Prospective Analysis: Guidelines for Forecasting Financial Statements

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"The first law of the thermodynamics is essentially the statement of the conservation of the energy for thermo-dynamical systems. […] the variation in energy of a system, during a transformation, is equal to the amount of energy that the system receives from its environment." First Law of the Thermodynamics
Thermodynamics Enrico Fermi.

I never think of the future. It comes soon enough.
Albert Einstein

I like the dreams of the future better than the history of the past.
Patrick Henry

1. Introduction

In this chapter we discuss some ideas that might be useful when forecasting financial statements FS, based on historical data.[1]

The approaches and suggestions presented in this chapter assume that the analyst has access to some company information that is not usually found in the publicly available financial statements. Some hints are appropriate for cases where the relevant information does not exist or may be very difficult to obtain.

In forecasting financial statements we start with the historical financial statements and from them we identify the patterns and relationships of different items, the implicit policies, growth rates and so on.

In this chapter we examine the historical financial statements in order to derive information from them that can be used to forecast financial statements. As much information needed cannot be obtained from the FS, then we assume that the information is available from the management. We show how we can find information not found in the FS. Finally, we develop a detailed example of a hypothetical firm to explain step by step, the procedure to forecast starting from historical financial statements. We also critically examine the usual practice of using plugs to forecast financial statement.

The chapter is organized as follows: First we present general comments in a general form about the relevance of prospective analysis in particular in relation with non traded firms. Specifically we mention the importance for these firms of having a financial model with which they can assess the value creation in the firm.

In a second section we present some basic reviews of subjects that will be needed for forecasting financial statements, such as Accounting and Economics. In the Accounting review we stress upon a financial statement that shows the detailed inflows and outflows of

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[1] Many ideas presented in this chapter are the result of advising undergraduate and graduate students in the course Cash Flow Valuation (CFV): A Basic Introduction to an Integrated Market-Based Approach at Duke University during the Fall of 2005 and my experience in teaching the subject at Universidad Tecnológica de Bolívar in Cartagena, Politécnico Grancolombiano in Bogotá, and other universities in Colombia.

cash in the firm: the Cash Budget. This is a very critical tool for managing a firm. Regarding the Economics review, we mention Pareto Law and Fisher equation. Fisher equation is the key of forecasting variables linked to inflation rate. We also review the indexes used to measure inflation. The chapter uses intensively the Fisher equation to forecast interest rates and increases in prices.

Special mention is devoted to a usual practice when forecasting: the plug. This is a use that we clearly do not recommend and show an alternate approach to avoid such maligned, but popular practice. The approach we propose in this chapter follows an Accounting principle that is the basis of any accounting procedure: the Double Entry Principle. This principle guarantees consistent and error free financial statements. We show with a simple example how the plug works and its limitations and problems that arise when using it.

Next, the reader will find what information is needed for the forecasting of financial statements and where and how to find it. We identify the procedure to identify policies that govern the ongoing of a firm such as accounts receivable and payable, inventories, dividend payout, payments in advance and the like. We also deal with the real life problem of a firm with multiple products and /or services. We suggest the proper simplifications when needed and if possible.

The proposed approach starts from very basic variables such as inflation rates, real increases in prices, increase in volume and policies and from them we construct intermediate tables that will make very easy the construction of the pro forma or forecasted financial statements. We use a hypothetical and detailed example and construct step by step starting from basic variables the intermediate tables and the financial statements. We compare the historical and forecasted behavior of some selected indexes such as gross, operating and net margins, EBITDA and EBITDA/Sales revenues.

Departing from the financial statements we show how to derive the cash flows that will be used in the book to value a firm. This is a major advantage of constructing a financial model such as the proposed in this chapter. We can have an accounting consistent financial statements and a valuation at market prices. Moreover, we suggest that any non traded firm should have a permanent assessment of the value creation through the use of a financial model where management could foresee the effect of many decisions on the value of the firm.

Finally we show some tools to perform sensitivity analysis for financial management and analysis. We also use this tool to check the consistency of the financial model.

There are several appendixes with examples on how to estimate real increases in prices from historical data. In another appendix the interested reader will find the financial model with the spreadsheet formulas that will allow her to construct by herself the detailed example presented in the chapter.

We hope that this chapter will help undergraduate and graduate students and practitioners to construct consistent financial statement that helps in the successful management of a firm. We invite the reader to use intensively the spreadsheet to reconstruct the example. This exercise will train the reader for a real life financial modeling.

In the next two sections we deal with the relevance of several accounting concepts. In particular we describe the basic principles of Accounting equation, the double entry concept and we briefly describe the financial statements.

2. General Comment on Financial Statement (FS) Forecasting

Why is relevant to work with forecasts? Forecasting financial statements is imperative for the management because it can provide a rough guide to the future performance of the firm. It is very important to do some prospective analysis for the long term in order to develop strategies for meeting the challenges that will surely arise. Moreover, for most firms, it is vital to have a financial model that allows management to control value creation. This can be done by constructing cash flows from the financial statements and having a permanent assessment of the firm value. We propose to construct three financial statements: Balance Sheet, Income Statement, and Cash Budget without plugs and without circularity.[2]

Non traded firms are an immense majority in the world. The stock market in the U.S. qualifies as a nearly perfect market for traded firms and despite that, traded firms are much less than 0.5% of the total firms. In emerging markets the proportion is much less.

The financial model might prove to be useful to examine in advance and anticipate the economic effect of a decision. This can be done through the use of sensitivity analysis, scenario analysis and simulation (Monte Carlo Simulation, MCS).

In addition, the financial model can be used for several purposes:
1. When you plan to raise funds for a new firm or a new project in an ongoing concern.
2. When you plan to sell or merge the firm and need to set a price for it.
3. When you apply for bond issues or private financing.

3. Review of accounting

We deal with three financial statements: Balance Sheet, Cash Budget and Income Statement. The Balance Sheet shows the historical values (also known as book values). How much belongs to the firm (assets)? How much belongs to financial debt holders and other liabilities holders (liabilities)? And finally, in a residual way, how much belongs to equity holders? If needed, the reader can visit and use the following glossaries to understand some terminology.

There are lots of glossaries in the web. Some of them can be found at
http://www.nyse.com/,
http://www.goodmoney.com/diction.htm,
http://us.rd.yahoo.com/finance/finhomed/educationglossary/*http:/biz.yahoo.com/f/g/,
http://e1.biz.yahoo.com/glosario/a.html (in Spanish),
http://washingtonpost.com/wp-srv/business/longterm/glossary/glossary.htm,
http://financial-dictionary.thefreedictionary.com/,
http://www.dfin.com/glossar1.htm.

These links were active on April 28, 2008.
In the next sections we review basic concepts and definitions on Accounting.

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[2] The uselessness and distractions of plugs and circularity will be apparent later in the chapter. We ask for the reader's kind patience.

<ol type="a">
Accounting Equation

Accounting in the firm is a closed system that includes the firm and its stakeholders and nothing is lost nor created. When this closed system exchanges wealth with the external environment, it will process exchanging internally when transactions are done. This is similar to what happens in Thermodynamics (see epigraph). In this case, the conservation of wealth principle is the basic accounting equation and it says:

Total assets = Total liabilities + Total equity (1)

This equation is known as the double entry or accounting equation. Each transaction in a financial statement has a corresponding transaction in at least one of the three financial statements. For instance, for each transaction in one side of the Balance Sheet, there should be another one on the other side. Or if there is a transaction on one side, there should be another one in the **same** side but with different sign, or a mixture of the two situations and a corresponding transaction(s) in the Cash Budget and/or the Income Statement. In short, you have to maintain the basic accounting equation and it cannot be violated. For instance, if the firm has $100 in cash, there can be an "exchange" of that $100 for $100 in inventory. The balancing of the accounting equation is preserved.

<ol type="a" start="2">
Double Entry Principle

Double entry accounting as we know it today, was defined many centuries ago by Luca Pacioli, who was born in 1445 and died near 1515. This procedure has multiple advantages. However, one of the most relevant is that arithmetic (accounting) errors are easily identifiable. The reason is simple: the total amount of debit entries must equal the total amount of credit entries. If this is not the situation, there is something fundamentally wrong.[3] The inconsistency of the basic accounting equation is a guarantee of an accounting error. However, the consistency of the basic accounting equation does not guarantee that there are no errors. Two errors may perfectly offset each other and the basic accounting equation will be blissfully balanced. Thus, it is important to have additional consistency checks on the consistency of the balance sheet.

<ol type="a" start="3">
The Balance Sheet

The Balance Sheet (BS) measures the (book-value) wealth of a firm. Balance sheet accounts (lines or items) are accumulators or tanks; these accounts accumulate the value of any transaction made within the firm; for instance, there is an accumulator for cash, another one for fixed assets and so on. In the BS we measure the level of these tanks. This means that the Balance Sheet is a snapshot of the firm in an instant of time. It does not measure the market value of the firm, and in the context of cash flow valuation, the distinction is of paramount importance.

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[3] http://happyaccountant.wordpress.com/2007/07/03/advantages-of-double-entry-bookkeeping/ (Visited on July 23, 2007)

d. The Income Statement

This financial statement estimates the Net Income available to be distributed to the owners. In some cases there may be losses. The Income Statement (IS) is constructed on the basis of accrual and cost apportionment. This means that not all the lines listed in the IS are inflows or outflows of cash.

As the Income Statement is a dynamical financial statement, the generation of rights and obligations is found there. For instance, when the firm dispatches and invoices the sales, it has the right to receive the amount invoiced. When the firm uses resources (raw material, labor, etc.) it has the obligation to pay for those resources. The size of these rights and obligations are listed in the BS.

The Income Statement measures the economic activity of the firm during a given period. It shows how much has been sold (revenues) and the costs of the resources used to produce the goods and/or services sold (expenses). The residual of all this is the Net Income, which is what the equity holders might potentially receive in each time period, and this might be different from the cash flow that the equity holders actually receives. We return to this point later.

e. The Cash Budget

The Cash Budget (CB) or cash forecast (other names are cash flow or fund flow, as many name it), shows the liquidity of the firm. In other words, the CB shows the amount of cash available or in hand at each instant of time. In the CB we record all the inflows and outflows of the firm. We can think of the CB as the financial statement that records all the checkbook transactions in the firm. The Cash Budget shows all the cash transactions of the firm. It shows how much cash goes into the firm bank account and how much cash goes out. The cumulative cash remaining is what the firm has as cash in hand at the end of any period. It should be identical to the amount of cash that is listed in the Balance Sheet. The reason to use these three financial statements is that it makes it easier to check for consistency and it allows the analyst to detect mistakes when matching the financial statements. The approach follows the Double Entry Principle. Moreover, the Cash Budget is very powerful tool for the financial management of any firm. As we show later, not all analysts do religiously follow and verify the consistency of the Double Entry Principle.

Perhaps the CB is the most important financial statement in the firm for financial management purposes. With it we can estimate the financing needs and the cash surplus in every period. In contrast with the IS, the CB shows the expected occurrence of the cash movements. It shows in addition, the accumulated balance of cash in the firm.

Some typical items in the Cash Budget Statement are shown in the next table:

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Table 1: Typical items in the cash budget statement[4]

Inflows	Outflows
Sales on cash	Accounts payable payments for purchases
Accounts receivables recovery	Salaries and fringe benefits
Loans received	Interest payments
Equity invested	Principal payments
Repayments of loans lent to third parties	Rent
Interest received from loans to third parties	Overhead expenses
Sale of inventories	Promotion and advertising
Sale of fixed assets	Asset acquisition
Sale of other assets	Social Security payments
Interest on marketable securities	Earnings distributed or dividends paid
Redemption of marketable securities	Taxes paid (Income, capital gains, VAT)
Customers' in advance payments	Investment in marketable securities
Value added tax (VAT) collected	Repurchase of equity
	Loans lent to third parties

With this tool we can answer some questions such as, when do we need funds? How much money do we need? Can we obtain it by speeding up the repayment of sales sold to customers? Is there a limit in the amount of sales? Can we postpone some payments? Can we renegotiate the debt terms with the bank? Can we increase sales with the available resources? For how long can we increase the sales with the actual available resources? If we increase sales, how much funds do we need to "response" to that sales effort? How can we negotiate a debt schedule profile with the bank? Which is the maximum debt capacity of the firm in a given planning horizon? When and how much liquidity will we have?

For convenience, we can organize the CB in modules according to the type of transactions we record. The CB we present is similar, in some way, to the Cash Flow statement according to General Accepted Accounting Principles, GAAP. However, we have to say that it is more detailed and of course is prospective, not an ex post analysis.

This approach is integral and allows the management to conduct sensitivity analysis from the input data. When we say integral we mean that everything in the model is linked to some input data (input variables) in such a way that a change in one of them will give a specific result. This feature allows the management making sensitivity analysis as we will see at the end of the chapter.

f. Detailed description of the CB

It is convenient to organize the CB in five modules as follows:

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[4] Taken and adapted from Tham and Vélez-Pareja 2004.

1. Module 1: Operating activities.
    1.1. Operating inflows (basically sales) and advance payments from customers.
    1.2. Operating outflows (raw material, labor costs, taxes, overhead expenses, sales expenses, etc.)
    1.3. Net Cash Balance before investment in fixed assets.
2. Module 2: Investment in fixed assets:
    2.1. Initial investment in assets.
    2.2. Investment in assets in other periods.
    2.3. Net cash balance of purchasing assets.
    2.4. Net cash balance after investing in fixed assets.[5]
3. Module 3: External financing.
    3.1. Inflow of loans in local or foreign currency (converted to local currency)
    3.2. Principal payment of loans (local or foreign currency)
    3.3. Interest paid for local or foreign currency loans.
    3.4. Net cash balance of financing.
4. Module 4: Transactions with owners.
    4.1. Equity investment
    4.2. Dividends payment
    4.3. Repurchase of equity.
    4.4. Net cash balance of transactions with owners
    4.5. Net cash balance for the year after previous transactions
5. Module 5: Discretionary transactions.
    5.1. Inflow from sale of marketable securities
    5.2. Interest from marketable securities.
    5.3. Investment in marketable securities.
    5.4. Net cash balance of discretionary transactions.
    5.5. Net cash balance for the period
    5.6. Cumulated cash balance.

The reason for the above organization of the CB is related to the calculation of debt and short term investments and to the construction of cash flows for valuing the firm using the direct method. Again, later the logic will become clearer.

4. Review of economics

a. Pareto Law

The Pareto[6] Law comes from the observation that when a large number of factors contribute to a result, the majority of the result (about 80%) is due to the contribution of a minority (about 20%). In the firm we could say that about 80% of the revenues are

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[5] With this NCB we could estimate the debt capacity of the firm. If we discount this NCB with the expected cost of debt, we will have the maximum amount the firm can repay during the forecast horizon.

[6] Who was Pareto? "Vilfredo Federico Damaso Pareto ([…] July 15, 1848, Paris – August 19, 1923, Geneva) was an Italian sociologist, economist, and philosopher. He made several important contributions especially in the study of income distribution and in the analysis of individuals' choices. He introduced the concept of Pareto efficiency and helped develop the field of Pareto efficiency." From http://en.wikipedia.org/wiki/Vilfredo_Pareto visited on April 28, 2008.

generated by 20% of the customers, or that 80% of the revenues are generated by 20% of the products.

b. Fisher Equation.

The basic idea of the Fisher[7] equation says: when two or more causes act at the same time, they have a multiplicative relationship, not additive. This is especially true for interest rates, inflation rates, devaluation or revaluation of foreign currency, real and nominal prices and similar. In arithmetical formulation:

$$1 + \text{nominal change} = (1 + \text{real change}) \times (1 + \text{inflation}) \qquad (2a)$$

As a derivation from it we can write

$$1 + \text{real change} = \frac{1 + \text{nominal change}}{1 + \text{inflation}} \qquad (2b)$$

From (2b) we have

$$\text{Real change} = \frac{1 + \text{nominal change}}{1 + \text{inflation}} - 1 \qquad (2c)$$

c. Nominal and Real Gross Domestic Product, GDP

Gross Domestic Product is the market value of goods and services produced by a country. An approach to measure GDP is to add Consumption, Investment, Government Purchases and Net Exports.

The GDP is measured with the inflation effect in it or without. In the first case it is the nominal or current dollar GDP; the second case is the real or constant dollar GDP. The nominal GDP is measured by valuing each item at the actual market price. The constant price GDP is valued with respect to the prices of a base year (or reference year).

d. Inflation rate.

Inflation is a measure for the general increase in prices in an economy. We can identify three indexes that measure the inflation: the Consumer Price Index, CPI, the Producer Price Index, PPI and the Implicit Deflator of the Gross Domestic Product, GDP. In the next paragraphs we describe briefly those different approaches to measure inflation.

i. Consumer Price Index CPI.

