function in Excel follows the same rule, which will give us 15.24% as a result (Figure 5.12). This means that the addition of what we wanted to earn (10%) and the surplus we reached ($137.24) give us a 15,24% total return.



(Figure. 5.11)

	A	B	C	D	E	F	G
1		Initial	Periods				
2		Investment	1	2	3	4	5
3	Flows	-1.000	300	300	300	300	300
4	K	10,00%					
5	NPV	137,24					
6	IRR	15,24					

Figure. 5.12

Evaluation of Flows with non-annual periods

For all the examples mentioned from the beginning of this chapter, we have worked under the assumption that all flows are annual. However, would there have to be an adjustment if all flows are non-annual?

Let's suppose we want to obtain a 12% annual return. This would be equal to a 1% monthly return and if we want to evaluate monthly periods, the rate would also have to be monthly. Now, if we have an annual rate, we will have to divide it by 12.

To evaluate quarterly periods, the annual rate we use has to be divided by 4. If we have half-yearly periods it has to be divided by two, and so on.

What happens with the IRR? We will obtain it per period, regardless of the scale used. For this purpose, if we have evaluated monthly flows and we want to know the annual return, we would simply have to multiply the IRR by 12.

Likewise, if we want to evaluate quarterly periods, we would have to multiply the IRR by 4. If we have half-yearly periods, we will have to multiply the IRR by 2, etc.

Decision-making with NPV and IRR

It would be good to compare some similarities and differences concerning NPV and IRR, since even though they both evaluate investment, they show different aspects:

- They both use the same flow of future funds
- They both take into account the time value of money
- The IRR is an unknown factor of the project; it emerges from its own conditions. On the other hand, the NPV uses a cost of money (the cost we would lose if we had the opportunity to invest), this is information that comes externally to the project.
- While the NPV is a measure of absolute profitability, the IRR is a measure of relative profitability.
- The NPV measures exactly the value created today resulting from an investment decision.

Now, let's suppose that in an investment project, the NPV is higher than zero and so is the IRR, would we invest in this project? Of course! Because we would recover our investment, we would earn what we want and something additional.

What would happen if the NPV is equal to zero? In that case, we would recover our investment and earn exactly what we wanted. Would we invest in such a project? The decision would not be that easy in this case.

Let's check the two options: either to invest our money in NOF and NFA or to give the money to a bank that will pay us exactly what we want to earn? What would you choose?

If you were an entrepreneur, how would you measure an investment's risk? What could we try to do to reduce risk? Can risk be fully eliminated? These and other questions will be answered in the next chapter.

KNOWLEDGE CONTROL

1. Do cash surpluses negatively affect the company's value?

2. What difference does it exist between simple and weighted profitability for shareholders?

3. Are the following statements true (T) or false (F)?

		T	F
A	A company's value is equal to its accounting value		
B	The free-risk rate is calculated based on a historical average		

4. Complete the following statements:

a) If a company finances an investment with money from shareholders, NPV increases _____

b) If NPV is negative, this means that _____ recovering my investment

c) To obtain a monthly NPV, you will have to _____ _____

d) The IRR is the _____ profitability that a project could earn

e) Some authors consider that the IRR is not a good indicator to evaluate investments, why? _____ _____

f) The IRR is a measure of relative profitability, NPV is a measure _____

g) If NPV is equal to 0, this means that _____ _____

5. If you deposit $ 500 on a bank account at a 12% annual interest rate. The bank charges an annual 2% rate for account management. How much money will you have at the end of the year?

6. You have to pay US$ 3,000 in 2 years for a loan you asked for today. The US$ 3,000 includes capital and interests. If the interest rate is 8%, how much do you have now?

7. Consider that the bank passive interest rate is 10% and the tax interest rate is 5%. If you want to make a US $ 100.000 5-year investment that will yield an 11% return. How will you finance it: with capital, debt or a mix?

8. What is the present value of a project if its initial investment is $1.000.000 and its profit is $100.000 per year at perpetuity. Consider a 10% rate and that the project has no growth throughout its duration.

Applications

9. Risto S.A, a well-known food chain, decided to open a new restaurant. For this purpose, it needs a US$100.000 investment in facilities and furniture, NOF for $50.000 per month from January to April and US$ 35.000 from May to December. Sales are expected to be 70.000 per month from January to April and US$ 95.000 from May to December with an annual 10% growth. Its ROS is 25%, amortization is 10%, and taxes are 40%. The bank is giving loans for a 10-year term with a 12% annual rate.

    a. How much should Risto S.A. ask for to start the business?
    b. What are the project's NPV and IRR if business perpetuity is considered?

10. Resto S.A. is evaluating the place where its new restaurant will be located in, which will have a 75m2 surface. Its two options are:

    a. In a shopping center: at a US$ 2/m2 cost per month for maintenance and security, US$ 3,000 for employees per month and US$5.000 for rent per month. Energy would cost US$ 500 per month and it would generate sales for US$40.000 per month.

    b. On a main street: this would cost US$ 2.100 per month for employees, US$ 700 per year for security, US$ 480 per month for electricity, rent will cost US$ 1000. Its sales will be US$ 28.000 per month.

    In both cases, the company will have to invest US$ 500 per m2 in decoration and furniture. Amortization will be 10% with a reinvestment in furniture of 11%. Gross margin is 70%, the cost of capital will be an annual 10%, capital is paid on year 10, and taxes are 36%.

    a. How much capital does Resto S.A. need to operate?
    b. What will the project's NPV and IRR be within 10 years?
    c. Where would you recommend the company to start its business?
    d. The bank offers Mr. Pedro Alvarez an 8% rate in a policy instead of investing in its new premises what would you recommend Mr. Alvarez to do?

11. Mr. Pedro Álvarez is evaluating a new investment in a cake factory. It is estimated that the necessary investment is US$ 200.000 in machinery and US$ 80.000 in furniture. Machines have a 5-year lifespan, furniture have 10-year lifespan. Building the factory would cost US$ 300.000 and it has a 30-year duration. Gross margin will be 30%, administrative and selling expenses would amount to 20.000 per year. Taxes are 40%. Annual sales are expected to be 200.000. The cost of capital is 10%.

    a. Evaluate the project using NPV

    b. How much should Mr. Alvarez ask for to finance the full project with a loan?

    c. Calculate the IRR.

FINANCE
FOR EXECUTIVES

VI

Profitability and Risk

Chapter VI

Profitability and Risk

In the previous chapter, we discussed profitability as a measure of the time value of money; that is, what we could earn by investing a capital during a given time period.

We also studied that money has a cost, which is what we would stop earning from an investment if we want to have that money in our hands today.

For this reason, the interest rate we stop earning is identified as an "opportunity cost" (with K) because we reject a future investment opportunity in exchange for money available today.

Actually there are a lot of opportunities to invest. For instance, banks with their different financial products (from sight deposits to policies and repos); or a company's investment projects to increase profit.

Besides, we have negotiable paper known as "securities" which can be acquired in Stock Exchanges or through exchange agents, which include innumerable securities that offer a fixed return (such as obligations, promissory notes, bonds, etc.) or a variable return, as it is only the case of shares.

Opportunities are present; there are a lot of options, therefore we ask ourselves: what should be good to invest in? We can evaluate the different options by means of the NPV.

Risk and Uncertainty

Before defining risk and uncertainty, it is necessary to know what certainty is and how the investment world under certainty is.

Certainty has to do with the known and real economic facts, whose information is available and there is no doubt they will happen. In this scenario of a world with certainty, a project or a financial asset's expected return will always be equal to the return obtained.

On the other hand, until now there is no investor who has the capability to foresee the future in an infallible manner; for this reason there will always be a difference between the expected return and the obtained return. This difference is what we call risk. Therefore, can we conclude that uncertainty and risk are equivalent terms?

Even though risk and uncertainty are closely related concepts, these are only equivalent when there is the possibility that these uncertain facts cause scenarios that are clearly different from a world with certainty, otherwise the uncertainty concept differs from the risk concept.

We can analyze risk because there are countless real situations that may alter the result we expect. These situations could be:

- Changes of Government; Coups de État
- Weather conditions; Natural disasters
- Growth, Recession or Economic Crisis

But not all situations have to be bad. For instance, natural changes can be either good or bad. The economy may grow or decrease, and so forth. The truth is that for better or worse, changing conditions will affect expected returns, therefore making us win or lose; if we win, it can be more or less than what we expect.

We also say that risk is measurable, the same as return. If return's measure is the interest rate or money value to be earned, risk's measure is all the variability that such expected return may suffer (Figure 6.1).

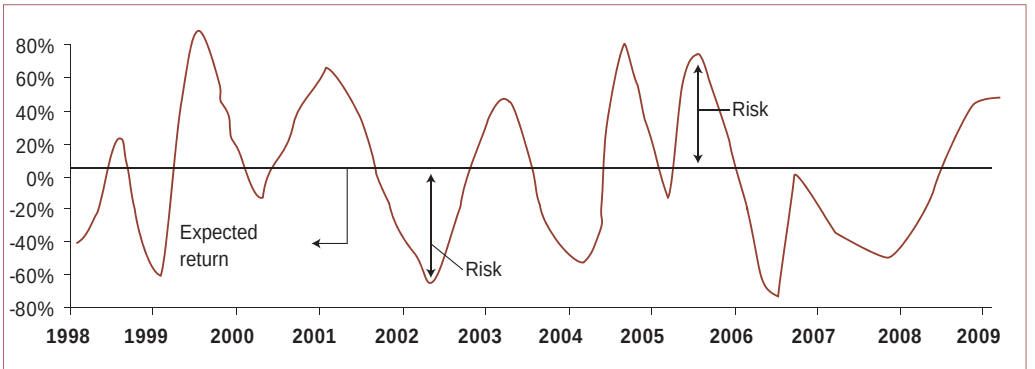


Figure 6.1

Variations on investment benefits can take place with much or little frequency. The regular recurrence of events will determine the peaks and valleys that may exist in a graph. For didactic purposes, in the next examples we will analyze graphs with regular variations.

Profitability and Risk

There is enough evidence to state that there is positive relationship between risk and profitability, that is, "the higher the risk, the higher the profitability".

For instance, Corporate Banks offer the lowest interests to sound and strong companies but they demand higher interests from less sound companies and with lower prestige as a compensation for the risk to lend them money. The same happens to debt issued by governments, for instance bonds issued by some Latin American governments which offer a higher rate than US bonds, this is so in response to the higher risk this debt has as compared to American bonds.

Choosing the best investment option

As we have seen, the choice of an investment option does not depend on NPV and IRR only, but also on risk, which in most cases will be related to the profitability measure.

Next, we will analyze investment project A and three investment options offered by a bank: B, C and D (Figure 6.2).

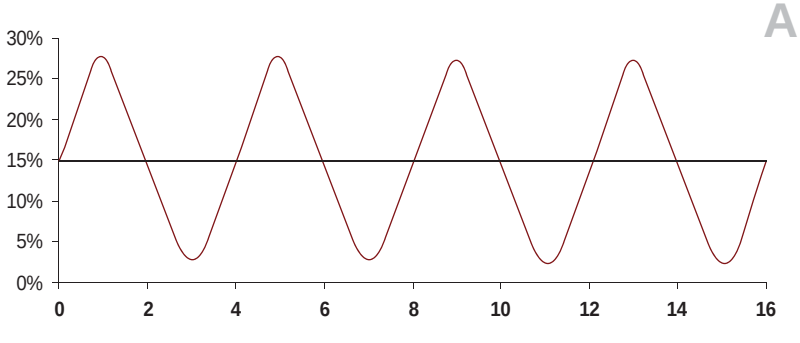
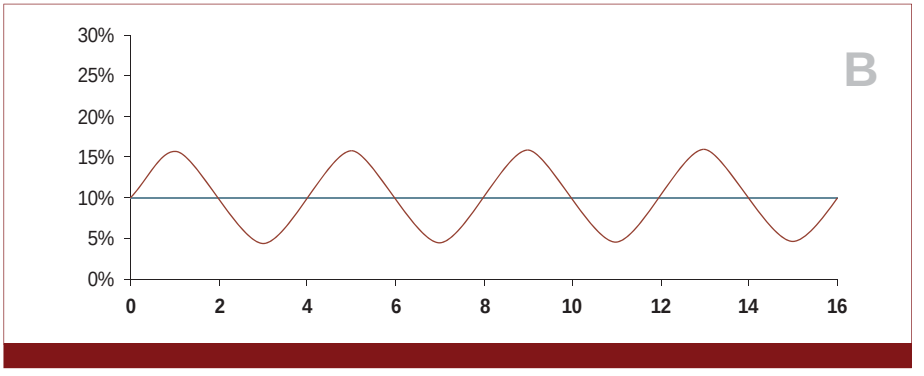
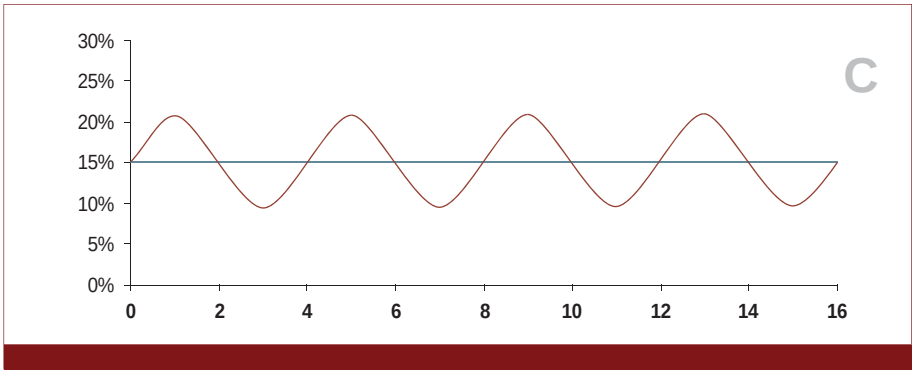


Figure 6.2





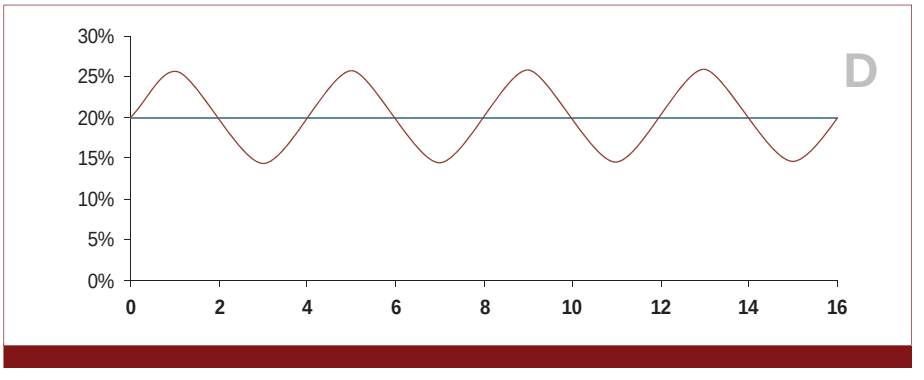


Figure 6.2

Investment in project A is made up of (NOF + NFA) and it has a 15% return. But in a project there are more factors that can go wrong, therefore a project's return should compensate for that higher risk acquired.

Let's compare investment project A against investment alternatives B, C and D in order to determine three basic situations:

a) When return is higher than the opportunity cost

Let's analyze project A with option B, which represents the opportunity cost (k) in the example analyzed in chapter 6. The bank offered the opportunity to earn 10% maintaining a low risk, but we decided to invest in the project and demand a return higher than 10% because there was more risk in our investment than with the bank (Figure 6.3).

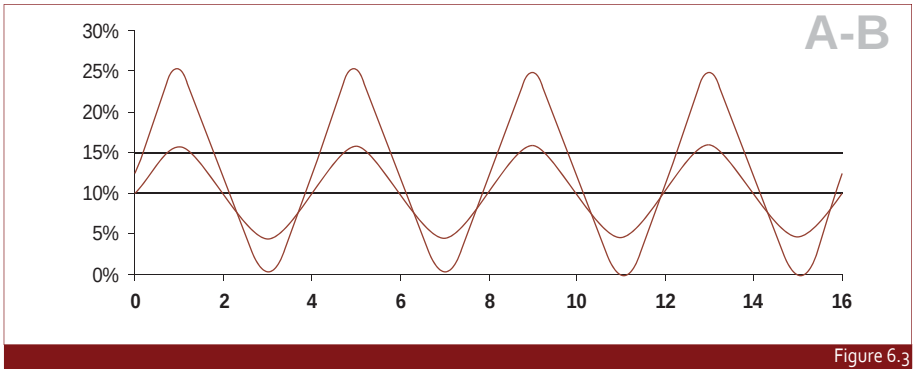


Figure 6.3

We had the opportunity to invest in the bank and earn a 10% return with a low risk, but we decided to invest in a high-risk project (more result variability) because it allowed us to earn more. Therefore, return was higher than the opportunity cost. In other words:

if:	IRR > K NPV > 0	➡ The project is accepted

The higher return earned in project A compensates for the higher risk acquired. We demand a higher return because there is more risk. If the project yields less than what we demand, then we go for the other option because it is less risky.

b) When return is equal to the opportunity cost

Now let's compare project A with option C. They both pay a 15% return but the bank offers a less risky opportunity than our project (Figure 6.4).

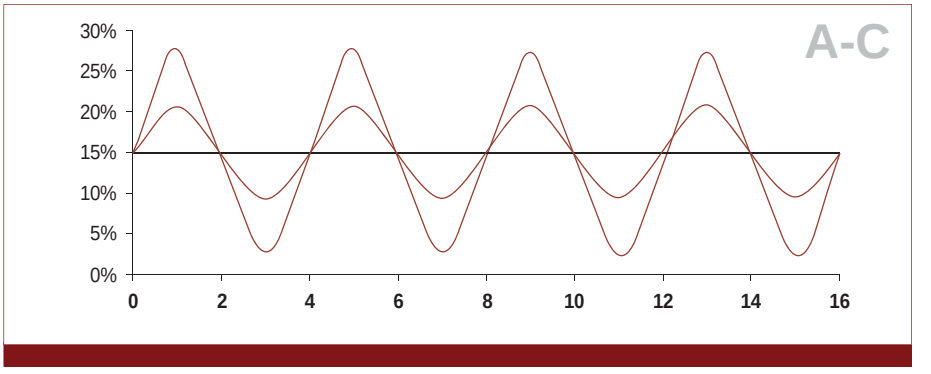


Figure 6.4

If we have the opportunity to earn the same return from two different options, what do we choose? The one with the lowest risk, of course. This dilemma is presented when return is equal to the opportunity cost:

if:	IRR = K NPV= 0	➡ Does the project have any chance?

The idea is not to rule out the project immediately, but to review the variables that affect a project the most, in order to see if its profitability can be increased or its risk reduced.

What options can a project have? So many investment options as a company may have. The execution, extension or reduction of the investment can be postponed. If we know what project variables may have an influence on results, we can play with them to choose the best option.

It is true that the determination of options often demand a complex mathematical analysis that is time and effort consuming. But it has to be considered that a project with several options is always worth more than another identical project without them.

Remember: sometimes it is worth given another step and find out if there are options that could give more favorable results.

c) When return is lower than the opportunity cost

Now let's analyze project A together with option D. The project gives us the opportunity to earn a 15% return but the bank offers an opportunity to earn more (20%) and with less risk (Figure 6.5).

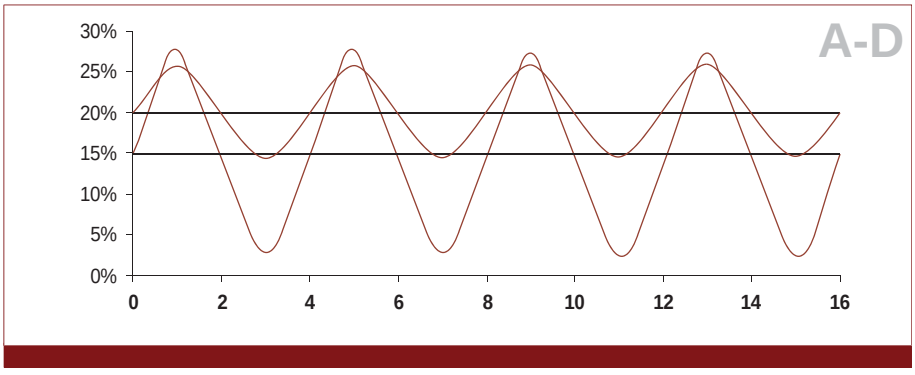


Figure 6.5

What option do we choose? Obviously the bank's option because it allows us to earn more with a lower risk. Even if the bank's risk increased with time, we would be left with option D, because the higher risk would be compensated with a higher return. Therefore, when return is lower than the opportunity cost:

if:	IRR < K NPV < 0	➡ Se rechaza el proyecto

The Portfolio "Game"

Until now we have considered the case of choosing between two investment options: a project and a bank service. But what happens inside the company? Every company represents a first investment made up of NOF + NFA. Therefore, a company is a set of investments in assets.

Adding a new investment in the company is the same as adding more assets to the company to yield more to investors. But the company generates a certain return with its corresponding risk measure.

Would this mean that if we add more assets to increase profitability, we would also increase risk? Not necessarily. Let's see now the case of company P which has two investment projects: project E and project F (Figure 6.6).

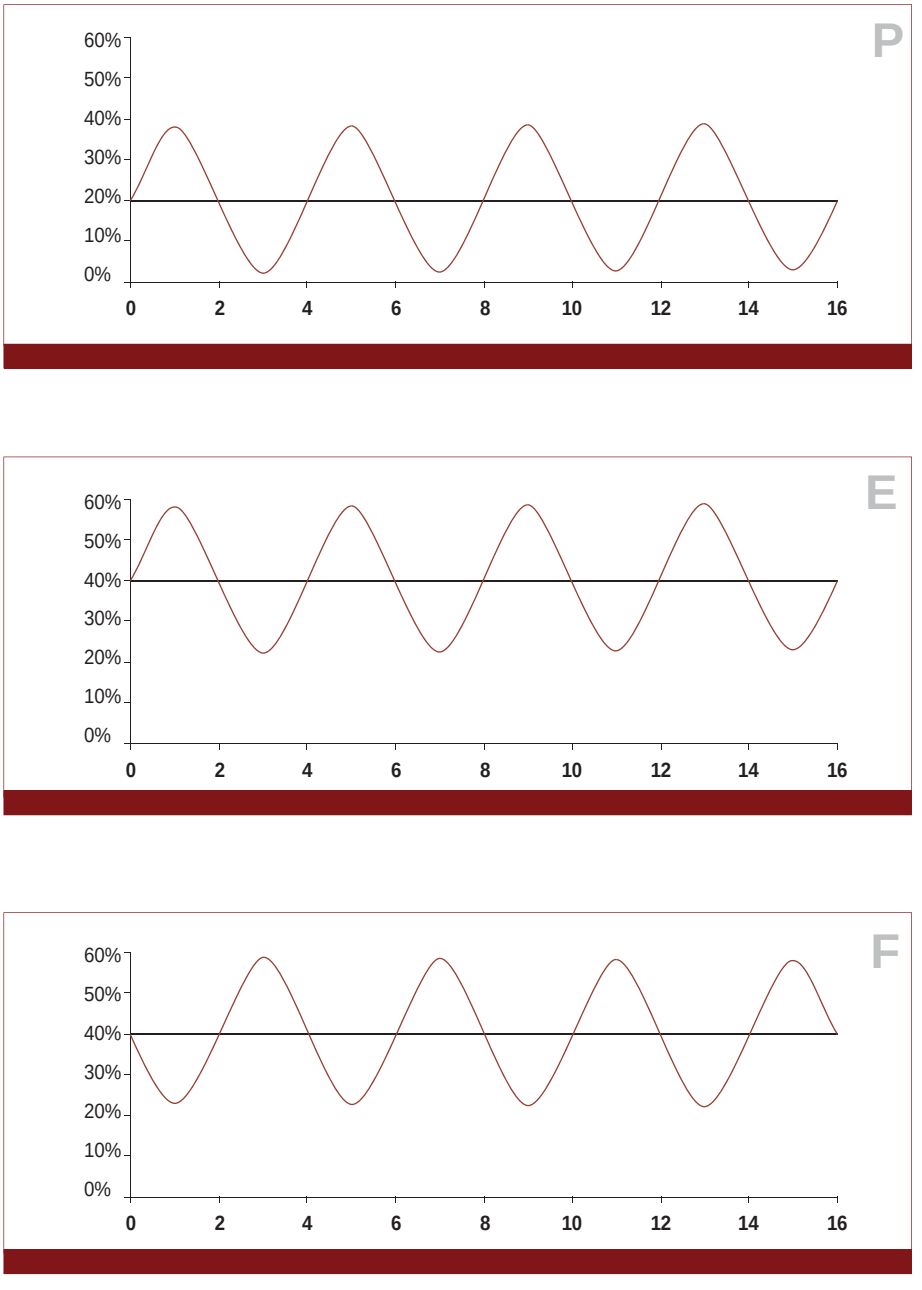


Figure 6.6

Company P yields a 20% return on its own. In this case, it is planning to start a project to increase profitability. Both project E and F have a 40% return and the same risk level. Which one would we choose?

It is not difficult to notice that while E and F have the same risk level; E varies in the same direction as company P moves (Figure 6.7), while F varies in the opposite sense (Figure 6.8).

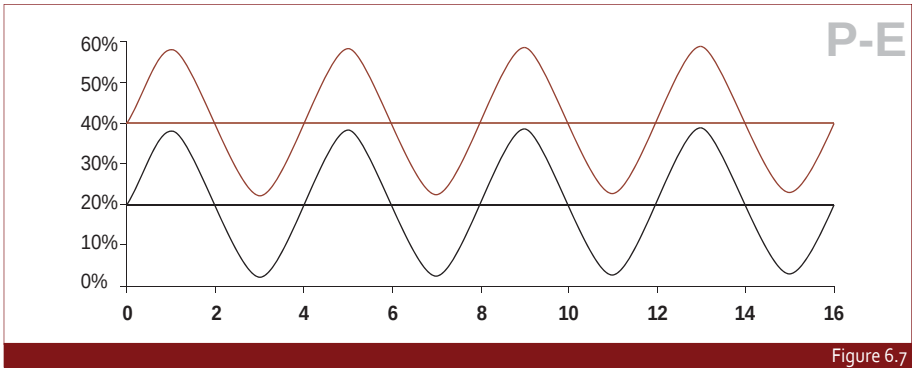


Figure 6.7

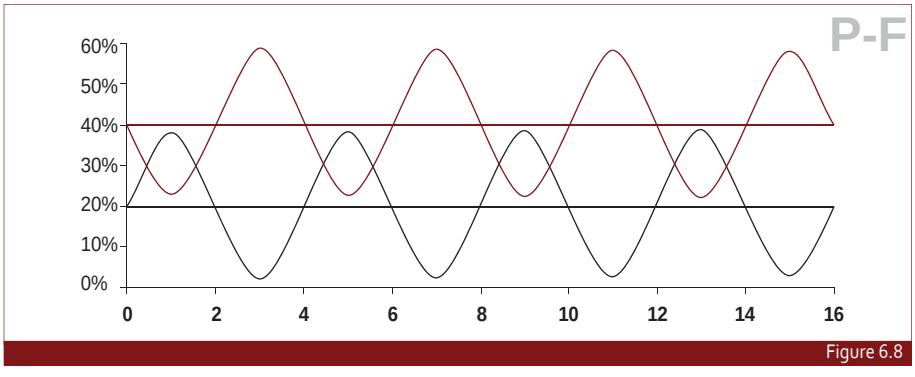


Figure 6.8

Why does E move in the same direction as P and on the other hand F moves in the opposite direction?