The concept of index and Consumer Price Index, CPI. "Price Index: A price index is a tool that simplifies the measurement of price movements in a numerical series. Movements are measured with respect to the base period, when the index is set to 100. [Consumer Price Index or] Cost-of-living index: A cost-of-living index measures differences in the price of goods and services, and allows for substitutions to other items as prices change. A consumer price index measures a price change for a constant market

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[7] Who was Fisher? "Irving Fisher (February 27, 1867 Saugerties, New York – April 29, 1947, New York) was an American economist, health campaigner, and eugenicist, and one of the earliest American neoclassical economists and, although he was perhaps the first celebrity economist, his reputation today is probably higher than it was in his lifetime. Several concepts are named after him, including the Fisher equation, Fisher hypothesis and Fisher separation theorem." From http://en.wikipedia.org/wiki/Irving_Fisher visited on April 28, 2008.

basket of goods and services from one period to the next within the same city (or in the Nation). The CPIs are not true cost-of-living indexes and should not be used for place-to-place comparisons."[8] The CPI is measured using a basket of goods consumed by a typical household. Inflation is a measure of the generalized increase in prices in an economy. The CPI includes all the goods and services consumed by the population, including those goods not produced in the country but imported from abroad.

ii. Producer Price Index PPI

The concept of Producer Price Index, PPI. "The Producer Price Index (PPI) program measures the average change over time in the selling prices received by domestic producers for their output. The prices included in the PPI are from the first commercial transaction for many products and some services."[9] "Producer Price Index (PPI): A family of indexes that measure the average change over time in selling prices received by domestic producers of goods and services. PPIs measure price change from the perspective of the seller. This contrasts with other measures that measure price change from the purchaser's perspective, such as the Consumer Price Index (CPI). Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs." [10] As can be observed, the PPI measures the price of a good or service produced or not in the country, but when it is sold for the first time; this means that it is not related to the price the end user pays.

iii. GDP Implicit price deflator.

The concept of implicit deflator for the Gross Domestic Product. The standard definition of this deflator is "Current dollar GDP divided by constant dollar GDP. This ratio is used to account for the effects of inflation, by reflecting the change in the prices of the bundle of goods that make up the GDP as well as the changes to the bundle itself."[11] This index includes only the goods and services produced in the country; it does not include imported goods or services. In formula we have

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100 \qquad (3)$$

5. Review of current practices in forecasting FS

a. Definition and use of plugs

When working on forecasting financial statements one discovers that there are many coarse oversimplifications. These methods might be valid more than 40 years ago, when the availability of computing resources were scarce. For instance, when forecasting financial statements it is a regular approach to forecast sales revenues and calculate the last financial statements as a percentage of sales revenues and apply those percentages to the forecasted sales revenues and from that they derive the BS and the IS. This is not the appropriate

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[8] U.S. Department of Labor, http://www.bls.gov/bls/glossary.htm#P, visited on April 28, 2008.
[9] U.S. Department of Labor, http://www.bls.gov/ppi/, visited on April 28, 2008.
[10] U.S. Department of Labor, http://www.bls.gov/bls/glossary.htm#P, visited on April 28, 2008.
[11] See http://www.investopedia.com/terms/g/gdppricedeflator.asp, visited on April 28, 2008.

approach. How do they match the financial statements? Very easy: they use plugs and/or circularity (iterations).

See Benninga, 2006, p. 274, Brealey, Myers and Marcus, 1995, p. 521, Daves, Ehrhardt and Shrieves, 2004, pp. 94-95, Day, 2001, p. 137, Gallaher and Andrew 2000, p. 129, Higgins, 2001, pp. 91-92, Palepu, Healy and Bernard, 2004, pp. 6-8 and 6-9, Penman, 2001, p. 457, Tjia, 2004, p. 119, Ross, Westerfield and Jaffe, 1999, p. 680, Van Horne 2001, p. 402, Polimeni, Fabozzi and Adelberg, 1991 Horngren, Sundem, Elliott and Philbrick 2005, and in general many textbooks on budgeting and model building. In a search in Google (see bibliography) the reader will find lots of references and samples of what is used by teachers and practitioners regarding the plugging in forecasting financial statements. Kester (1987) "illustrates the use of computationally efficient algebraic formulas that directly solve the balancing problem that occurs in financial forecasting when projected assets do not equal projected liabilities and equity. Specifically, the formulas can be used to compute funds deficits/excesses that adjust for the simultaneous effects on income taxes and dividends and hence should be valuable for both classroom and practical use." The approach proposed by Kester needs iterations to solve circularity. Arnold and Eisemann (2007) propose a solution for the circularity problem when using plugs. Their solution consists in determining the value of the current debt using variables such as Earnings before Interest and Taxes (EBIT), equity, retained earnings, tax rate, dividends payout ratio and cost of debt. However, they use plugs.

A plug is a formula to match the Balance Sheet using differences in some items listed in it in such a way that the accounting equation holds. In other words, "a plug is an item which guarantees that Assets = [Total] Liabilities + Equity. Plug is usually a financing item such as Cash, Debt or Common stock. […] The Plug is not a number. It is an equation, for instance,

Cash = Total liabilities [+Equity] – [Non Cash] Current Assets – Net Fixed Assets
Debt = Total assets – Current liabilities – Equity
Equity = Total assets – Current liabilities – Debt" (Benninga, 2007)

b. Advantages and disadvantages

This is a very easy way to do it but it encompasses some risks. The risks are that certain numbers in the financial statements could be in error and still the plug would indicate that everything is correct because the Balance Sheet matches. Hence, don't plug! Using plugs presents a problem for the forecasting of financial statements: the analyst could make a lot of mistakes and the method does not help to identify these mistakes because it always shows that the BS is balanced or matched. This means that one of the main advantages of the double entry accounting is lost. In Appendix D the reader will find examples of the problems of using plugs.

A common practice is to calculate interest charges and/or return based on the average of beginning and ending balance of debt (investment) to try to reflect what happens in reality. This is correct when we did not have the calculating resources of today. In today's spreadsheets we can use up to 256 columns and 65.536 lines. If we use a column per monthly period we could cover more than 21 years of analysis. If that is not good

enough, we could work with quarters or bimesters (periods of two months)[12] and cover more than 60 years or 42 years respectively. The meaning of all this is that using the average of debt to calculate interest is not necessary because we could construct the model with a convenient (and practical length: moth, quarters, semesters, etcetera). When using average debt we need to activate the iteration ability of a spreadsheet because otherwise circularity will appear. We do not like to use circularities when they are avoidable. There are some instances in Corporate Finance where circularity is needed: when we calculate the Weighted Average Cost of Capital WACC, for the Free Cash Flow (FCF) or the cost of levered equity (Ke) for the Cash Flow to Equity (CFE) when valuing cash flows. In these cases circularity is not avoidable. However, in constructing pro forma financial statements circularity is avoidable.[13]

6. What information do we need for forecasting?

To construct and forecast the cash flows from a robust set of financial statement we need a lot of information. However, much of the information can be derived from the historical financial statements. Other information has to be found outside the firm or have to be requested from the firm in order to make a good financial statements forecast. Not all the information can be derived from the financial statements. Hence, it is necessary to find out some additional information from the management of the firm. In addition to the information from the financial statements, we need some extra information, such as

- Debt schedule of actual debt
- Quantities sold for different goods and/or services
- Historical prices of goods and/or services
- Historical prices of inputs
- Product mix
- Depreciation method
- What is the demand driver
- Investment in capital assets plans

a. What information IS NOT in the FS?

Not all the information needed for the forecast is in the financial statements. We either need exogenous information such as inflation rates or endogenous information such as quantities sold and prices.

Usually in the financial statements the analyst does not find explicit information such as quantities sold, quantities purchased, number of products and their share in revenues and expenses, historical prices of inputs, outputs and specific expenses. In

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[12] Bimester is not included in the Merriam-Webster Dictionary, but its definition can be found in http://onlinedictionary.datasegment.com/word/bimester, http://www.thefreedictionary.com/bimester, http://www.diracdelta.co.uk/science/source/b/i/bimester/source.html, http://www.audioenglish.net/dictionary/bimester.htm, http://www.webdictionary.co.uk/definition.php?query=bimester.

[13] We have to say, for the record, that using the Adjusted Present Value (APV) or valuing the Capital Cash Flow (CCF) when we assume that the discount rate for the tax shield or tax savings is the cost of unlevered equity (Ku) we can calculate the value of the firm without circularity.

addition, there are exogenous data that have to be found elsewhere, such as, inflation rates and specifically, Consumer Price Index CPI, Producer Price Index PPI or GDP Implicit price deflator. Therefore, the analyst should find out figures for quantities and prices. The analysis of these two variables will derive from this valuable information the real increase of prices and the increase in volume.

The actual debt schedule is a critical part of the financial statements. If there is not information for the payment of some liabilities (especially financial debt) in the historical financial statements, assume a reasonable period to pay back that debt based on the last interest rate calculated with the historical financial statements. Construct the debt schedule for each loan. It is usual to receive from the firm the information for the actual debt schedules and the future commitments with the debt owners.

We should know the depreciation method that the firm has been using and how much remaining depreciation time remains for each type of assets. Different assets have different depreciation lives. For instance, usually land is not subject to depreciation, buildings have 20 years, vehicles and plant equipment 10 years and vehicles 5 years. This might be a huge task and probably it will be necessary to make some simplifying assumptions. When forecasting financial statements it might be necessary to simplify and assume a weighted average or even assume that the total amount of assets is depreciated at a given typical life.

What spurs the demand of the firm's product or service? Identify the "driver" of growth. For instance, if your product or service is bought by end users identify how the target market is increasing. In these cases the "driver" is usually the population and it might be useful to identify the growth rate of population. (It might be necessary to identify which segment of the population is the target population for the product or service). If your product or service is for firms and not directly to the end user, you need to identify growth rates for those firms and the growth rate of the number of those firms. (Eventually, all demands are related to population growth, but specific trends in the specific target market are needed). Compare the estimated growth of the "driver" for your demand with the growth rates found in the historical financial statements and assess if they are consistent.

b. What information is in or can be derived from the historical FS?

Before we deal with the analysis of policies, let us mention some ideas on when to use averages. When is advisable to use averages as an indicator or measure of a given variable or policy? A good guide to make a good decision on this is to consider the average when we estimate a policy or variable as a ratio. For instance, when we estimate the Accounts Receivable policy, we divide the Accounts Receivables through the Sales Revenues. When we do this we eliminate any distortion of other variables such as inflation or currency. In this case we could calculate the average of that ratio during the previous years. Another example of proper use of the average is when we estimate the real increase in a price. The real increase in price results after we have deflated the nominal increase. A final example is when we estimate the risk premium of an interest rate (be it a cost of debt or a return of excess cash invested). In short, use averages when you have proportions or real changes in a variable.

Some inputs are not variables, but policies or goals. Policies such as Accounts Receivable, AR, Inventory, Accounts payable, AP, payout ratio and cash in hand. For

instance the management has control on AR policy, price increase policy, final inventory policy and the like. These can be estimated from historical financial statements. For the analyses in the base case scenario, we can assume that the future policies will be similar to the policies in the past. If subsequent sensitivity and Monte Carlo analysis is done, we can examine the impacts of changes in the policies on the cash flows from the different points of view.

We can estimate an AR policy examining the historical financial statement and calculating the proportion of AR to sales of the same year. Average this number and use it as the policy for the forecast years. The same can be done with AP, cash, payout ratio and inventory policy. In the case of AP we find them as a percentage of purchases and inventory as a percentage of cost of goods sold, COGS.

Cost of debt can be derived from the financial statements. Look at the historical interest rates: cost of debt and marketable securities returns. Do not rely in single and isolated interest rates. The best procedure to determine the cost of debt, for instance, is to divide total financial expenses by total financial debt of the previous period. This might result in a non-constant cost of debt, Kd. This cost of debt is composed of inflation and real cost of debt (that might include some risk premium). See next section.

Any interest rate in the market is composed of the expected inflation rate, the real rate of interest and a component that takes into account risk. The higher the risk, the higher is the interest rate. The risk component is known as debt risk premium. It depends on the risk perceived by the lender. If this information is not available within the firm we can make a rough estimate of the risk premium using the aggregate information of the financial system of the country on the borrowing rate. To estimate the risk premium subtract the risk free rate from the borrowing rate. In this case use the average of that difference over the last 10-20 years.

In the same way we can examine the return on short term investment. The return on short term investments is usually lower than any other investment. One of the reasons is that by definition that investment could be redeemed in any moment. This fact lowers the return. The short term return can be estimated by dividing the interest income with the short term investment in the previous period. Hence, the risk premium for the return on marketable securities can be calculated subtracting the risk free, Rf, rate and average the result.

We can analyze historical expenses in order to detect their behavior. Do not calculate expenses as a percent of revenues, especially those expenditures that by their nature seem to be fixed costs. Fixed costs do not increase (within some limits) with the level of activity of the firm; examples are staff salaries, rent, depreciation of fixed assets, and similar. It is better to look at the historical behavior by deflating them and trying to estimate the real growth with the deflated figures and later when making the forecast, introduce the inflation effect. Be careful when real growth is abnormal. Try to find out what is the cause of such behavior.

For the Selling and administrative expenses we have the same comments. This item might include variable costs such as promotion and advertising expenses, and sales commissions. It is better if it is possible, to disaggregate the sub items. If not, it is not a good practice to express them as a percentage of sales revenues. Labor expenses might be included in this item. Sometimes labor costs are not a variable expense.

If depreciation is not disaggregated in the historical financial statements and the investment in fixed assets is calculated as the difference between net fixed assets from one

period to the next, or as the difference between book value of assets, there might be a wrong estimation of the capital investment during the historical period. The correct way to estimate capital investment expenditures in a year t is to calculate it as

$$\text{Investment}_t = (\text{Net fixed assets})_t - (\text{Net fixed assets})_{t-1} + \text{Depreciation}_t \quad (4)$$

Another approach to roughly estimate depreciation charges from historical financial statements is to find the difference between Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) and Earnings before Interest and Taxes (EBIT). This difference is an upper limit for depreciation charges (it might have amortization charges in it). In traded firms this is usually an available information. If historical depreciation charges are not identified, it might be necessary to define a method of depreciation and depart from the last figure for net assets in the latest historical Balance Sheet. Be careful not to depreciate an asset beyond its actual book net value.

Although capital investment expenditures do not occur as a function of revenues, they can be expressed as the historical average expense as a percent of revenues. It might be better to calculate that percent in terms of deflated or real revenues and adjust for the future domestic or foreign inflation rate. Another alternative to forecast capital investment expenditures is to invest the depreciation charge of the period plus the rate of real growth of the revenues (growth of units sold) times the net fixed assets for the previous period. In this chapter we assume the investment if operating assets is identical to the depreciation of the period.

We need to keep track of the "new" investment to adjust the depreciation charge. In the next table we show an example.

Table 2. Depreciation schedule with "reinvestment" of the depreciation

Year	0	1	2	3	4	5
Real growth rate, g		1.00%	1.00%	2.00%	2.00%	2.00%
Beginning Net fixed assets		400.0	404.0	408.0	416.2	424.5
Annual depreciation (5 years)		80.0	96.8	117.0	142.0	172.1
Cumulated depreciation		80.0	176.8	293.8	435.8	607.8
Investment in new assets$_t$ = depreciation$_t$ + real g in units × net assets$_{t-1}$	400.0	84.0	100.8	125.1	150.3	180.5
Net fixed assets	400.0	404.0	408.0	416.2	424.5	433.0

In this table we assume a depreciation life of 5 years. For example, Investment for new assets in year 2 is 96.8 + 1% × 404 = 96.8 + 4.04 = 100.84. On the other hand, Depreciation for year 3 is 96.8 + 100.8/5 = 96.8 + 20.16 = 116.96. Care has to be taken to keep track of new investment and include the new depreciation charge. Observe that depreciation for year 2 has increased to 116.96 because we have added the extra depreciation charge of 20.16.

You might be tempted to express all the lines in the financial statements as a percent of revenues. Be careful. For instance, taxes should not be calculated as a percentage of revenues but as a percentage of Earnings before Tax (EBT). To estimate the average tax rate sum all the taxes and divide by the sum of all the EBTs. This will give you a weighted average of the tax rate. Use this weighted average as the tax rate for forecasted financial statements.

7. How long the forecast should be?

It is very risky to make generalizations on this. The usual practice is to cover a spam of time of 7 to 10 years. However, for each case we need a specific decision.

Not only is necessary to define the time spam of the forecast but to define the time period. In a previous section we commented on the possibility and advantages of using monthly periods. Apart from avoiding an unnecessary circularity it is of major importance to recognize business cycles and seasonality that affect the particular firm. For instance, firms with extreme business or economic cycles should cover at least two cycles. For instance, the construction industry usually has deep and long economic cycles. Firms with strong monthly seasonality should consider seriously making forecasts using months instead of years or semesters. In this case, a firm that produces toys or clothes might suffer of heavy seasonality.

Another issue regarding the length of the forecast has to do with the use of the forecast itself. We have said that the financial model should be a tool for value based management. This means that forecasts have to be permanently updated and should include a continuing or terminal value. Terminal value captures all the value creation beyond the forecasting period. Well, the usual procedure to calculate the terminal value is to construct a perpetuity. This approach simplifies the cash flows and need many assumptions that supposedly will hold during the next period of the last one in the forecast, up to the end of the times. Of course that these will be heroic assumptions and the less our value relies on the terminal value, the better. The influence of terminal value in the firm value will be higher for short term forecast and lower for long term forecast. This influence has to do with the discounting of that terminal value and hence, the farthest the terminal value is, the less its weight in the total value.

8. Dealing with multiple products and/or services.

When we analyze the financial statements of a firm and we need to forecast them we can find several situations, but in particular we can find two special scenarios: either we have historical information on prices and volumes per product or service and of course, the sales revenues from the financial statements or we only have the information from the financial statement, namely sales revenues, costs and expenses.

What does the firm sell? The answer to this question might give the analyst light on how to handle multiple products. For instance, a firm might seem to sell indefinite services: it depends on what the customer needs. However, a little insight will tell the analyst that the firm sells time of service. Moreover, it might be difficult to estimate the time spent in each event of service. In this case a little extra insight could tell the analyst to analyze the firm activity in terms of the number of service events serviced in the year. This might be easier to identify and could enlighten the analyst in the pricing of the service.

If disaggregate information exists, then use Pareto's Law: 20 percent of the causes are responsible of 80 percent of the effects. This can be useful if it is necessary to reduce the number of inputs and/or products in a complex firm, say Wal-Mart or K-Mart.

In some instances it might be useful and possible to reduce an apparent large number of products to only one. This happens in firms with a common input in all products. For instance, it might seem that a tire maker has many references, or that a firm in the printing industry might have not only many different products but what is worse, the

products are not predictable because they might take orders from their customers and manufacture what the customer needs. Think of Goodyear. Think of Budweiser or think of Coca-Cola. Think of firms like Apollo (an educational enterprise) that sells many courses and programs. All these firms might be considered as selling a sole and unique product: tons of rubber, tons of paper, gallons of beer or gallons of water (with some concentrate, artificial color and sugar), thousands of tuitions. This insight might make it easier to forecast the number of units sold and there might not be any need to start from dollar amounts from the historical financial statements.

Sometimes the product or service cannot be defined in a precise manner because it depends on the needs of the customer. Imagine a consulting firm or an air conditioning maintenance firm. The services they provide depend on customer's needs and preferences. In cases like this one, it might be better to think that the unitary product the firm sells is time. Then, what they sell is specialized man hours. If it is not possible to identify the number of hours invoiced, it might be possible to identify the number of events or customer calls effectively serviced. In this last case the selling price and/or the unit cost of the service will be the total (sales revenues or costs) divided by the number of events.

Another simplifying approach is to group the different products in classes. For instance, in a grocery store you may find groups such as fruit and vegetables, dairy products, house cleaning, personal cleaning and so on.

9. Using Fisher Equation or CAPM in forecasting.

We have to distinguish two stages in forecasting: the use of past information and the forecasting of new information itself. In using the Fisher equation or relationship, we have to take into account those two stages, as follows.

Historical data ⬅	➡ **Forecast**
$$\text{Real} = \frac{1 + \text{nominal}}{1 + \text{inflation}} - 1$$	$$\text{Nominal} = (1 + \text{real}) \times (1 + \text{inflation}) - 1$$
• Historical prices of inputs and outputs. • Expenses. • Calculate the nominal increases, deflate with the inflation rate, calculate an average and use it as forecast.	• Use the forecasted inflation rate and the average of the real increase as an input data. • Estimate increase in prices • Estimate increase in expenses

Some examples of using Fisher equation follow.

Find the risk implicit in the cost of debt as the cost of debt minus the risk free rate. Risk free rate can be estimated as the return of T-Bonds or Treasury Bonds. Calculate the average of this risk premium. Another rough approach for estimating the risk premium is to use the historical average cost of debt or borrowing rates, announced by banks and select the most appropriate for the firm we are analyzing. To that historical average we can subtract the historical risk free rate and the average of that difference is a gross estimate of the debt risk to be added to the forecasted risk free rate. This information is provided by the

Federal Reserve (see for instance, http://www.federalreserve.gov/releases/h15/data.htm visited on April 28, 2008).

Deflate the risk free rate and calculate the average of this deflated risk free rate. This is an estimate of the real rate of interest that can be used in the forecasts. In any case, decompose the historical cost of debt in risk premium, real rate of interest and inflation. Average the risk premium and the real rate in order to use them in your forecast.

From the analysis of the historical financial statements you have found estimates of real growth, real increase in prices and risk premium in debt as an average of these historical data. Use these averages as the forecast. Combine them with forecasted or prospective inflation rates to forecast nominal increases in revenues and costs, and nominal interest rates. When estimating interest rates, price increases and similar do not mix nominal with real rates. For instance, when using the Capital Asset Pricing Model, CAPM, $(Ke = Rf + \beta(Rm-Rf))$ Rf and Rm should be either nominal or real. The usual procedure is that for CAPM we use nominal rates because β usually is calculate based on nominal returns.

We can extract information from historical financial statements if we derive the following items: Nominal and real increase in prices of output, inputs and expenses. Nominal and real cost of debt and return on short term investments can be calculated in the same fashion. Real "variables" can be estimated in the same basic way: using the Fisher relation backwards, this is,

$$\text{Real} = \frac{1 + \text{nominal}}{1 + \text{inflation}} - 1 \tag{5a}$$

With the risk premium for debt estimated from the retrospective financial statements, the estimation of real interest rates and the prospective inflation rates, estimate the future cost of debt. When preparing a debt schedule use end of year convention. Interest charges are paid at the end of year, not at the beginning. Make sure that interest payments in the debt schedule are the same you use in the Income Statement and in the Cash Budget. In the case of a loan fully paid in the forecasting period, the sum of principal payments should be identical to the initial debt balance. The same, the present value of the payments at the cost of debt for that specific loan should be identical to the initial debt balance. Principal payment at time t is equal to the constant payment at time t minus the interest at time t calculated as $Kd \times (Deb_{t-1})$. Debt balance for the last year has to be zero (in case the debt is fully paid during the forecasted period). The debt balance at any year (or the sum of all debt balances in case there are several loans) should be identical to the total debt in the Balance Sheet.

Look for estimates for the future inflation rate. The Federal Reserve or the Central Bank should have an estimate for the future inflation. At least they might have the trend and the behavior of inflation for the near future. Expected inflation might also be derived from the zero-coupon curve. This is what the market expects regarding future inflation. Link all the rates that are inflation related, to inflation (from any of the approaches mentioned above). For instance, risk free rate should be composed (using Fisher relationship) of real interest rate and inflation rate. Nominal increase in prices should be linked to inflation as well. If this is not done properly, when conducting sensitivity analysis a change in inflation rate will not affect the price increase which is not logical, from the economic point of view.

Real increase in prices and inflation play a very critical role in a financial model. We can introduce additional degrees of sophistication regarding price increases. For instance, we can introduce the effect of price demand elasticity in the model. This might be seen as too sophisticated, however, its use would prevent the analyst of assuming high real price increases scenarios without any effect on demand. A good market analysis should provide the management with the sensitivity of the demand with respect to prices. This information might be a useful (although coarse) estimation of the consequences of increasing prices.

If foreign exchange currency is used in the financial model, estimate a base exchange rate change using the purchasing parity power model, PPP, (remember the Big Mac Index: The Economist (www.economist.com click the link "Markets & Data" http://www.economist.com/markets/bigmac/ visited on April 28, 2008). Under purchasing parity power the change in foreign exchange price will be equal to

$$\text{Real} = \frac{1 + \text{domestic inflation rate}}{1 + \text{Foreign inflation}} - 1 \qquad (5b)$$

Use this as a basis from which we can examine some deviations. Be careful in using this model because in this case the behavior of value as a function of inflation could result in exotic results. (For instance, if there are revenues in foreign exchange, the higher the domestic inflation, the higher the revenues and this might contradict the usual knowledge that inflation destroys value). This comes from the fact that the firm improves the income when the exchange rate is high and the higher domestic inflation rate, the higher the exchange rate.

10. Forecasting Inputs for the Financial Statements, FS.

We recommend a step by step approach that simplifies the construction of financial statements. Construct intermediate tables that include the following:
- Input data (Inflation rate, tax rate, real increases, real interest rate, policies and the like)
- Table for nominal increases in prices
- A basic input variables calculation table to forecast future prices, quantities, total sales, interest rates, etcetera.
- Depreciation schedule
- Inventory level in units
- Cost of goods sold (COGS)
- Sales and purchases
- Inflows from sales and outflows from purchases

With this information the IS can be constructed up to the Earnings before Interest and Taxes, EBIT, line. After this line we need to know interest charges and interest received. This can be estimated for the first forecast period from the last financial statements. For the second year we need to construct the CB. The critical lines in the Cash Budget are the debt (to check if there is a new debt) and the short term investment.

If we only have the sales revenues (and costs and expenses) from the financial statements, we need to make some approximations. In this case the analyst could do the following:

a. Increase in sales revenues

Calculate the increase in nominal sales revenues (costs and expenses). This increase is composed by the real growth in units, the real increase in prices and inflation.

b. Deflate the nominal increase

With the appropriate measure for inflation we can deflate the calculated nominal increase according to the previous item. The resulting number will be the combination of real increase in units (growth) and the real increase in prices. Let us call it the "real" growth rate for sales revenues.

c. Calculate average

Calculate the average of these deflated increases and use it as the forecast for the mix of the two input variables: the growth in units and the real increase in prices. In Appendix 3 we show an example of how to use the deflator for calculating those forecasts.

For measuring growth we have to find real growth measures. If we have the information on volume and prices we can estimate the growth in units and the real increase in prices. For calculating the real or unit's growth we can use the average of the historical real growth. However, we have to check with other indicators such as the GDP for the industry and the expected growth of the demand driver.

In the case of the increase in prices, when we compare historical prices we can calculate the historical increase in nominal prices and using the appropriate measure for the inflation, we can measure the historical real increase in prices. The figure to be used as the forecast could be the average of the historical real increases in prices, Then we would have real growth in units, real increase in prices and forecasted inflation. With these three inputs we can calculate the increase in sales that is composed of these three input variables:

$$\text{Increase in Sales Revenues}_t = (1 + \text{inflation}_t) \times (1 + \text{real growth}_t) \times (1 + \text{real increase}_t) - 1 \qquad (6)$$

If we know the sales revenues for the last historical period, we apply this increase to that value and the same for the following years. Something similar can be done with costs and expenses. Find inflation rates from Consumer Price Index, CPI or Producer Price Index, PPI, or Gross Domestic Product, GDP implicit price deflators for the years for which there are historical financial statements.

The "real" growth for sales revenues above, gives us a constraint to the combined effect of real growth in units and real increase in prices. We can estimate one of the two and the other will be defined (using Fisher relation). For instance, one can estimate real growth in units from the industry GDP and then an estimation of real increase in prices (average) will result. The real increase in prices might be estimated as

$$\text{Real increase in price} = \frac{1 + \text{"real" growth}}{1 + \text{real growth in units}} - 1 \qquad (7)$$

In the next table we show an example of this interdependence.

Table 3. Decomposition of "real" increase in sales revenues

"Real" increase in sales revenues	Increase in volume	Increase in real Price (1+"real" growth)/(1+real growth in units)-1
2.57%	0.00%	2.57%
2.57%	0.50%	2.05%
2.57%	1.00%	1.55%
2.57%	1.50%	1.05%
2.57%	2.00%	0.55%
2.57%	2.50%	0.06%

Cash outflows could be determined by defining the amounts to purchase using the cost of goods sold figure and the initial and final inventory: Initial inventory + Purchases − Final Inventory = Cost of goods sold. Depending on the payment of payables policy you can determine the amount of cash paid for that item. The same has to be said for overhead, sales and administrative expenses and the like.

When there is not information for the content or meaning of a given figure in the Balance Sheet, it is better to keep it constant for the forecasting period. Or even you should "eliminate" it either by paying it out or cashing it in and this has to be reflected in the Cash Budget.

Do not express items such as assets, equity, new equity investment, cumulated retained earnings, equity repurchase, debt and the like, (they are cumulative items or will cumulate with previous balances) as a percent of any other figure (say, revenues). These items should change as a result of the different transactions recorded in the Income Statement and the Cash Budget. For instance, the amount to be borrowed or the amount to be invested as cash excess will pop up from the Cash Budget. Recall that the lines in the Balance Sheet are accumulators; therefore it is not recommended to express and forecast some items in the Balance Sheet as a percent of say, revenues.

Be sure to recover and pay all the accounts receivables, AR and accounts payable, AP (or any other liability) from the last historical financial statement. If not, keep them constant but you should realize that doing it might reduce value (in the case of say, AR or increase value (in the case of AP). Do not match the Balance Sheet adding or subtracting any difference between assets and liabilities and equity. This practice might hide some errors that will make difficult and inconsistent the analysis and valuation of the firm. See the above discussion on the use of plugs and Appendix D.

If you list a provision for uncollectible or bad debts it should be subtracted in the Income Statement, reduce the Accounts Receivable, AR in the Balance Sheet and reduce the Revenues from sales in the Cash Budget.

If you pay in advance or receive payments in advance in a given period, you have to reduce those amounts from inflows and outflows from future periods. An approach to take this into account is to split the sales revenues and the payments in three parts:

1. Sales revenues
    a. Payments received in advance (previous period)
    b. Payments received current period
    c. Payments to be received in the future (Accounts receivables AR)
2. Purchases
    a. Payments paid in advance (previous period)
    b. Payments paid current period

    c. Payments to be paid in the future (Accounts payable AP)

  With the previous splitting, we can construct the inflows and outflows for each "slice".

   3. Inflows for Sales revenues
    a. Payments received in advance (from future sales)
    b. Payments received current period
    c. Payments received from past periods (Accounts receivables AR)
   4. Outflows for Purchases
    a. Payments paid in advance (from future purchases)
    b. Payments paid current period
    c. Payments to be paid from past periods (Accounts payable AP)

  There are useful indexes that can be calculated from the financial statements. Find typical and useful indexes such as gross margins, accounts receivables and accounts payable period, inventory turnover, etcetera, based on deflated figures. Use indexes as percentage of revenues for those items that are directly linked to revenues. These are known as variable costs. This is they depend on the level of activity the firm has. For instance, the higher the units sold, the higher the revenues and the higher the cost of goods sold (COGS).

  A proper financial statement forecast cannot be made if the analyst does not take into account the economic environment and related variables. Identify as much variables as possible that might affect forecasts and try to quantify them. Later you might discard some of them either because there is no information or because they are not too relevant. Making this list will give you a broad picture of the firm that you are forecasting. In the comprehensive example we show below the reader could imagine the list of input variables needed to forecast financial statements in reality. Look for the economic environment and use as much information as possible to estimate future trends in the economy.

11. An example

  This is a hypothetical commercial firm. It buys a sole product and sells it at a higher price. The example is based on some input data and from them we derive the complete financial model. The input data is estimated from 5 years of historical financial statements. We start with an initial financial statement (last historical year). Imagine that we construct the financial statements by hand; we start from the last historical financial statements and construct the IS for year 6. We can repeat this process (CB year 6 ➜ IS year 7 ➜ CB year 7 ➜ IS year 8 and so on) until we arrive to the end of the forecasting period. Once the CB and IS are defined, we construct the final BS. The idea is that we cannot construct the IS if we do not know if in the previous period we have contracted new debt or if we have invested some excess cash. This information is the basis to calculate the interest to be paid or received in the next period.

  This example does not intend to show a good or bad financial management. It has the sole purpose to illustrate procedures for forecasting. In fact, figures are completely hypothetical.

a. Use of historical FS

Now we show 5 years of historical financial statements from where we extract some information for forecasting additional 5 years. The historical financial statements are in the next tables. We assume we know some extra information such as that new assets will be bought in year 8 at a price of 65[14], that long term (LT) debt is for 10 years and Short term loan is for 1 year. Taxes are paid the same year as accrued and we will use lineal depreciation for 4 years[15]. We also know information about prices and quantities and the debt schedule for the outstanding debts.

The historical financial statements follow. The first one is the Income Statement.