The answer is pretty simple: P is a banana company; E is a banana project but F is a shrimp project. E moves in the same direction as P because they belong to the same industry; therefore everything that affects banana will affect P and E equally, but not F.

If P invests both in E and F, it is going to obtain the same average return. However, if something affected banana, investors would lose everything they have invested both in P and E. But it they invested in F, investors would lose P but their investment in F would be safe.

In other words, even if P increases its profitability, E contributes more risk to the company because it is the same industry, while F helps to reduce risk because it is a different industry (Figure 6.9).

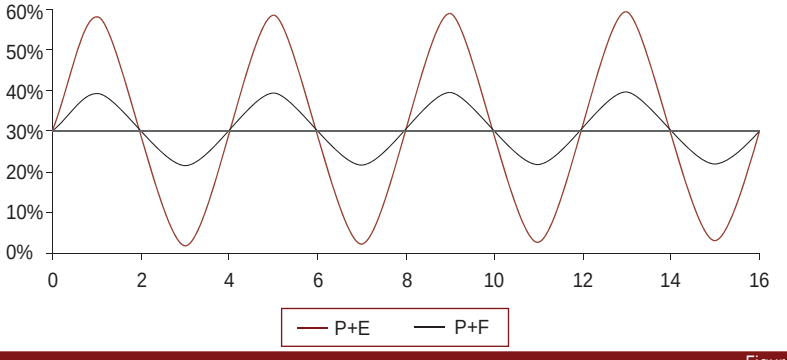


Figure 6.9

In practice, investors diversify. To protect their investment from risk, investors place their money in companies from different industries; in this way, what affects one industry will not necessarily affect the rest.

But in order to invest in other companies, shares have to be bought. As we know, shares are securities and investors have a wide range of securities to choose from besides shares and in this way they reduce risk. This is what is known as the Portfolio game.

According to what we have analyzed, are we capable of eliminating all risk?

There are predictable situations that are common to all industries. For instance, a change of government affects all industries equally and therefore in elections time all company's budgets tend to be very conservative in their projections.

Therefore in any investment there are two kinds of risk: 1) a risk that decreases as portfolio is diversified, and 2) a risk that remains regardless of portfolio diversification (Figure 6.10).

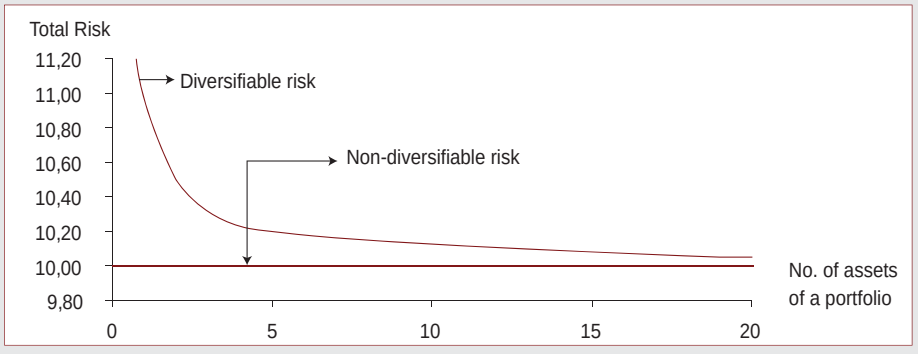


Figure 6.10

In this way, we can break the risk associated to an asset into:

- Diversifiable Risk: this is the risk that is eliminated through diversification.
- Non-diversifiable or systematic risk: this is the risk that cannot be eluded and that affects all assets equally, although with different intensity.
- Or it is also the one acquired when having a share and not diluted when diversifying the portfolio with other shares.

Contribution of an Investment to the Portfolio's return

In the example of company P, we see that if project E or F were added, return increased from an initial 20% without project and 30% with project. However, both projects contributed in a different manner to risk.

What an investor who maintains a diversified portfolio is interested in is the contribution of each asset to the portfolio's return and risk. The better investor chooses assets for his portfolio, the lower the risk it will have.

How do we measure the contribution of an investment to portfolio's return? This will be given by the average resulting from each asset's return. Weighting is based on the share of each investment in relation to total investment. Therefore:

$$Return_{Port} = W_1 R_1 + W_2 R_2 + W_3 R_3 + \ldots + W_n R_n$$

Where:
W = Proportion of an investment in relation to total investment
R = Individual return of each investment.

In our previous example, assuming investors invest the same amount of money in P and E, portfolio's return would be equal to:

$$Return_{Port} = W_P R_P + W_E R_E$$

$$Return_{Port} = 0.5 \times 20\% + 0.5 \times 40\% = 30\%$$

And the same would happen if you would invest in P and F; they both would yield 30%. Now, how do we calculate the return of each individual investment? A simple average can be calculated if we have historical information about an investment's return during a given period.

$$Return = \frac{\sum_{i=1}^{n} R_i}{n}$$

This formula means that: an investment's return will be equal to the summation (∑) of all historical returns (Ri) starting from the first (i=1) until the last time (n) and the sum is divided by the total data (n)

Contribution of an investment to Portfolio's risk

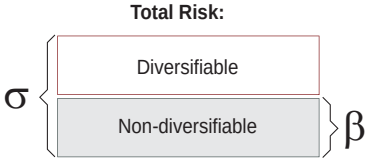
How do we calculate the contribution of an investment to the portfolio's risk? It would be simple to apply the same procedure we use to measure the contribution to return. However, this would be wrong for one reason: not all projects contribute to the same extent to portfolio's risk.

In the previous example, both E and F have the same risk measure; however, adding project E reports more risk to company P than investing in project F, because if we invest in E, the diversifiable effect will not appear, but if we invest in F, it will have an influence.

This means that even though E and F have the same risk measure, there is a higher proportion of common risk (systematic) in E while there is a higher proportion of diversifiable risk in F.

Since diversifiable risk decreases as the portfolio is diversified until achieving systematic risk, we are not interested in knowing total risk, but only the contribution of systematic risk that each investment makes to the portfolio.

In Finance, to measure the total risk of an investment, a data dispersion statistical measure known as Standard Deviation, represented by the lower-case Greek letter sigma (σ). On the other hand, systematic risk is represented with the lower-case Greek letter (β).



When studying an investment option, the investor will have to choose the option that contributes with the lowest systematic risk to the portfolio because that will be the option with the highest diversifiable risk, although we know that diversifiable risk can be reduced.

Now let's analyze the case of company P, which now has six new investment projects gathered in three categories:

a) When betas are different

Company P wants to add an investment project and has options G and H. Project characteristics are:

Project G		Project H
R_g	=	R_h
σ_g	=	σ_h
β_g	<	β_h

As we can see, both projects have the same return and total risk measure. However, the systematic risk of G compared to H is lower. This means that company P and project G are not very interrelated, therefore it can be inferred that diversifying risk is higher in G. (Figure 6.11).

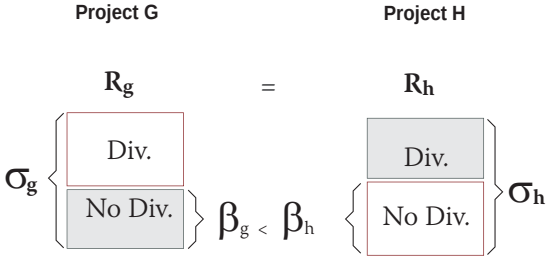


Figure 6.11

At first glance, it would seem to make no difference to choose one company or the other, since total risk for both companies is the same as well as return. However, when adding them to the portfolio, project H increases total risk because it has a higher beta. Therefore, the company will choose project H.

Then we can say that for the same return and total risk, the best option will be the one that contributes less systematic risk to the portfolio.

b) When betas are equal

Now let's analyze projects J and K, with the following characteristics:

Project J		Project K
R_j	>	R_k
σ_j	>	σ_k
β_j	=	β_k

Both J's return and total risk are higher than K's. Would we choose J for having a higher return than K?

In the beginning we could say that the choice depends on the degree of risk aversion or rejection of each investor. Therefore, the investor that is willing to take a higher risk to obtain a higher return would choose option J. On the other hand, someone more conservative would choose option K.

However, considering that betas are equal, this means that by diversifying correctly the portfolio, they both contribute with equal risk (Figure 6.12). Thus, option J will be chosen since it offers a higher return, considering that they both have the same systematic risk.

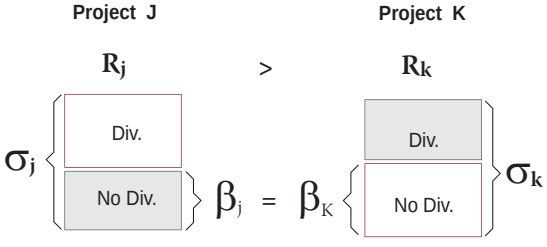


Figure 6.12

As we can see, both projects are equally correlated with the company. But if we try to diversify the portfolio correctly, diversified risk will disappear and only systematic risk will remain. Therefore, we choose the option that yields the highest return, that is, J.

Then we define that when we have the same systematic risk, we will choose the option that yields the highest return.

c) When betas and returns are equal

Finally, we will analyze the two remaining projects of company P, projects M and N. Their characteristics are as follows:

Project M		Project N
R_m	=	R_n
σ_m	>	σ_n
β_m	=	β_n

Both return and systematic risk from both projects are equal. Their information suggests that it makes no difference to choose one or the other, but this is not so.

Although systematic risk is equal for both projects, N's total risk is lower than M's total risk (Figure 6.13). Now, as we have analyzed previously, if we have the opportunity to earn the same return, we will choose the option with the lowest risk.

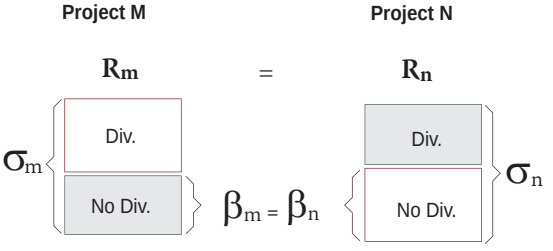


Figure 6.13

Besides, when choosing the option with less diversifiable risk, less effort will be needed to diversify the portfolio and in this way move diversifiable risk away.

Therefore, when facing two options with the same return and systematic risk, we choose the one with the lowest total risk.

When the portfolio is a synonym of market

Until now we can draw the following conclusions:

- Making an investment does not only depend on its return but also on its risk.
- If an investment is planned to increase portfolio's return, it is true that return will increase, but so will risk.
- Risk can be reduced as the investment portfolio is diversified.
- Risk can be reduced but only up to the same common risk: systematic risk.

The following question can also be raised: what is the limit of diversification? That is, how many investments can I have in my portfolio?

Let's suppose we are investors with a lot of resources available and as we know the more diverse portfolio is, the lower total risk will be, we start diversifying in all our existing industries.

No sooner said than done: we invest in oil companies, shrimp, banana, forest, textile industries, hospitals, real estate companies, public companies, etc. until we manage to cover all existing industries, even investing in several companies per industry.

What would we obtain then? As we are investing in several companies from the whole range of industries, we would obtain a representative sample of the national economy. That is, our portfolio would evolve in the same sense as the country's Gross Domestic Product (GDP).

This is so because GDP covers all existing companies and industries, while we only take part of it, that is, a sample, but this sample can be representative (that is, it clearly reflects what is happening in all industries) and therefore it varies in the same same as GDP.

At that moment, the portfolio we hold could become a trustworthy representation of the market. What would it be the systematic risk in this case? Those risks associated with the whole country, for instance: changes of government, budget deficit, inflation, high interest rates, etc.

Could this systematic risk be eliminated? Yes, by investing in companies from other countries. But we have to consider that there is non-diversifiable risk at global level.

However, the world has its own risks, such as the fall of the strongest currencies. Just like our national portfolio is a representative sample of national GDP, an international well-diversified portfolio could become a representative sample of world GDP.

Nowadays, it is possible to make investments in companies from any country thanks to Stock Exchanges, which provide the necessary conditions for buyers as well as sellers of investments (represented by securities, specially shares) could negotiate in a rapid, efficient manner at world level too.

In this way, the limit of diversification would then be the entire world. Our portfolio could become a specific sample of the world market and economy. However, the Stock Exchanges are themselves a sample of the world market and economy because of the amount of transactions and securities that are negotiated through them.

Undoubtedly, the world's most famous Stock Exchange is the New York Stock Exchange (best known after the name where it is located, Wall Street). Nowadays, more than 2,500 American companies and more than 2,700 foreign companies quote their shares there.

In order to facilitate decision making, Wall Street financial analysts have created different market indexes that reveal the economic movement on this Stock Exchange. The most famous indexes are:

a) Dow Jones Industrial Average (Figure 6.14): this is an index made up of the share price of the 30 biggest companies that trade in Wall Street.

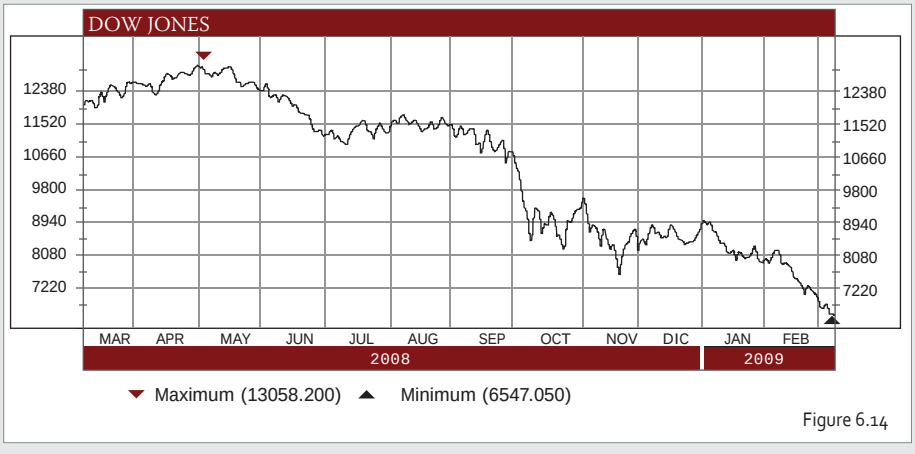


Figure 6.14

b) Standard & Poors (Figure 6.15): This is a more representative index that chooses the share return of companies that belong to different industries. This sample represents more than 80% of the market value of all shares that are listed in Wall Street.

Depending on the number of companies chosen for this sample, the index name changes. For instance, S&P 500 is an index made up of 500 companies, while S&P 1000 is an index made up of 1,000 companies.

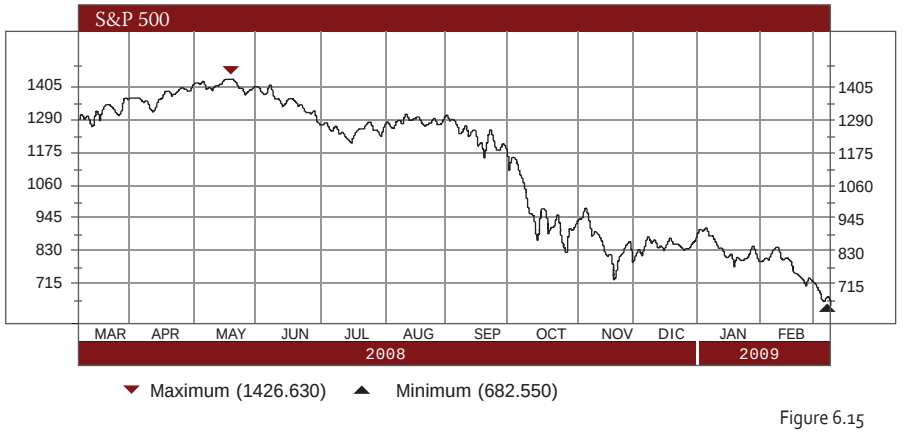


Figure 6.15

Although these indexes show the economic movement in the Stock Exchange, they also meet two other objectives. One of them is to show the world economic situation.

If we study Figures 6.14 y 6.15 we realize that both Dow Jones and S&P 500 have the same evolution, they even have their maximums and minimums on the same dates. This is due not only to the fact that they represent the movement of the same Stock Exchange, but also because they represent world movement (Figure 6.16).

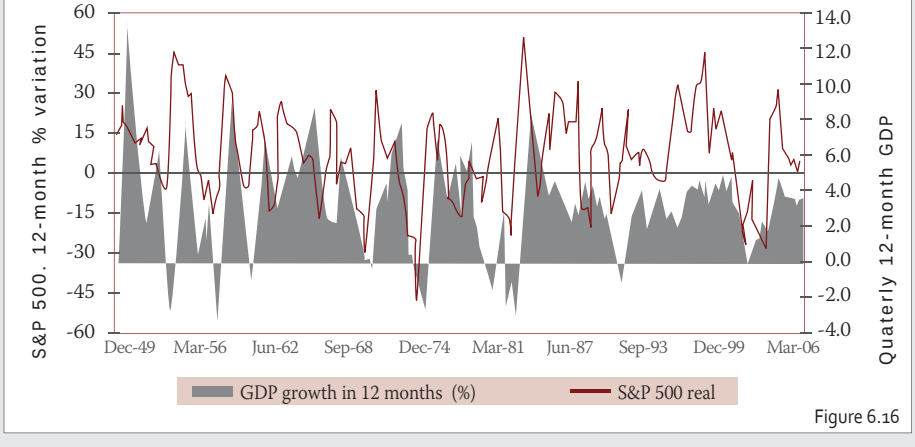


Figure 6.16

As we can see in Figure 6.16, the S&P 500 movement precedes or predicts world GDP movement. Therefore, these indexes reveal what is happening, not only inside the Stock Exchange, but also at world level.

A second objective met by these indexes is to facilitate investment decisions. In this way, if a potential investor doubts about his/her investments in companies, he/she could decide to invest in Dow Jones or S&P, which act as prefabricated portfolios.

When is it good not do diversify?

We said that diversifying a portfolio contributes to reduce risk. However, what can we do to increase our portfolio's return more? In other words, what can we do to earn more?

Again, subjectivity comes into play. If we are risk-averse investors, we can maintain or obtain a moderate return's growth. But if we like risk, then we will not diversify in order to have a growth increasingly greater than return.

However, it is not always convenient to face risk. When is the most appropriate time to start diversification? Again, beta helps since according to the beta level we will have the following options:

- **$\beta>1$:** It means that shares have more systematic risk than the market and therefore will increase or decrease more than the market. Only is an upward-moving market is expected, investing in those shares will be a good investment because they will have a higher return than the market's. This is an aggressive position.

- **$\beta=1$:** Or very close to 1, it means that shares move in a similar way as the market, that is, they have a similar risk.

- **$\beta<1$:** means that shares have lower risk than the market and therefore they will increase or decrease less than the market. Only if a downward-moving market is expected, investing in those shares will be a good investment because its return will decrease less than the market. This is a defensive position.

- **$\beta=0$:** Or close to zero, it implies that shares have no relation with the market. The risk they contribute with to the portfolio will be diversifiable.

Now, what is beta dependent on? As we have explained earlier, it depends on the correlation degree that exists between the investment and the market.

The existing Correlation Degree

Diversification assumes that an investment has an opposite movement to the market; on the contrary a non-diversification implies that the investment has the same movement as the market.

Within this context, when is it good not to diversify? Only when we are aggressive investors and we expect the market to be rising and continue with an upward trend. Then we will choose investments that are directly correlated with the market. In that case, beta will be equal or higher than 1.

On the other hand, if we are conservative risk-averse investors, then it will not matter whether the market is rising, because we take care of our portfolio and we want to maintain profitability. Therefore, we will try to diversify to protect our portfolio only in case the market is falling.

But if we have assets that move opposite to the market, when it starts falling, our assets will respond in the opposite direction, thus protecting our portfolio.

Why is beta higher in some cases and lower in others? Because systematic risk is a function of the type of existing correlation between two investments. The formula of beta explains it:

$$\beta_i = \frac{cov(r_i, r_m)}{\sigma^2(r_m)} = \frac{\sigma(r_i)}{\sigma(r_m)} \cdot \rho(r_i, r_m)$$

Where:

σ_i = Investment's individual risk

σ_m = Portfolio or market risk

ρ_{i-m} = Existing correlation between investment and portfolio

$\frac{\sigma(r_i)}{\sigma(r_m)}$ = This is the volatility ratio of investment and the global shares portfolio

As we see, beta is the proportion of investment risk (σa. ρa-p) that contributes to portfolio's risk. The higher the direct correlation is, the higher systematic risk will be. But just like there are direct correlations, there are also indirect correlations. In this way, we can have the following variables:

ρ=1: Perfect Direct Correlation (Figure 6.17): Assets move exactly in the same direction as the market. This was the case for portfolio P and option E; in real life this situation rarely happens.

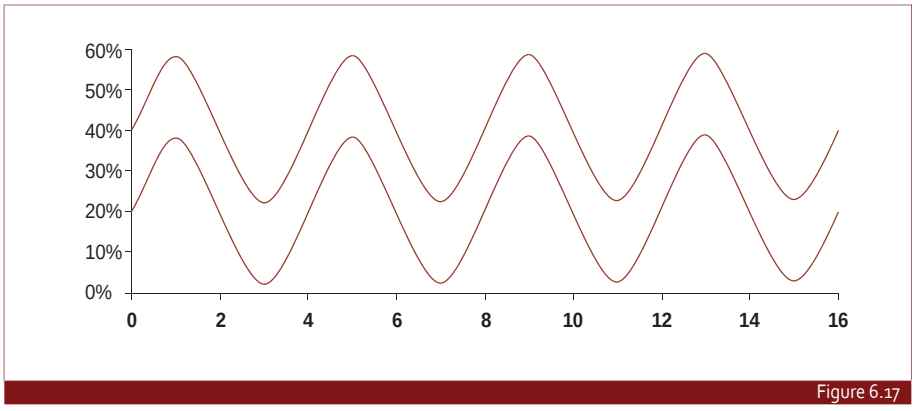


Figure 6.17

0<ρ<1: Imperfect Direct Correlation (Figure 6.18): Assets move in the same direction as the market, but with some variations. Figure 6.18

0>ρ>-1: Imperfect opposite correlation (Figure 6.19): Assets move opposite to the market, but not exactly.

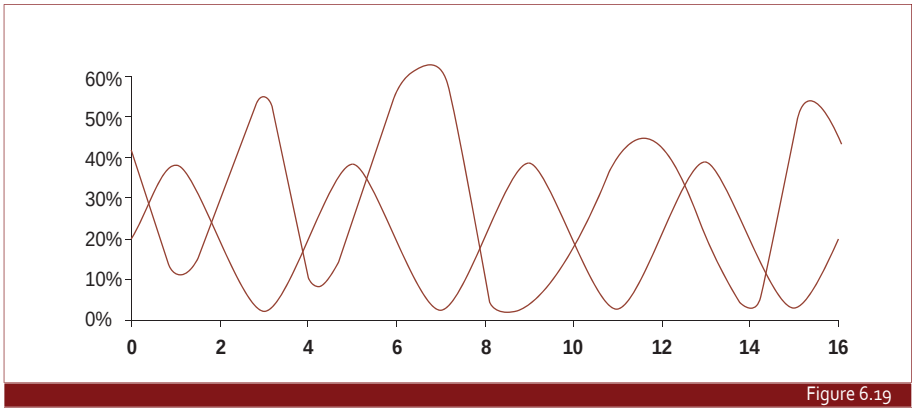


Figure 6.19

ρ=-1: Perfect opposite correlation (Figure 6.20): Assets move exactly opposite to the market. This was the case for portfolio P and option F; in real life this situation rarely happens.

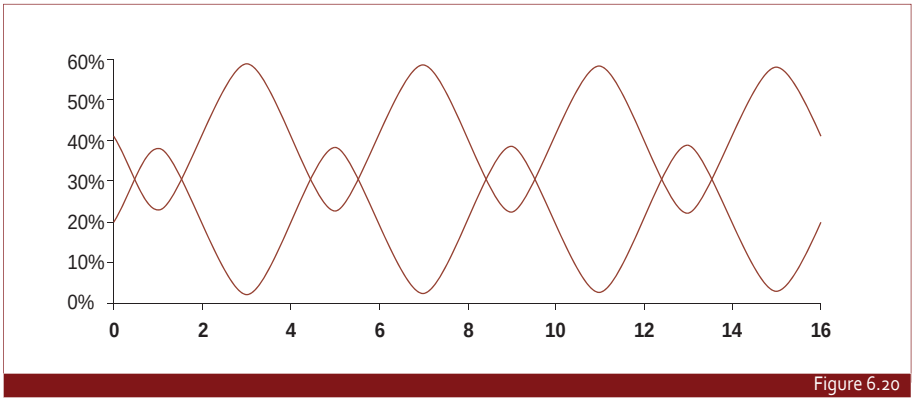


Figure 6.20

ρ=0: Absence of Correlation (Figure 6.21): Assets move independently from the market and it is not possible to predict their evolution in relation to the market.

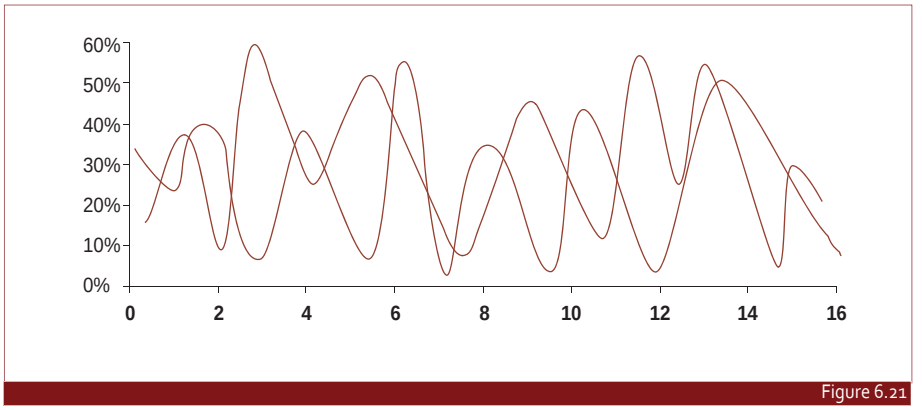


Figure 6.21

While beta can take values from zero onwards, correlation (always identified with the Greek letter Rho) only takes values between 1 and -1, which makes predictable the risk of systematic degree in an investment.