Table 4a. Historical Income Statement

Year	1	2	3	4	5
Sales revenues	381.4	410.1	444.4	479.3	515.5
COGS	270.3	289.2	312.5	334.8	358.9
Gross Income	111.1	120.9	131.9	144.6	156.6
Overhead expenses	23.4	25.0	26.5	28.0	29.6
Administrative and selling expenses	52.5	56.5	60.7	65.0	69.2
Depreciation	11.3	11.3	11.3	11.3	14.1
Earnings Before Interest and Taxes (EBIT)	23.9	28.2	33.5	40.3	43.8
Interest payments.	8.9	5.1	3.4	2.4	7.0
Return (interest) from ST investment.	0.0	0.0	0.6	2.2	0.0
Earnings Before Taxes EBT	15.0	23.1	30.7	40.2	36.8
Income Taxes.	5.2	8.1	10.7	14.1	12.9
Net Income	9.7	15.0	19.9	26.1	23.9

Now we show the historical Balance Sheet.

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[14] We can design sophisticated procedures in a spreadsheet to define when to invest in fixed assets depending on the available capacity and the lead time of receipt of the new asset.

[15] We use a depreciation life of 4 years only for illustration purposes. We should note that usual depreciation lives are 5, 10 and 20 years depending on the class of assets.

Table 4b. Historical Balance Sheet

Year	1	2	3	4	5
Assets					
Cash	10.0	11.0	12.0	13.0	14.0
Accounts Receivable AR	22.9	24.6	17.8	33.6	15.5
Inventory	22.6	23.2	28.3	28.6	30.3
Short Term investments	0.0	7.8	28.3	0.0	30.7
Current assets	55.5	66.6	86.4	75.1	90.4
Total net fixed assets	33.8	22.5	11.3	56.3	42.2
Total	89.27	89.15	97.62	131.44	132.61
Liabilities and equity					
Accounts Payable AP	27.3	31.9	38.1	23.5	28.8
Short term debt	6.0	0.0	0.0	0.0	0.0
Current liabilities	33.3	31.9	38.1	23.5	28.8
Long term debt	31.3	24.5	17.8	55.5	44.3
Total Liabilities	64.6	56.4	55.9	79.0	73.2
Equity investment	15.0	15.0	15.0	15.0	15.0
Retained earnings	0.0	2.7	6.8	11.4	20.5
Current year Net Income	9.7	15.0	19.9	26.1	23.9
Repurchase of equity	0.0	0.0	0.0	0.0	0.0
Total Liabilities and equity	89.27	89.15	97.62	131.44	132.61

From the historical financial statements we can estimate policies and some input data for the forecasting.

Table 5. Estimation of policies

Year	0	1	2	3	4	5	Average
Cash in BS		10.0	11.0	12.0	13.0	14.0	
Cash as % of sales		2.62%	2.68%	2.70%	2.71%	2.72%	2.69%
Sales revenues		381.4	410.1	444.4	479.3	515.5	
Inventory	20.00	22.64	23.25	28.26	28.59	30.26	
COGS		270.35	289.23	312.55	334.75	358.86	
Inventory policy = Inventory/COGS as %		8.37%	8.04%	9.04%	8.54%	8.43%	8.49%
Accounts receivables		22.9	24.6	17.8	33.6	15.5	
AR policy = AR/Sales revenues as %		6.00%	6.00%	4.00%	7.00%	3.00%	5.20%
Purchases = Final Inv. - Beginning Inv +COGS		272.98	289.84	317.56	335.08	360.54	
Accounts payables		27.30	31.88	38.11	23.46	28.84	
AP policy = AP/Purchases as %		10.00%	11.00%	12.00%	7.00%	8.00%	9.60%
Cumulated retained earnings.	0.00	0.00	2.72	6.78	11.36	20.50	
Net Income	0.00	9.72	15.02	19.93	26.12	23.93	
Dividends. Dn-1=RNn-1-RNn+NIn		0.0	7.0	11.0	15.3	17.0	
Payout ratio= Dividends/Net Income			72.0%	73.0%	77.0%	65.0%	71.8%

In the previous table dividends to be paid in year 6 are calculated from the Net Income of year 5 and the policy of dividends. From the selling and purchasing prices and expenses in the IS, we can estimate the nominal and real price increases. We also calculate the nominal and "real" increase in sales revenues.

For instance in the previous table, cash as a percentage of sales is calculated for year 4 as

13/479.3 = 2.71%.

The inventory policy for year 3 is calculated as

22.9/312.55= 9.04%

Purchases for year 2 are calculated as

Purchases = Final Inv. - Beginning Inv + COGS

= 23.25 - 22.64 + 289.23 = 289.84

Dividends defined with the Net Income, NI from period n-1 will be paid in year n. The dividends are calculated from the retained earnings, RNI, and the net income itself, NI. The calculations come from the formula $D_{N-1}=RNI_{n-1}-RNI_n+NI_n$. For year 3 we have 17.9 – 26.7 + 19.8 = 11.0

The firm usually provides the debt schedules for the actual debts contracted. This hypothetical firm has two long term loans outstanding. The debt schedules for the two loans are shown in the next table. The information from these tables will be included in the Cash Budget.

Table 6. Debt schedule for debt contracted in the past

Year	Payments loan in year 0, L_0	Payments L_1	Interest, L_1	Payments L_4	Interest, L_4
1	6.0				
2	6.0	0.73	0.99		
3	6.0	0.73	0.91		
4	6.0	0.73	0.77		
5	6.0	0.73	0.64	4.44	5.57
6		0.73	0.53	4.44	4.88
7		0.73	0.42	4.44	4.15
8		0.73	0.32	4.44	3.47
9		0.73	0.24	4.44	2.98
10		0.73	0.16	4.44	2.48
11		0.73	0.08	4.44	1.99
12				4.44	1.49
13				4.44	0.99
14				4.44	0.50

In addition there exists some extra information on quantities and prices, as follows.

Table 7. Additional data not found in the financial statements

Year	1	2	3	4	5
Inflation	6.0%	5.5%	5.5%	5.0%	4.5%
Risk free rate, Rf	9.18%	8.66%	8.66%	8.15%	7.63%
Q sold	51.0	51.4	52.3	53.1	54.2
Selling Price	7.5	8.0	8.5	9.0	9.5
Purchasing price	5.33	5.65	6.01	6.34	6.65

The LT loan contracted before year 1 is repaid until year 5. The new LT loan contracted in year 4 is being paid with equal principal payments during 10 years. This information has to be included in the Cash Budget.

In the following tables we make extensive use of the Fisher equation.

Table 8. Estimation of historical nominal and real price increases

Year	1	2	3	4	5	Average
Overhead expenses	23.44	24.97	26.45	28.00	29.61	
Nominal increase in overhead expenses		6.8%	6.7%	6.6%	6.3%	5.3%
Real increase in overhead expenses		1.00%	0.40%	0.80%	1.20%	0.85%
Administrative and selling expenses	52.52	56.49	60.72	64.98	69.19	
Nominal increase in administrative and selling expenses		7.56%	7.48%	7.03%	6.48%	
Real increase in administrative and selling expenses		1.95%	1.87%	1.93%	1.89%	1.91%
Nominal increase in Selling price		6.66%	6.56%	6.26%	5.34%	
Real increase in Selling price		1.10%	1.00%	1.20%	0.80%	1.03%
Nominal increase in Purchasing price		6.13%	6.24%	5.53%	4.92%	
Real increase in Purchasing price		0.60%	0.70%	0.50%	0.40%	0.55%
Nominal increase in Sales revenues		7.51%	8.37%	7.85%	7.55%	
"Real" increase in sales revenues		1.91%	2.72%	2.72%	2.92%	2.57%
Gross margin	29.13%	29.47%	29.67%	30.16%	30.39%	29.76%
Tax rate = Taxes/EBT	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%

As we have mentioned, we have to be careful in analyzing the behavior of the different costs such as overhead and administrative expenses. Abnormal behavior (too high or too low) have to be explained and we have to decide if to include or not that abnormal number in the calculation of the average.

From the additional information above (Table 5) we have inflation and risk free rate. Using this information we can estimate nominal and real interest rates, risk premium in debt and in short term investment.

Table 9. Estimation of cost of debt and return on ST investment

Year	1	2	3	4	5	Average
Interest paid		5.1	3.4	2.4	7.0	
Debt (Total)	37.3	24.5	17.8	55.5	44.3	
Interest rate paid		13.59%	13.97%	13.35%	12.54%	
Risk free rate, Rf		8.66%	9.72%	6.05%	6.59%	
Risk premium in debt = Interest rate paid – Risk free rate		4.92%	5.30%	5.20%	4.90%	5.08%
Interest received	-	-	0.64	2.22	0.00	
ST term investment	0.0	7.8	28.3	0.0	30.7	
Interest rate received	NC	NC	8.18%	7.85%	NC	
Risk premium in ST investment	NC	NC	-0.49%	-0.30%	NC	-0.39%

From the IS and the BS we can extract relevant information to estimate interest rates. For instance, in Table 9, to find the cost of debt for each year we divide the financial expenses (interest paid) for the year, by the debt in the previous year. For year 5 we have, $Kd_5 = 7.0/55.5 = 12.54\%$. The risk premium is Kd minus the risk free rate, Rf. For year 5 it

is 12.54% - 6.59% = 4.9%. In a similar fashion we calculate the return for the short term investment. For both, we calculate the average and use it as an input data.

b. Forecasting FS

From the previous tables and external information we construct a table of input data as follows:

Table 10. Input data (In parenthesis the table from the data come from)

Year	6	7	8	9	10
Corporate tax rate (T. 8)	35.0%	35.0%	35.0%	35.0%	35.0%
Inflation rate (External information)	4.0%	3.5%	3.0%	3.0%	3.0%
Real increase in selling price (T. 8)	1.03%	1.03%	1.03%	1.03%	1.03%
Real increase in purchase price (T.8)	0.55%	0.55%	0.55%	0.55%	0.55%
Real increase in overhead expenses (T.8)	0.85%	0.85%	0.85%	0.85%	0.85%
Real increase in payroll expenses (T.8)	1.91%	1.91%	1.91%	1.91%	1.91%
Increase in sales volume (units) (Internal estimates)	3.00%	3.0%	3.0%	4.0%	4.0%
Real interest rate (External information)	3.00%	3.00%	3.00%	3.00%	3.00%
Risk premium for cost of debt (T.9)	5.08%	5.08%	5.08%	5.08%	5.08%
Risk premium for ST investment (T.9)	-0.39%	-0.39%	-0.39%	-0.39%	-0.39%
Policies and goals					
Inventory as % of COGS (T.5)	8.49%	8.49%	8.49%	8.49%	8.49%
Accounts receivable as % of sales (T.5)	5.20%	5.2%	5.2%	5.2%	5.2%
Accounts payable as % of purchases (T.5)	9.50%	9.5%	9.5%	9.5%	9.5%
Payout ratio (T.5)	71.75%	71.8%	71.8%	71.8%	71.8%
Minimum cash required as % of sales revenues (T.5)	2.69%	2.69%	2.7%	2.7%	2.7%
Repurchase of equity as % of depreciation	0.0%	0.0%	0.0%	0.0%	0.0%
New investment is year 8			65.0		

The real interest rate can be estimated deflating the risk free rate and averaging it. Another option is to look for reports from research in universities and/or the Central Bank or Federal Reserve. Expected inflation rate can be obtained from Central Bank or Federal Reserve estimations. Growth of volume in units is estimated based upon the investment in physical assets. We include an option for repurchase equity based on the funds generated by depreciation. In this case we set that percent as 0%.

With these input data we can construct three financial statements: The Cash Budget, the Income Statement and the Balance Sheet. In the next tables we show the procedure to do this. We start with some intermediate tables and we end with the financial statements.

Table 11. Nominal increase in prices and growth in units.

Year	6	7	8	9	10
Selling	5.1%	4.6%	4.1%	4.1%	4.1%
Purchase	4.6%	4.1%	3.6%	3.6%	3.6%
Overhead expenses	4.9%	4.4%	3.9%	3.9%	3.9%
Payroll expenses	**6.0%**	**5.5%**	**5.0%**	**5.0%**	**5.0%**
Increase factor in volume	3.0%	3.0%	3.0%	4.0%	4.0%

For instance, nominal increase in selling price for year 6 from table 10. is $(1+1.03\%)\times(1+4.00\%)-1 = 5.1\%$.

In the next table we show the forecast of other variables.

Table 12. Basic input variables calculation

Year	5	6	7	8	9	10
Sales in units, Q	54.2	55.8	57.5	59.2	61.6	54.2
Selling price, P	9.5	10.0	10.5	10.9	11.3	9.5
Total sales	515.5	557.9	600.8	643.9	696.9	515.5
Forecast for unit cost	6.65	6.95	7.24	7.49	7.76	8.04
Price of asset in year 8				65.0		
Risk free rate, Rf		7.12%	6.60%	6.09%	6.09%	6.09%
Return of short term investment		6.73%	6.21%	5.70%	5.70%	5.70%
Cost of debt, Kd, from CAPM= Rf + risk premium in cost of debt		12.20%	11.69%	11.17%	11.17%	11.17%
Minimum cash		14.99	16.14	17.30	18.72	20.26

In the previous table we have Q for year 8 is $59.2 = 57.5\times1.03$.

When we have quantities and prices we calculate the real increases in prices and in volume. When we forecast prices and volume using the average of real increase in price and the average of increase in volume, we are splitting the "real" increase of sales revenues in two. In that specific case it is the same to forecast prices and volume or sales revenues. Usually, we forecast volume based on the growth of the demand driver (population, construction, car production, and etcetera) and not using the average of past volume increases. In general, we would forecast a real growth in volume (units) that is linked not to the average of historical growth of units but to a forecast growth based on the demand driver and/or the explicit investment in operating assets.

In general they are not identical. See table below.

Table 13. Comparison of forecasting sales revenues using two approaches

Year	5	6	7	8	9	10
Real increase in selling price		1.03%	1.03%	1.03%	1.03%	1.03%
Increase in sales volume (units)		3.00%	3.00%	3.00%	4.00%	4.00%
Inflation rate		4.0%	3.5%	3.0%	3.0%	3.0%
Forecast of sales revenues as P×Q (T. 12)	515.5	557.87	600.81	643.93	696.85	754.12
Average of "real" increase ((1+nominal inc. sales revenues)/(1+inflation rate) – 1) in sales revenues. (T. 8)		2.57%	2.57%	2.57%	2.57%	2.57%
Nominal increase in sales revenues		6.67%	6.15%	5.64%	5.64%	5.64%
Forecast of sales revenues from the IS	515.5	549.88	583.72	616.66	651.45	688.20
Average Gross margin (T. 8)		29.76%	29.76%	29.76%	29.76%	29.76%
COGS = Sales revenues × (1- average gross margin)		386.21	409.98	433.11	457.55	483.36

In the next table we show the depreciation and investment schedule.

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Table 14. Depreciation schedule

Year	5	6	7	8	9	10
Beginning fixed assets		42.2	42.2	42.2	107.2	107.2
Depreciation Investment year 4	14.1	14.1	14.1	14.1		
Depreciation Investment year 5		0.0	0.0	0.0	0.0	
Depreciation Investment year 6			3.5	3.5	3.5	3.5
Depreciation Investment year 7				4.4	4.4	4.4
Depreciation Investment year 8					21.7	21.7
Depreciation Investment year 9						7.4
Annual depreciation		14.1	17.6	22.0	29.7	37.1
Cumulated depreciation	59.1	73.2	90.7	112.7	142.4	179.5
New fixed assets		14.1	17.6	87.0	29.7	37.1
Net fixed assets	42.2	42.2	42.2	107.2	107.2	107.2

We assume that the firm invests in fixed assets an amount equal to the depreciation charges. In addition, we assume that in year 8 there will be an extra investment in fixed assets. (See table 10). The previous table shows the calculation of depreciation included the new investment of an operating asset by $65.0 in year 8 and the investment of depreciation every year. For instance, depreciation in year 6 is 14.1 and so is the new investment. Depreciation of year 7 of that new investment is 3.5 (14.1/4). This new depreciation adds to the previous one and we arrive to 17.6 in year 7.

In the next table we calculate the units to be purchased and in inventory. This is based on the forecast of units sold and the inventory policy. Purchases in units can be derived from the level of inventory as follows:

Final inventory, FI = Initial inventory, II + Purchases, P – Units sold, S   (8a)

P = FI – II + S   (8b)

From the BS in year 5 and purchasing price in Table 7 we estimate the inventory in year 5 in units as 4.6 (30.3/6.65)

Table 15. Inventory and purchases in units

Year	5	6	7	8	9	10
Units sold (T. 12)	54.18	55.81	57.48	59.20	61.57	64.04
Final inventory in units	4.55	4.74	4.88	5.02	5.22	5.43
Initial inventory in units	4.51	4.55	4.74	4.88	5.02	5.22
Purchases in units		55.99	57.62	59.35	61.77	64.24
Forecasted Unitary cost	6.65	6.95	7.24	7.49	7.76	8.04

Purchases in units for year 6 are 55.99 (4.74– 4.55 + 55.81). The reader should verify that final inventory is 8.49% of the sales in units.

Table 16. Cost of goods sold (COGS) and overhead and administrative and selling expenses calculation

Year	5	6	7	8	9	10
Initial inventory in dollars		30.3	32.9	35.3	37.6	40.6
Purchases in dollars		389.3	417.0	444.8	479.5	516.4
Final inventory in dollars	30.3	32.9	35.3	37.6	40.6	43.7
COGS		386.7	414.6	442.4	476.6	513.3
Overhead expenses.	29.6	31.1	32.4	33.7	35.0	36.3
Administrative and selling expenses	69.2	73.3	77.4	81.2	85.2	89.5

Final inventory is calculated as units in inventory times unit cost. For instance, for year 6, we have $6.95 \times 4.74 = 32.9$. COGS for year 6 is Initial inventory + Purchases – Final inventory = $30.3 + 389.3 - 32.9 = 386.7$. Compare the COGS calculated in the previous table with the one calculated based upon the forecast for sales revenues and the average Gross margin in the table 13. We prefer and recommend, when possible, the approach presented in the previous table.

To calculate expenses we apply the nominal increase to the previous value of the expense.

In the next table we split sales and purchases in inflows and outflows according to the AR and AP policies.

Table 17. Sales and purchases

Year	6	7	8	9	10
Total sales revenues (T. 13)	557.9	600.8	643.9	696.9	754.1
Credit sales (% from T. 10)	29.0	31.2	33.5	36.2	39.2
Inflow of sales revenues for current year	528.9	569.6	610.4	660.6	714.9
Total purchases (T. 16)	389.3	417.0	444.8	479.5	516.4
Purchases on credit (% from T. 10)	37.4	40.0	42.7	46.0	49.6
Purchases paid the same year	351.9	376.9	402.1	433.4	466.9

In table 17 we calculate how much of the sales revenues are received the same period they are invoiced and how much is left as AR for the next period. In the same fashion we calculate that for the purchases. For instance, in the previous table we split the sales for year 6 (557.9) in Inflow of sales for current year as credit sales (Sales revenues × % of AR, $557.9 \times 5.2\% = 29.0$) and the rest of sales will be received in year 7. In a similar fashion we calculate the outflows for purchases. In the following table we place each amount in the proper year.

Table 18. Inflows from sales and outflows for purchases

Year	6	7	8	9	10
Inflow of sales revenues for current year	528.9	569.6	610.4	660.6	714.9
Inflows from Accounts Receivables	15.5	29.0	31.2	33.5	36.2
Total inflows	544.3	598.6	641.7	694.1	751.1
Purchases paid the current year	351.9	376.9	402.1	433.4	466.9
Payment of Accounts Payable	28.8	37.4	40.0	42.7	46.0
Total payments for purchases	380.8	414.3	442.1	476.1	512.9

In the previous table we put each amount in the period that will be received. With all these input data we construct the Cash Budget, CB. In the CB we link input data and

intermediate tables, with some lines from the Income Statement, IS. Remember that all financial statements are intertwined.

Table 19. Cash Budget (In parenthesis the table the data are taken from)

Year	6	7	8	9	10
Module 1: Operating activities					
Cash inflows					
Total AR plus sales on cash (T. 18)	544.3	598.6	641.7	694.1	751.1
Total inflows	544.3	598.6	641.7	694.1	751.1
Cash outflows					
Total payments for purchases T. 18)	380.8	414.3	442.1	476.1	512.9
Overhead and Administrative and selling expenses (T. 16)	104.4	109.8	114.9	120.2	125.8
Income Taxes (From IS below, T. 21)	17.3	19.7	22.0	22.7	25.6
Total cash outflows	502.5	543.8	579.0	619.0	664.3
Net cash balance NCB before fixed assets purchase	41.9	54.8	62.7	75.1	86.8
Module 2: Investment in assets					
Purchase of fixed assets (T. 14)	14.1	17.6	87.0	29.7	37.1
NCB of investment in assets	-14.1	-17.6	-87.0	-29.7	-37.1
NCB after fixed assets investment	27.8	37.2	-24.3	45.4	49.8
Module 3: External financing					
Inflow of loans					
ST Loan	0.0	0.0	0.0	0.0	0.0
LT loan 10 years	0.00	0.00	21.56	0.00	0.00
Payment of loans					
Principal ST loan	0.0	0.0	0.0	0.0	0.0
Interest ST loan	0.0	0.0	0.0	0.0	0.0
Principal LT loan (T. 6 and 20, below)	5.2	5.2	5.2	7.3	7.3
Interest LT loan (T. 6 and 20, below)	5.4	4.6	3.8	5.6	4.8
NCB of financing activities	-10.6	-9.7	12.6	-13.0	-12.1
Module 4: Transactions with owners					
Initial Invested equity					
Dividends payment (T. 21)	17.2	23.0	26.2	29.4	30.2
Repurchase of stock (T. 21)	0.0	0.0	0.0	0.0	0.0
NCB of transactions with owners	-17.2	-23.0	-26.2	-29.4	-30.2
NCB for the year after previous transactions	0.0	4.4	-38.0	3.1	7.4
Module 5: Discretionary transactions					
Redemption of short term ST investment (T. 4b for year 6)	30.7	31.8	37.0	0.0	1.7
Return from ST investments	2.1	2.0	2.1	0.0	0.1
ST investments	31.77	37.01	0.00	1.68	7.65
NCB of discretionary transactions	1.0	-3.3	39.1	-1.7	-5.9
Year NCB	0.99	1.15	1.16	1.42	1.54
Cumulated NCB (Check with T. 12)	14.99	16.14	17.30	18.72	20.26

Observe that interest paid and received depend on previous balance of debt and marketable securities (short term investment). Dividends depend on Net Income of previous year and dividends policy as well.

It is necessary that the reader understands the clue in the CB calculation. There are two relevant issues in order to avoid plugs and circularity. One is the calculation of debt (short term and long term) and the other one is the cash excess invested in marketable securities.

The model checks if there is a deficit or an excess of cash. The first equation for calculating ST debt is the following:

Net cash balance NCB before fixed assets purchase - Interest ST loan -Principal ST loan >0   (9a)

For year 7 we have $54.8 - 0.0 - 0.0 > 0$ hence there is no need for a ST loan. If negative, then there exists a deficit and there will be a ST loan by an amount equal to the absolute value of the deficit. If positive, then there is no need for a loan. All the elements in the formula are from the current year except the cumulated NCB that comes from the previous year. Observe that principal payments and interest payments in this equation (9a) have been defined from a debt contracted in previous years. In this analysis we consider only short term items, such as the operating NCB (Net cash balance NCB before fixed assets purchase).

The second formula is for the LT debt. The equation for LT debt is the following:

NCB after fixed assets investment + ST Loan - Principal ST loan - Interest ST loan - Principal LT loan - Interest LT loan + NCB of transactions with owners + Redemption of short term ST investment + Return from ST investments - Minimum cash + Cumulated NCB (previous period) > 0   (9b)

If this is negative, they contract a loan for the absolute value of the deficit. If not, they do not. All the elements in the formula are from the current year, except the cumulated NCB that comes from the previous year. Observe that principal payments and interest payments in this equation (9b) have been defined from a debt contracted in previous years.

For instance, at year 8, we have:
-24.33+0.00-0.00-0.00-5.17-3.80-26.23+37.01+2.11-17.30+16.14 = -21.57 < 0
As this is negative, it is a deficit and the firm has to contract a long term loan for the amount of 21.57.

For the cash excess we have the following:

NCB for the year after previous transactions + Redemption of short term ST investment + Return from ST investments+ Cumulated NCB (previous period)- Minimum cash > 0   (10)

If this is positive, there is cash excess and the model invest that amount. All the elements in the formula are from the current year, except the cumulated NCB that comes from the previous year. Observe that redemption of and return from ST investment in this equation (10) has been defined from an investment made in previous years.

For instance, for year 7 we have:

=14.99+4.4+31.8+2-16.14 = 37.05 (please, allow for rounding errors).

The first thing we can see in the CB is that the model shows that we will need a new LT loan in year 8. For illustration purposes we show an additional line in the debt schedule to show the new LT loan.

Table 20. Long term loan Schedule (includes old debt)

Year	6	7	8	9	10
Beginning balance	44.4	39.2	34.0	37.7	31.6
Interest payment LT	5.4	4.6	3.8	5.6	4.8
Principal payments LT	5.2	5.2	5.2	7.3	7.3
Total payment LT	10.6	9.7	9.0	13.0	12.1
New debt	0.0	0.0	21.6	0.0	0.0
Ending balance	39.2	34.0	50.4	43.1	35.7
Interest rate	11.58%	10.65%	10.14%	10.14%	10.14%

From the BS of year 5 we can calculate interest charges and return from ST securities and then we can complete the IS and the CB for year 6. The interest charges are calculated as $Kd_t \times$ Total deb_{t-1} ($11.58\% \times (0.0+44.4) = 5.14$. In the same fashion we calculate the return on ST securities.

In the next table we show the forecast for the Income Statement.

Table 21. Income Statement.

Year	5	6	7	8	9	10
Sales revenues (T. 12)	515.5	557.9	600.8	643.9	696.9	754.1
COGS (T. 16)	358.9	386.7	414.6	442.4	476.6	513.3
Gross Income	156.6	171.2	186.2	201.5	220.3	240.8
Overhead expenses (T.16)	29.6	31.1	32.4	33.7	35.0	36.3
Administrative and selling expenses (T. 16)	69.2	73.3	77.4	81.2	85.2	89.5
Depreciation (T. 14)	14.1	14.1	17.6	22.0	29.7	37.1
Earnings Before Interest and Taxes (EBIT)	43.8	52.7	58.8	64.6	70.4	77.9
Interest payments (T 19 and 20)	7.0	5.4	4.6	3.8	5.6	4.8
Return (interest) from ST investment. (T. 19)	0.0	2.1	2.0	2.1	0.0	0.1
Earnings Before Taxes EBT	36.8	49.4	56.2	62.9	64.8	73.2
Income Taxes	12.9	17.3	19.7	22.0	22.7	25.6
Net Income	23.9	32.1	36.6	40.9	42.1	47.6
Dividends	17.4	23.0	26.2	29.4	30.2	34.1
Cumulated retained earnings	20.6	27.3	36.3	46.7	58.2	70.1
Repurchase of equity	0.0	0.0	0.0	0.0	0.0	0.0

Observe that interest payments and return on ST investments depend on previous balances for each year.

As historical financial statements do not give the information on dividends to be paid in the next year, we have to use the estimate of dividend policy from table 5. With this policy we calculate the dividends to be paid from year 6 to 10 and based on the previous Net Income. For instance, the dividend to be paid in year 6 is calculated from the Net Income of year 5 and the dividend policy ($17.4 = 24.3 \times 71.8\%$).

On the other hand, with the IS for year 5 we calculate the tax for year 6, hence we can construct the CB for year 6. In fact, as taxes are assumed to be paid the same year as accrued, the tax payment for year 6 is known). If taxes were paid the following year, the tax

calculated in year 5 allows us to construct the CB for year 6. When we construct the CB for year 6 to 10 we can construct successively the IS for those years).

In the previous IS we can observe how easy is to complete it. In practical terms, the IS has been constructed from previous tables, most of them (up to EBIT) from intermediate tables.

Once we have the CB and the IS for years 6 to 10 we can construct the BS for the same years. In a spreadsheet all this happens at the same time because the three financial statements are intertwined. In the next table we show the BS for years 6 to 10. For illustration we have added a new column for illustration purposes, where we show where each item value is taken from.

Table 22. Forecast Balance Sheet

Year		6	7	8	9	10
Assets						
Cash	CB (T. 19)	15.0	16.1	17.3	18.7	20.3
Accounts Receivable AR	IT (T. 17)	29.0	31.2	33.5	36.2	39.2
Inventory	IT (T. 16)	32.9	35.3	37.6	40.6	43.7
ST investments	CB (T. 19)	31.8	37.0	0.0	1.7	7.6
Current assets	Sum	108.7	119.7	88.4	97.2	110.8
Total net fixed assets	IT (T. 14)	42.2	42.2	107.2	107.2	107.2
Total		150.92	161.92	195.66	204.42	218.02
Liabilities and equity						
Accounts Payable AP	IT (T. 17)	37.4	40.0	42.7	46.0	49.6
Short term debt	CB (T. 19)	0.0	0.0	0.0	0.0	0.0
Current liabilities	Sum	37.4	40.0	42.7	46.0	49.6
Long term debt	CB (T. 19)	39.2	34.0	50.4	43.1	35.7
Total Liabilities	Sum	76.5	74.0	93.1	89.1	85.3
Equity investment	ID (T. 4b)	15.0	15.0	15.0	15.0	15.0
Retained earnings	IS (T. 21)	27.3	36.3	46.7	58.2	70.1
Current year Net Income	IS (T. 21)	32.1	36.6	40.9	42.1	47.6
Repurchase of equity	IS (T. 21)	0.0	0.0	0.0	0.0	0.0
Total Liabilities and equity	Sum	150.92	161.92	195.66	204.42	218.02

In this table CB = Cash Budget; IT = intermediate tables; ID = Input data and Sum indicates that we have to add up lines above. In the previous BS we can observe how easy is to complete it. In practical terms, the BS has been constructed from previous tables, most of them from intermediate tables.

Now we can compare the behavior of the forecast with the historical one and we can asses if our forecasts are in line or not with what has happened in previous years. This comparison will give us some insight of any drastic deviation from the historical situation. Major deviations have to be understood, justified and explained.

Table 23. Selected indexes from historical and forecasted financial statements

Year	1	2	3	4	5	6	7	8	9	10
Gross margin	29.1%	29.5%	29.7%	30.2%	30.4%	30.7%	31.0%	31.3%	31.6%	31.9%
Operating margin	3.9%	5.6%	6.9%	8.4%	7.1%	8.9%	9.4%	9.8%	9.3%	9.7%
Net margin	2.5%	3.7%	4.5%	5.4%	4.6%	5.8%	6.1%	6.4%	6.0%	6.3%
EBITDA	35.1	39.4	44.7	51.6	57.8	66.8	76.4	86.6	100.1	115.0
EBITDA/Sales revenues	9.2%	9.6%	10.1%	10.8%	11.2%	12.0%	12.7%	13.5%	14.4%	15.3%

In the previous table gross margin is defined as gross income divided by sales revenues; operating margin is EBIT divided by sales revenues; net margin is net income divided by sales revenues; and finally, EBITDA is EBIT plus depreciation (and amortization).

In this example we identify a drop of operating and net margins (in year 5) due to the new investment in operating assets. This high investment generated significant depreciation and debt (interest charges). However, when we examine EBITDA and EBITDA/(Sales revenues) we find a regular pattern in their behavior.

In addition to this historical comparison we should compare with the industry where the firm belongs. We have to remind that the industrial information is an average, but it is useful because it shows a trend.

As a last comment, we remind the reader that this example does not intend to show a good or bad financial management. It has the sole purpose to illustrate procedures for forecasting.

In the next section we show how we can derive the cash flows for valuation purposes from the financial statements.

12. Cash Flows from Financial Statements to value a Firm

In this section we will derive the cash flows for a firm. These cash flows will be the basis to calculate the market value of the firm and specifically the market value of equity.

In seminal papers Modigliani and Miller (1958, 1959 y 1963) from now on M&M, proposed a basic idea: in a perfect market where no taxes exist, total value of a firm is unchanged by the way the assets are owned. The capital structure of the firm does not affect the total value. Capital structure is the financing structure of the firm. In other words, how it is financed, how much is debt and how much is equity. This is

$$V^{Unlevered} = E^{Unlevered} = V^{Levered} = E^{Levered} + D \qquad (11a)$$

Where $V^{Unlevered}$ is the value of the unlevered (without debt) firm, $E^{Unlevered}$ is the value of the unlevered equity, $E^{Levered}$ is the value of equity when the firm has debt and D is the market value of debt. This means that under this hypothetical situation (when there are no taxes) capital structure does not affect firm value.

For each term of the previous equation there exists a cash flow and they (the cash flows) maintain the same relationship, as follows.

FCF = CFD + CFE $\qquad\qquad$ (11b)

Where FCF is the free cash flow, CFD is the cash flow to debt and CFE is the cash flow to equity.

On the other hand they established that when taxes exist this externality creates an additional value that has been called the value of the tax shields or tax savings for paying interest. In this case, capital structure does affect the value of the firm, as follows.

$$V^{Levered} = V^{Unlevered} + V^{TS} = E^{Levered} + D \qquad (11c)$$

Where V^{TS} is the value of tax shields, other terms where defined above. By the same token we can associate cash flows to each element of the last equation, as follows.

$$FCF + TS = CFD + CFE = CCF \qquad (11d)$$

Where TS is the tax shield or tax savings and CCF is the Capital Cash Flow (see Ruback, 2002). It has to be noticed that CFE in equation 11b is different in value from the CFE in 11d. The CFE in 10d is larger than CFE in 11b and the difference is the TS.