What is the best way to take care of our portfolio and even of our company? By adding investments that are inversely correlated to the market. But let's remember that diversification has a limit, therefore sooner or later, our portfolio will become a representative sample of the market and at that moment portfolio's risk will be equivalent to national and even world systematic risk.

Calculation of Betas with Excel

Calculation of individual risk of a specific investment implies using advanced statistical tools such as standard deviation. However, in order to find such deviation manually, we have to perform several mathematic operations.

We created an Excel template that will allow us to calculate returns, correlations and betas (Figure 6.22). In this example we want to add an investment to our personal portfolio and we have investment options A, B and C.

	A	B	C	D	E
1		Market	Option	Option	Option
2	Month	S&P 500	A	B	C
3	January	3,31%	-3,39%	11,39%	21,62%
4	February	1,89%	-18,70%	-11,92%	1,17%
5	March	3,31%	-14,97%	-14,50%	2,62%
6	April	7,49%	-2,6%	9,37%	15,15%
7	May	-1,24%	1,23%	13,17%	-4,15%
8	June	3,52%	5,21%	0,90%	8,09%
9	July	-3,31%	-14,23%	0,61%	0,08%
10	August	1,13%	-0,69%	8,20%	0,04%
11	September	1,01%	-1,71%	-8,51%	6,11%
12	October	-1,52%	-17,14%	-11,54%	-0,08%
13	November	1,74%	-0,84%	15,91%	-6,60%
14	December	-1,02%	2,12%	-2,00%	4,00%
15	Return				
16	Risk				
17	Correlation				
18	Beta				

Figure 6.22

How do we calculate the individual return of each investment? We explained previously that the individual return of each investment was equivalent to the simple average of its historical returns.

In order to calculate returns in Excel, we go to cell B15 and go to the Insert menu, option Function. This time we will work with functions from the Statistics category. To begin, let's look for and choose from this category the Average function.

In the dialog box that appears (Figure 6.23), on the Number 1 field, we enter all cells that contain historical returns of the option under analysis. Then we accept the function and we obtain the average return of each option.

Once we have found the individual return of each option, we can see that option C is the most profitable (4.00%). Would we immediately choose option C? No, because we have to evaluate the risk level that the options would contribute to the portfolio.

How do we calculate individual risk? We go to B16 and again within the same category we look for the STDEVP function, which means Population Standard Deviation.

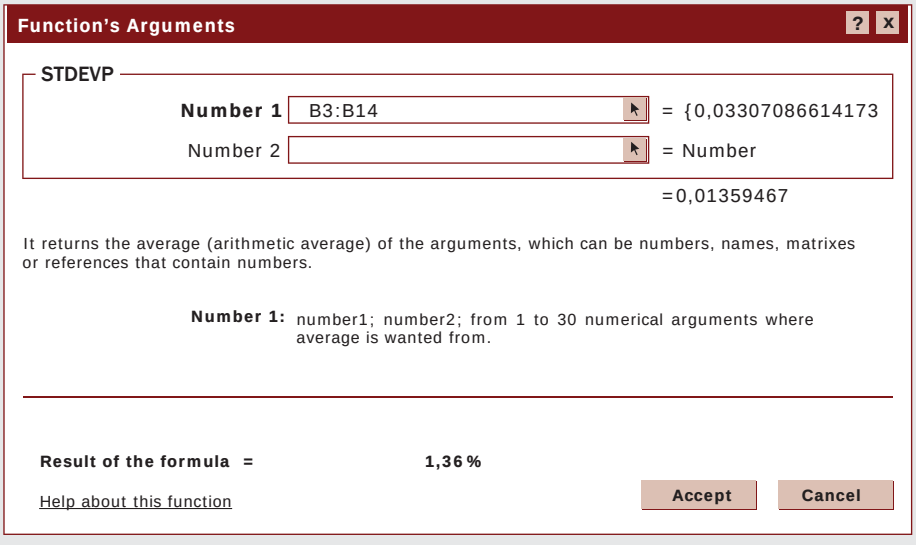


Figure 6.23

In the new dialog box that appears (Figure 6.24), on the Number1 field, we enter all cells that contain the historical returns of each option. We click OK and we obtain the total individual risk of each option.

Now that we have found individual risk, we see that the riskiest option is option B and also the least profitable. Would we immediately rule option B out? No, because we have to analyze how much of that risk is diversifiable and how much is not.

As we have mentioned, systematic risk depends on the existing correlation degree between an investment and the market. To calculate correlation, we go to C17 and on the same category we search the CORREL function.

In the dialog box that appears (Figure 6.25), on the Matriz1 field, we enter the market's historical returns and on the Matriz2 field, we enter each option's historical returns. When we click OK, we obtain the existing correlation between each option and the market.

In order to calculate correlation, the values that should be in Matriz1 should always correspond to the market's returns, because we want to examine the existing correlation between each option and the market.

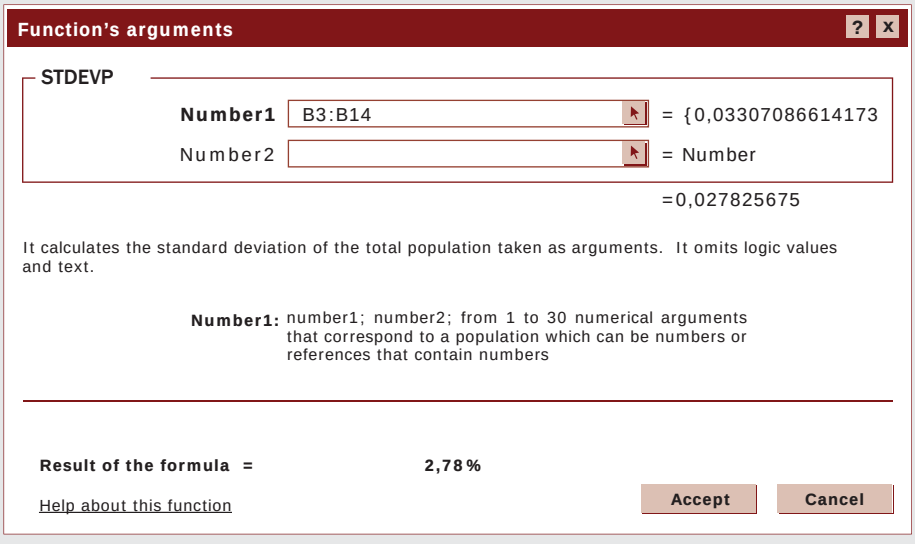


Figure 6.24

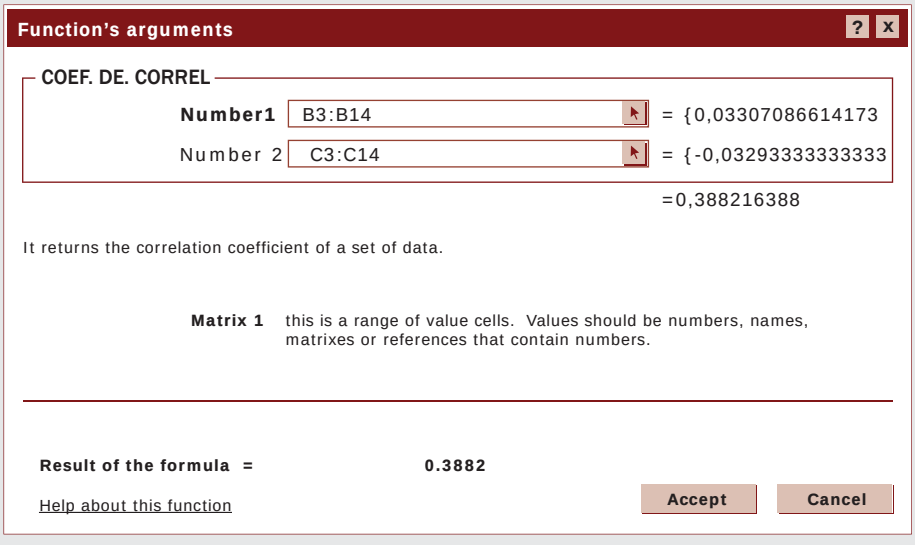


Figure 6.25

Now that we have correlation coefficients for each option, we see that option B is the least correlated. That is, this option will contribute less systematic risk than other options. Therefore, we could predict that option B will have the lowest beta level.

We confirm this: we go to C18 and enter the following formula: = (C16*C17)/B16. This will correspond to multiplying the correlation divided by market risk. In this way, risk individual con la we will find the betas and our template will be complete (Figure 6.26).

	A	B	C	D	E
1		Market	Option	Option	Option
2	Month	S&P 500	A	B	C
3	January	3,31%	-3,39%	11,39%	21,62%
4	February	1,89%	-18,70%	-11,92%	1,17%
5	March	3,31%	-14,97%	-14,50%	2,62%
6	April	7,49%	-2,60%	9,37%	15,15%
7	May	-1,24%	1,23%	13,17%	-4,15%
8	June	3,52%	5,21%	0,90%	8,09%
9	July	-3,31%	-14,23%	0,61%	0,08%
10	August	1,13%	-0,69%	8,20%	0,04%
11	September	1,01%	-1,71%	-8,51%	6,11%
12	October	-1,52%	-17,14%	-11,54%	-0,08%
13	November	1,74%	-0,84%	15,91%	-6,60%
14	December	-1,02%	2,12%	-2,00%	4,00%
15	Return	1,36%	-5,48%	0,92%	4,00%
16	Risk	2,67%	7,67%	9,86%	7,30%
17	Correlation		0,2157	0,1606	0,6099
18	Beta		0,6191	0,5921	1,6643

Figure 6.26

Just like we predicted, although it has a higher total risk level, Option B has the lowest systematic risk level; therefore, its contribution to portfolio's risk will be very little.

What conclusion can we draw? Do we definitively choose Option B? We mentioned that if the market is on the rise, the best option would be the one whose beta were higher than 1. However, the market (S&P 500) is falling, therefore it would be convenient to choose the option whose beta is lower than 1.

Finally, the best option is Option B, because it has the lowest systematic risk and the market is falling (Figure 6.27).

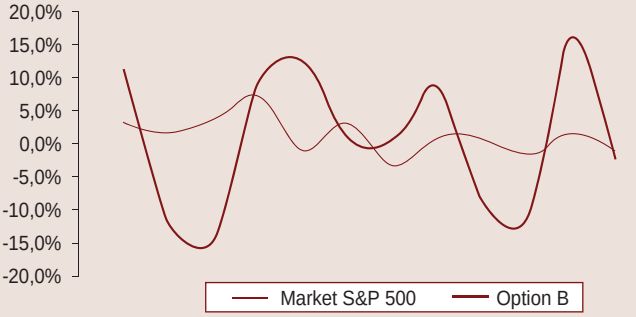


Figure 6.27

Beta's usefulness

As we have analyzed in this chapter, investment decisions do not depend on an investment's return only, but on the risk associated to this investment. And from all the existing risk, we are especially interested in all risk that cannot be eliminated through diversification.

Besides, we will analyze that both individuals and companies have a tendency for portfolios which are a set of investments. Companies can invest as much in NOF, fixed assets, projects and financial assets, such as securities, including shares.

Therefore, the expected return will have to compensate an investment's risk. But return should also compensate investors' opportunity cost. And not only shareholders are investors, but also lenders are investors.

If the return should cover the opportunity cost, then how do we measure such cost? And how does such cost affect investment decisions? These questions will be answered on the next chapter.

LEVERAGED BETA*

1. The Volatility Coefficient

The volatility coefficient – beta – of a financial asset indicates how much that asset's return varies as a function of the variations in the return of the market where it is negotiated1. In this way, since the market's beta is equal to 1, all assets negotiated in it will have betas that are higher, lower or equal to 1. Betas that exceed 1, are called aggressive assets and they are the ones that go up faster when the market is on the rise, but on the contrary, they are the ones that go down faster when the market collapses; that is, they are the ones that have more systematic risk. On the other hand, assets whose betas are lower than one are the ones that vary less than the market as a whole, when this goes up or down, and therefore they have a lower systematic risk.

Asset portfolios also have their beta (βp), which is obtained by calculating the weighted average of the betas of their constituent assets (βi) in relation to the part of the budget invested in them (Xi). This can be expressed as follows:

$$\beta_p = X_1\beta_1 + X_2\beta_2 + \ldots + X_n\beta_n$$

Through the CAPM model, beta can be used as basic instrument of the calculation of an asset's opportunity cost of capital. The underlying idea is very simple: the return of such an asset has two parts, a risk-free return (expected return for postponing consumption) and a risk premium. According to the CAPM, the latter is calculated by correcting the extra return expected for investing in a given market (risk price) with the beta of the asset under analysis. All this can be expressed in the famous equation:

$$E_i = r_f + [E_M - r_f]\,\beta_i$$

where Ei is the i asset's expected return, rf is the risk-free return and the difference [EM – rf] indicates the market's risk premium, and βi indicates the volatility coefficient of the asset to be valued. It is not the objective of this work to comment on how the volatility coefficient is statistically obtained by means of a regression model (if the model's period is a week, a month, a year, etc.), nor whether fundamental, accounting or historical betas should be used.

On the other hand, we are not going to discuss either what the value of the risk-free interest rate and the market's risk premium should be[2].

We are going to focus on the relationships that govern a company's different betas, which are key to the financial analyst's work.

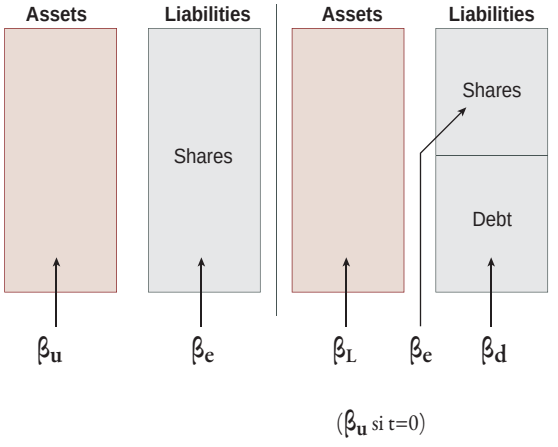
*Study developed by Prof. Juan Mascareñas, Universidad Compluterse de Madrid, 2002

[1] SHARPE, William: "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk". Journal of Finance, Sept. 1964. Pp.: 425-442

[2] All these topics can be commented on DAMODARAN, Aswath: Applied Corporate Finance. A User's Manual. John Wiley. Nueva York. 1999. Chapter 4.

A company's betas

In general, a company has four types of betas: the asset beta when it has no debt, the asset beta when it has debt[3], the equity beta and the debt beta. It is evident that the company's asset beta should be the same as the liability beta, therefore when the company has no debt, the asset beta and the equity beta are the same. On the other hand, when the company is indebted, the asset beta should be the same as the liability beta; the latter is obtained through the beta average of equity and debt weighted by their share in the company's liabilities (liabilities are made up of equity and debt).



In order to obtain the expression of the volatility coefficient for equity when the company has debt (β_e), we start from two expressions that calculate the company's assets value:

a) According to Modigliani-Miller (MM)4, a company's value (V_L) is equal to the value of its assets when it has no debt (V_u) plus the present value of the stream of tax exemptions of debt interests (tD). Therefore, the value of a leveraged company is: $V_L = V_u + tD$

b) On the other hand, if we see the company from the liabilities side, its value will be equal to the market value of equity (E) plus the market value of its debts (D): $V_L = E + D$

[3] We always refer to medium, long-term debt
[4] MODIGLIANI, Franco and MILLER, Merton: "Corporate Income, Taxes and the Cost of Capital: A Correction". The American Economic Review, vol. 53 june 1963. Pp.: 433-443. Another source of consultation is HAMADA, Robert: "Portfolio Analysis, Market Equilibrium and Corporation Finance". The Journal of Finance n° 24. March. 1.969. Pp.: 13-31 y HAMADA, Robert: "The Effect of the Firm´s Capital Structure on the Systematic Risk of Common Stocks".
Journal of Finance nº27. 1972. Pp.: 435-452.

When making both expressions equal, the first thing we can see is that share value (E) is equal to: $E = V_u - D(1 - t)$, that is, the market value of shares is equal to the company's value without debt (V_u) minus debt value (D) plus the current value of interest tax exemptions (tD).
As we already said, an asset's beta of a company with debt (β_L) is equal to the weighted average of the equity beta (β_e) and debt beta (β_d):

$$\beta_L = \beta_e \frac{E}{E+D} + \beta_d \frac{D}{E+D} = \beta_e \frac{E}{V_L} + \beta_d \frac{D}{V_L}$$

On the other hand, using MM expression of a company's value, we can obtain another value for the assets' beta of an indebted company based on the fact that VL breaks into two addends with their corresponding betas and weighted for their value:

$$V_L = V_u + tD$$

$$\beta_L = \beta_u \frac{V_u}{V_u + tD} + \beta_d \frac{tD}{V_u + tD} = \beta_u \frac{V_u}{V_L} + \beta_d \frac{tD}{V_L}$$

Making both β_L expressions equal, we can work out the value of the beta of shares (β_e):

$$\beta_e \frac{E}{V_L} + \beta_d \frac{D}{V_L} = \beta_u \frac{V_u}{V_L} + \beta_d \frac{tD}{V_L} \rightarrow \beta_e E + \beta_d D = \beta_u V_u + \beta_d tD$$

$$\beta_e E = \beta_u V_u - \beta_d D(1 - t)$$

$$\beta_e = \beta_u \frac{V_u}{E} - \beta_d \frac{D(1 - t)}{E}$$

And since $E = V_u - D(1 - t) \rightarrow V_u = E + D(1 - t)$ then:

$$\beta_e = \beta_u \frac{E + D(1 - t)}{E} - \beta_d \frac{D(1 - t)}{E}$$

$$\beta_e = \beta_u \left[1 + \frac{D(1 - t)}{E} \right] - \beta_d \frac{D(1 - t)}{E} = \beta_u + (\beta_u - \beta_d) \frac{D(1 - t)}{E}$$

Which means that the systematic risk of shares is equal to the non-leveraged company's risk plus the product of the difference of systematic risks between the company with no debt and debt multiplied by the Debt/shares ratio, considering tax exemptions.

If debt is considered to have a not significant risk ($\beta_d = 0$), then the above expression turns into:

$$\beta_e = \beta_u \left[1 + \frac{D(1-t)}{E} \right]$$

On the other hand, the asset's beta when the company has debt (β_L) can be expressed as a function of the non-leveraged beta (β_u):

$$\beta_L = \beta_e \frac{E}{E+D} + \beta_d \frac{D}{E+D} = \left[\beta_u + (\beta_u - \beta_d)(1-t) \frac{D}{E} \right] \frac{E}{E+D} + \beta_d \frac{D}{E+D} =$$

$$= \beta_u \frac{E}{E+D} + (\beta_u - \beta_d)(1-t) \frac{D}{E+D} + \beta_d \frac{D}{E+D} =$$

$$= \beta_u \frac{E}{E+D} + (\beta_u - \beta_d - \beta_u t + \beta_d) \frac{D}{E+D} =$$

$$= \beta_u \frac{E}{E+D} = \beta_u \frac{D}{E+D} - (\beta_u - \beta_d) \frac{Dt}{E+D} = \beta_u - (\beta_u - \beta_d) \frac{Dt}{E+D}$$

For example:

A company's market value of equity reaches 50 million Euros while its debt is 25 millions. The company's shares beta is equal to 1.05 while debt's beta is equal to 0.5. The tax rate is 35%. Therefore we can deduct that the value of assets' beta when there is no debt (β_u) is equal to:

$$\beta_u = \left[\frac{\beta_e + \beta_d \frac{D(1-t)}{E}}{1 + \frac{D(1-t)}{E}} \right] \qquad \beta_u = \left[\frac{1{,}05 + 0{,}5 \times 0{,}65 \times \frac{25}{50}}{1 + 0{,}65 \times \frac{25}{50}} \right] = 0.9151$$

If we had assumed that debt's beta was null, the β_u value would have been equal to 0.79 (which would have had an error of 16%). On the other hand, the beta of an indebted company's assets is equal to:

$$\beta_L = \beta_u - (\beta_u - \beta_d)\frac{D(1-t)}{E+D} = [(0{,}9151 - 0{,}5)\,(0{,}35)\,(25/75)] = 0{,}8667$$

A comment on debt's beta

In order to calculate the company's cost of capital, we can do it in two ways: the weighted average cost of capital or the CAPM.

The weighted average cost of capital (k_o) is calculated by obtaining the average cost of equity (k_e) and debt (k_i) after taxes, weighted by the value of such resources in the total long and medium term financing, which leads us to the famous expression:

$$k_o = k_e \frac{E}{E+D} + k_i\,(1\text{-}t)\,\frac{D}{E+D}$$

where $k_i\,(1\text{-}t)$ represents the debt cost after taxes.
On the other hand, by using the CAPM, we can also calculate company´s capital cost through the following expression:

$$k_o = r_f + [E_M - r_f]\,\beta_L$$

which is a way to obtain the return demanded by the market as a function of the systematic risk of the company's assets.

As it is logical, both expressions should match and therefore the following equalities should occur:

$$k_e = r_f + [E_M - r_f]\,\beta_e$$
$$k_i\,(1\text{-}t) = r_f + [E_M - r_f]\,\beta_d$$

Then:

$$k_o = k_e \frac{E}{E+D} + k_i\,(1\text{-}t)\frac{D}{E+D} = [r_f + (E_M - r_f)\,\beta_e]\frac{E}{E+D} + [r_f + (E_M - r_f)\,\beta_e]\frac{E}{E+D} =$$
$$= r_f + (E_M - r_f)\,\beta_e\left[\frac{E}{E+D} + \beta_d\frac{D}{E+D}\right] = r_f + (E_M - r_f)\,\beta_L$$

Where it can be inferred that:

$$k_i\,(1\text{-}t) = r_f + [E_M - r_f]\,\beta_d$$

This is an important expression because it implies several interesting things. For instance, if a company had a cost of debt before taxes equal to the return of risk-free assets, the beta of such third-party resources would be equal to:

$$r_f(1-t) = r_f + [E_M - r_f]\,\beta_d \rightarrow r_f t = [E_M - r_f)\,\beta_d \rightarrow \beta_d = \frac{-r_f t}{E_M - rf}$$

So that if the risk-free interest rate is 5%, the tax rate is 35% and the risk premium is 4%, the beta value of debt is –0,4375. In other words, a company that pays an interest very close to the risk-free nominal rate will have a negative debt beta (if it makes a profit, of course). It is true that due to the small share that such debt would represent in the company's capital structure, its effect would practically not be noticed in the calculations where the debt beta appears involved.

On the other hand, for debt beta to be null, its cost before taxes should be equal to:

$$k_i(1-t) = r_f + [E_M - r_f]\,0 \rightarrow k_i = \frac{r_f}{1-t}$$

For instance, if the risk-free rate is 5% and the tax rate is 35%, the cost of debt before taxes should be 7.7% (which implies a 2.7% difference5). In this case, debt should represent a higher share in the capital structure than in the above case, but now beta is zero, therefore it will not affect the calculations it is involved in.

From the above, it can be inferred that there will be companies with negative debt betas, with a non-zero leverage ratio and that of course companies with a BB rating or less6 will have positive debt betas and an important leverage ratio. In both cases the general, not simplified, expression should be used when calculating the beta of non-leveraged assets, subject to make an important mistake. Let's take as an example Jazztel7's debt return by the end of the year 2000, which was 22.9% before taxes when the risk-free interest was 5.1% and it was assumed that the market risk premium was 3,5%. Jazztel's debt beta was equal to:

$$k_i(1-t) = r_f + (E_m - r_f)\,\beta_d \rightarrow 22{,}9\%\,(1\text{-}0{,}35) = 5{,}1\% + (3{,}5\%)\,\beta_d \rightarrow = 2{,}7957$$

[5] The theoretical difference for a debt beta of zero will be equal to: ki –rf = [rf / (1-t)] – rf = rf t / (1-t)
[6] Damodaran calculates an average difference of 3,5% over the risk-free rate for companies rated BB. See Damodaran, Aswath: Investment Valuation. John Wiley 2002 (2ª ed.) Pag.: 209
[7] Data obtained from a Merrill Lynch report of December 13, 2000. It should be observed that the cost of debt is a lot more expensive than the one of shares, which does not seen something logical, but this is what the report states. It should be remembered that at that time there was a liquidity problem in the high-return bond market (the famous trash bonds) which was Jazztel's kind of debt. Arbitration with the stock market was not desirable due to that lack of liquidity.

which is far from insignificant. At that moment, the beta of shares was $\beta_e = 1.74$, cost of shares equal to $k_e = 11{,}2\%$. The debt/equity ratio was 0.43. With this information if we use the last expression we would obtain a value of the non-leveraged beta (β_u) equal to:

$$\beta_u = \frac{1{,}74}{[1 + (1\text{-}0{,}35)0{,}43]} = 1{,}36$$

but if we use the full expression, the value of the non-leveraged beta would be:

$$\beta_e = \beta_u \left[1 + \frac{D(1-t)}{E} \right] - \beta_d \frac{D(1-t)}{E} \rightarrow \beta_u = \left(\beta_e + \beta_d \frac{D(1-t)}{E} \right) / \left[1 + \frac{D(1-t)}{E} \right]$$

$$\beta_u = \left(\beta_e + \beta_d \frac{D(1-t)}{E}\right) / \left[1 + \frac{D(1-t)}{E} \right] =$$

$$= (1{,}74 + (2{,}7957 \times 0{,}65 \times 0{,}43)) / [1 + (0{,}65 \times 0{,}43)] = 1{,}97$$

as we can see, the difference is not really important and however the simplified expression that involves zero risk for debt is widely used in financial analysis. Now let's suppose that the analyst wants to find out what the equity's beta for Jazztel would be if the debt/equity ratio were equal to one. For this purpose, we will use both the non-leveraged beta from the simplified expression as well as the beta from the general expression:

a) Simplified expression. $\beta_u = 1{,}36 \rightarrow \beta_e = 1{,}36\,[1 + (1\text{-}0{,}35)\,1] = 2{,}244 \rightarrow k_e = 5{,}1\% + (3{,}5\%)\,2{,}244 = 12{,}954\%$

b) General expression. $\beta_u = 1{,}97 \rightarrow \beta_e = 1{,}97\,[1 + (1\text{-}0{,}35)\,1] - [2{,}7957\,(1)\,(1\text{-}0{,}35)] = 1{,}4333 \rightarrow k_e = 5{,}1\% + (3{,}5\%)\,1{,}4333 = 10{,}11655\%$

From the above it can be seen that the difference between using one expression and the other is enormous: almost three percentage points in the cost of capital of equity!

The above example is typical because the cost of debt is higher than the cost of equity, which is unusual. However, despite all, it has been helpful to illustrate the difference between using the simplified expression (debt beta equal to zero) and the general expression.

4. Possible inconsistencies of these expressions

It is necessary to say that all the expressions related to beta calculation are based on the equation developed by Modigliani and Miller: $V_L = V_u + tD$, and as we know this expression exaggerates the company's value when the leverage ratio reaches an important level. This level is where bankruptcy and agency costs become important in the company's value. This means that if both costs become important, the expressions we have analyzed cannot be longer support themselves.

On the other hand, in many industrialized countries, including Spain, the law avoids double taxation; therefore payment of a company's income tax is on account of payment of personal income tax. The result is that the tax treatment of interests and dividends is different and favorable to the latter. For this purpose, if the company distributes all profit as dividends, it can be considered that $t = 0$ in the above expressions. If dividends are not distributed but all money is reinvested, t would be a marginal tax rate. And for an intermediate case, t would have to be rectified as a function of the dividend distribution rate[8].

[8] I thank Professor Gómez-Bezares for his comments on this aspect. It should also be said that according to Higgins, Robert (2003) "It should be stressed that our discovery of a tax bias in favor of debt financing is an American result to a great extent. In most industrialized countries, corporate and personal taxes are integrated, at least partially, which means that dividend payees receive at least a partial credit on their personal tax bill for the corporate taxes paid on distributed profits" (pag. 222).

KNOWLEDGE CONTROL:

1. The index made up of the 30 biggest companies that quote in Wall Street is:

    a. Standard and Poors
    b. Dow Jones Industrial Average
    c. Nasdaq
    d. None of the above

2. What is the difference between the Standard & Poors index and the Dow Jones Industrial Average?

3. Explain the following statement: “S&P500 movement precedes or predicts world GDP movement”

4. What is the meaning of: “The Dow Jones indicator facilitates investment decisions”

5. Determine the final value of each of these shares.

Market Movement	B	Initial share value	Final share value
+5%	0,5	3	
+9%	0,9	5	
-15%	1,1	9	
+30%	1	10	
-4%	1,4	11	

6. Say whether you would: diversify (D), or maintain (M) in the following cases:

Market’s movement	C	Decision.
-8%	-1	
-1%	0	
+12%	1	
+44%	0,5	
-0,1%	-0,4	

7. If the company earns a 10% return and increases assets to increase profitability, would risk also increase?

8. If you own a beach clothing store and want to diversify your risk, what is your risk? In what other business would you invest to reduce it?

9. What is the return of the following portfolio made up of:

   a. Company A: 20% annual return

   b. Company B: 5% monthly return

   c. Company C: 60% return at the end of the project (3 years). The proportion in the portfolio is: A (40%), B (25%), C (35%)

10. What is the difference between diversifiable risk and non-diversifiable risk?

11. Explain the following saying: "An investment's risk can be reduced or increased by means of portfolio diversification".

12. A portfolio's risk has a minimum level. What is it?

13. If an investor invests in many companies from all industries. What would be his portfolio's rate?

Applications

14. Mr. Juan Pazmiño, a well-known investor, has maintained for years a well-diversified investment portfolio. Its decisions have always been based on the personal knowledge of managers of the biggest companies and the decisions they have made. His son, Jorge Pazmiño, who just entered the investment world wants to make more technical and objective decisions, therefore he decides to calculate the betas and base his decisions on the market's movements.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Market: S&P 500	5%	3,1%	-1,5%	-1,4%	3%	8%	-3%	-2%	1%

The information on the shares Jorge Pazmiño can invest in is detailed in the table below. Based on the beta information, in what companies would you invest?

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Pors S.A.	0,04%	4%	4%	-4,15%	-6%	0,08%	20%	-6,6%	30%
Picoli S.A.	-17%	-16%	15%	1%	-1,71%	1,23%	2,12%	8%	9,5%
Arcos S.A.	-11,5%	-14%	0,95	8,21%	6,11%	4%	-0,08	-6%	11%

FINANCE
FOR EXECUTIVES

VII

Profitability of an Investment Project

Chapter VII

Profitability of an Investment Project

In the previous chapter we studied risk, its characteristics and the way it can be reduced. We also analyzed that despite our efforts there is always a risk that cannot be eliminated by means of diversification, this systematic risk is represented by beta.

We also learned that return is associated to the beta level it has. In this way, the higher the systematic risk, the higher the return demanded will be. This is the basis for evaluating investment projects. A project's expected return will have to exceed the risk acquired by the company as a whole as well as the one investing his own resources.

The CAPM Model

We have previously analyzed risk associated to a portfolio of assets. The company as a whole is a portfolio of assets and so can an investment project be.

An investor makes decisions not only measuring the risk involved in adding one more asset to his portfolio, but also considering the return offered by that asset. In this way, investors will be willing to add a risky asset provided the expected return compensates the associated risk.

But there is a starting point to measure the expected return. While it is true that the return should compensate the risk acquired, an ideal condition for any investment is to obtain a free-risk return. Is there any type of investment that is completely risk-free?

Yes, in theory. The return paid by governments to invest in State bonds is considered a risk-free return or rate, because it assumed that a Government will not stop paying a debt in its own currency. For countries whose currency is the American Dollar, the risk-free rate corresponds to that of US government bonds.

Therefore, investors expect to obtain at least the risk-free rate plus an additional return for the risk to be acquired. In this way, an asset's expected risk is made up of:

$$\text{Asset expected return} = R_f + \text{Risk premium}$$

The risk premium depends on the amount of risk associated to the asset you want to invest in. Risk level is measured by the beta level. If we know how much risk will be added to the portfolio, we only have to find out what the value of risk is.

We could define the value of risk as a price-quantity relationship, where beta is the quantity. Therefore, the risk premium would be:

$$\text{Risk Premium} = \text{Risk quantity } (\beta) \times \text{Risk price}$$

Let's think about this: according to the above formula, price risk would be equal to the risk premium as long as $\beta=1$. If we remember clearly, beta is a function of the existing correlation between the asset to invest in and the market's portfolio.

For $\beta=1$, the asset should be perfectly correlated with the market's portfolio. In other words, the asset movement should be exactly the same as the movement of the market portfolio and thus investing in the asset would be exactly the same as investing in the market portfolio.

Then, let's suppose we invest in the market portfolio. The return we would obtain would be equal to the market's return. Therefore, if $\beta=1$, the risk premium for investing in the market portfolio would be exactly the same as the difference between the risk-free rate and the market's return.

$$\text{Market's Return } (R_m) = R_f + (\text{Risk premium})_m$$
$$\text{Market's Return } (R_m) = R_f + (R_m - R_f)$$

The risk premium would be exactly the same as what is left for the risk-free rate to be equal to the market's return. In this way we obtained the risk price. Now, for an asset whose beta is different than 1, the expected return for investing in that asset is given by:

$$\text{Asset's return } (R_a) = R_f + \beta\,(R_m - R_f)$$

With the above expression, we have inferred one of the most important theories in Finance: the Capital Assets Pricing Model. As we have seen, this model infers asset's return from its expected risk.

While the model has some problems, it is the most used to obtain returns in market values as compared to returns in book value (such as ROE).

Using the CAPM

Both investors as well as companies use this formula to find out the return the market expects to obtain. In this way, if an investment should yield an expected return below the market, no investor will be willing to invest his money.

Let's consider the following example used at the end of chapter 6. The market's return (S&P 500) was 1,36%. Option B (the least risky) had a beta of 0,59 and an individual return of 0,92%; while Option C (the riskiest) had a beta of 1,66 and an individual return of 4%.

Now let's assume a 1% risk-free rate, according to the CAPM the expected return for each option would be:

$$R_B = R_f + \beta_b\,(R_m - R_f)$$
$$R_B = 1{,}00\% + 0{,}59 \times (1{,}36\% - 1{,}00\%) = 1{,}2127\%$$

Option B offered an individual return of 0,92%. However, according to the CAPM, the expected return for investors with the same beta should be 1.21%. If I can have a higher expected return with the same beta in another company, it is not convenient at all to choose Option B. Now let's see the situation in relation to Option C:

$$R_C = R_f + \beta_C (R_m - R_f)$$
$$R_C = 1{,}00\% + 1{,}66 \times (1{,}36\% - 1{,}00\%) = 1{,}5978\%$$

Option C offered a 4% individual risk. According to the CAPM, the expected return for investments with the same beta should be 1,59%. Since with the same beta I obtain a higher expected return than it could obtain (according the CAPM), then Option C would be more convenient.

In the previous chapter we demonstrated that Option B was the best because it allowed more portfolio diversification. However, now we say that the best option is C, because for the same level of systematic risk I obtain a higher return than the one expected by the market.

The question is: what is really the best option? If what I want is to reduce risk, I will choose option B. If what I want is to earn more and face a higher risk, I will choose option C. However, the ideal option would be the one with less systematic risk, with a higher return than the market expects.

The CAPM is applied not only to assets, but also to portfolios.

Let's suppose we have decided to invest in both B and C. Investment will be in equal parts. Therefore, portfolio's return would be equal to:

$$\text{Portfolio's return } (R_p) = W_B R_B + W_C R_C$$
$$R_p = (0{,}5 \times 1{,}2127\%) + (0{,}5 \times 1{,}5978\%) = 1{,}405\%$$

Let's verify the result. Since portfolio's beta can be inferred as weighted average, the beta would be:

$$\beta \text{ portfolio } (\beta p) = W_B \beta_B + W_C \beta_C$$
$$\beta_p = (0{,}5 \times 0{,}59) + (0{,}5 \times 1{,}66) = 1{,}128$$

Now, introducing the portfolio's beta in the CAPM, we obtain the following:

$$R_p = R_f + \beta_p (R_m - R_f)$$
$$R_p = 1{,}00\% + 1{,}128 \times (1{,}36\% - 1{,}00\%) = 1{,}405\%$$

Considering that the average return obtained in the portfolio is equal to the return obtained by the CAPM using average betas, it is demonstrated that the CAPM is suitable both for portfolios as well as for individual assets.

The implications are important: since the CAPM can be applied to portfolios and considering the company is an assets portfolio, the CAPM can be used to obtain assets' return. However, within the company there are other returns.

The Cost of Invested Capital

Once again, let's go over a very important concept: every project represents an investment, which will be made up of NOF and Fixed Assets. Such investment in assets will be financed with third-party resources (Debt) and the company's resources (Equity).

However, the invested capital has an implicit cost, which is the time value of money. Therefore:

- Investing third-party resources means not having such resources available (D) in order to have a greater capital in the future.

- Investing the company's own resources means not having such resources available (E) in order to have a greater capital in the future.

When investing third-party resources, you expect a return that allows increasing capital. Such return is the compensation received from not having the capital today and instead having a greater capital in the future. Such compensation is the time value of money (K).

Likewise, when investing the company's resources you expect a return that compensates the time you are not going to have your capital available in order to obtain a greater capital in the future. Such return also corresponds to the time value of money (K).

In this way, we can identify two types of the time value of money:

- The time value of the capital from third-party resources, known as the Cost of Debt (K_d)
- The time value of the capital from the company's own resources, known as the Cost of Equity (K_e)

But there is a third investor: The State. This investor provides natural and legal resources to the company. For that investment, the State expects to receive a return which is the tax rate (t).

Taxes are calculated based on the earnings generated by the company and because of a sovereign right, the State collects its expected return before shareholders collect their returns.

However, taxes are calculated from profit once financial expenses have been deducted (the cost of debt). This is quite fair because the State also collects taxes from those who invested third-party resources, based on their earnings (interests earned).

Therefore what the State stops collecting from the company is actually the tax it will collect from lenders. If what lenders obtain as return is Kd, the tax lenders will pay (which represent tax savings for the company) will be $K_d \cdot t$

In this way, the real cost of debt will be: the original cost of debt (K_d) minus the tax savings generated by financial expenses ($K_d \cdot t$). Therefore the cost of debt will be: $K_d - (K_d \cdot t)$. If we work out the common value, the algebraic expression will be: $K_d \cdot (1-t)$.

In this way, we have obtained the Cost of Debt. In order to obtain the Cost of Equity, we apply the CAPM model; for this purpose we will have to calculate the beta of shares. Once beta is obtained, we look for the risk-free rate and the market's return and we calculate the cost of equity, according to the CAPM.

Now we know the company should yield the returns expected by shareholders, whose cost for the company will be equal to $K_d \cdot (1-t)$; but it should also yield the returns expected by shareholders, whose cost for the company will be equal to K_e, calculated by means of the CAPM.

However, the company should yield such returns to investors in proportion to what they invested. The lender invested D. The shareholder invested E. It would be a mistake to assume that what the company should yield is simply the sum of both costs.

Therefore, for the one investing D, the return will be K_d and for the one investing E, the return will be K_e. That is, the company does not yield the sum of both costs, but a weighted average of such costs. This weighted average is obtained with the share of each element (D and E) over the total capital invested (D+E).

In this way, we introduce the Weighted Average Cost of Capital concept (WACC), that is, the company should yield the weighted average cost of capital invested. Mathematically, it can be expressed as follows:

$$WACC = K_d \cdot \frac{D}{D+E} \cdot (1 - t) + K_e \cdot \frac{E}{D+E}$$

where:

Kd = Cost of Debt
D = Value of Debt
t = Tax rate
Ke = shareholder's return
E = Value of equity

The formula is expressed as follows: the share of capital invested that generates a return for the lender (considering tax savings) plus the share of capital invested that generates a return for shareholders. And this return would be:

$$K_e = R_f + \beta_e (R_m - R_f)$$

WACC Application: Discounted Flow of Funds

Here is where all the financial concepts studied previously come together.

The present value was obtained by discounting future flows at a rate that represented the time value of money, which was the return we stopped earning for having the money available today.

For a company that wants to make an investment to obtain future flows, the rate that should be used to discount flows was the general rate that reflects the expected return that each investor wanted to earn, in other words, the WACC (Figure 7.1).

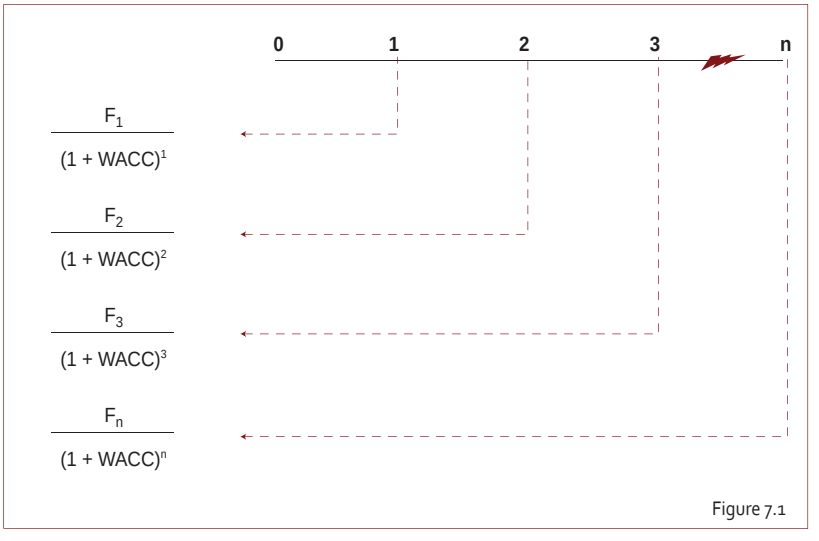


Figure 7.1

Besides, as every company is created to last forever, at the end of the analysis a perpetual flow should be considered, that is a perpetuity. And as this flow is expected to grow over time, a perpetuity will be considered with growth:

$$PV = \frac{F_1}{(1+WACC)^1} + \frac{F_2}{(1+WACC)^2} + \frac{F_3}{(1+WACC)^3} + \ldots + \frac{F_n(1+g)}{(1+WACC)^n(WACC-g)}$$

Finally, as in every company, to generate future flows an investment made up of NOF plus Fixed Assets should be made, this investment should be subtracted from the present value of future flows in order to obtain NPV:

$$NPV = -F_0 + \frac{F_1}{(1+WACC)^1} + \frac{F_2}{(1+WACC)^2} + \frac{F_3}{(1+WACC)^3} + \ldots + \frac{F_n(1+g)}{(1+WACC)^n(WACC-g)}$$

And according to the NPV obtained we can draw the same hypothesis we studied in chapter five:

- **NPV > 0:** All investors recovered their investment (D and E). They earned what they wanted and in addition they earned something else.
- **NPV = 0:** All investors recovered their investment and earned exactly what they wanted to earn (K_d y K_e).
- **NPV < 0:** At least, one of the investors, if not all of them, recovered his/her investment but did not earn what he/she wanted. It could also be the case that he/she did not even recover his/her investment.

On the other hand, the IRR suffers no change. It continues to be the rate that makes the NPV be zero and it shows the return obtained by the company or project. And interpretations are identical as for NPV:

- **IRR > 0:** All investors recover their investment and in addition earn a return (which can be more or less than WACC)

- **IRR = 0:** All investors recover their investment but they do not earn anything in addition.

- **IRR < 0:** At least one of the investors, if not all of them, does not recover his/her investment.

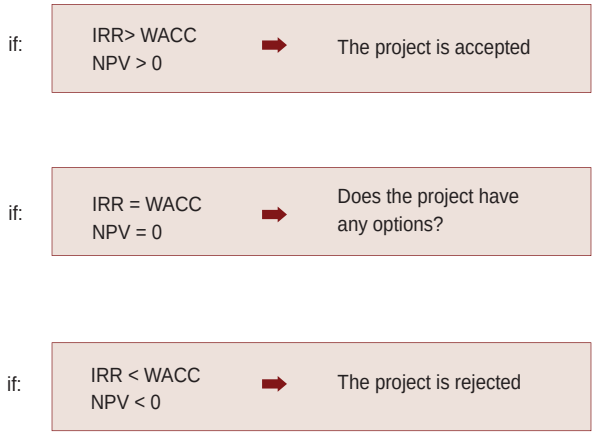
And as we have mentioned, NPV and IRR are complementary indicators and could be used jointly to evaluate investments. When using them together, we can get to the following conclusions:

If NPV	and IRR	Then ...	Therefore
NPV > 0	IRR > 0	Investors recover their investment and earn more than they expected.	IRR > WACC
NPV = 0	IRR > 0	Investors recover their investment and earn exactly what they expected.	IRR = WACC
NPV < 0	IRR > 0	Investors recover their investment but they earn less than what they expected.	IRR < WACC
NPV < 0	IRR = 0	Investors recover their investment only. There are no earnings.	IRR < WACC
NPV < 0	IRR < 0	At least one of the investors, if not all of them, does not recover his investment.	IRR < WACC

This brings about the same implications analyzed in chapter six. Investors have their own expectations and expect to obtain a return that exceeds them, especially if they plan to invest in a project where there is a higher number of factors that may go wrong.

Therefore, a project's expected return should compensate the higher risk acquired.

Therefore:



Now we have all the necessary elements to evaluate investment projects: we know how to project balance sheets and income statements, we know how to discount future flows, we know what rate to use to discount flows and we know how to evaluate results. The only thing we have left to find is maybe the most important one: Future Flows.

The key concept: Cash Flow

We have seen that to calculate an investment's return we need to know the future flows or cash flows. But what is a cash flow? The correct definition of cash is all revenues and expenses from economic benefits (not accounting) that a company or project can generate.

From the concept that cash flows are economic flows, we should start from an economic source. This source is the Income Statement. Therefore in order to prepare the different flows of funds, we will have to make projections of the projects accounting results, and if necessary, we will also have to project balances.

Therefore, we are to build a projection matrix in Excel and we will work under the following assumptions for a project of Ixu S.A.:

- **Investment:** The project consists of a new production line, which needs an investment in machinery for $24.000,00. Besides, a NOF investment is estimated for 12,5% of sales, which are projected to be $20.000,00 during the first year with a growth rate stated in the matrix.

- **Debt:** For the acquisition of this machinery, a $10.000,00 bank loan is negotiated for a 5-year term, with an annual 5% interest rate (K_d = 5%)

- **Equity:** 10.000 shares are issued with a face value of $1,40 per share. Shareholders expect to earn a return of 14,96% or above (K_e = 14,96%), according to the following information:

Market Information	Value
Return on government bonds	5,00%
Sector Risk (β)	1,66
Stock Exchange Index (S&P500)	11,00%

- **Time:** The project will have a duration of five years, after that the project will be liquidated and the machinery will be sold for an expected value of $12.000,00. Depreciation will be linear and an annual 10%. 100% of earnings will be retained and they will be distributed at the end of the project's lifespan.

Once the balance sheet and the income statement have been projected (as explained in chapter 4), we can start from the Net Profit and make the necessary adjustments to get to the different cash flows:

a) Free cash flow (FCF)

The Free Cash Flow is the flow of funds produced by assets, assuming they are financed entirely with the company's own resources (Figure 7.2). This flow is available to reward the three main investors: lenders, government and shareholders.

	A	B	C	D	E	F	G	
1		**Period 0**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	
2	**Income Statement**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**	
3	**Sales**		20.000	22.000	23.980	25.659	26.942	**Conditions:**
4	Cost of goods sold		8.000	8.800	9.592	10.263	10.777	
5	Gross Profit		12.000	13.200	14.388	15.395	16.165	
6	Administrative Expenses		3.200	3.520	3.837	4.105	4.311	
7	Selling Expenses		2.400	2.640	2.878	3.079	3.233	It grows with sales
8	**EBITDA**		6.400	7.040	7.647	8.211	8.621	It grows with sales
9	Depreciation		2.400	2.400	2.400	2.400	2.400	It is invested as
10	**EBIT**		4.000	4.640	5.274	5.811	6.221	much as it depreciates
11	Financial Expenses		500	410	315	215	110	
12	**EBT**		3.500	4.230	4.959	5.596	6.111	
13	Taxes (40%)		1.400	1.692	1.983	2.238	2.444	10% of debt
14	Net Profit		2.100	2.538	2.975	3.358	3.666	
15								
16	**Income Statement Ratios**							**Formulas**
17	Sales Growth (g)			10,00%	9,00%	7,00%	5,00%	Sales x (1+g)
18	Profit Margin %		60,00%	60,00%	60,00%	60,00%	60,00%	Gross Margin / Sales
19	ROS		10,50%	11,54%	12,41%	13,09%	13,61%	Net Profit / Sales
20	ROA		15,09%	17,35%	19,53%	21,36%	22,73%	EBIT / (NOF+NFA)
21	ROE		13,04%	13,62%	13.77%	13,45%	12,82%	Net Profit /E
22								
23		**Period 0**	**Period 1**	**Period 2**	**Period3**	**Period 4**	**Period 5**	
24	**Financial Balance**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**	
25	Surplus Cash		190	2.978	6.111	9.564	28.638	
26	NOF		2.500	2.750	2.998	3.207	-	
27	NFA		21.600	19.200	16.800	14.400	-	
28		24.000						
29	STD							
30	LTD		8.190	6.290	4.295	2.200	0	
31	E	10.000	16.100	18.638	21.614	24.971	28.638	
32		14.000						
33		**Period 0**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**	
34	**Project's Flow of Funds**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**	
35	Net Profit							
36	(+) Depreciation / Amortization							
37	(+) Financial Expenses							
38	(-) Tax Shield							
39	(+) NOF Variations							
40	(+) Fixed Assets variations							
41	**FREE CASH FLOW**							
42	**Project's NPV with WACC=**				Project's IRR			
43								
44	(+) Tax Shield							
45	**CAPITAL CASH FLOW**							
46	**Project NPV with WACC=**				Project's IRR			
47								
48	(-) Debt amortization							
49	(-) Financial Expenses							
50	(+) Third-party resources							
51	**EQUITY CASH FLOW**							
52	**Shareholder's NPV with K_e =**				Shareholder's IRR			
53								
54	Verification: Cash Variation =							

Figure 7.2

As we have mentioned previously, the company or project is evaluated regardless of how it is financed. This is what FCF is for. How is the FCC built? We can start from net profit and continue to make the following adjustments:

1) **Add depreciations and amortizations:** Fixed assets depreciations and intangible assets amortizations (different from financial debt amortization) do not consume profit because they are not actual money outflows. Therefore, they should be added to profit:

Net Profit	2.100,00
+ Intangibles Depreciation/Amortization	2.400,00

2) **Add Financial Expenses:** FCF's purpose is to evaluate the company or project, regardless of its financing. The most important effect of financing is interest expenses. As in the Income Statement interests are being subtracted, in the FCF they will have to be added to return them to profit.

Net Profit	2.100,00
+ Intangibles Depreciation / Amortization	2.400,00
+ Financial Expenses	500,00

3) **Subtract Tax Savings or Tax Shield:** This is the second most important effect of financing. If there was no debt, there would not be a Tax Shield. As in the Income Statement this are savings, in the FCF it will have to be subtracted to eliminate its effect.

Net Profit	2.100,00
+ Intangibles Depreciation/Amortization	2.400,00
+ Financial Expenses	500,00
- Tax Shield	-200,00

This also has another implication. As taxes have not been returned but tax savings have been eliminated, the total effect would be tax payment without financial expenses. That is called a Hypothetical Tax.

We can get to the Hypothetical tax in another manner. Since it is assumed that there are no financial expenses, the EBIT would be equal to EBT and therefore the hypothetical tax would be equal to EBIT • T. Therefore, in order to get to the FCF we can start from the Net Profit as well as from the EBIT:

Net Profit	**EBIT**
+ Depreciation	+ Depreciation
+ Intangibles amortization	+ Intangibles Amortization
+ Financial Expenses	- Hypothetical Tax (EBIT • t)
Tax shield (FE • t)	

4) **Add or subtract NOF variations:** This line follows the same principle as the Statement of Cash Flows. We add it because it can represent both consumption and profit savings. Since NOF are assets and represent the use of funds, the less we use them, the better. Therefore, if we follow the rules of the Statement of Cash Flows:

- NOF increases represent funds consumption; therefore increases are recorded with a negative sign.
- NOF decreases represent funds saving; therefore decreases are recorded with a positive sign.