We will see how we can derive these cash flows from the pro forma financial statements. The basic idea is to identify how much cash the owners of the right hand side terms of the equations receive. These owners are the debt holders and the equity holders.

We can derive the cash flows in a direct or indirect way. First we show the easiest way: the direct method. This means that we identify directly the amounts of the cash flows from the CB.

a. Cash Flow to Debt. CFD

Which is the contribution and retribution of the debt holders? They supply the firm with loans and they receive as compensation the amount the firm borrowed plus the contractual interest. The interesting thing is that our Cash Budget already has this amount calculated. Let us see the Module 3 in the CB:

Table 24a. Module 3: External financing, from Cash Budget

Year	6	7	8	9	10
Module 3: External financing					
ST Loan	0.0	0.0	0.0	0.0	0.0
LT loan 10 years.	**0.00**	**0.00**	**8.81**	**0.00**	**0.00**
Payment of loans.					
Principal ST loan	0.0	0.0	0.0	0.0	0.0
Interest ST loan	0.0	0.0	0.0	0.0	0.0
Principal LT loan	5.2	5.2	5.2	6.0	6.0
Interest LT loan	5.1	4.2	3.5	3.8	3.2
NCB of financing activities.	-10.3	-9.3	0.2	-9.9	-9.3

The CFD is the net value in the NCB of financing activities but with the sign reversed. Remember that the debt owner "invest" her money in the firm, hence it is an outflow and she receives back the principal payments plus interest. They are inflows for them.

Hence the CFD is

Table 24b. Calculation of CFD from the CB

Year	6	7	8	9	10
Module 3: External financing					
ST Loan (Minus)	0.0	0.0	0.0	0.0	0.0
LT loan 10 years. (Minus)	0.00	0.00	8.81	0.00	0.00
Payment of loans.					
Principal ST loan (Plus)	0.0	0.0	0.0	0.0	0.0
Interest ST loan (Plus)	0.0	0.0	0.0	0.0	0.0
Principal LT loan (Plus)	5.2	5.2	5.2	6.0	6.0
Interest LT loan (Plus)	5.1	4.2	3.5	3.8	3.2
Cash Flow to Debt	10.3	9.3	-0.2	9.9	9.3

CFD is all the debt holders lend to the firm and the repayment with interest the firm repays to them.

b. Cash Flow to Equity. CFE

Using the same approach we can identify the cash flow that equity holders receive. We look at Module 4 in the CB, as follows

Table 25a. Module 4: Transactions with owner, from the CB

Year	6	7	8	9	10
Module 4: Transactions with owners.					
Initial Invested equity.					
Dividends payment.	15.8	23.1	26.3	29.4	30.9
Repurchase of stock.	0.0	0.0	0.0	0.0	0.0
NCB of transactions with owners.	-15.8	-23.1	-26.3	-29.4	-30.9

The CFE is the NCB of transactions with owners but with reversed sign. The CFE is just the same numbers with negative sign.

Table 25b. Calculation of CFE from the CB

Year	6	7	8	9	10
Module 4: Transactions with owners.					
Equity Investment. (Minus)					
Dividends payment. (Plus)	15.8	23.1	26.3	29.4	30.9
Repurchase of stock. (Plus)	0.0	0.0	0.0	0.0	0.0
Cash Flow to Equity, CFE	15.8	23.1	26.3	29.4	30.9

c. The Capital Cash Flow. CCF

The sum of the CFD plus the CFE is called the Capital Cash Flow, CCF. With this CCF we can calculate the value of the firm.

Table 25c. Calculation of the CCF

Year	6	7	8	9	10
CFD	10.3	9.3	-0.2	9.9	9.3
CFE	15.8	23.1	26.3	29.4	30.9
CCF	26.1	32.4	26.1	39.3	40.1

$$CCF = CFD + CFE \tag{12}$$

Observe that the previous equation is the right hand side of the equilibrium equation for cash flows. We have to call the attention to the reader regarding this last equation: what we are interested in is not what remains in the firm, but what goes out of the firm. What the owners (of debt and equity) receive. It is not inflows minus outflows, as many might think.

We can say that CCF (no matter how we arrive to this value) is as follows:

$$CCF \equiv \text{What the owners of debt and equity receive} \tag{13}$$

d. The Free Cash Flow. FCF

Let us remind what M&M said what happens when we have taxes. We can say that FCF (no matter how we arrive to this value) is as follows:

$FCF \equiv$ What the owners of debt and equity receive minus the tax savings (14a)

Hence, a simple way to derive the FCF is using 11d

$$FCF = CFD + CFE - TS \tag{14b}$$

Where all the variables have been already defined.

Observe that FCF is related to the other three cash flows: the CFD, CFE and TS.

We profit from the simplicity of the ideas legated by Modigliani and Miller: We could say with Einstein: When the solution is simple, God is answering.

As can be seen, this is the easiest way to construct the FCF: the direct method. Where can we see these cash flows? We find the CFD and the CFE in the Cash Budget. And how can calculate the TS? As we have shown, we can determine when the taxes are paid and if we have enough EBIT in order to earn the TS. It can be shown that if EBIT (plus other income) is greater than interest charges, the TS will be T × Interest. If EBIT is positive but lower than interest charges, the TS is T×EBIT. If EBIT is negative, the TS is zero.[16]

From the Income Statement and input data we have

Table 26. Calculation of TS

Year	6	7	8	9	10
Earnings Before Interest and Taxes (EBIT)	52.7	58.4	64.3	70.0	77.5
Interest payments.	5.1	4.2	3.5	3.8	3.2
Return (interest) from ST investment.	1.9	2.2	2.3	0.0	0.2
Earnings Before Taxes EBT	49.5	56.5	63.1	66.2	74.5
Tax rate	35.0%	35.0%	35.0%	35.0%	35.0%
Tax savings = T × Interest	1.8	1.5	1.2	1.5	1.3

For instance, the TS for year 8 is $35.5\% \times 3.5 = 1.2$.

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[16] If we have losses carried forward (LCF) we can recover in future periods the TS not earned. In any case, we have to check the tax law.

In a previous table we have calculated the CFD, the CFE and the CCF, hence, the FCF can be calculated as follows

$$FCF = CCF - TS = CFD + CFE - TS \tag{16}$$

Table 27. Calculation of the FCF using the direct method

Year	6	7	8	9	10
CFD	10.3	9.3	-0.2	9.9	9.3
CFE	15.8	23.1	26.3	29.4	30.9
CCF	26.1	32.4	26.1	39.3	40.1
TS	1.8	1.5	1.2	1.3	1.1
FCF	24.3	31.0	24.9	37.9	39.0

The FCF for year 9 is 39.3 – 1.3 = 37.9. We have just learned how to derive the cash flows (specially the FCF) with the direct method. In the next section we show how to calculate the FCF using the indirect method.

a. Indirect Methods

Now we proceed to illustrate the use of the most popular approach to calculate the FCF: the indirect method. In the indirect method the analyst only has available the traditional financial statements: the Income Statement and the Balance Sheet.

In this scenario it will be necessary to calculate the amount of investment in operating assets. This calculation follows:

$$\text{Net fixed Assets}_t = \text{Net fixed Assets}_{t-1} + \text{Investment in operating assets}_t - \text{Depreciation}_t \tag{17a}$$

$$\text{Investment in operating assets}_t = \text{Net fixed Assets}_t - \text{Net fixed Assets}_{t-1} + \text{Depreciation}_t \tag{17b}$$

The most popular approach to calculate the FCF also requires the calculation of the working capital of the firm (current assets minus current liabilities) and the change of that working capital (CWC) from one period to the next and introduce that amount in the following equation:

$$FCF = EBIT \times (1 - T) + \text{Depreciation} + \text{Amortization} - CWC - \text{Investment in operating assets} \tag{18} \text{ [17]}$$

Where EBIT is Earning before Taxes and Interest, T is the corporate tax rate, and CWC is the change in working capital. What we do with this formula is to undo some transactions in the Income Statement based on accrual and cost apportioning into a cash flow.

i. A Close Look to the Change in Working Capital

Let us examine this last "formula". When we calculate EBIT × (1-T) we are recognizing corporate taxes without the effect of tax savings for payment of interest. This effect is taken into account when we use the Weighted Average Cost of Capital, WACC as a discount rate for the cash flows. When we add back depreciation and amortization we recognize that they are not a cash flow (remember that we are trying to convert accounting

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[17] We can also calculate the FCF from the Net Income.

items (with accrual) into cash flows. When we subtract the CWC we are adjusting the accounting result (EBIT) that is based on the accrual principle[18] with those items that appear in the IS, but that in terms of cash flow have not yet occurred (say, sales and COGS because there exist accounts receivable and accounts payable).

Let us examine in detail the arithmetic operations with the CWC and in particular an item that will allow us to understand why it has to be subtracted (See Velez-Pareja, 2005. The following paragraphs and equations are taken from there.). If for a given year t, we list $Sales_t$ in the IS we could have the idea that we receive that amount but it is apparent. If we wish to determine how much of those sales has been received in that year t we have to make two reflections. First, not all that was invoiced and that appears as sales has been received in t; in t we have received the amount left after we subtract from the total sales the accounts receivable AR_t. This is, from the sales list in t, $Sales_t$, the firm receives only

$$\text{CF due to sales at t} = CF_{St} = Sales_t - AR_t \tag{19a}$$

Secondly, at the beginning of year t (end of year t−1) there were some AR pending to be received, and were invoiced at year t−1, this is $AR_{t−1}$. If those AR were received in t, then they will be part of the cash flow of t. If not, they will be listed in AR_t. Hence, the total cash flow in t due to sales in t and years before will be

$$CF_{St} = AR_{t−1} + Sales_t - AR_t \tag{19b}$$

Grouping terms we have

$$CF_{St} = Sales_t + AR_{t−1} - AR_t \tag{19c}$$

or,

$$CF_{St} = Sales_t - (AR_t - AR_{t−1}) \tag{19d}$$

This is, we subtract the change in AR from t−1 to t, from $Sales_t$. We have to remember that accounts receivable are part of the working capital.

In the case of accounts payable and using a similar argument we have that purchases are listed in the cost of goods sold (COGS) (COGS = Initial inventory + Purchases − Final inventory) in the IS. However, part of those purchases has not been paid yet and hence the cash flow due to the purchases in year t, P_t, is

$$\text{CF from Purchases in t} = P_t - AP_t \tag{20a}$$

Where AP_t means accounts payable in year t.

As we did with AR, we have some AP from previous years, then the cash flow for year t is

$$CF_{Pt} = AP_{t−1} + P_t - AP_t \tag{20b}$$

Grouping terms we have

$$CF_{Pt} = P_t - (AP_t - AP_{t−1}) \tag{20c}$$

Now let us examine what appears in the IS as the COGS:

$$COGS_t = FI_{t−1} + P_t - FI_t \tag{21a}$$

Where FI is final inventory and COGS is the cost of goods sold.

From 21a we solve for P_t and replace it in 20c

$$P_t = COGS_t + FI_t - FI_{t−1} \tag{21b}$$

The cash flow associated to COGS is

$$CF_{Pt} = COGS_t + FI_t - FI_{t−1} - (AP_t - AP_{t−1}) \tag{22a}$$

Then the net CF is

$$\text{Net } CF_t = Sales_t - (AR_t - AR_{t−1}) - (COGS_t + FI_t - FI_{t−1} - (AP_t - AP_{t−1})) \tag{23a}$$

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[18] To make the analysis easier and without loss of generality, we are assuming no excess cash investment in short term securities and no cash in hand.

Simplifying we have

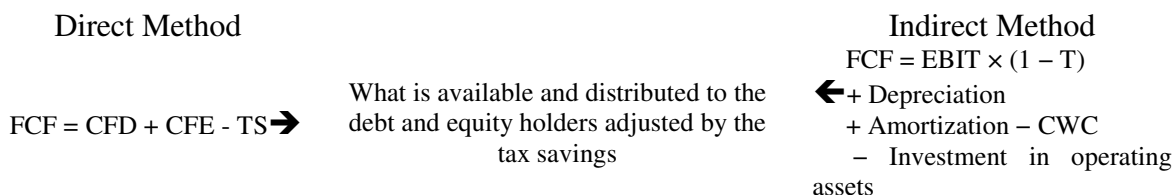Net $CF_t = Sales_t - COGS_t - (AR_t - AR_{t-1}) - (FI_t - FI_{t-1}) + (AP_t - AP_{t-1}))$ (23b)

Simplifying

Net $CF_t = EBIT_t - CWC_t$ (23c)

To convert EBIT into a cash flow we have to subtract the change in working capital.

ii. An Apparent Paradox

Now we are confronted with an apparent paradox: how come that it is said that the FCF must be free of the effects of the financing and yet we have calculated the FCF from the items that finance the firm as we did in the first method? The answer is very easy. We can see it as what the owners of the capital receive (first or direct method) or what is available for distribution (indirect method) and effectively is distributed the owners of capital (debt and equity) after adjusted by the tax savings. Both approaches arrive to the same result.

In a graphical way, we are doing the following:

Direct Method		Indirect Method
		FCF = EBIT × (1 − T)
	What is available and distributed to the debt and equity holders adjusted by the tax savings	← + Depreciation
FCF = CFD + CFE - TS➜		+ Amortization − CWC
		− Investment in operating assets

Where do we get each piece of information in order to derive the cash flows? Using the first approach (direct method), from the cash budget and from the knowledge of the way taxes are paid and if EBIT is greater, equal or lower than the interest charges. In the second approach (indirect method) we take the information from the Balance Sheet and the Income Statement.

In relation with the consistency between the definition of FCF and the "formula" we have to take special care in the definition of the items included in it. For instance, when we say working capital we refer exactly to the definition of it: the difference between current assets and current liabilities. In this case the current assets have all the items included in that category. In particular, it includes the cash in hand, AR, inventories and market securities; on the other hand, it includes the current liabilities *except the current part of the financial debt (financial debt is that liability that accrues interest charges)*. On the contrary, if we do not include in the working capital all the items in the current assets or current liabilities, (for instance, if we leave out items like cash in hand, and marketable securities because they are not operating items) we are not consistent with the definition of cash flow.

If we calculate cash flows using both approaches, the results have to be identical. When we say identical we mean exactly identical. With the arrival of spreadsheets the old idea of rounding errors is gone. It is a myth. We consider that the first approach is crystal clear, simple and the probability of mistakes is negligible.

Now we will illustrate the calculation of FCF using the indirect method.

iii. Cash flows from the Income Statement

Now we present the indirect method to calculate cash flows. As we have said, the indirect method uses the information from the Income Statement and the Balance Sheet. In the next table we calculate the working capital and its change.

Table 28. Working Capital and Change in Working Capital

Year	5	6	7	8	9	10
Working capital						
Cash	14.0	15.0	16.1	17.3	18.7	20.3
Accounts receivable	15.5	29.0	31.2	33.5	36.2	39.2
Inventory	30.3	23.1	24.8	26.4	28.5	30.7
Marketable securities	31.1	42.2	49.1	0.0	4.6	12.9
Current assets	90.9	109.3	121.3	77.2	88.1	103.1
Accounts payable	28.8	36.1	39.6	42.2	45.5	49.0
Current liabilities	28.8	36.1	39.6	42.2	45.5	49.0
Working capital = Current assets - Current liabilities + Short term debt	62.0	73.2	81.7	35.0	42.6	54.1
Change in working capital		11.2	8.4	-46.7	7.6	11.5

As we said above, when using the indirect method we have to "derive" the investment in assets from the pro forma financial statements. Using (16b), in the next table we calculate investment in operating assets

Table 29. Calculation of the investment in fixed assets from the financial statements

Year	5	6	7	8	9	10
Net fixed assets	42.2	42.2	42.2	107.2	107.2	107.2
Depreciation		14.1	17.6	22.0	29.7	37.1
Investment in operating assets$_t$ = Net fixed Assets$_t$- Net fixed Assets$_{t-1}$+ Depreciation$_t$		14.1	17.6	87.0	29.7	37.1

The investment in year 8 is 107.2 – 42.2 + 22.0 = 87.0. Observe that this amount includes depreciation for year 8 (as an investment) and the purchase of the new asset of 67 forecasted for that year.

We calculate the FCF and the CFE from EBIT. In the next tables we show the derivation of the FCF and the CFE.