Net Profit	2.100,00
+ Intangibles Depreciation/Amortization	2.400,00
+ Financial Expenses	500,00
- Tax Shield (D • Kd • t)	-200,00
± NOF Variation	-2.500,00

5) Add or Subtract Fixed Assets Variations: This line also follows the same principle than the Statement of Cash Flows. We add it because it may represent an investment as well as a divestment. And if we divest in fixed assets is because we sell them and if we sell them we obtain earnings. Therefore, if we follow the rules of the Statement of Cash Flows:

- Fixed Assets increases (without depreciation) represent investments; therefore, increases are recorded with a negative sign.
- Fixed Assets decreases (without depreciation) represent divestments; therefore, decreases are recorded with a positive sign.

By making all these adjustments, we get to the Free Cash Flow:

	Net Profit		2.100,00
	+ Depreciation		2.400,00
	+ Financial Expenses		500,00
Current Assets	- Tax Shield (D • Kd • t)		-200,00
	± NOF variations		-2.500,00
	± Fixed assets variations	**-24.000,00**	0,00
	= FREE CASH FLOW (FCF)	**-24.000,00**	**2.300,00**

A particular aspect: initial investments are recorded in Period 0, that is, before the company starts operations. If there is an investment or a divestment in assets in the operating stage, these will be recorded from Period 1 onwards, which will correspond to the operation period.

Another explanation: when talking about "Periods", we refer to economic years, which will be used in the Income Statements being used. When talking about "Period 1", we refer to the company's or project's first operating economic year. On the other hand, when talking about "Period 0" we refer to all the pre-operating economic years , that is, before the company started its operations.

Appropriate Discount Rate to Discount FCF: There are two ways to evaluate a company or a project: by means of absolute returns (the flows) and relative returns (discount rates). The purpose in both cases is to measure investment's return.

In the FCF, as we analyzed, financial expenses and the tax shield are not considered. However, these elements are real and they are part of the project. If in the FCF these two elements were not considered, then they should be included in the discount rate to be used.

As we know, the rate that considers the cost of debt, the tax shield and shareholder's return is WACC. Therefore, this is the rate that should be used to discount the FCF. In this case, this would be:

$$WACC = K_d \cdot \frac{D}{D+E} \cdot (1 - t) + K_e \cdot \frac{E}{D+E}$$

WACC= 0.05 x 41,67% x (1-0.4) + 0.1496 x 58,33% = 9,98%

Final project value: Since the project has a defined duration, in the last year assets will be liquidated (NOF and FA). In the case of NOF, its liquidation value will be obtained by variation. In the case of fixed assets, their liquidation value will be their sale value. The effect of the accounting profit or loss on sale of assets will have to be eliminated too.

In this way, once WACC has been found, we can find NPV and TIR of the FCF, using the Excel formulas and following the same procedure explained in chapter 6. The project's FCF would remain as it appears in Figure 7.3:

	A	B	C	D	E	F	G
33		Period 0	Period 1	Period 2	Period 3	Period 4	Period 5
34	**Project's Flow of Funds**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**
35	Net Profit		2.100	2.538	2.975	3.358	3.667
36	(+) Depreciation/Amortization		2.400	2.400	2.400	2.400	2.400
37	(+) Financial Expenses		500	410	315	215	110
38	(-) Tax Shield		-200	-164	-126	-86	-44
39	(+) NOF Variations		-2.500	-250	-248	-210	3.207
40	(+) Fixed Assets Variation	-24.000					12.000
41	FREE CASH FLOW	-24.000	2.300	4.934	5.317	5.677	21.340
42	WACC	**9,98%**			**Project's IRR**		13,81%
	NPV	**3.313**					

Figure 7.3

b) Capital Cash Flow (CCF)

As we analyzed, the FCF shows us the future flows generated by the investment we made in assets. On the other hand, the Capital Cash Flow shows us the future flows generated by the capital invested (D+E). However, since A=D+E, is there any difference between FCF and CCF?

Of course there is. FCF evaluates the company as if it were fully financed with equity (A=E), while the CCF evaluates the company with its real financing (A=D+E). The difference lies in debt, which as we know creates a tax shield.

This shield is a saving that increases profit and therefore increases equity. If equity is increased, the assets of an indebted company will be higher than the assets of a company with no debt (Figure 7.4). This is precisely what the CCF evaluates: the increase of net assets.

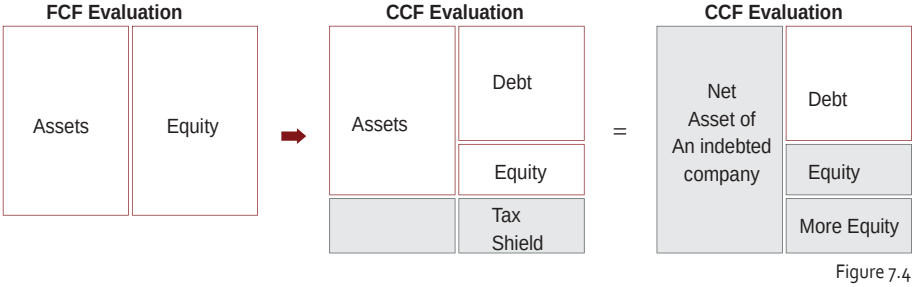


Figure 7.4

Therefore, in order to get to the Capital Cash Flow, we only have to add the tax shield value to the Free Cash Flow:

Free Cash Flow	**-24.000,00**	**2.300,00**
+ Tax shield (D x Kd x T)		200,00
= CAPITAL CASH FLOW (CCF)	**-24.000,00**	**2.500,00**

Appropriate Discount Rate for the CCF: Since the CCF does take into account the Tax shield value, such effect will not have to be considered in the discount rate. In this way, the discount rate to be used will be a WACC adjusted before taxes:

$$WACC_{bt} = K_d \cdot \frac{D}{D+E} + K_e \cdot \frac{E}{D+E}$$

WACC= 0.05 x 41,67% + 0.1496 x 58,33% = 10,81%

Once the appropriate rate is obtained, we obtain the NPV and IRR of the project's CCF (Figure 7.5):

44	(+) Tax shield		200	164	126	86	44
45	**CAPITAL CASH FLOW**	-24.000	2.500	5.098	5.442	5.763	21.384
46	**WACC**	10,81%	Project's IRR				14,39%
	NPV	3.029					

Figure 7.5

c) Equity Cash Flow (ECF)

The importance of discounted cash flows is to evaluate the future flows that will be generated by an investment, whether without debt (FCF) or with it (CCF). But what are the future flows generated by debt? Basically two: capital amortization and interest payment.

It is obvious that future flows of debt will come from an indebted company (which will have a higher asset due to the Tax Shield). If we subtract debt future flows from the company's future flows, only the future flows generated by equity will be left.

This is the essence of the Equity Cash Flow. It shows us the future flows generated by equity, that is, by shareholder's investment. The difference between the FCF and the ECF is that the FCF evaluates every investment as if it were entirely by equity, while ECF only evaluates the shareholder's portion, that is, only equity. (Figure 7.6).

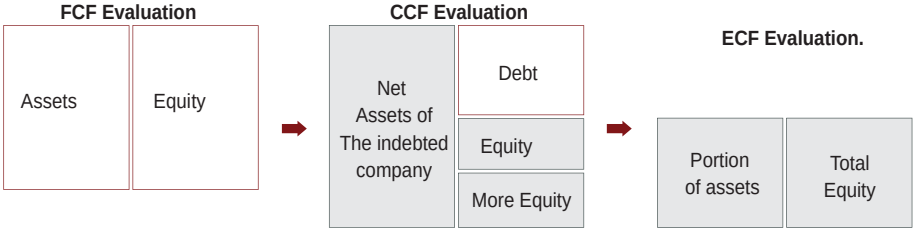


Figure 7.6

And just like we mentioned, in order to get to the ECF, we have to subtract from the flows generated by the indebted company (CCF) the flows generated by debt (debt amortization and financial expenses).

An explanation: since what we want to evaluate is Equity, we will have to add the value of third-party resources to the total investment (that both in FCF as in CCF has a negative sign) so that only Equity remains as initial investment in Period 0.

Capital Cash Flow	**-24.000,00**	**2.500,00**
- Debt amortization		-1.810,00
- Financial Expense		-500,00
+ Third-party resources	10.000,00	
= EQUITY CASH FLOW (ECF)	**-14.000,00**	**1.310,00**

Appropriate Discount Rate for ECF: Since ECF already includes the tax shield (from CCF) and financial expenses, these elements will not have to be considered in the discount rate to be used. And since ECF includes as investment only shareholder's portion, the rate will be only the cost of equity, without any proportions.

As we know what rate to use to discount the ECF, we use NPV and IRR to obtain shareholder's return (Figure 7.7):

48	(-) Debt amortization		-1.810	-1.900	-1.995	-2.095	-2.200
49	(-) Financial expenses		-510	-410	-315	-215	-110
50	(+) Third-party resources	10.000					
51	**EQUITY CASH FLOW**	-14.000	190	2.788	3.133	3.453	19.074
52	**Shareholder's NPV with K_e =**	**14,96%**	**5.814**		**Shareholder TIR**		**28,57%**

Figure 7.7

Once the three different project flows have been completed and evaluated, we have finished the income statement, balance sheet and cash flows projections, we can determine whether investing in the project is feasible or not.

	A	B	C	D	E	F	G
1		**Period 0**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
2	**Income Statement**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**
3	**Sales**		20.000	22.000	23.980	25.659	26.942
4	Cost of goods sold		8.000	8.800	9.592	10.263	10.777
5	Gross Profit		12.000	13.200	14.388	15.395	16.165
6	Administrative Expenses		3.200	3.520	3.837	4.105	4.311
7	Selling Expenses		2.400	2.640	2.878	3.079	3.233
8	**EBITDA**		6.400	7.040	7.647	8.211	8.621
9	Depreciation		2.400	2.400	2.400	2.400	2.400
10	**EBIT**		4.000	4.640	5.274	5.811	6.221
11	Financial Expenses		500	410	315	215	110
12	**EBT**		3.500	4.230	4.959	5.596	6.111
13	Taxes (40%)		1.400	1.692	1.983	2.238	2.444
14	Net Profit		2.100	2.538	2.975	3.358	3.666
15							
16	**Income Statement Ratios**						
17	Sales Growth (g)			10,00%	9,00%	7,00%	5,00%
18	Profit Margin %		60,00%	60,00%	60,00%	60,00%	60,00%
19	ROS		10,50%	11,54%	12,41%	13,09%	13,61%
20	ROA		15,09%	17,35%	19,53%	21,36%	22,73%
21	ROE		13,04%	13,62%	13.77%	13,45%	12,82%
22							
23		**Period 0**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
24	**Financial Balance**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**
25	Surplus Cash		190	2.978	6.111	9.564	28.638
26	NOF		2.500	2.750	2.998	3.207	-
27	NFA	24.000	21.600	19.200	16.800	14.400	-
28							
29	STD						
30	LTD	10.000	8.190	6.290	4.295	2.200	0
31	E	14.000	16.100	18.638	21.614	24.971	28.638
32							
33		**Period 0**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
34	**Project's Flow of Funds**	**Investment**	**2008**	**2009**	**2010**	**2011**	**2012**
35	Net Profit		2.100	2.538	2.975	2.358	3.666
36	(+) Depreciation / Amortization		2.400	2.400	2.400	2.400	2400
37	(+) Financial Expenses		500	410	315	215	110
38	(-) Tax Shield		-200	-164	-126	-86	-44
39	(+) NOF Variations		-2500	-250	-248	-210	3.207
40	(+) Fixed Assets variations	-24.000					12.000
41	**FREE CASH FLOW**	-24.000	2.300	4.934	5.316	5.677	21.340
42	**Project's NPV with WACC=**	9,98%			Project's IRR		13,81%
43		3.313					
44	(+) Tax Shield		200	164	126	86	44
45	**CAPITAL CASH FLOW**	-24.000	2.500	5.098	5.442	5.763	21.384
46	**Project NPV with WACC=**	10,81%			Project's IRR		14,39%
47		3.029					
48	(-) Debt amortization		-1.810	-1.900	-1.995	-2.095	-2.200
49	(-) Financial Expenses		-500	-410	-315	-215	-110
50	(+) Third-party resources	10.000					
51	**EQUITY CASH FLOW**	-14.000	190	2.788	3.133	3.453	19.074
52	**Shareholder's NPV with K_e =**	14,96%	5.814		Project's IRR		28,57%
53							
54	Verification: Cash Variation =		190	2.788	3.133	3453	19.074

Conditions:

It grows with sales
It grows with sales

10% of Fixed Assets

According to amortization table

Formulas
Sales x (1+g)
Gross Margin / Sales
Net Profit / Sales
EBIT / (NOF+NFA)
Net Profit /E

KNOWLEDGE CONTROL:

1. What is the difference between the market's return and an asset's return?

2. What is the CAPM model based on?

3. What is the difference between the returns in market value and in book value. Provide an example of each.

4. In every company there are investors who expect a return Kd, Ke and T respectively. Who are these investors?

5. A shareholder evaluates the return of his investment using the Project's Free Cash Flow, the Capital Cash Flow or the Equity Cash Flow? What are these flows for?

Applications

6. Mr. Paul Donoso invests $ 500 in his company expecting a 5% return. He has asked for a $500 bank loan with a 15% interest rate, his father lent him $200 with no interest and his brother lent him $300 at a 10% rate. If the tax rate is 40%. What will the cost of capital invested in Paul's company be?

7. José Hidalgo is evaluating the possibility to invest in a business project. He decided to analyze the existing rates. An export project had a beta of 0.6 and its individual return was 0,95. A chocolate production project had a beta of 1,5 and a 3,4%individual return. The market's return (S&P 500) is 1,4% and the risk-free rate is 1%.

    a. What is the expected return for each option, according to the CAPM? What project would you recommend Mr. Hidalgo?
    b. Mr. Hidalgo decides to invest in both projects (export and production) in the following proportion: 40% and 60% respectively. What is the portfolio's expected return according to the CAPM?

8. For each of the following situations, write down where you would invest: Bank (B), Building Project (C), International Project (I), Clothes store project (A)

		A	B	C	I
A	A project's IRR is 10%, the bank offers you an 8% rate and NPV = 0				
B	C project's NPV is -5, the bank offers a 4% rate and IRR =12%				
C	The bank's rate is 4%, risk rate is 3.5% and β is 3%. A project's NPV is 8% the risk rate is 4% and β is 3%. C project's rate is 8%, risk rate is 4% and β is 2%				

9. Mr. Pedro Alvarez wants to invest in a chocolate sales project. For this project he needs US$ 20.000 for the land and building, US$ 15.000 for furniture, US$ 5.000 for market studies and US$ 10.000 as working capital. What is the project's value in year 0?

10. Brent S.A. contracted a US$ 400.000 loan with UCBT bank at an annual 14% rate for 10 years. The capital is payable from year 5. The tax rate is 10.36%. What is Brent's Cost of Capital?

11. Verdun S.A., a clothes trading company, is considering the possibility of growing by means of a new store. For this purpose, it will have to invest US$ 300.000. US$ 100.000 are for furniture and building, US$ 200.000 are for NOF during the first 2 years. For this reason, shareholders decided to invest US$150.000, ask for a US$ 100.000 bank loan at a 12% interest rate and finally they will have a US$ 50.000 leverage from suppliers. The tax rate is 25%. The risk-free rate is 3% and the market rate is 6,5%. What is the project's WAAC if its $\beta = 1$?

12. Class S.A. requires a new wood design for the production of its new line of furniture during the next 5 years. For this reason, it has to adapt a new room that will cost US$ 30.000 to be amortized in 5 years and buy a new machine that will cost US$ 270.000 to be depreciated over 10 years. They are considering a machine's sale for US$ 100.000 at the end of the project. In order to carry out the project, shareholders decided to issue new 100.000 shares with a face value of US$ 1,5 and they expect a 14% return. These benefits will be paid at the end of the project. The rest of the necessary investment will be obtained with a 5-year debt payable annually at a 10% interest rate. Projected sales are US$ 300.000 for the first year with a growth rate of 10%, 9%, 7%, 5% per year during the 2nd, 3d, 4th and 5th year respectively. NOF are 10% of sales.

    The cost of sales is 56% of sales, administrative expenses are 8% of sales and selling expenses are 4% of sales.
    Market information is as follows: bonds' return 5%, sector's risk 1,6 and the stock exchange index (S&P 500) is 11%. Tax rate is 40%.

    a. Calculate the Income Statement ratios (G, gross margin, ROS, ROA and ROE)
    b. Present the Financial Balance
    c. Calculate the project's NPV with WACC and IRR using the Projected Cash Flow model.
    d. Calculate the tax shield as well as the Capital Cash Flow
    e. Calculate the Equity Cash Flow.

13. Croigar Group, leader in selling evening dresses, is interested in increasing its portfolio by entering the wedding gowns market or the sports clothes business. For this reason, it has performed a study of both projects with the following results:

In what business would you recommend Croigar to enter?

FREE CASH FLOW	FCF 0	FCF 1	FCF 2	FCF 3	FCF 4	FCF 5	FCF 6
Sports Clothes	$ (3.500)	$ (800)	$ 40	$ 924	$ 942	$ 1.131	$ 1.593
WACC	10,00%	NPV c/WACC	$ 855		Project's IRR		17,10%

FREE CASH FLOW	FCF 0	FCF 1	FCF 2	FCF 3	FCF 4	FCF 5	FCF 6
Wedding gowns	$ (4.500)	$ 1.000	$ 1.040	$ 1.154	$ 1.408	$ 1.549	$ 1.611
WACC	10,00%	NPV c/WACC	$ 969		Project's IRR		16,39%

14. Amerti is a building company that is evaluating two building projects. The first one is a 10-floor building that will need 4 years for construction and the other one is a house that could be built in 2 years. What project would you recommend Amerti?

FREE CASH FLOW	FCF 0	FCF 1	FCF 2	FCF 3	FCF 4	FCF 5	FCF 6
Sports clothes	$ (1.000)	$ 400	$ 500	$ 800	$ 400		
WACC	10,00%	NPV c/WACC	$ 651		Project's IRR		35,96%

FREE CASH FLOW	FCF 0	FCF 1	FCF 2	FCF 3	FCF 4	FCF 5	FCF 6
Wedding gowns	$ (1.000)	$ 650	$ 1.000				
WACC	10,00%	NPV c/WACC	$ 417		Project's IRR		37,65%

FINANCE
FOR EXECUTIVES

VIII

Summary on Company Valuation

Chapter VIII

Summary on Company Valuation

Company valuation is undoubtedly such a long subject that one could write a book on this matter. Actually, there are books that devote exclusively to everything concerning company valuation.

Valuation is more than setting a purchase/sale price to a company. There are subjective elements that influence the decision and specially the negotiation between the parties.

In this chapter we will make a brief summary of all the existing valuation methods, with an emphasis on the discounted cash flows method.

Value and Price

It is very important to make a distinction between a company's value and price. When we talk about valuation, we refer to the effort to find a justifiable value for an economic entity. But when we talk about price, we refer to the transaction's value that both seller and buyer discuss to perform the selling-buying operation of a company.

The fact that there are two parties in a transaction considers that valuation takes place from a specific perspective, the buyer's or the seller's. The buyer will try to set the maximum value he would be willing to pay for a company.

On the other hand, the seller will try to set a minimum value he could accept for the operation. Obtaining two different values is what takes the parties to negotiate, where the objective is to agree on a value which will probably be between the two.

However, a company has different kinds of value. Some of them may be:

- **Market value:** The price paid by the company if it has been sold recently, or its price today if it quotes at the Stock Exchange
- **Intrinsic value:** This is the company's value as a function of its projected future flows.
- **Potential value:** This is the company's value when internal changes are made to increase cash flows, so that it is worth more.

When performing a valuation, three types of value are present:

- **First,** if the company's conditions can be better than at present (that is, if the company can work more efficiently) there will be a potential value that will increase the company's capability to generate future flows.

- **Second,** if there is a potential value, then there will be a higher intrinsic value than expected, since expected future flows will be higher.

- **Third,** if the intrinsic value is higher, the price range will be lower (since the buyer's minimum expected value will be higher), which ensures a higher market value.

We have learnt an important lesson here: if a company is not working under optimum conditions and it is known that there may be a potential value to improve its efficiency, then valuation should be made under the assumption of optimum conditions.

Valuation Purposes

Unlike project evaluation which helps us find out an investment's return, company valuation has several purposes, but all of them focused on value creation. In this way, company valuation serves to the following objectives.

- **Buying-selling operations:** In order to determine a base price of a maximum amount to pay and a minimum amount to accept.

- **Inheritances and wills:** It serves to compare the value of the company's shares against other goods.

- **In companies quoted in the Stock Exchange:** To compare the value obtained against shares' quote in the market. It helps decide whether to sell, buy or keep the shares. It is also used to make comparisons between several companies.

- **Going public:** It serves to justify the price offered by shares to the public.

- **In identifying and paying value drivers:** In this case when identifying business units that create value for the company, we can compensate the executives who manage it as an incentive. It also allows the detection of value destruction sources.

- **In strategic decisions:** Company valuation and business unit valuation is a step prior to making firm decisions such as: liquidating, selling, merging, growing or buying companies.

- **In Strategic Planning:** It is useful to decide whether it is convenient to maintain, foster or abandon certain products, businesses, clients, etc. It also helps us measure the impact of probable policies and strategies concerning value creation (what we said about potential value).

Valuation Methods

Depending on the methodology used, valuation criteria must be simple in order to achieve a rapid approximation of the company's value. But, simplicity has inaccuracy as counterpart. On the contrary, other complex methodologies allow a closer approximation to reality.

Next we will discuss some (not all) valuation methodologies:

a) Methods based on Equity Value or the Balance Sheet

These are the simplest methods of all. They try to determine the company's value by means of equity's accounting value. However, these are static methods since they do not consider the company's future evolution. These include:

1) **Accounting Value Method:** It is the valuation determined by the company's accounting. In this way, the value of equity is equal to Assets minus Liabilities. If a company has $100 in assets and $60 in liabilities, its equity will be worth $40 (Figure 8.1).

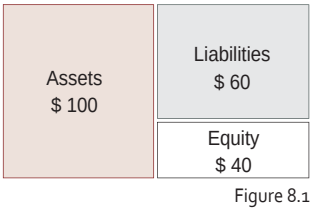


Figure 8.1

2) **Adjusted Accounting Value Method:** This is the adjustment of book values of Assets and Liabilities. They are made up by leveling them (as approximate as possible) to their market value. .

In the above example we saw that total assets are worth $100 in books. But if we adjust their accounts individually, we can get to an approximate market value.

Besides, if we eliminate uncollectable accounts from accounts receivable and we do the same with obsolete inventory and we adjust fixed assets to the value they could be sold for today, we can get to a market value of $120 for assets. Assuming the market value of debts is equal to their book value (which is very common), the new equity value would be $60(Figure 8.2).

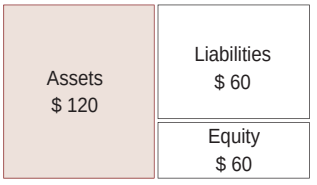


Figure 8.2

3) **Liquidation Value Method:** This is a company's remaining value if liquidation took place (selling all assets to pay for all liabilities). This method is rarely used as valuation criteria, unless the company is worth more dead than alive and it is bought with the purpose of selling it in parts.

b) Methods based on Profitability or the Income Statement

Unlike the above methods, these have a more dynamic point of view since they try to determine the company's value by estimating its future return. These include:

1) **Earnings per share method:** It tells us how much profit or earnings per share are. To obtain this ratio, we have to divide the net profit or earnings by the number of outstanding shares:

$$\text{Net earnings per share} = \frac{\text{Net Profit}}{\text{Number of outstanding shares}}$$

2) **Price/Earning Ratio (PER):** It establishes a relationship between share price and their earnings of profit.

$$PER = \frac{\text{Share price}}{\text{Profit or Earnings per Share}}$$

The PER relates a market measure (share price) to an accounting category (earnings per share). In this way, a PER of 10, would mean that investors are willing to pay for shares 10 times their earnings.

The PER allows us to value shares as follows: if we know the PER of companies that belong to our sector, we can obtain the price of our shares multiplying the market's PER by our earnings per share:

$$\text{Price} = PER_m \times \text{Earnings per share}$$

In this way, for instance, if the market's PER is 10 and our earnings per share are $0.50, the price of our shares will be $5,00.

c) Mixed Methods (Equity Value and Return)

These methods make a statistical evaluation of the company's assets and then confer some dynamics to such valuation, by trying to determine the value of the company's future performance.

1) **Goodwill Method:** This is the most used mixed method. Assets in books are evaluated (for the case of mergers between companies) or their market value (for the case of an acquisition of a company by another).

In acquisitions, once assets and liabilities are evaluated according to market value, equity value is determined by difference (Figure 8.2). After that, using our PER (or other methods) we obtain the price of our shares and we multiply it by the number of outstanding shares in order to obtain equity value.

Price = PER x Earnings per share
Price = 10 x 0.50 = $5 per share

Assuming this company has a total of 16 outstanding shares, the value of equity would be:

Equity value = Share price x N°of outstanding shares
Equity value = $5 x 16 shares = $80

The difference between the equity value obtained by PER (which will be the value to be paid by the buying company) and the equity value obtained by accounting equation (which will be the value to add to the company's equity of the buying company) will be the Goodwill:

Goodwill = Equity Value (PER) – Equity Value (Adjusted)
Goodwill = $80 - $60 = $20

For the buying company, the goodwill represents an asset (if positive) or a liability (if negative), which can be amortized throughout time in order to compensate for future losses or to generate tax shields when a profit increase is forecasted.

d) Simplified Discounted Cash Flow Methods

Nowadays the discounted cash flow method is widely used, and its methodology is the only one that is conceptually correct.

This method states that the real value of an asset (a share) is not its book value or its market value, but the present value of the cash flows that such asset may generate in the future. Such cash flows will have to be discounted at a rate that reflects not only the time value of money but also their risk.

Simplified discounted cash flow methods assume two particular conditions, precisely to simplify analysis:

- The cash flow rate is only the dividends to be received by shareholders in the future; and
- Dividends may be constant or may have an upward trend, stable or not.