Table 30. FCF derived from EBIT

Year	6	7	8	9	10
EBIT	52.7	58.4	64.3	70.0	77.5
Minus tax on EBIT	-18.5	-20.5	-22.5	-24.5	-27.1
Plus depreciation and amortization	14.1	17.6	22.0	29.7	37.1
Plus Return on ST investments	1.9	2.2	2.3	0.0	0.2
Minus tax on return on ST investment	-0.7	-0.8	-0.8	0.0	-0.1
Minus change in working capital	-11.2	-8.4	46.7	-7.6	-11.5
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
FCF	24.3	31.0	24.9	37.9	39.0

Now we derive the CFE from EBIT. In this case we need to calculate the TS as we did in the direct method.

Table 31. CFE derived from EBIT

Year	6	7	8	9	10
EBIT	52.7	58.4	64.3	70.0	77.5
Minus tax on EBIT	-18.5	-20.5	-22.5	-24.5	-27.1
Plus depreciation and amortization	14.1	17.6	22.0	29.7	37.1
Minus change in working capital	-11.2	-8.4	46.7	-7.6	-11.5
Minus principal payments	-5.2	-5.2	3.6	-6.0	-6.0
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
Plus Return on ST investments	1.9	2.2	2.3	0.0	0.2
Minus tax on return on ST investment	-0.7	-0.8	-0.8	0.0	-0.1
Minus Interest payments	-5.1	-4.2	-3.5	-3.8	-3.2
Plus tax savings	1.8	1.5	1.2	1.3	1.1
CFE	15.8	23.1	26.3	29.4	30.9

As we mentioned above, we can derive the cash flows from the Net Income as well. Next we calculate the FCF and the CFE departing from the Net Income. In the case of the FCF we need to calculate the TS as we did with the direct method.

Table 32. FCF from Net Income

Year	6	7	8	9	10
Net Income	32.2	36.7	41.0	43.0	48.4
Plus depreciation and amortization	14.1	17.6	22.0	29.7	37.1
Plus Interest payments	5.1	4.2	3.5	3.8	3.2
Minus Tax savings	-1.8	-1.5	-1.2	-1.3	-1.1
Minus change in working capital	-11.2	-8.4	46.7	-7.6	-11.5
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
FCF	24.3	31.0	24.9	37.9	39.0

In the same fashion we can calculate the CFE departing from the Net Income. In this case we do not need to calculate the TS.

Table 33. CFE from Net Income

Year	6	7	8	9	10
Net Income	32.2	36.7	41.0	43.0	48.4
Plus depreciation and amortization	14.1	17.6	22.0	29.7	37.1
Minus change in working capital	-11.2	-8.4	46.7	-7.6	-11.5
Minus Principal payments	-5.2	-5.2	3.6	-6.0	-6.0
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
CFE	15.8	23.1	26.3	29.4	30.9

As can be observed, we have presented one direct method and two indirect methods. All of them arrive exactly to identical results. We leave the reader to decide which approach is preferable to her. The first method departs from the Cash Budget. The second one departs from the Income Statement and the Balance Sheet. The first is simple and crystal clear. The second is more complex and prone to make mistakes.

The usual argument is that in the first method we need an additional financial statement and that with the indirect method we require less information. Yes, it is true, but it is a critical and very useful financial tool for financial management. Once we have constructed the model, we could say "if you can do it with less, don't do it with more". We prefer to do it the easier way. Remember Aristotle's notion that "the more perfect a nature is the fewer means it requires for its operation."

Using a financial model is of key relevance for non traded firms. Traded firms can asses its value everyday (every minute we could say when using the available technology). Non traded firms cannot. The calculation of the value for a non traded firm should not be reduced to the case when the firm is sold or when we want to buy an ongoing concern. The financial model with the calculation of value should be a permanent managerial tool to asses value and in particular, to asses the change in value derived from any future decision. We can introduce the input data related to that decision and see if it creates or destroys value.

Moreover, we should say that the goal of a financial manager is not to maximize return (Internal Rate of Return, IRR) but to maximize value and to control the value creation process. In other words, the financial model is a tool to keep an eye on value creation. This is exactly value creation management.

iv. How the "recipe" works

The experience shows that many users of the previous textbook formulas for deriving the cash flows from the IS and the BS use the procedure as a recipe without a clear and full understanding of it. Let us see which the reason for including each item in the "recipe" is. We examine the simplest formulas for the FCF and the CFE.

First we examine the FCF departing from EBIT.

<div align="center">
EBIT
Minus tax on EBIT
Plus depreciation and amortization
Plus Return on ST investments
Minus tax on return on ST investment
Minus change in working capital
Minus Investments in operating assets
FCF
</div>

Let us see the reasons for each item in the previous "formula".

- Taxes are calculated because our analysis includes taxes. That is the reason of taxes on EBIT. It is taxes on EBIT because we expect to arrive to what is available to debt and equity holders and should not include interest (that are part of what we pretend to estimate).
- As we are going from financial statements (IS and BS) to cash flows (indirect method), we have to "undo" all the transactions in the financial statements based on accrual and cost apportionment. This is the reason why we add depreciation and amortization (they are not cash flows and are subtracting in the IS) and why we subtract the change in working capital (see item i A Close Look to the Change in Working Capital, above).

- After tax return on ST investment is added because that is part of the income eventually received by equity holders.
- Investment in operating assets is subtracted because that is a cash flow that is not listed in the IS.
- After these adjustments, we arrive to the FCF or what is available and actually is distributed to the debt and equity holders after the adjustment for tax savings. (We are calculating the taxes on EBIT and this item is not affected by the interest charges).

Now we examine the simplest indirect formula for calculating the CFE.

Net Income
Plus depreciation
Minus change in working capital
Minus Principal payments
Minus Investments in operating assets
CFE

- The reasons for including depreciation, amortization, change in working capital and investment in operating assets have been explained above.
- Principal payments are subtracted because Net income has included (as payment) part of the CFD, this is, the interest payments. The other part of the CFD is principal payments. As we are interested in arriving to the amount to be paid to equity holders we have to subtract what has not been taken into account in the IS as part of the CFD.
- Investment in operating assets is subtracted because that is a cash flow that is not listed in the IS.

We warn the reader regarding the use of the previous formulas as recipes: try to understand why each item is included in the formula. They are not "all size" formulas that we can blindly apply in all cases. There are specific situations that are not covered by the standard formulation. Hence it is of utmost importance to analyze each situation and make the proper adjustments to the standard formula.

v. Cash Flows from the IS and BS with Operating Working Capital

The most popular approach to calculate cash flows using the indirect methods is to consider that cash in hand and short term investment are funds that belongs to the equity holder and then it should be distributed. However as they are listed in the BS, those amounts ARE NOT cash flows and are not listed in the CB as outflows.

Using this approach the working capital (WC) does not include cash neither short term investment. The WC and change in WC when using that approach are

Table 34. Operating Working Capital WC, and its Change

Years	5	6	7	8	9	10
Accounts receivable	15.5	29.0	31.2	33.5	36.2	39.2
Inventory	30.3	23.1	24.8	26.4	28.5	30.7
Current assets	45.7	52.1	56.0	59.9	64.7	69.9
Accounts payable	28.8	36.1	39.6	42.2	45.5	49.0
Current liabilities	28.8	36.1	39.6	42.2	45.5	49.0

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Operating WC = Operating Current assets – Operating Current liabilities + Short term debt	16.9	16.1	16.4	17.7	19.2	20.9
Change in WC		-0.8	0.4	1.3	1.5	1.7

Now we will derive the cash flows using the operating approach. In the next table we show the FCF, the CFE and the differences with the approach with full WC.

Table 35. Cash Flows Derived using the Operating WC

Year	6	7	8	9	10
EBIT	52.7	58.4	64.3	70.0	77.5
Minus tax on EBIT	-18.5	-20.5	-22.5	-24.5	-27.1
Plus depreciation	14.1	17.6	22.0	29.7	37.1
Minus change in operating WC	0.8	-0.4	-1.3	-1.5	-1.7
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
FCF with operating WC	35.1	37.6	-24.5	44.0	48.7
FCF with full WC	**24.3**	**31.0**	**24.9**	**37.9**	**39.0**
EBIT	52.7	58.4	64.3	70.0	77.5
Minus tax on EBIT	-18.5	-20.5	-22.5	-24.5	-27.1
Plus depreciation	14.1	17.6	22.0	29.7	37.1
Minus change in working capital	0.8	-0.4	-1.3	-1.5	-1.7
Minus principal payments	-5.2	-5.2	3.6	-6.0	-6.0
Minus Investments in operating assets	-14.1	-17.6	-87.0	-29.7	-37.1
Minus Interest payments	-5.1	-4.2	-3.5	-3.8	-3.2
Plus tax savings	1.8	1.5	1.2	1.3	1.1
CFE with operating WC	26.6	29.75	-23.1	35.5	40.6
CFE with full WC	**15.8**	**23.09**	**26.3**	**29.4**	**30.9**

As can be seen there is a difference between the two approaches. This difference has to be explained. It results from considering that amounts that appear listed in the BS and that ARE NOT cash flows appear as if they have been distributed to the equity holders. On the other hand, what is a cash flow (the return on ST investment), IS NOT considered a cash flow. This of course, is a conceptual inconsistency with the elementary definition of what a cash flow is. The next table reconciles that difference. We also include the equilibrium of cash flows equation.

Table 36. Reconciliation of the differences between the two approaches

Year	6	7	8	9	10
FCF+TS	36.89	39.08	(23.28)	45.34	49.83
CFD+CFE	36.89	39.08	(23.28)	45.34	49.83
Difference in FCF	10.79	6.66	-49.42	6.05	9.71
Difference in CFE	10.79	6.66	-49.42	6.05	9.71
Change in cash	0.99	1.15	1.16	1.42	1.54
Change in ST investment	11.04	6.92	-49.09	4.63	8.32
Return on ST investment	-1.90	-2.18	-2.29	0.00	-0.22
Tax on ST return on ST investment	0.66	0.76	0.80	0.00	0.08
Sum	10.79	6.66	-49.42	6.05	9.71
Check	0.00	0.00	0.00	0.00	0.00

We consider that the correct approach is the one that strictly considers cash flows as what they are. This is, if the amount is listed in the BS it cannot be at the same time, a cash flow. What concerns the equity holder is the cash in her pocket. Cash in the pocket and not potential dividends is what creates value and what concerns equity holders.

There is empirical evidence that dividends are what increases firm value and not cash in hand or invested in market securities. See Vélez-Pareja and Magni, 2008. There is enough evidence that what creates value is cash in the pocket of the stockholders. We have conducted an exploration of five Latin-American countries from 1991 to 2007 (see next table where the covering and characteristics of the sample for each country are shown). The columns where the variables are shown contain the average for each variable.

Table 37. Summary of variable and sample characteristics

	E_t/EBV_t	E_{t+1}/EBV_t	Div_{t+1}/EBV_t	dCS_{t+1}/EBV_t	dLA_{t+1}/EBV_t	# of observations	Number of firms	Period
Argentina	1,156	1,388	0,027	-0,029	0,019	538	68	1994-2007
Brazil	0,097	1,081	0,042	-2,103	0,348	122	57	1991-2007
Chile	1,704	1,928	0,081	-0,069	0,018	1.275	157	1991-2007
Mexico	1,667	1,991	0,055	-0,061	0,031	978	97	1992-2007
Peru	1,572	2,202	0,071	-0,006	0,046	445	83	1995-2006
Total	1,530	1,865	0,062	-0,126	0,038	3.358	462	

We tested the following falsified model:

$$E_t/EBV_t = \beta_1 E_{t+1}/EBV_t + \beta_2 dCS_{t+1}/EBV_t + \beta_3 Div_{t+1}/EBV_t + \beta_4 dLA_{(t+1)}/EBV_t + \varepsilon_t \quad (24)$$

1. E = Market equity value
2. EBV = Equity book value
3. dCS = Change in (cumulated) capital stock contributed by shareholders
4. Div = Dividends paid in cash
5. dLA = Cash + Short-term investments (marketable securities) or potential dividends

We say a falsified model because we include the change in liquid assets that as we have said, should not be included in the calculation of the cash flow.

And the theoretically correct model

$$E_t/EBV_t = \beta_1 E_{t+1}/EBV_t + \beta_2 dCS_{t+1}/EBV_t + \beta_3 Div_{t+1}/EBV_t + \varepsilon_t \qquad (25)$$

We say this last model is the correct one because it comes from the M&M propositions.

Observe that the models do not include a constant because we have to keep the correct model as it should be and the value observed in t should only be explained by the variables on the right hand side of the model. The statistical regression analysis gives the following results:

1. For the falsified model

Table 38a. Regression Analysis for Falsified Model

	Coefficients	t statistic	P-value
Adjusted R^2	0.81108032		
Observations	3,358		
	Coefficients	t statistic	P-value
E_{t+1}/EBV_t	0.72667584	108.879283	0
Div_{t+1}/EBV_t	1.08112762	6.76801082	1.5348E-11
dCS_{t+1}/EBV_t	0.17799963	10.5006109	2.1171E-25
dLA_{t+1}/EBV_t	-0.81626077	-16.2253862	4.7022E-57

The sign of the coefficient of dLA/EBV is negative. This means that dLA destroys value as expected and as says the theory (see Jensen, 1986). If we interpret the coefficients as a discount factor, observe that the falsified model shows a coefficient for Dividends that makes no sense: the present value of one dollar in the future cannot be larger that itself. This means that the presence of dLA (that destroys value) forces the model to assign a coefficient to the dividends paid larger than one that implies a negative discount rate. When we run the proper model, the coefficients are consistent as a discount factor.

2. For the theoretical and correct model

Table 38b. Regression Analysis for the Correct Model

	Coefficients	t statistic	P-value
Adjusted R^2	0.7963357		
Observations	3,358		
	Coefficients	t statistic	P-value
E_{t+1}/EBV_t	0.71703298	103.879187	0
Div_{t+1}/EBV_t	0.87808106	5.31020984	1.1663E-07
dCS_{t+1}/EBV_t	0.23231810	13.4639858	2.7812E-40

From this test we conclude that cash in hand or invested in market securities destroys firm value. What increase that value are dividends paid to equity holders. "Potential" dividends does not mean more value for equity holders although including them in the analysis as cash flows for valuation the resulting value is greater than when they are not included. Equity value is overvalued when "potential" dividends are included in the cash flow.

Pinkowitz, Williamson and Stulz, (2007) examined publicly traded firms for 35 countries and divided the sample between corrupt and non corrupt countries and countries with good and poor protection to minority equity holders according to two Investor Protection Indices. Their results point out that one dollar of increase in dividends creates

about ten dollars in value while one dollar increase in cash creates about 29 cents of value for countries with poor shareholders rights countries. In high corruption countries one dollar increase in dividends creates more than 6.5 dollars of value and one dollar of cash and cash equivalent create 33 cents of value. In the non corrupt countries and with good protection to the shareholders one dollar of extra dividends creates near four dollars in value and one dollar in cash and cash equivalents creates about one dollar in value. In short, dividends are between 20 and 34 times more relevant than cash in value creation in "bad" countries and about 4 times more relevant than cash in "good" countries. Pinkowitz and Williamson 2002, report that on the average, one dollar in dividends is $1.25 worth in value.

In the next section we study a powerful tool in constructing pro forma financial statements: sensitivity analysis.

13. Sensitivity Analysis

After we have completed the financial model we can perform what is known as sensitivity analysis. Why sensitivity analysis is a powerful and recommended tool for financial management? Because many input data is in reality a stochastic variable and what we have written as input data is ONE possible value of a very large number of possible values of the variable. We should perform sensitivity analysis to see what happens for different values of a given variable (or several given variables). In the following tables we show an example of what is known as one way and two way tables. In one way tables we define one input variable and several results. In two way tables we define two input variables and one result. These options are found in the Menu option Data ➔Data Tables or Office 2003 and older versions. For Office 2007 you can find it at Data➔If Analysis ➔ Data Table.

There are other possibilities for sensitivity analysis. In the spreadsheet we can use the Menu option Tools ➔ Scenarios Management for 2003 and older versions. In Excel© version Office 2007 you can find it at Data➔If Analysis ➔ Scenario Analysis or Management.

Another and more sophisticated tool is Monte Carlo Simulation (MCS). There are commercial and free software to do this. There is a very good free (or email) software for MCS developed by Professor Luciano Machain, Universidad Nacional de Rosario, (Rosario, Argentina) and can be downloaded (there is an English version available) from www.simularsoft.com.ar. The software is very similar to some commercial software available and we recommend it extensively.

One way and two way tables follow.