If dividends have an upward trend, then a constant rate of dividend growth should be considered (g). In this way, both methods give us:

1) **Dividends with no growth (g=0):** As its name suggests, this method assumes that dividends do not grow, but hat every year shareholders will receive the same amount of money as dividends. Therefore:

$$D_1 = D_2 = D_3$$

This method is based on the following assumptions:

- The company does not retain earnings (100% is distributed), therefore it does not reinvest in itself and therefore it cannot grow.
- If the company does not grow, there will not be NOF variations.
- The depreciation figure remains constant; therefore net profit will also be constant.
- And if it remains constant, then dividends will also be supported, which will cause a perpetuity (Figure 8.3):

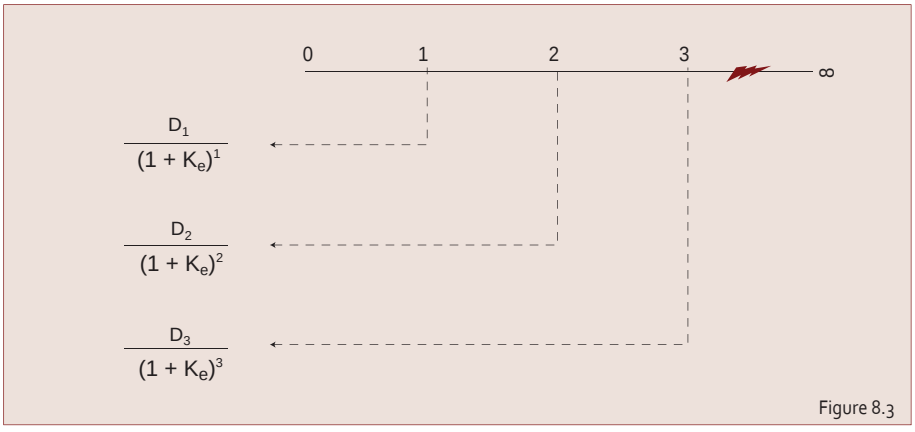


Figure 8.3

As we analyzed in chapter five, the value of a perpetuity (share price) can be calculated by dividing the flow (dividend) by the interest rate (shareholder's opportunity cost):

$$P = \frac{D}{K_e}$$

In this way, if a company does not grow and distribute a $10 annual dividend at perpetuity and the opportunity cost of shareholders is 20%, the share price will be $50.

$$P = \frac{\$10}{0{,}20} = \$50$$

2) **Dividends with constant growth (g>0):** In practice, the previous model is not applicable because the company needs to grow and it will not always maintain the same depreciation level. Therefore, since the company needs to grow, it will reinvest part of its profit and therefore:

$$D_1 < D_2 < D_3$$

This model also considers profit reinvestment, with the company's corresponding growth, which takes it to invest in NOF and FA, with depreciation's increase. But it also assumes that dividends will grow at a constant rate (Figure8.4).

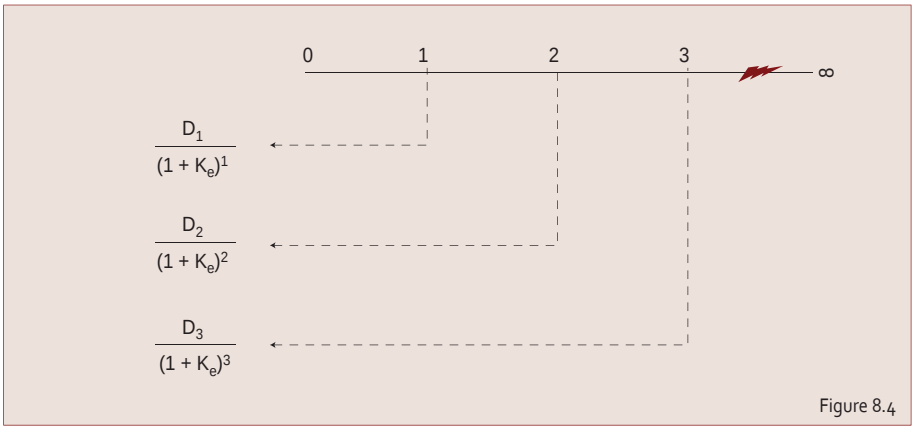


Figure 8.4

- $D_2 = D_1 \times (1+g)^1 = D_1 \times (1+g)$
- $D_3 = D_1 \times (1+g)^2 = D_2 \times (1+g)$
- $D_4 = D_1 \times (1+g)^3 = D_3 \times (1+g)$

Just like we analyzed in chapter five, a perpetuity's value (share price) when there is constant growth will be as follows:

$$P = \frac{D}{K_e - g}$$

And taking up again the previous example, if a company distributes an annual $10 dividend with a 5% constant growth and the opportunity cost of shareholders is 20%, the share price will be $66,67.

$$P = \frac{\$10}{0,20 - 0,05} = \$66,67$$

Although this model is closer to reality, it has some inconveniences that can be overcome. These are:

- The formula cannot be used unless $K_e > g$ (but always $K_e > g$)
- Dividends do not grow at a stable rate (but they do at an average rate)
- There are companies that pay dividends but not irregularly.

Estimating the growth rate: There are several manners to estimate the growth rate, such as:

1) **Historical growth:** This is the calculation of the percentage variation (growth or decrease) that a dividend has suffered:

$$g = \frac{D_n - D_{n-1}}{D_{n-1}}$$

If historical growth reflects what will happen in the future, this calculation can be used. If historical growth has not been constant, in that case an average of percentage variations from one year to the next can be obtained. That average will be the estimated growth.

In this way, if the previous year the company paid a $15 dividend and this year it pays a $20 dividend, it can be expected that the expected growth is 33%:

$$g = \frac{\$20 - \$20}{\$15} = 33\%$$

2) **Return on reinvestment:** This method assumes that the earnings retained by the company will be reinvested with the same return generated by the company, that is, its ROE. The formula is:

$$g = ROE \times retention\ rate$$

If a company has a 10% ROE and retains 50% of its earnings, then retained earnings earn 10% again and the company will grow 5% in total:

$$g = 10\% \times 50\% = 5\%$$

We can also get to this formula in another way. We know that the Retention Rate = 1 – Payout rate; and since the payout rate is equal to the proportion of dividends in relation to profit or earnings:

$$\text{Payout} = \frac{\text{Dividends}}{\text{Earnings}}$$

When calculating Payout in a unitary manner (that is, per share) we can calculate growth as follows:

$$g = ROE \bullet \left(1 - \frac{DPA}{BPA}\right)$$

DPS, is the dividend per share and EPS is earnings per share. Therefore, if this company has $12 as earnings per share and distributes 50% ($6 per share), growth would be 5% again.

$$g = 10\% \bullet \left(1 - \frac{\$6}{\$12}\right) = 5\%$$

3) **Average geometric growth:** Another way to observe the historical growth rate is to calculate a geometric average or by means of a linear or exponential estimation. Its formula is as follows:

$$g = \left(\frac{DPA_n}{DPA_0}\right)^{\frac{1}{n}} - 1$$

Where DPA_n are this year's dividends per share and DPA_0 are the dividends per share in periods ago. If a company pays dividends per share for $0,96 today and 4 years ago it paid a dividend per share for $0,80, average geometric growth was 4,66%:

$$g = \left(\frac{\$0,96}{\$0,80}\right)^{\frac{1}{4}} - 1 = 0,0466 = 4,66\%$$

Total return of shares: The total return of shares will be equal to: Dividend's return plus capital earnings.

Dividends' yield can be obtained when relating the dividend with the share price. This can be obtained by working out the value of K_e in the equation of dividends with growth. According to the above example, we have:

$$K_e = \frac{D}{P} + g = \frac{\$10}{\$66,77} + 5\% = 20\%$$

On the other hand, capital earnings are calculated by means of the percentage variation of prices (not dividends). Supposing that at the end of a year, share prices have increased to $73,34; then capital earnings have been 10%.

$$G = \frac{P_n - P_{n-1}}{P_{n-1}} = \frac{\$73,34 - \$66,67}{\$66,67} = 10\%$$

Therefore, total assets return will be 20%:

Total Yield = Yield + G = 20% + 10% =30%

e) Discounted Cash Flow Methods: Apart from the inconveniences pointed out previously, simplified discounted cash flow methods have another problem: they give a very brief vision of the flows to be perceived by shareholders. These methods assume that the only thing the shareholder receives is the dividends declared and paid.

However, they do not take into account what a company can pay as dividends. Some companies do not pay what they could really pay as dividends to shareholders or give dividends irregularly or do not pay at all for years.

What would be a more accurate measure of shareholder's flow? In the previous chapter we mentioned that a project may belong to a company but could also act as an independent company. This means that valuation methods used by a rising company (a project), may also be used to valuate existing companies.

Therefore, discounted cash flow methods used for company valuation are:

1. Free Cash Flow (FCF), discounted at WACC

2. Capital Cash Flow (CCF), discounted at WACCbt

3. Equity Cash Flow (ECF), discounted at shareholder's return, K_e

From all cash flows presented, the one we are most interested in is the ECF (but let's not forget that in order to get to the ECF we should go through the FCF and the CCF, which are also useful) because it represents a measure of what the company can or has the capacity to pay as dividends.

Besides the three methods allow the evaluation of a company's potential value. Let's analyze this through Ixu's valuation. In Table 8.1 we see Ixu's situation without activity optimization. In Table 8.2 we see Ixu's situation with resource optimization.

In Table 8.3 we see Ixu's shares valuation with and without optimization. Let's see:

Ixu's Analysis		
Analysis factor	**Without optimization**	**With optimization**
Collection period	27	24
Inventory days	159	120
Payment period	18	30
Cash Cycle	168	114

As we can see, when Ixu S.A. was evaluated without optimizing its activities, NPV (Net Asset Value) of ECF amounted to $4,850, which meant a share price of $1.21. However, under the assumption of optimization, the NPV of EFC amounts to $6,798, which means a share price of $1.70.

Therefore, there is a potential value per share of $0.49, which in total amounts to $1,960, which is the increase of intrinsic value (the NPV of the ECF). Then, we can conclude that optimization provides a much higher market value (price per share).

Why do we stress optimization and the potential value measure? If a person or a company wanted to acquire Ixu's shares paying a price per share of $1,50, we would think that we are earning $0.29 per share ($1.50 - $1.21), when we are actually losing $0.20 per share ($1.50 - $1.70), since Ixu S.A. is actually worth more than what its bookkeeping says.

Table 8.1 – Ixu's Projected Financial Statements (without optimization)

	A	B	C	D	E	F	G	H
1		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
2	**Income Statement**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
3	**Sales**	16.115	17.726	19.499	21.058	22.743	24.108	25.554
4	Cost of Sales	7.607	8.368	9.205	9.942	10.737	11.381	12.064
5	**Gross Margin**	8.507	9.358	10.293	11.117	12.006	12.726	13.490
6	Administrative Expenses	3.975	4.372	4.810	5.194	5.610	5.947	6.303
7	Selling Expenses	2.471	2.718	2.990	3.229	3.487	3.697	3.918
8	**EBITDA**	2.062	2.267	2.494	2.693	2.909	3.083	3.268
9	Depreciation	537	537	537	537	537	537	537
10	**EBIT**	1.524	1.730	1.957	2.156	2.372	2.546	2.731
11	Financial Expenses	473	369	306	255	205	155	105
12	**EBT**	1.052	1.361	1.651	1.901	2.167	2.391	2.626
13	Taxes (40%)	421	544	660	760	867	956	1.050
14	Net Profit	631	817	990	1.141	1.300	1.435	1.576
15								
16	**Income Statement Ratios**							
17	Sales growth (g)		10,00%	10,00%	8,00%	8,00%	6,00%	6,00%
18	Gross Margin in %	52,79%	52,79%	52,79%	52,79%	52,79%	52,72%	52,79%
19	ROS	3,92%	4,61%	5,08%	5,42%	5,72%	5,72%	6,17%
20	ROA	16,79%	18,57%	20,21%	20,91%	21,35%	21,14%	20,82%
21	ROE	13,11%	14,51%	14,96%	14,70%	14,35%	13,67%	13,05%
22								
23		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
24	**Full Balance Sheet**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
25	**Assets**							
26	Cash	54	50	50	355	808	1.460	2.240
27	Customers	1.209	1.348	1.483	1.601	1.729	1.833	1.943
28	Accounts receivable	806	886	975	1.053	1.137	1.205	1.278
29	Inventory	3.303	3.685	4.053	4.377	4.727	5.011	5.312
30	**Total Current Assets**	5.372	5.969	6.561	7.387	8.402	9.510	10.772
31	Net Fixed Assets (NFA)	5.372	5.372	5.372	5.372	5.372	5.372	5.372
32	**Total Assets**	10.743	11.340	11.932	12.758	13.773	14.881	16.144
33								
34	**Liabilities**							
35	Accounts payable	322	438	749	513	555	583	618
36	Accrued Expenses	591	709	780	842	910	964	1.022
37	Accrued Taxes	752	876	992	1.092	1.198	1.288	1.382
38	Short-term Debt (STD)	215	138	12	-	-	-	-
39	**Total Current Assets**	1.880	2.161	2.262	2.448	2.662	2.836	3.023
40	Long-term Debt (LTD)	4.050	3.550	3.050	2.550	2.050	1.550	1.050
41	**Total Liabilities**	5.930	5.711	5.312	4.998	4.713	4.386	4.073
42								
43	**Equity**							
44	Share Capital	698	698	698	698	698	698	698
45	Reserves	3.483	4.115	4.931	5.922	7.062	8.362	9.797
46	Income of the year	631	817	990	1.141	1.300	1.435	1.576
47	**Total Equity**	4.813	5.630	6.620	7.761	9.061	10.495	12.071
48	**Total Liabilities and Equity**	10.743	11.340	11.932	12.758	13.773	14.881	16.144

50		Real	Investment	Period 1	Period 2	Period 3	Period 4	Period 5
51	**Financial Balance**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
52	Cash Surplus	4	-	-	305	758	1.410	2.190
53	NOF	3.703	3.946	4.310	4.634	4.982	5.264	5.560
54	NFA	5.372	5.372	5.372	5.372	5.372	5.372	5.372
55								
56	STD	215	138	12	-	-	-	-
57	LTD	4.050	3.550	3.050	2.550	2.050	1.550	1.050
58	E	4.813	5.630	6.620	7.761	9.061	10.495	12.071
59								
60	**Financing Analysis**							
61	NOF	3.703	3.946	4.310	4.634	4.982	5.264	5.560
62	WC	3.491	3.808	4.299	4.939	5.739	6.674	7.750
63	Cash Surplus (WC-NOF>0) or							
64	Resources to be Negotiated (WC-NOF<0)	-211	-138	-12	305	758	1.410	2.190
65	Verification STD – Cash	211	138	12	-305	-758	-1.410	-2.190
66								
67	**Balance Sheet Ratios**							
68	Collection Period	27	27	27	27	27	27	27
69	Inventory Days	159	159	159	159	159	159	159
70	Payment Period	18	18	18	18	18	18	18
71	Cash Cycle	168	168	168	168	168	168	168
72	Asset Turnover	1,78	1,90	2,01	2,04	2,05	2,00	1,95
73	NOF Financing with WC	94,30%	96,50%	99,73%	106,59%	115,21%	126,79%	139,38%
74	Leverage	88,62%	65,51%	46,25%	32,86%	22,63%	14,77%	8,70%

Table 8.2 – Ixu's Projected Financial Statements (with optimization)

	A	B	C	D	E	F	G	H
1		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
2	**Income Statement**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
3	**Sales**	16.115	17.726	19.499	21.058	22.743	24.108	25.554
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9	Depreciation	537	537	537	537	537	537	537
10	**EBIT**	1.524	1.730	1.957	2.156	2.372	2.546	2.731
11	Financial Expenses	473	355	305	255	205	155	105
12	**EBT**	1.052	1.375	1.652	1.901	2.167	2.391	2.626
13	Taxes (40%)	421	550	661	760	867	956	1.050
14	Net Profit	631	825	991	1.141	1.300	1.435	1.576
15								
16	**Income Statement Ratios**							
17	Sales growth (g)		10,00%	10,00%	8,00%	8,00%	6,00%	6,00%
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19	ROS	3,92%	4,65%	5,08%	5,42%	5,72%	5,95%	6,17%
20	ROA	16,79%	18,83%	20,22%	20,89%	21,33%	21,12%	20,80%
21	ROE	13,11%	14,63%	14,95%	14,68%	14,33%	13,66%	13,04%
22								
23		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
24	**Full Balance Sheet**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
25	**Assets**							
26	Cash	54	50	1.488	1.961	2.541	3.295	4.184
27	Customers	1.209	1.231	1.300	1.404	1.516	1.607	1.704
28	Accounts receivable	806	886	975	1.053	1.137	1.205	1.278
29	Inventory	3.303	3.254	3.068	3.314	3.579	3.794	4.021
30	**Total Current Assets**	5.372	5.962	6.831	7.331	8.773	9.901	11.187
31	Net Fixed Assets (NFA)	5.372	5.372	5.372	5.372	5.372	5.372	5.372
32	**Total Assets**	10.743	11.333	12.203	13.103	14.144	15.273	16.559
33								
34	**Liabilities**							
35	Accounts payable	322	555	752	849	917	966	1.024
36	Accrued Expenses	591	709	780	842	910	964	1.022
37	Accrued Taxes	752	881	992	1.092	1.198	1.288	1.382
38	Short-term Debt (STD)	215	-	-	-	-	-	-
39	**Total Current Assets**	1.880	2.145	2.524	2.783	3.050	3.219	3.428
40	Long-term Debt (LTD)	4.050	3.550	3.050	2.550	2.050	1.550	1.050
41	**Total Liabilities**	5.930	5.695	5.574	5.333	5.075	4.769	4.478
42								
43	**Equity**							
44	Share Capital	698	698	698	698	698	698	698
45	Reserves	3.483	4.115	4.940	5.931	7.071	8.371	9.806
46	Income of the year	631	825	991	1.141	1.300	1.435	1.576
47	**Total Equity**	4.813	5.638	6.629	7.770	9.070	10.504	12.080
48	**Total Liabilities and Equity**	10.743	11.333	12.203	13.103	14.144	14.273	16.559

50		Real	Investment	Period 1	Period 2	Period 3	Period 4	Period 5
51	**Financial Balance**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
52	Cash Surplus	4	540	1.438	1.911	2.491	3.245	4.134
53	NOF	3.703	3.277	2.870	3.038	3.258	3.438	3.624
54	NFA	5.372	5.372	5.372	5.372	5.372	5.372	5.372
55								
56	STD	215	-	-	-	-	-	-
57	LTD	4.050	3.550	3.050	2.550	2.050	1.550	1.050
58	E	4.813	5.638	6.629	7.770	9.070	10.504	12.080
59								
60	**Financing Analysis**							
61	NOF	3.703	3.277	2.870	3.038	3.258	3.438	3.624
62	WC	3.491	3.816	4.307	4.948	5.748	6.683	7.759
63	Cash Surplus (WC-NOF>0) or							
64	Resources to be Negotiated (WC-NOF<0)	-211	540	1.438	1.911	2.491	3.245	4.134
65	Verification STD – Cash	211	-540	-1.438	-1.911	-2.491	-3.245	-4.134
66								
67	**Balance Sheet Ratios**							
68	Collection Period	27	25	24	24	24	24	24
69	Inventory Days	159	140	120	120	120	120	120
70	Payment Period	18	24	30	30	30	30	30
71	Cash Cycle	168	141	114	114	114	114	114
72	Asset Turnover	1,78	1,93	2,01	2,05	2,05	2,00	1,95
73	NOF Financing with WC	94,30%	116,48%	150,11%	162,90%	176,45%	194,40%	214,07%
74	Leverage	88,62%	62,97%	46,01%	32,82%	22,60%	14,76%	8,69%

Table 8.3 – Ixu's Valuation

	A	B	C	D	E	F	G	H
1	**Ixu's valuation without activity optimization**							
2		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
3	**Company valuation**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
4	Net Profit		817	990	1.141	1.300	1.435	1.576
5	(+) Depreciation / Amortization		537	537	537	537	537	537
6	(+) Financial expenses		369	306	255	205	155	105
7	(-) Tax shield		-148	-122	-102	-82	-62	-42
8	(±) NOF variations		-244	-364	-324	-348	-282	-296
9	(±) Fixed Assets variations		-537	-537	-537	-537	-537	-537
10	Free Cash Flow without perpetuity		794	810	970	1.075	1.245	1.343
11	(+) Perpetuity							28.327
12	**FREE CASH FLOW**		794	810	970	1.075	1.245	29.670
13	**Project's NPV with WACC=**	**9,98%**	**20.400**					
14								
15	(+) Tax shield		148	122	102	82	62	42
16	Capital Cash Flow without perpetuity		942	932	1.072	1.157	1.307	1.385
17	(+) Perpetuity							25.023
18	**CAPITAL CASH FLOW**		942	932	1.072	1.157	1.307	26.408
19	**Project's NPV with WACC=**	**10,81%**	**18.212**					
20								
21	(-) Debt amortization		-500	-500	-500	-500	-500	-500
22	(-) Financial Expenses		-369	-306	-255	-205	-155	-105
23	(+) Third-party resources							
24	Equity Cash Flow without perpetuity		73	126	317	452	652	780
25	(+) Perpetuity							8.219
26	**EQUITY CASH FLOW**		73	126	317	452	452	8.998
27	**Shareholder's NPV with K_e =**	**14,96%**	**4.850**					
28	**Number of outstanding shares =**	**4.000**						
29	**Share price =**	**$ 1,21**						
30								

32	**Ixu's Valuation with activity optimization**							
33		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
34	**Company valuation**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
35	Net Profit		825	991	1.141	1.300	1.435	1.576
36	(+) Depreciation / Amortization		537	537	537	537	537	537
37	(+) Financial expenses		355	305	255	205	155	105
38	(-) Tax shield		-142	-122	-102	-82	-62	-42
39	(±) NOF variations		426	407	-168	-220	-180	-187
40	(±) Fixed Assets variations		-537	-537	-537	-537	-537	-537
41	Free Cash Flow without perpetuity		1.464	1.581	1.126	1.203	1.348	1.452
42	(+) Perpetuity							30.639
43	**FREE CASH FLOW**		1.464	1.581	1.126	1.203	1.348	32.091
44	**Project's NPV with WACC=**	**9,98%**	**23.282**					
45								
46	(+) Tax shield		142	122	102	82	62	42
47	Capital Cash Flow without perpetuity		1.606	1.703	1.228	1.285	1.410	1.494
48	(+) Perpetuity							27.004
49	**CAPITAL CASH FLOW**		1.606	1.703	1.228	1.285	1.410	28.498
50	**Project's NPV with WACC=**	**10,81%**	**20.828**					
51								
52	(-) Debt amortization		-500	-500	-500	-500	-500	-500
53	(-) Financial Expenses		-355	-305	-255	-205	-155	-105
54	(+) Third-party resources							
55	Equity Cash Flow without perpetuity		751	898	473	580	755	889
56	(+) Perpetuity							9.374
57	**EQUITY CASH FLOW**		751	898	473	580	755	10.263
58	**Shareholder's NPV with K_e =**	**14,96%**	**6.798**					
59	**Number of outstanding shares =**	**4.000**						
60	**Share price =**	**$ 1,70**						

Perpetuity Calculation:

Why are we calculating a perpetuity? Because in general companies are created under the "Operating Company", which means that companies are created to last forever.

What flow will we calculate to obtain a perpetuity? We have to consider implicitly some subjective elements, but let's consider a question: what do we need for the company to continue generating flows forever? Well, it needs to invest in a recurrent manner.

A company cannot generate flows for ever only with initial investment. The company needs to renovate its investments every time in a while in order to maintain a stream of perpetual flows. If it wants that stream to be of growing flows, all the more reason to reinvest in the company.

Considering this fact, are the cash flows obtained a good representation of this principle? That is, do cash flows consider constant reinvestment? For Ixu, we will say yes, because it invests as much as it depreciates (lines 5 and 9 from Table 8.3).

Next, to calculate the perpetuity, we have taken the last value of each cash flow and discounted it at its corresponding rate. Therefore:

FCF Perpetuity	CCF Perpetuity	ECF Perpetuity
$\frac{FCF_5(1+g)}{WACC - g}$	$\frac{CCF_5(1+g)}{WACC_{bt} - g}$	$\frac{ECF_5(1+g)}{K_e - g}$

Company valuation with project:

From chapter one we have mentioned that all investment decisions made will have to be addressed to value creation for the company and for shareholders. Therefore, the decision of investing in a project should create value for shareholders, which will be reflected in their share price.

Let's continue with Ixu 's case. The company, once optimized, obtained a share price of $1.70. But in addition to optimization, it decided to invest in a profitable project (see chapter seven). Once the project was added to the company's portfolio (that is, to the rest of assets), the share price increased to $2.02, as we will see in Table 8.4. Therefore, Ixu has created value with the project.

Table 8.4 – IXU's valuation (with project)

	A	B	C	D	E	F	G	H
1		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
2	**Income Statement**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
3	**Sales**	16.115	17.726	39.499	43.058	46.743	49.766	52.496
4	Cost of Sales	7.607	8.368	17.205	18.742	20.329	21.645	22.841
5	**Gross Margin**	8.507	9.358	22.293	24.317	26.394	28.122	29.655
6	Administrative Expenses	3.975	4.372	8.010	8.714	9.447	10.052	10.614
7	Selling Expenses	2.471	2.718	5.390	5.869	6.365	6.776	7.151
8	**EBITDA**	2.062	2.267	8.894	9.733	10.582	11.294	11.890
9	Depreciation	537	537	2.937	2.937	2.937	2.937	2.937
10	**EBIT**	1.524	1.730	5.957	6.796	7.645	8.357	8.953
11	Financial Expenses	473	355	805	665	520	370	215
12	**EBT**	1.052	1.375	5.152	6.132	7.126	7.987	8.738
13	Taxes (40%)	421	550	2.061	2.453	2.850	3.195	3.495
14	**Net Profit**	631	825	3.697	3.679	4.275	4.792	5.243
15								
16	**Income Statement Ratios**							
17	ROS	3,92%	4,65%	7,83%	8,54%	9,15%	9,63%	9,99%
18	ROA	16,79%	5,21%	17,54%	19,28%	20,65%	21,30%	21,43%
19	ROE	13,11%	4,20%	13,60%	13,93%	13,93%	13,51%	12,88%
20								
21		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
22	**Financial Balance**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
23	Cash surplus	4	540	1.628	4.889	8.602	12.809	32.773
24	NOF	3.703	3.277	5.370	5.788	6.255	6.645	3.624
25	NFA	5.372	29.372	26.972	24.572	22.172	19.772	5.372
26								
27	STD	215	-	-	-	-	-	-
28	LTD	4.050	13.550	11.240	8.840	6.345	3.750	1.050
29	E	4.813	19.638	22.729	26.408	30.683	35.476	40.718
30								
31		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
32	**Company valuation**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
33	Net Profit		825	3.091	3.679	4.275	4.792	5.243
34	(+) Depreciation / Amortization		537	2.937	2.937	2.937	2.937	2.937
35	(+) Financial Expenses		355	805	665	520	370	215
36	(-) Tax Shield		-142	-322	-266	-208	-148	-86
37	(±) NOF variations		426	-2.093	-418	-468	-390	3.021
38	(±) Fixed Assets Variation		-24.537	-537	-537	-537	-537	11.463
39	Free Cash Flow without perpetuity		-22.536	3.881	6.060	6.520	7.024	22.792
40	(+) Perpetuity							110.609
41	**FREE CASH FLOW**		-22.536	3.881	6.060	6.520	7.024	133.401
42	**Project's NPV with WACC=**	**9,98%**	**71.493**					
43								
44	(+) Tax Shield		142	322	266	208	148	86
45	Capital Cash Flow without perpetuity		-22.394	4.203	6.326	6.727	7.172	22.878
46	(+) Perpetuity							94.744
47	**CAPITAL CASH FLOW**		-22.394	4.203	6.326	6.727	7.172	117.622
48	**Project's NPV with WACC=**	**10,81%**	**60.153**					
49								

50	(-) Debt amortization		9.500	-2.310	-2.400	-2.495	-2.595	-2.700
51	(-) Financial Expenses		-355	-805	-665	-520	-370	-215
52	(+) Third-party resources							
53	Equity Cash Flow without perpetuity		-13.249	1.088	3.261	3.713	4.207	19.964
54	(+) Perpetuity							55.267
55	EQUITY CASH FLOW		-13.249	1.088	3.261	3.713	4.207	75.231
56	Shareholder's NPV with Ke =	14,96%	28.258					
57	Number of outstanding assets =	14.000						
58	Share price =	$ 2,02						

Perpetuity Calculation: Again the question should be raised: Are cash flows obtained a good representation of the constant reinvestment principle? Not in this case. Let's look at Period 5, where there is divestment that corresponds to the sale of fixed assets. Will this happen forever? Of course not, otherwise the company will be left with no assets.

However, let's suppose machinery liquidation does not take place in year five, but the company decides to keep the asset for ever, would it be convenient then to take the flow from year five as a basis to calculate the perpetuity?

No, because taking into account machinery investment for the project, it will not be replaced in the following years; net fixed assets would decrease in accounting terms while depreciation would remain fixed. Therefore, a perpetuity based on the flow of year five would cause a negative asset in the future, which is impossible.

Then, what value do we take to calculate the perpetuity? When an appropriate value would be net profit and then we would suppose that assets increases would be financed with debt or that assets remain constant (or that investment takes place as much as depreciation).

On the long-run, it seems a reasonable hypothesis, since it is as much as saying that the company will grow at a constant pace and will maintain a similar financial structure as today's. However, when net profit is not an appropriate value for perpetuity either (because of extraordinary entries), then we would have to consider preparing a Regulatory Flow, which considers reinvestment assumptions.

For Ixu's valuation (including the project) we use as perpetuity base the net profit value, since the Income Statement does not contain an extraordinary entry. Therefore:

FCF Perpetuity	CCF Perpetuity	ECF Perpetuity
$\frac{BN_5(1+g)}{WACC - g}$	$\frac{BN_5(1+g)}{WACC_{bt} - g}$	$\frac{BN_5(1+g)}{K_e - g}$

Then, the project adds a value of $0.32 to each share, which means that shareholders increased their wealth by $0.32. Now, the new share price is $2.02.

Adjusted Present Value Method (APV): As previously studied, the purpose of the Free Cash Flow was to evaluate the company's flows regardless of how it was financed. In other words, the FCF evaluates the company with no debt. Now, what if this assumption were true?

If it were true, the FCF would be equal to the ECF and therefore, flows would not have to be evaluated at WACC, but they would be evaluated directly at the equity cost of capital (K_e). However, the K_e is also affected by debt since there are insolvency risks (stop paying the bank) therefore the shareholder will demand a higher return that compensates the risk acquired.

As we know, risk is reflected in beta. Therefore, if the shareholder incurs in or asks for more debt, his/her beta will be higher since there is a higher risk. If there were no debt, beta would be lower and therefore K_e would be lower.

Betas that include debt risk are known as leveraged betas (due to leverage or the D/E ratio); while betas that do not include that risk, are known as unleveraged betas. Likewise, rates that include leveraged betas are called leveraged rates (K_e), while those that include non-leveraged betas are unleveraged rates (K_a).

The Adjusted Present Value method evaluates the company as if it had no debt. The APV involve FCF evaluation (under the assumption that FCF = ECF) at an unleveraged rate (K_a) that represents the opportunity cost of the shareholder who has not incurred in debt.

How do we obtain Ka if we know that there are actually very few companies who are fully financed with equity? A way to obtain K_a is unleveraging the leveraged beta. We do this by means of the Hamada Equation (called after its inventor, Robert Hamada):

$$\beta_5 = \frac{\beta_e}{1 + \frac{D\,(1 - t)}{E}}$$

Where:

β_a = unleveraged beta
β_e = leveraged beta
D = debt value
T = Tax rate
E = Equity value

Once the unleveraged beta has been obtained, we have the unleveraged cost of capital with the CAPM formula:

$$K_a = R_f + \beta_a\,(R_m - R_f)$$

For Ixu S.A., we have the following information to calculate the unleveraged beta:

Market Information	Value
Total Third-party resources	4.265.00
Total Equity	4.813.00
Government Bonds Return	5.00%
Sector Risk (β_e)	1.66
Stock Exchange Index (S&P500)	11.00%

We use the Hamada equation to unleverage beta:

$$\beta_a = \frac{1.66}{1 + \frac{4{,}265 \bullet (1 - 0.4)}{4{,}813}} = 1.08$$

Once the unleveraged beta is obtained, we obtain the unleveraged rate:

$$K_a = 0.05 + 1.08\ .\ (0.11 - 0.05) = 11.50\%$$

With the unleveraged rate, we evaluate the FCF and we obtain the value of the fully unleveraged company:

31		Real	Investment	Period 1	Period 2	Period 3	Period 4	Period 5
32	**Company valuation**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
33	Net Profit		825	3.091	3.679	4.275	4.792	5.243
34	(+) Depreciation / Amortization		537	2.937	2.937	2.937	2.937	2.937
35	(+) Financial Expenses		355	805	665	520	370	215
36	(-) Tax shield		-142	-322	-266	-208	-148	-86
37	(±) NOF variations		426	-2.093	-418	-468	-390	3.021
38	(±) Fixed Assets variation		-24.537	-537	-537	-537	-537	11.463
39	Free Cash Flow without perpetuity		-22.536	3.881	6.060	6.520	7.024	22.792
40	(+) Perpetuity							84.653
41	**FREE CASH FLOW**		-22.536	3.881	6.060	6.520	7.024	107.445
42	**Project's NPV with WACC=**	11,50%	51.483					

This means that the entire company without debt is worth $20,000 less than if it had debt ($71,493-$51,483). Conclusion: the company is worth more with debt than without it.

e) Value Creation Methods

During the last years, new methodologies have been developed to evaluate a company's value creation. While it is true that the NPV allows measuring value creation in an accurate manner, the new methods developed are oriented towards measuring value creation per period.

This is the case of EVA®, patented by Stern & Stewart & Co. EVA tries to measure value creation per period. EVA is based on the following assumptions: we know that the company's investment is in NOF and NFA. That investment is financed with debt (D) and equity (E).

As we know, debt has a cost (K_d) and so des equity (K_e). However, we can see clearly in the Income Statement what the company pays for the cost of debt (that is, financial expenses), on the other hand we cannot calculate easily (because it does not appear in the accounting structure) the monetary cost of equity.

But, what if we could determine the cost of equity as a monetary expenditure? In that case, the Income Statement structure would look like this:

EBIT
- Financial Expenses (cost of debt)
= EBT
- Taxes
= Net Profit
- Shareholders' return (Cost of E)
= Residue

What would this residue be? The value created in each period. This value is different from retained earnings, after dividends have been declared. Distribution rates or Earnings retention rates are only a company's policy while Ke represents a desired return.

What is needed to obtain such residue? EBIT (minus the hypothetical tax) would have to be higher than the three returns shown at the end:

- The monetary cost of debt
- The monetary cost of taxes (with tax savings) and
- The monetary cost of equity.

We know that the three returns make up the WACC. Then, if we analyze these monetary costs in detail, they can be obtained directly from multiplying the WACC by all the capital invested, that is, D+E. Therefore, EVA would be equal to:

$$EVA = [EBIT \times (1-T)] - [WACC \times (D+E)]$$

Let's see in another way: EBIT is the company's operating result. Therefore, to calculate ROA, we divided EBIT by total assets. Working out the value of EBIT, we would obtain EBIT = ROA x (D+E). If we replace this in the above formula, after working out the value of the D+E common factor, we would obtain:

$$EVA = (ROA - WACC) \times (D+E)$$

This is a fundamental principle of value creation. The company creates value when ROA > WACC, just like shareholders create value when ROE > Ke. Therefore, ROA-WACC is value creation measured as a percentage. If we multiply this percentage (called Spread) by the capital invested, we would obtain value creation measured in monetary terms.

This is what EVA looks for: the monetary value of that residue, since if the residue exists this would mean that the company has yielded more than what investors demand. It would also demonstrate that executives have done a good management work because the company creates value.

EVA intends that the executive is conscious that he is using financed assets, but that this financing has a cost. Therefore, it demands from executives to manage those assets in a way that allows obtaining a return that is at least equal to cost. After covering costs, all the extra money earned will be a reward for good management.

Let's see Ixu's case in Table 8.5. During the investment period, the company creates no value, therefore a strong investment in assets is needed (project's machinery). But once this investment generates results, we see that ROA is higher than WACC (lines 28 to 30).

On the other hand, if we measure value creation in monetary terms, we see that EBIT is higher than the three costs mentioned. Therefore, there will be a residue, which will represent the economic added value per period. This will also mean that Ixu's executives have done a good work. They have suggested investing in a project and thanks to that they have added value.

Table 8.5 – Measuring EVA at IXU S.A.

	A	B	C	D	E	F	G	H
1		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
2	**Income Statement**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
3	**Sales**	16.115	17.726	39.499	43.058	46.743	49.766	52.496
4	Cost of Sales	7.607	8.368	17.205	18.742	20.329	21.645	22.841
5	**Gross Margin**	8.507	9.358	22.293	24.317	26.394	28.122	29.655
6	Administrative Expenses	3.975	4.372	8.010	8.714	9.447	10.052	10.614
7	Selling Expenses	2.471	2.718	5.390	5.869	6.365	6.776	7.151
8	**EBITDA**	2.062	2.267	8.894	9.733	10.582	11.294	11.890
9	Depreciation	537	537	2.937	2.937	2.937	2.937	2.937
10	**EBIT**	1.524	1.730	5.957	6.796	7.645	8.357	8.953
11	Financial Expenses	473	355	805	665	520	370	215
12	**EBT**	1.052	1.375	5.152	6.132	7.126	7.987	8.738
13	Taxes (40%)	421	550	2.061	2.453	2.850	3.195	3.495
14	Net Profit	631	825	3.697	3.679	4.275	4.792	5.243
15								
16		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
17	**Financial Balance**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
18	Cash surplus	4	540	1.628	4.889	8.602	12.809	32.773
19	NOF	3.703	3.277	5.370	5.788	6.255	6.645	3.624
20	NFA	5.372	29.372	26.972	24.572	22.172	19.772	5.372
21								
22	STD	215	-	-	-	-	-	-
23	LTD	4.050	13.550	11.240	8.840	6.345	3.750	1.050
24	E	4.813	19.638	22.729	26.408	30.683	35.476	40.718
25								
26		**Real**	**Investment**	**Period 1**	**Period 2**	**Period 3**	**Period 4**	**Period 5**
27	**EVA per Period**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
28	ROA		3,13%	10,52%	11,57%	12,39%	12,78%	12,86%
29	WACC		9,98%	9,98%	9,98%	9,98%	9,98%	9,98%
30	Difference (ROA-WACC)		-6,85%	0,54%	1,59%	2,41%	2,80%	2,88%
31	Added value (Spread x (D+E))		-2.274	184	560	892	1.099	1.203
32								
33								
34	EBIT x (1 - T)		1.038	3,574	4.078	4.587	5.014	5.372
35	WACC x (D - E)		3.312	3.390	3.518	3.695	3.915	4.168
36	Difference (added value)		-2.274	184	560	892	1.099	1.203
37	**EVA with WACC=**	**9,98%**						

EVA is not only a valuation tool, but also a management tool. Goals can be set for executives based on EVA. Actually, a deeper analysis on EVA would imply writing an entire book exclusively devoted to this subject.

It is true that the Company valuation subject is extensive. In a few lines, we have only outlined a short summary of the different valuation methods, but there is more. My suggestion is that with this knowledge, you keep on doing research and going deeper into this interesting and necessary field of science called Finance.

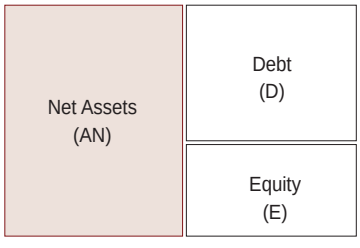
Comments on company valuation by discounted cash flows *

Certainly, in Corporate Finance company valuation is one of the most fascinating subjects because of the wide variety of aspects it entails and because the many valuation methods can be often arguable. Just look at the plentiful specialized bibliography under the title "company mergers and acquisitions".

In this note I intend to have a brief look at the mathematical approach of the problem, in order to clarify certain definitions. The objective is that the reader has a document that gathers conceptually correct methodology on the one hand and on the other hand a set of parameters and ideas that make him question himself about such approaches, since the task of valuating companies requires knowledge, wisdom and it generates commitment.

To begin with, we should start from the following diagram, which represents the company as a whole:

Figure 1. Company's representation



*Note from IDE's Research Division
Prepared by Professor Alberto Pérez Endara. November 1996.

In reference to this diagram, we have to establish the three components: NA, D and E are expressed in market values. And they are defined as follows:

NA = Total Assets minus Liabilities without explicit cost. Throughout this note, net assets will simply have to be understood as net assets.

D = sum of all debts with financial cost for the company.

E = Equity expressed in market value = Share value x number of shares

We insist on the fact that in the diagram in Figure 1, liabilities without explicit cost have been taken out both from assets as well as from liabilities, for instance: accounts payable, accrued taxes, social security taxes, short-term provisions, etc.

In this way, Net Assets (NA) represent the net investment made by the company, an investment that is precisely the cause that generates cash flows, which will serve both for Debt (D) as for Equity (E).

Therefore the company's value is precisely the market value of Net Assets. The basic equation to consider is as follows:

$$NA = D + E$$

In other words, it will always have to be met that the market value of assets is identical to the sum of the market value of shares plus debt (at market values too).

Let's add the weighted cost of D, K_d and the profitability demanded from E, K_e.

Ways to calculate a company's value by discounted cash flows.

1. Calculation of the market value of assets

Company's value= D + E

$$(1A)\quad D+E = \sum_{j=1}^{\infty}\left[\frac{FCF_j}{\Pi^j \quad (1 + WACC_j)}\right] = AN$$

If WACC is constant throughout time, (1A) is transformed into:

$$(1B)\quad D+E = \sum_{j=1}^{\infty}\left[\frac{FCF_j}{(1 + WACC)^j}\right] = AN$$

where:

FCF = Free Cash Flow

WACC = Weighted cost of debt and shares

$$WACC = \frac{K_d\,(1\text{-}t)\,D + K_e\,E}{(D+E)}$$

For the case of perpetuities with constant growth g, we would obtain:

$$(1C)\quad D + E = \frac{FCF_1}{WACC\text{-}g)}$$

2. Calculation of the market value of shares

$$(2A)\quad E = \sum_{j=1}^{\infty}\left\{\frac{CFacc_j}{\Pi_j \quad (1 + K_{ej})}\right\}$$

If Ke is constant throughout time, (2A) is transformed into:

$$(2B)\quad E = \sum_{j=1}^{\infty} \left\{ \frac{CFacc_j}{(1 + K_e)j} \right\}$$

Where:
CFsh = Cash FIow for shares = Dividends
K_e = Cost of equity of leveraged company = profitability demanded from shares.

For perpetuities with constant growth g, we would obtain:

$$(2C)\quad E = \frac{CFacc}{(K_e - g)}$$

3. Alternative company valuation

$$(3A)\quad AN = D + E = \sum_{j=1}^{\infty} \left\{ \frac{FCF_j}{\Pi^j \quad (1 + Ku_j)} \right\} + NPV$$

From tax savings
For interest payment

If K_u is constant throughout time, (3A) is transformed into:

$$(3B)\quad D + E = \sum_{j=1}^{\infty} \left\{ FCFj\ (1 + Ku)j \right\} + NPV$$

From tax savings
For interest payment

Where:

K_u = Cost of equity of unleveraged company = Shares expected return of an unleveraged company (that is, financed with equity)

For the case of perpetuities with constant growth, we would obtain:

(3C) $$D+E = CFsh \frac{1}{(K_u - g)} + NPV$$ from tax savings for interest payment

The Capital Asset Pricing Model (CAPM)

This model can be summarized in the following expressions:

(4) $K_e = R_f + \beta_L \cdot PM$

Similarly, it is inferred that:

(5) $K_u = R_f + \beta_u \cdot PM$

(6) $K_d = R_f + \beta_d \cdot PM$

In these expressions:

R_f = Risk-free return = risk-free interest rate
β = Incremental share risk or systematic risk
MP = Market premium = market return minus free risk = $R_M - R_f$
The product of $\beta \cdot PM$ is then the share risk premium.

It is convenient to remember that share's VOLATILITY is the one that measures total risk, that is, its systematic risk (measured by its β, not diversifiable) and not the non-systematic risk (diversifiable).

Volatility is the annualized standard deviation of a share's return.

$$\beta = \frac{cov\,(R_i, R_m)}{var\,(R_m)} = \frac{cov\,(R_i, R_m)}{\sigma_m^2}$$

R_i = share's return
R_m = market's return

Non-systematic risk is eliminated by making up a portfolio of several shares (30 a 40). For the holder of a diversified portfolio, β is the relevant risk measure. While if he has one share only or a non-diversified portfolio, volatility is the risk measure to take into account.

Besides:

(7) $$\beta_U = \beta_{act} \frac{\beta_d \ D\ (1 - t) + \beta_L\ E}{D\ (1 - t) + E}$$

(8) Or rather, applying the Modigliani and Miller Model, we can estimate the different variables that are useful for valuation. Therefore:

(9) $$K_e = k_u + (k_u - k_d)\ (1-t)\ D/E$$

If we replace 9) in WACC's expression, we get to:

(10) $$WACC = k_u \left[1 - t \frac{D}{D + E}\right]$$

If we replace K_d for R_f
K_u for $R_f + \beta_u\ (R_m - R_f)$
K_e for $R_f + \beta_L\ (R_m - R_f)$

We get :

(11) $$\beta_L = \beta_u \left[1 + (1- t) \frac{D}{E}\right]$$

Let's remember the need to apply the formulas of the Modigliani and Miller model with extreme wisdom and only for moderate-debt cases.

Some definitions and comments

We remember the Cash Flow definition for shares, which correspond to the cash flow concept starting from net profit:

CFsh = NP + Depreciations - NOF Increase – Investments in fixed assets + Accounting value of withdrawn or sold assets – Increases in Amortizable Expenses – Debts' back return – New debt.

Free Cash Flow is defined as the hypothetical CFsh the company would have if it had no debt on liabilities, that is:

FCF = CFsh + I • (l - t) + Returned Debt – Debt increase

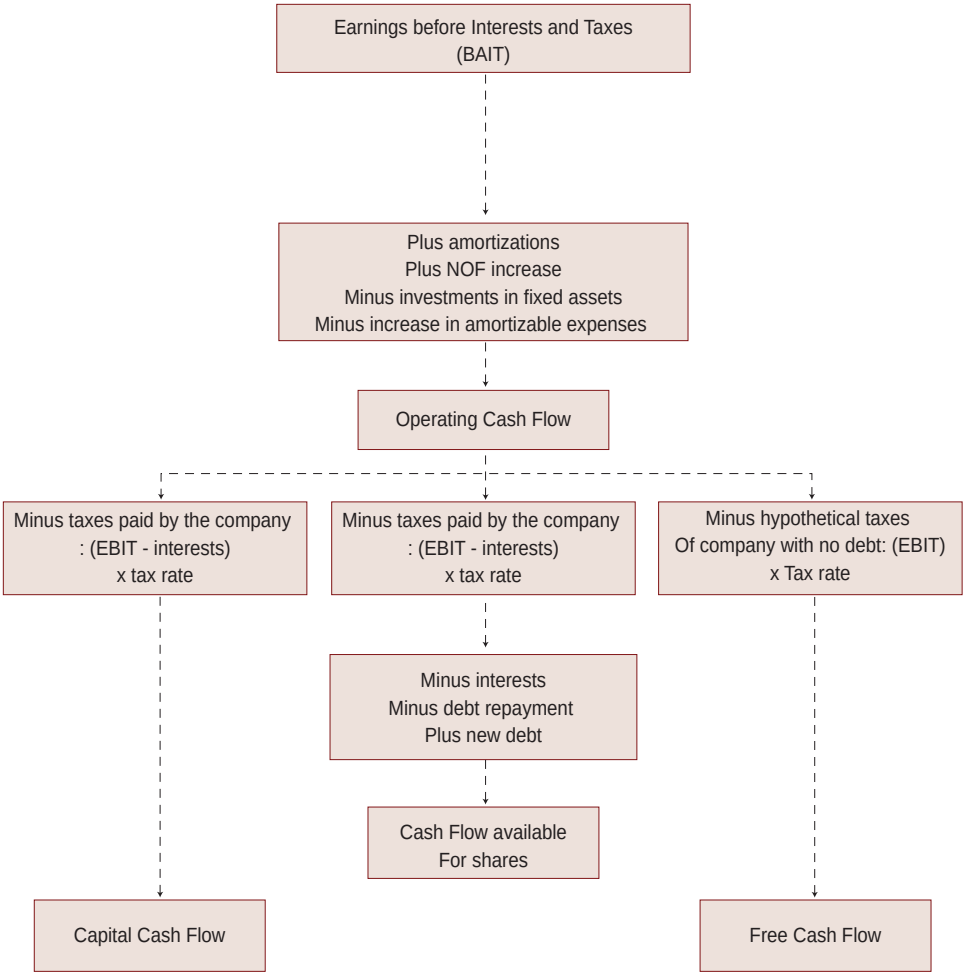
It becomes clearer if we put it this way:

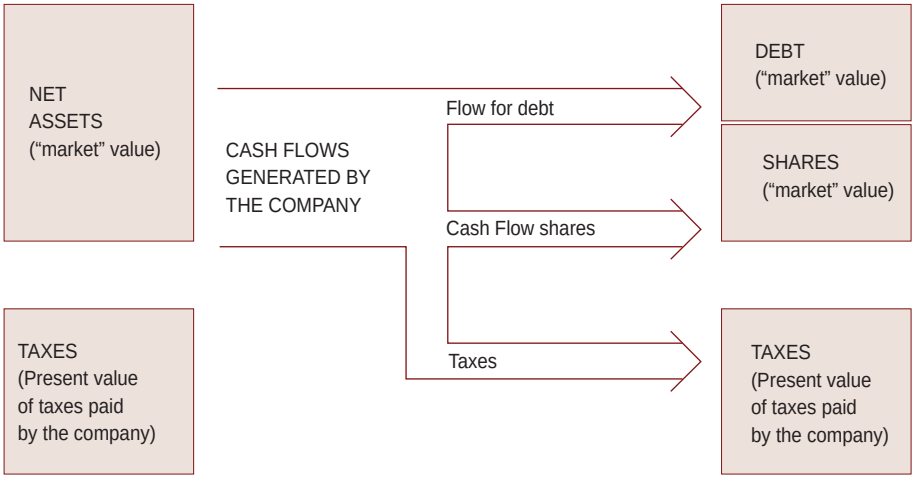
CFsh = FCF - interests • (1 - t) – devolution of principals + new debt.

We define Capital Cash Flow, CCF, as the flow available exclusively for Debt and Shares.

The following figures explain these definitions:

Obtaining different Cash Flows





Comments:

a) From the nature of composition of the above expressions, it is clear that valuating a company is not easy. The first big task is to estimate the flows. The second one is to estimate the risk of those flows, that is, K_d, K_e, WACC, etc.

b) To follow the order mentioned, let's comment on cash flow estimation. The starting point will probably be sales forecast. To begin with, this forces to set a temporary horizon. But the way this forecast is made, which can be very scientific, is not what matters, but rather the conviction degree of executives (or valuators) for these forecasts to be realistic and true. Very often sales forecasts also involve estimating a growth rate.

c) But not only sales have to be forecasted. Also investment growth, repayment and debt increase, savings and cost evolution, both variable and fixed, certain amortizable expenses (R&D, Corporate Advertising, etc.), liquidation of obsolete assets. etc.

d) In order to complete flows, a final (or rescue) value should be estimated, which summarizes the company's activity beyond the temporary horizon that covered previous forecasts. Due to the influence of this final value in final NPV, this is a very delicate aspect and a lot of judgment should be used to choose the estimation method (perpetuities, PER, etc.) for this value, and above all, weight up the consequences of the hypotheses considered.

e) If we succeed in addressing the flow issue, the discount rate is next. In principle it is easy: investors tell us what their demanded return is and that is it... Well, no! It should be consistent with what you are trying to do: value shares impartially, therefore the discount rate has to correspond to the risk of flows (or the one used in an investment of similar risk level than the one analyzed). The problem lies in measuring this risk, but at least it should be clear whom such risk corresponds to.

f) Another interesting subject is flow treatment with inflation. To make it brief, we will say that the way to reduce the probability of making mistakes is treating flows in current values (nominal) and discount them at a compound rate that includes inflation, thus avoiding the problems involved in recording amortizations and NOF.

Some developments for perpetuities

Let's analyze this case due to its simplicity and its usefulness at the moment of drawing conclusions.

For these cases, the formulas become:

1p) $$E + D = \frac{FCF}{WACC}$$

1p') $$D = \frac{I}{K_d}$$

2p) $$E = \frac{CFacc}{K_e}$$

3p) $$E + D = \frac{FCF}{Ku} + \text{NPV of tax savings}$$

The relationship between FCF and CFsh is:

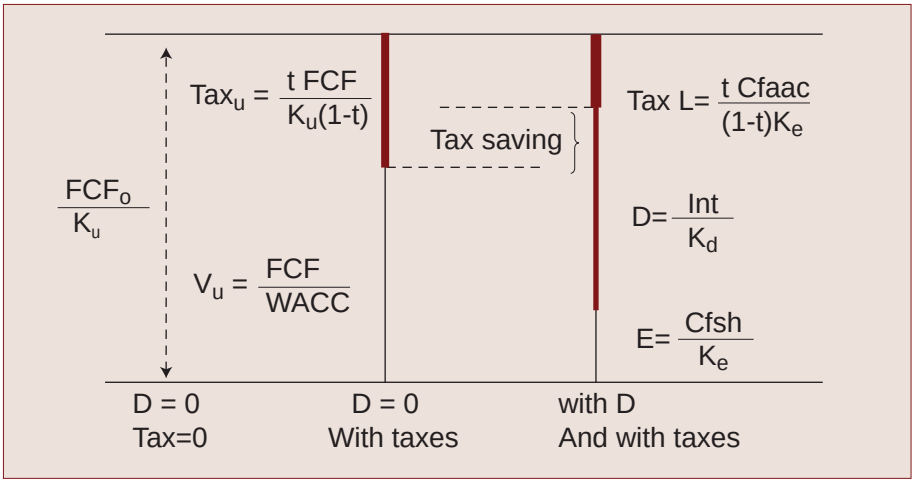
4p) $$FCF = CFacc + D\ K_d\ (1 - t)$$

It is well understood that FCF/K_u corresponds to the value of the company's shares with no debt, which is identical to the value of assets. Therefore K_u has β_u, as asset risk. The unleveraged company's value (or share value) will be called V_u (u from "unleveraged").

We equal [1p] and [2p]; and using [4p] we obtain WACC's expression:

$$WACC = \frac{D\ K_d\ (1 - t) + E\ K_e}{E+D}\ ;\ \text{weighted average cost}$$

Graphic representation of the different flows and the company's value



Obtaining these expressions can help understand the concepts that are continuously being used and apply them to real complex situations. Let's see:

For a perpetuity, NP = EBT = CFsh

FCFo is the company's FCF if there were no taxes.

With taxes FCF = $FCF_o \bullet (1-t)$

Let's remember also that EBT = EBT - T = EBT - t • EBT = EBT (1 - t)

And for the unleveraged company:

$Tax_u = t \bullet EBT_u = t \bullet FCF_o$

This is very important because it means that the risk of an unleveraged company is the same as for FCFo, that is, Ku. If we update this flow to this rate, we get:

$$Tax_u = [\, t \bullet FCF / (1-t) \,] / K_u = \frac{t\ FCF}{(1-t)K_u}$$

Now let's see the flow of our leveraged company:

$$Tax_u = t \bullet EBT_L = \frac{t \bullet EAT_L}{(1-t)} = \frac{t \bullet CFsh}{(1-t)}$$

And we know that the risk of a leveraged company is Ke. Therefore:

$$Tax_L = \frac{t\ CFsh}{(1-t)\ K_e}$$

Finally, the NPV of our tax savings is finally: Taxu - TaxL. This difference is:

$$NPVtax\ sav. = \left[\frac{t}{(1-t)}\right]\left[\frac{FCF}{K_u} - \frac{CFsh}{K_e}\right]$$

Replacing [c] and [d], we get to

$$NPVtax\ sav. = \frac{t}{(1-t)}\left[D - NPVtax\ sav.\right]$$

which takes us to:

$$NPVtax\ sav. = t\ D$$

Using [2p], [3p] y [4p], we can get to:

$$K_e = K_u + (K_u - K_d)\left[\frac{D(1-t)}{E}\right]$$

Which is precisely the expression developed by Modigliani and Miller.

This expression would seem to indicate that if taxes increase, K_e decreases. But this is not true. Neither K_u, nor K_e, K_d, and D depend on t.

What is clear is that the E value does depend on t. Moreover, we can easily prove that a tax increase Δt, generates a reduction in equity ΔE is equal to $- E\Delta t / (1-t)$.

On the other hand, if we equal [1p] and [3p], we get to

$$WACC = K_u\left[1 - \frac{t\ D}{(D+E)}\right]$$

This tells us that with taxes, WACC is always lower than K_u. Besides, it depends inversely on leverage. Another aspect that is inferred is that WACC is independent from K_d and K_e.

Comparison between world stock exchange markets

We analyze this case because of its simplicity and its usefulness to draw conclusions.

Comparative Table between International Markets

	USA	Spain	Mexico	Argentina	Chile	Ecuador
Vol. against. Daily M USD (a)	37.000	300	100	88^	17	18
Companies quoted (a)	3.086	425	116	102	287	37
With real participation (a)	3.086	100#	136	15	45" "	6
Risk-free rate: Rf (b)	6%	7%##	30%&	10%^^	10%	70%
Market premium: PM(c)	7%	12,30%	45%&&	^^^	7%	

Figure. A

(a) Information updated in July 1999. Values have been rounded up.
(b) Unless otherwise stated, it corresponds to the longest-term bond contracted in local currency.
(c) For a diversified portfolio. Estimation for 1998 or the last year .
* 1994
\# The 35 most liquidated companies replicate the index.
30-year State obligation
& 90 days
&& The last 3 years, 20% above inflation (today it is 25%).
^ It corresponds to the electronic wheel
^^ Dollar bonds
^^^ Difficult estimation: little history and a lot of volatility.
" Shares registered: 300. 147 are for work (without vote)
" " They have a negotiation frequency higher than 75% . 10 companies concentrated 43% of hiring last year.

KNOWLEDGE CONTROL:

a) It is usual that after having invested many hours of calculation of flows and the rate, at the end they are discounted to obtain the value of shares (NPV of cash flows). What does discounting all flows at the same rate imply?

b) If CAPM is to be applied to value companies as it is usually done in the US for instance, what Beta should be used?

c) Very often when valuing a company it is very helpful to compare indexes or its parameters against similar companies from the same sector or against sector information. How are the different sectors in Ecuador's stock exchange market represented?

d) What conclusions can be drawn from the analysis of Figure A?

e) What relationship does it exist between R_f, K_d, K_u, K_e and the WACC?

f) Is it possible for WACC to be lower than K_d or R_f?

g) Does WACC depend on the cost of debt or indebtedness?

h) Does share value depend on the cost of debt or indebtedness?

i) In formulas (3a), (3b) and (3c), what is the appropriate discount rate of the tax shield?

j) Can a company have different Betas?

k) For the case of a company acquisition, whose Ke or β should be chosen to value the flows: the buyer's or the seller's?

A P P E N D I X I

ENGLISH – SPANISH TERMINOLOGY OF FINANCIAL STATEMENTS

Balance Sheet (Terminología del Balance General)

Assets	A	Activos	A
Cash		Caja y Bancos	
Marketable Securities		Inversiones Temporales	
Accounts Receivable		Cuentas por Cobrar o Clientes	
Inventory, Stock		Inventarios o Existencias	
Row Material	RM	Materia Prima	MP
Work in progress		Productos en Proceso	
Finished goods		Productos Terminados	
Total Current Assets	CA	Total Activos Circulantes	AC
Net fixed assets or property net		Activo Fijo o Inmovilizado neto	
Total assets		Total activos	

Liabilities	L	Pasivos	P
Accounts payable		Proveedores	
Accrued expenses		Cuentas por pagar	
Accrued taxes		Impuestos por pagar	
Short-term debt		Deuda de corto plazo	
Long-term debt, current portion		Porción corriente deuda a largo	
Total Current Liabilities		Total Pasivos Corrientes	
Bank loan		Préstamo Bancario	
Mortgage		Hipoteca	
Long-term debt	D	Deuda a largo plazo	D
Total Non-current liabilities		Total Pasivos de largo plazo	
Total liabilities		Total pasivos	

Equity	E	Patrimonio	Pt
Common stocks		Capital	
Reserves		Reservas	
Net income of the year		Utilidad del ejercicio	
Total Equity		Total Patrimonio	
Total Liabilities and Equity		Total Pasivos y Patrimonio	

Income Statement or Profit and Loss Statement Terminology
(Terminología del Estado de Resultados)

Sales or Revenues	Ventas o Ingresos
Gross Sales	Ventas Brutas
Discount on Sales	Descuentos en Ventas
Return back on sales	Devoluciones en Ventas
Net Sales	Ventas o Ingresos Netos
Cost of sales	Costo de Ventas
Beginning Inventory	Inventario Inicial
Purchases	Compras
Ending Inventory	Inventario Final
Cost of goods sold	Costo de Mercancías Vendidas

Gross Margin or Gross Profit	Margen o Beneficio Bruto
Administrative Expenses	Gastos Administrativos
Selling Expenses	Gastos de Ventas
Overhead	Gastos Generales
Operating Expenses	G. Operativos o de Explotación
Earnings before interest, taxes, depreciation and amortization (EBITDA)	Beneficio antes de amortización, depreciación, intereses e impuestos
Depreciation or amortization	Depreciación y/o amortización

Earnings befote interest and taxes (EBIT)	Beneficio antes de intereses e impuestos (BAIT)
Interest or Financial Expenses	Intereses o Gastos Financieros
Earnings before Taxes (EBT)	Beneficio antes de Impuestos (BAT)
Accrued taxes or income taxes	Provisión de Impuestos

Net Income, Net Profit or Net Earnings	Benefico Neto o Utilidad Neta

Terminology of Elements of Analysis of the Balance Sheet

Terms		Términos	
Need of Funds for Operations	NOF	Necesidades Operativas de Fondos	NOF
Working Capital	WC	Fondo de Maniobra	FM
Bank Credit		Crédito Bancario	
Cash Surplus		Excedente de Caja	
Leverage	Lev	Apalancamiento	Lev
Collection Period		Días o Plazo de cobro	
Payment Period		Días o Plazo de pago	
Days of Inventory		Días o Plazo de existencias	

Terminología de Elementos de Análisis del Estado de Resultados

Terms		Términos	
Growth of sales	g	Crecimiento de Ventas	g
Expected sales growth	E(g)	Crecimiento esperado	E(g)
Return on Sales	ROS	Rentabilidad sobre ventas	
Return on Assets	ROA	Rentabilidad sobre activos	
Return on Equity	ROE	Rentabilidad sobre patrimonio	
Cash Flor from Operations	CFO	Flujo de Caja Operativo	FCO

APPENDIX II

Additional Accounts of Financial Statements

In the analysis performed throughout the chapters of this book, we have analyzed the most well-known accounts of Financial Statements in order to present examples in a didactic and accessible manner.

However, in practice there will be many other accounts that will need to be analyzed. We describe below the accounts that appear more frequently in Financial Statements:

Balance Sheet Accounts

Current Assets:

Temporary Investments: They represent the cash surplus investments that at this moment are not used in the business normal operations.

Accounts receivable: They represent an unconditional written promise of payment whereby someone commits to pay another a certain amount of money on sight or at a specific time in the future.

Discounted Documents: This is the amount of accounts receivable that have been discounted by the bank before their expiration.

Estimations for uncollectable accounts, obsolete inventory, etc.: These accounts are presented as complementary entries for accounts receivable and inventory, in order to maintain such accounts with its net receivable value.

Inventory: In a commercial company, this account should include merchandise stocks that are available in the warehouse, consignment stock, outside the warehouse and in transit, provided their property corresponds to the company.

In a manufacturing company, this account should include raw material stock, work-in-process, finished products in the warehouse, consignment stock, goods in transit, provided their property corresponds to the company.

Prepaid Expenses: These are payments of goods and/or services paid in advance, which will be consumed within the normal cycle of operations or within a year.

Tax credit: This is the amount of value added tax that can be recovered by the company, which originates from purchases, expenses or investments that meet tax requirements.

Retained Taxes: This is the amount of income tax retentions that have been made to the company and that can be used as tax credit for the corresponding tax payment

Non-Current Assets:

Long-term or permanent investments: These are investments made to be kept for many years; that is, they are not acquired with the purpose of selling them in the near future.

Investments in shares of subsidiaries: These are investments in securities that represent the share capital of other companies, intended to be maintained for an indefinite term. In general they are made in order to exert control or have interference over other companies.

Goods under financial leasing: these represent fixed assets whose right of use has been acquired by the company by means of a financial leasing contract.

Intangible Assets:

Startup expenses: These are costs that are necessary to start a business, such as: legal fees, state payments and promotion costs associated with the company's startup.

Discount on issue of obligations: This is the discount conferred to investors for selling their obligations below their face value.

Patents: This is the cost of the license to use, manufacture and sell a product or a process in an exclusive manner for a given period.

Goodwill: It represents the amount paid in excess of book value when acquiring property of an already set business.

Prepaid expenses more than one year in advance: These are payments made in advance for goods and/or services to be consumed within a term higher than the normal operations cycle or one year.

Accumulated Amortization of...: Similar to depreciation of fixed assets. The amortization process applies only to intangible assets.

Current Liabilities:

Documents Payable: They represent a written promise signed by the person drawing it to pay a certain amount of money at sight or within a specific future date. They usually accrue interests.

Accrued Interests Payable: They represent the interests resulting from loans that have accrued at the time of the balance sheet.

Revenues collected in advance: These are revenues that have been collected before performing a service or delivering a good. In this entry there are revenues, rents, advance payments from customers and other revenues that have been received in advance.

Current share of long-term liabilities: This is the share of long-term debt that will expire next year.

Bank Acceptances: This is a security documented as a bill of exchange and it is drawn by a corporation with a bank's support.

Commercial Paper: this is a negotiable promissory note, without specific guarantee issued by a company, whose shares are registered in the Stock Exchange, which represent a commitment to pay a certain amount of money within a maximum term of 90 days.

Dividends payable in the short run: they represent the amount of cash dividends, outstanding for payment within less than one year, declared by the meeting of shareholders.

Obligations payable in the short run: this is the amount of obligations payable within next year.

Bank overdraft: This is the amount that appears when cash payments exceed bank deposits.

Long-term Liabilities:

Obligations payable: these are securities that represent a long-term credit obtained by a group of investors.

Premium in Issue of Obligations: it represents the surplus obtained in the sale of obligations according to their face value.

Revenues collected more than one year in advance: deferred revenues that will be taken to results within a term no longer than a year or within the normal cycle of operations.

Equity

Preferred Share Capital: this is similar to share capital, but its difference lies in the rights that preferred shareholders have in a company in relation to the rights of common shareholders.

Contributions for future capital increase: This entry indicates that the company's shareholders contribute with cash or goods, but this capital increase has not been approved by the Board of Shareholders at an extraordinary meeting.

Paid-in-excess Capital (premium on sale of shares): it represents the contribution of shareholders in excess of share's face value of common or preferred shares.

Treasury shares: this is the amount for the company's shares repurchased after they were issued and fully paid.

Paid-in capital from treasury shares: this is the surplus obtained from selling treasury shares when such sale is made for an amount higher than the amount paid by them.

Excess or shortage in accounting capital update (monetary restatement): it represents the change in valuation above or below the result of restatement of historical cost for indexes.

Donated Surplus: It includes the value of goods received by the company (mainly fixed assets) without having to pay for them or paying a symbolic value.

Reserves (legal reserves for dividend payment, reinvestment, etc.) this is the visual separation of profit for a specific purpose.

Retained Earnings: Earnings available to shareholders, who may withdraw them as dividends by means of an agreement at the Meeting of Shareholders, or assign them to a specific purpose, thus affecting a reserve.

Income Statement Accounts

Expenses on Purchases: They include all the necessary payments to contribute to the Business, the merchandise or raw material purchases, such as freights, insurances, tariffs and loading / unloading maneuvers.

Other expenses: Recurrent expenses that are not part of the company's Business.

Other revenues: Recurrent revenues different from selling merchandise.

Financial revenues: Interests in favor of the Business, as a result of temporary investments.

Share of Employees in profit: This is the amount of the workers' share in the company's profit, calculated based on tax profit.

Extraordinary entries: they represent losses or earnings that do not affect the Business normal operation and that should be classified in a special section at the end of the Income Statement. They come from exceptional transactions that are usually not repeated.

APPENDIX III

Methods for Depreciation of Fixed Assets

Methodology according to the Accounting Methodology

Both the Ecuadorian Accounting Rules (NEC) as well as the International Accounting Rules (NIC) define several methods for depreciating fixed assets, which are aligned with the Generally Accepted Accounting Principles. These methods are written under certain conditions of asset utilization.

We can classify depreciation methods into:

- Constant Depreciation Methods
- Accelerated Depreciation Methods

Under the constant method, the same depreciation expenses are recorded for the lifespan of a fixed asset. The procedure for the calculation of depreciation is known as Straight Line Depreciation and its formula is as follows:

$$D = \frac{C - R}{V}$$

Where:

D = Depreciation expense
C = Cost of Asset
R = Residual or salvage value
V = Asset's lifespan

Some accountants estimate the residual value – the amount a company expects to sell a depreciated asset for, according to market prices - in $0.00, so that depreciation value is equal to the cost divided by its lifespan.

Example: A machinery acquired in $100,000.00 is depreciated in straight line for a 5-year period, considering a residual value of $0,00 at the end of its lifespan. If we apply the formula, we have an annual depreciation expenditure of $20,000.00.

Asset Depreciation Table			
Years	Depreciation	Accumulated depreciation	Book value
0			100.000.00
1	20.000.00	20.000.00	80.000.00
2	20.000.00	40.000.00	60.000.00
3	20.000.00	60.000.00	40.000.00
4	20.000.00	80.000.00	20.000.00
5	20.000.00	100.000.00	0.00

On the other hand, under the accelerated methods assets can be depreciated in an accelerated manner, assigning higher depreciation amounts during the assets' first years, thus originating decreasing balances in the fixed assets accounts. The main methods to make accelerated depreciations are as follows:

- Fixed percentage method
- Sum-of-years-digits method
- Units of production method

Fixed Percentage Method.- It involves applying a depreciation rate to the asset's remaining book value. This rate represents the fixed percentage; value decreases every year and it represents the decreasing balance. The formula to determine depreciation for a specific period is as follows:

$$D = C \cdot (1 - t)^n$$

Where:
D = Depreciation expense
C = Cost of Asset
t = Fixed percentage applied
n = Specific period

Example: A vehicle bought for $17,000.00 depreciates in an accelerated manner for a 5 –year period at a 40% depreciation rate. The depreciation table shows:

Asset Depreciation Table					
Years	Calculation	Depreciation	Accumulated Depreciation	Book Value	Formula
0				17.000.00	
1	17.000.00 x 40%	6.800.00	6.800.00	10.200.00	17.000 x (1-0.40)1
2	10.200.00 x 40%	4.080.00	10.880.00	6.120.00	17.000 x (1-0.40)2
3	6.120.00 x 40%	2.448.00	13.328.00	3.672.00	17.000 x (1-0.40)3
4	3.672.00 x 40%	1.468.80	14.796.80	2.203.20	17.000 x (1-0.40)4
5	2.203.00 x 40%	881.28	15.678.08	1.321.92	17.000 x (1-0.40)5

In order to determine the depreciation rate to be used as fixed percentage, we have to:

- Calculate the rate that would be used under the straight line method (depending on the asset's lifespan)
- Double that rate

For this reason, this method is also known as double straight line or depreciation method at 200%. Because this is a mathematical model based on percentages, the asset's book value will never be zero.

Sum-of-years-digits method (SYD).- This method involves applying a depreciation factor to the asset's remaining book value. This factor is a fraction whose numerator is the inverted order of the asset's lifespan periods and the denominator is the sum of year's digits.

For instance, if an asset's lifespan is 5 years, the sum of years' digits would be:

$$1 + 2 + 3 + 4 + 5 = 15$$

The formula to determine the sum of years' digits is:

$$SYD = n \cdot \left(\frac{n + 1}{2}\right)$$

Where:
n = Number of periods

According to the previous example, the asset's SYD would be: 5 x ((5+1)/2) = 15. Now, the formula to calculate the depreciation expense of a period under the SYD method is:

$$D = (C - R) \,.\, F :. = \frac{n}{SAD}$$

Where:
D = Depreciation Expense
C = Cost of Asset
R = Residual Value
F = Depreciation Factor

Example: An equipment bought for $13.500.00 depreciates in an accelerated manner under the SYD method for a 5-year period, considering a residual value of $1.350,00 at the end of its lifespan. The base value to calculate depreciations would be $12,150.00. The depreciation table is as follows:

Asset Depreciation Tabley

Years	Calculation	Depreciation	Accumulated Depreciación	Accounting Value
0				13.500.00
1	12.150.00 x 5/15	4.050.00	4.050.00	9.450.00
2	12.150.00 x 4/15	3.240.00	7.290.00	6.210.00
3	12.150.00 x 3/15	2.430.00	9.720.00	3.780.00
4	12.150.00 x 2/15	1.620.00	11.340.00	2.160.00
5	12.150.00 x 1/15	810.00	12.150.00	1.350.00

Units of Production Method.- It involves charging an exact proportion of how much the asset has been used to each accounting period. This method can be calculated not only over units of production, but also over the number of hours of work of kilometers covered. The formula is as follows:

$$D = \frac{C - R}{N} \cdot n$$

Where:
D = Depreciation Expense
C = Cost of Asset
R = Residual or Salvage Value
N = Number of units of production, hours of work or km. covered
n = No. of units actually produced during the period

Example: A Ford truck is bought with the following characteristics:

Type:	Truck
Capacity:	3.50 tons
Value:	$39.600.00
Lifespan:	211.200 km.
Residual value:	$2.200.00

During the first month, the truck has covered 550 km. Therefore, depreciation for the first month will be:

$$\frac{39.600.00 - 2.200.00}{211.200} \cdot 550 = \$97.39$$

Discrepancies between Regulations and Tax Laws

As expressed before, these methods are aligned with the Accounting Principles; therefore, they are more recommended to calculate fixed assets depreciations.

However, when depreciating an asset with a very high usage rate or during a very short period of time, a very high depreciation expense is produced, which will reduce the tax base for tax calculation.

Therefore, tax authorities promulgate laws where percentages and depreciation time of fixed assets are set, in order to obtain a higher tax collection.

In Ecuador, tax regulations that are applied to recording revenues and expenses is contained in the Internal Tax Regime Law (LRTI) and its Regulation for Application (R-LRTI), as well as any other law or resolution issued by the Internal Revenue Service (SRI).

Both in the LRTI and the R-LRTI, percentages and depreciation times of fixed assets are clearly expressed, according to their nature. These percentages are as follows:

Maximum Depreciation Percentages of Fixed Assets Depreciation		
Fixed Asset	Annual Percentage	Percentage
Real estate (except land), ships, airplanes, barges and the like	5%	20 years
Facilities, machinery, equipment and furniture	10%	10 years
Vehicles, transportation equipment and roadside equipment	20%	5 years
Computer equipment and software	33%	3 años

Legal Base: Art. 21 Number 6 Letter A from the Regulation

Rules Vs. the Law: whom to obey?

The analyst or consultant faces a dilemma: What method to apply? Should he follow accounting rules or the law provisions? The answer is both. Tax regulations define it as follows:

"Bookkeeping will follow the double entry system, in Spanish language and in United States dollars, subject to the Ecuadorian Accounting Rules (NEC) and the International Accounting Rules (NIC). For tax purposes, Accounting Rules will have to consider the provisions of the Internal Tax Regime Law and this regulation, as well as other legal or regulatory rules of tax nature".

Legal Base: Art. 30 of the Regulation

Therefore, in order to comply with accounting rules as well as tax laws, the expert or professional will have to:

- Do bookkeeping under GAAPs, NECs and NICs
- At the moment of declaring taxes, the difference between expenses, calculated following accounting rules, and the expenses value that should be recorded in application of tax regulations, should be calculated.
- Finally, this total difference will have to be added to the tax base obtained during the accounting period and the corresponding tax will have to be calculated based on this amount.
- This operation is known as "Tax Reconciliation"

APPENDIX IV

Summary of key financial Ratios

Leverage	
Interest burden	$\frac{\text{EBIT - Interest expense}}{\text{EBIT}}$
Interest coverage (Times interest earned)	$\frac{\text{EBIT}}{\text{interest expense}}$
Leverage	$\frac{\text{Assets}}{\text{Equity}} = 1 + \frac{\text{Debt}}{\text{Equity}}$
Compound leverage factor	Interest burden x Leverage
Asset utilization	
Total asset turnover	$\frac{\text{Sales}}{\text{Average total assets}}$
Fixed asset turnover	$\frac{\text{Sales}}{\text{Average total assets}}$
Inventory turnover	$\frac{\text{Cost of goods sold}}{\text{Average inventories}}$
Days receivables	$\frac{\text{Average accounts receivable}}{\text{Annual sales}} \times 365$
Liquidity	
Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$
Quick ratio	$\frac{\text{Cash + marketable securities + receivables}}{\text{Current liabilities}}$
Cash ratio	$\frac{\text{Cash + marketable securties}}{\text{Current liabilities}}$
Profitability	
Return on assets	$\frac{\text{EBIT}}{\text{Average total assets}}$
Return on equity	$\frac{\text{Net income}}{\text{Average stockholders' equity}}$
Return on sales (Profit margin)	$\frac{\text{EBIT}}{\text{Sales}}$
Market price	
Market-to-book	$\frac{\text{Price per share}}{\text{Book value per share}}$
Price-earnings ratio	$\frac{\text{Price per share}}{\text{Earnings per share}}$
Earnings yield	$\frac{\text{Earnings per share}}{\text{Price per share}}$

BIBLIOGRAPHY

- Brealey & Myers. Principles of Corporate Finance, 5 ed., New York, Mc-Graw-Hill, 1996.

- Copeland & Weston. Financial Theory and Corporate Police, 4 ed., Massachusetts, Addison-Wesley, Reading, 2003.

- Fernández, Pablo. Opciones y Valoración de Instrumentos financieros, España, Deusto, 1991.

- Fernández, Pablo. Valuation Methods and Shareholder Value Creation, 1 ed., Academic Press, 2002.

- Markowitz, Harry. Portfolio Selecion: Efficient Diversification of Investments, New York: John Wiley & Sons, Inc., 1959.

- Sharpe, William F. Investments, 6 ed., Englewood Cliffs, N, J. Prentice Hall, 1998.

- Faus, Josép & Pradas, Lidia. Manual Pedagógico, IESE, 1998.

- Faus, Josep & Tápics, Josép. Finanzas Operativas, 5 ed., España, Estudios y Publicaciones IESE, S.L. 2003

- Bodie, Zvi & Kane, Alex & Marcus, Alan. Investments, 8 ed., USA, Mc-Graw-Hill, 2009

- Kidwell, David & Parrino Robert Fundamentals of Corporate Finance., USA, Wiley. 2009

- Ross, S.A., Westerfiel, R. W., Jaffe, J.F. Corporate Finance, 4 ed., Richard D. Irwin, 1996

- Martinez Abascal, Eduardo. Finanzas para Directivos, 1 ed., España, Mc-Graw-Hill, 2005

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