Table 39. One way table for AR policy with several results

	NCB 8	FCF7	TS7	CFD7	CFE7	FCF8	TS8	CFD8	CFE8
AR Policy	-24.3	31.2	1.6	9.7	23.0	12.3	1.3	-12.6	26.2
0%	-22.7	31.2	1.6	9.7	23.0	34.7	1.3	9.0	27.1
1%	-23.0	31.2	1.6	9.7	23.0	34.5	1.3	9.0	26.9
2%	-23.3	31.2	1.6	9.7	23.0	34.4	1.3	9.0	26.7
3%	-23.7	31.2	1.6	9.7	23.0	27.5	1.3	2.2	26.6
4%	-24.0	31.2	1.6	9.7	23.0	20.6	1.3	-4.5	26.4
5%	-24.3	31.2	1.6	9.7	23.0	13.7	1.3	-11.2	26.3
6%	-24.6	31.2	1.6	9.7	23.0	6.8	1.3	-18.0	26.1
7%	-24.9	31.2	1.6	9.7	23.0	-0.1	1.3	-24.7	25.9
8%	-25.2	31.2	1.6	9.7	23.0	-7.0	1.3	-31.4	25.8
9%	-25.5	31.2	1.6	9.7	23.0	-13.9	1.3	-38.2	25.6
10%	-25.8	31.2	1.6	9.7	23.0	-20.8	1.3	-44.9	25.5

In this table we can observe how the AR policy affects the NCB after investment in fixed assets, and the cash flows for years 7 and 8. We can also observe that some results such as the cash flows for year 7 are not affected by the policy. However, for year 8 we observe that the CFD is heavily affected by the change in AR policy but the TS is not. This is explained because in year 8 we contract new debt, but the effect on interest (and on TS) is only observed in year 9. The reader could check that the equilibrium equation for cash flows is valid for all the cases (FCF + TS = CFD + CFE).

In the next table we show a two way table. In that table we examine the effect of AR Policy (AR) and the Inventory Policy (IP) on FCF for year 8.

Table 40. Two way table for AR Policy (AR) and the Inventory Policy (IP) on FCF8

						IP						
	12.3	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	0%	34.9	34.9	34.9	34.9	34.8	34.8	34.8	34.7	34.7	34.7	34.7
	1%	34.8	34.8	34.7	34.7	34.7	34.6	34.6	34.6	34.6	34.5	34.4
	2%	34.6	34.6	34.6	34.5	34.5	34.5	34.5	34.4	34.4	32.0	27.5
	3%	34.5	34.4	34.4	34.4	34.3	34.3	34.3	34.2	29.7	25.1	20.6
AR	4%	34.3	34.3	34.2	34.2	34.2	34.2	31.8	27.3	22.8	18.3	13.7
	5%	34.1	34.1	34.1	34.1	34.0	29.4	24.9	20.4	15.9	11.4	6.8
	6%	34.0	33.9	33.9	31.6	27.1	22.6	18.0	13.5	9.0	4.5	-0.1
	7%	33.8	33.7	29.2	24.7	20.2	15.7	11.1	6.6	2.1	-2.4	-7.0
	8%	31.4	26.9	22.3	17.8	13.3	8.8	4.2	-0.3	-4.8	-9.3	-13.8
	9%	24.5	20.0	15.4	10.9	6.4	1.9	-2.7	-7.2	-11.7	-16.2	-20.7
	10%	17.6	13.1	8.5	4.0	-0.5	-5.0	-9.6	-14.1	-18.6	-23.1	-27.3

In the previous table we can see that the higher the AR policy and the higher the Inventory Policy, the lower the FCF for year 8. Why? Because in that year we need a loan and the less cash is available (an increase in AR and an increase in IP tie more cash to them and hence the firm will need a larger debt to cover any deficit).

The sensitivity analysis allows us not only to perform a looking forward financial management and analysis, but is a powerful tool to check the consistency of our model.

14. Summary

In this chapter we have presented some suggestions and tips on what, how and why to look at the historical financial statements in order to make a set of forecasted financial statements in order to value the cash flows resulting from them. We presented a detailed example with 5 historical years and the forecast for 5 additional years. We calculated policies, real increases, risk premium, increases in volume as input data. With these input data we constructed intermediate tables in order to integrate the three financial statements: Cash Budget, Income Statement and Balance Sheet. These financial statements have been constructed using the double entry principle and need no plug and no circularity iterations. The Balance Sheet matches and all of them are consistent.

We also presented different approaches to derive cash flows. One of them is the direct method that is very simple and clear. Other approaches are the indirect methods. For these methods we explain in detail why the different items are included or not in the formulas.

We also present empirical evidence that "potential" dividends should not be included in the determination of cash flows.

Finally we presented a powerful tool for analyzing the consistency of our financial model and the value creation capacity of any decision we make.

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Appendix A. A summary of the chapter

1. The analyst should gather from the firm, the following information:
   a. Historical financial statements for
      i. To calculate indexes such as gross margin, operational margin or net margin. This will be useful to double check if deviations from the historical average are substantial.
      ii. To calculate the indexes that reveal policies within the firm. For instance,
         1. Accounts Receivable.
         2. Accounts Payable
         3. Inventories
         4. Payment of dividends
         5. Investment in fixed assets
         6. Investment of cash excesses
         7. Cash required by operations (CRO) held by the firm
      iii. To analyze the behavior of some items and to try to find explanations to those unusual behaviors (i.e. very high or very low growths rates). For instance, we might examine the behavior of items such as
         1. Amount of sales revenues
         2. Labor expenses
         3. Overhead expenses
         4. Cost of goods sold (COGS)
         5. After we analyze these items we can compare growth with historical inflation rates and try to explain what happened. For instance, if the firm shows a growth in sales revenues of 102% and inflation rate was 5%, we have to find out the causes of the other 92.38% ((1+102%)/(1+5%)-1 = 92.38%).
2. The analyst should understand some basic ideas:
   a. That the growth of some items has three components. For instance, the growth in sales revenues form an Income Statement has inside the following: inflation rate, real growth (in units) and a real increase in prices.
   b. That some variables are a measure of activity, hence their growth is just that: an increase in volume, in units. For instance, if we have the number of people attending a theater, its growth is a growth of volume of operations. It is different from the growth in sales revenues in dollars that includes, as we said above, inflation, increase in units and real increase in prices.
3. The analyst should gather some basic initial information, such as
   a. Initial amount of some items. Such as overhead expenses, labor costs and the like.
   b. Identify some initial amounts that will appear in the forecast such as, Accounts receivable, Accounts payable, debt balances, (find out how is the Schedule of repayment of those debt balances).
4. Information that usually is not found in the historical financial statements.
      i. Historical selling prices of products/Services not sold by the firm.
      ii. Historical Price of inputs.
      iii. Historical inflation rate.
      iv. Historical minimum wage

v. With these data we can estimate the real increase in selling and purchasing prices. In some countries the increase in salary in the firm apparently will be defined by the increase in the minimum wage salary increase. Based on this we can estimate the real increase in prices and combine them (into the future) with the expected inflation, we estimate the nominal increase in prices and the prices themselves. These estimates for some variables are available in the Central Bank or in the large firms (especially financial firms) that have specialized areas to do these forecasts.

vi. Interest rates charged by the bank to the firm, borrowing rates. When we compare these rates with the risk free rate, its difference (averaged) is the risk premium the bank is charging to the firm.

5. Require the management data about sales forecasts, short and long term budgets. Examine and study the financial model they have in the firm.

6. How to handle a firm with multiple products. Apparently firms have a large amount of different products and/or references for the same product. However, in many cases we can do the following:

   a. Group products that use fundamentally the same raw material. For instance, in the case of firms that manufacture and sell soft drinks, juices, beer, printing services, doors, windows, foundries, consulting firms, etc. We can identify a common raw material in order to measure their sales revenues: gallons of beer or soft drinks, juices, tons of paper, feet of lumber or wood, tons of bronze, hours invoiced, minutes or seconds invoiced, etc. Based on the sales revenues and cost of sales from an Income Statement, estimate the selling price or the cost per unit. All this depends on the availability of information in the firm.

   b. Use Pareto's Law: 20% of the causes is responsible for 80% of the effects. Twenty percent of the products of the firm is responsible of 80% of the cost or the sales revenues. (See for instance, http://financial-dictionary.thefreedictionary.com/Pareto+Law)

   c. Identify products and/or services with largest volume of sales. Measure its growth and/or the increase in prices. Use this as a proxy for the growth in units for the whole firm or the real price increase.

7. Identify the "driver" of the demand of the product or service. For instance, if the firm manufactures baby clothing, the growth of the units sold will be associated to the population from 0 to 3 years. If the firm manufactures wooden doors for housing, then the growth will be associated to the growth of construction industry. If the firm constructs living units, then the growth will be associated not to the demographic growth of people, but to the rate of growth of families or households. You have to be very creative and imaginative to identify the driver of the demand.

8. Avoid the use of plugs. The plug is a formula that calculates the difference between total liabilities and equity minus all the lines in the balance sheet except cash. The plug replaces the line of cash or the use of iterations to solve circular relationships in the formulas when you construct a financial model with forecasted financial statements. (Other plugs might be debt or equity). Using plugs is apparently easier, but it encompasses too high risks because the plug always obtains the matching between the numbers in a balance sheet.

9. With all this information we can construct consistent and flexible financial statements.
10. Once we have constructed the financial statements we can proceed to calculate cash flows for valuation purposes.

Appendix B. Example for Estimating Nominal and Real Rates

1. Gather historical series of
   1.1. Prices of inputs and products of the company or of similar products.
   1.2. Different typical expenses of the company or from similar companies (general expenses, rent, wages, etc.).
   1.3. Risk free interest rates.
   1.4. Inflation rate of and
   1.5. Interest rates charged by the banks.

For instance, we identify the historical value of the minimum wage and inflation rates for the last years.

Year	Minimum wage[19]	Inflation rate
1996	142,125	21.64%
1997	172,005	17.68%
1998	203,826	16.70%
1999	236,460	9.23%
2000	260,100	8.75%
2001	286,000	7.64%
2002	309,000	6.99%
2003	332,000	6.49%
2004	358,000	5.50%
2005	381,500	4.85%

2. Calculate the nominal rates of increase of prices

For instance, with these data we calculate the nominal increase (with inflation) for the minimum wage. We have

Year	Minimum wage	Nominal increase
1996	142,125	
1997	172,005	21.02%
1998	203,826	18.50%
1999	236,460	16.01%
2000	260,100	10.00%
2001	286,000	9.96%
2002	309,000	8.04%
2003	332,000	7.44%
2004	358,000	7.83%
2005	381,500	6.56%

To calculate the nominal increase we use the following formulation:

---

[19] I use the case of Colombia.

$$\text{Nominal increase}_t = \frac{\text{Wage}_t}{\text{Wage}_{t-1}} - 1$$

For year 2005

$$\text{Nominal increase} = \frac{381,500}{358,000} - 1 = 6.56\%$$

3. Calculate
   3.1. Real rates of increase in prices (deflating the nominal rates)
   3.2. Real rates of interest (deflating the risk free rate of interest).
   3.3. Average the real rates and use that average as input for the forecast.
   3.4. Calculate the risk premium in the rate banks charge customers (Kd) as the difference between historical Kd and the historical risk free rates. Average these results and use the average for the forecast.

In our example, as we know the nominal increase and the inflation rate, we can calculate the real increase as follows.

$$\text{Real increase} = \frac{1 + \text{nominal increase}}{1 + \text{inflation rate}} - 1$$

For instance, for year 2005 we have

$$\text{Real increase} = \frac{1 + 6.56\%}{1 + 4.85\%} - 1 = 1.63\%$$

In the case of the minimum wage we have

Year	Nominal increase	Real increase
1996		
1997	21.02%	2.84%
1998	18.50%	1.54%
1999	16.01%	6.21%
2000	10.00%	1.15%
2001	9.96%	2.15%
2002	8.04%	0.98%
2003	7.44%	0.90%
2004	7.83%	2.21%
2005	6.56%	1.63%

When we calculate the average of the real increase from 1997 we obtain 2.18% and this value might be used in the forecast as the real increase.

We can do a more critical and complex analysis using econometric methods, but that is beyond the purpose of this appendix. (See Vélez Pareja 2002 in the bibliography for the chapter).

4. Find a reliable forecast for inflation.

Now assume we have a forecasted inflation. For instance, using the Central Bank or Government Planning Department forecasts, we have,

Year	Forecasted inflation
2006	4.50%
2007	4.00%
2008	3.50%
2009	3.00%
2010	3.00%
2011	3.00%
2012	3.00%

5. With the real rates and the inflation projection forecast
   5.1. Nominal rates of increase rates
   5.2. Risk free rates.
   5.3. With the forecasted risk free rate use CAPM to find the forecasted Kd.

For instance,

Year	Forecasted inflation	Real increase in wages	Nominal increase
2006	4.50%	2.18%	6.78%
2007	4.00%	2.18%	6.27%
2008	3.50%	2.18%	5.76%
2009	3.00%	2.18%	5.24%
2010	3.00%	2.18%	5.24%
2011	3.00%	2.18%	5.24%
2012	3.00%	2.18%	5.24%

Now we can construct the nominal increase using Fisher equation:

Nominal increase = (1+ inflation rate) × (1+ real increase) − 1

For year 2012,

Nominal increase = (1+3.00%) × (1+2.18%) − 1 = 5.24%

6. Apply the nominal increases to the values that you have found for today (purchase and sale prices, general expenses, etc.). Today is time (or instant) zero (year 0 in most of textbooks, appraisal of projects and working papers or articles).

Now we can forecast the value of the minimum wage. For instance, for year 2006, we have,
Minimum wage 2006 = 381,500.00 × (1+6.78%) = 407,354.79.
(The minimum wage for year 2006 in Colombia was 408,000.00).

Year	Nominal increase in wages	Value of the minimum wage
2006	6.78%	407,354.79
2007	6.27%	432,880.65
2008	5.76%	457,794.44
2009	5.24%	481,803.27
2010	5.24%	507,071.22
2011	5.24%	533,664.35
2012	5.24%	561,652.13
2013	6.78%	591,107.72

7. Estimate the real growth rate of your products or services (in units). In order to evaluate if it is reasonable, compare it with the real growth rate of the economy or the industry where the company or project is located. Another benchmark to check this increase in volume is the growth rate of the driver of the demand. For instance, the population between some given ages, the forecasted growth or the relevant industry associated to the product or service that we plan to sell, etc.
8. With the rate of real increase (rate of increase of volume or units of product or service), forecast the units to sell in the future.
9. After these steps you must have nominal increases in prices and expenses, nominal risk free rates and risky interest rates, volumes of sales in units, forecasted inflation.
10. With the previous findings and applied to the initial input data (purchase and sale prices, initial volume of the demand, expenses of list, general expenses, etc.) it is possible to forecast prices of products and inputs, general expenses, expenses of list, volumes, etc.
11. This determines values of invoicing, purchases, forecasted current interest rates, general expenses, etc.
12. All this information is the basis for constructing the financial statements.

Appendix C. Example of Using the GDP Implicit Deflator and the Change in PPI
1. Find historical series for
    1.1. Sales revenues and costs for the firm or for a similar firm.
    1.2. GDP at nominal and real prices or directly the series for the implicit deflator.
    1.3. Producer Price Index, PPI or its change.
    For instance, we identify the sales revenues for the firm, the nominal and real GDP:

Year	GDP nominal	GDP real	Sales Revenues	PPI
1980	2,789.5	5,161.7	25,674.0	611.0
1981	3,128.4	5,291.7	28,526.9	663.1
1982	3,255.0	5,189.3	30,980.4	700.6
1983	3,536.7	5,423.8	32,827.1	726.3
1984	3,933.2	5,813.6	34,715.5	750.4
1985	4,220.3	6,053.7	36,553.9	765.3
1986	4,462.8	6,263.6	38,131.1	777.9
1987	4,739.5	6,475.1	39,989.8	792.3
1988	5,103.8	6,742.7	42,303.2	817.3
1989	5,484.4	6,981.4	44,946.3	841.9
1990	5,803.1	7,112.5	47,408.4	867.6
1991	5,995.9	7,100.5	49,955.0	889.5
1992	6,337.7	7,336.6	51,933.7	900.6
1993	6,657.4	7,532.7	54,227.5	917.0
1994	7,072.2	7,835.5	56,527.6	929.5
1995	7,397.7	8,031.7	58,837.4	948.1
1996	7,816.9	8,328.9	60,871.5	962.3
1997	8,304.3	8,703.5	63,257.2	970.7
1998	8,747.0	9,066.9	65,405.5	981.1
1999	9,268.4	9,470.3	67,605.0	988.9
2000	9,817.0	9,817.0	70,037.6	1,000.0
2001	10,100.8	9,866.6	72,964.4	1,015.1
2002	10,480.8	10,083.0	75,530.4	1,024.2
2003	10,983.9	10,397.2	77,833.6	1,038.0

2. Using the previous table we calculate the deflator for the GDP and the inflation rate (increase in nominal prices) measured by the deflator.

Year	GDP nominal	GDP real	Deflator	Inflation	Sales Revenues	Increase in Sales Revenues
1980	2,789.5	5,161.7	0.5404		25,674.0	
1981	3,128.4	5,291.7	0.5912	9.39%	28,526.9	11.11%
1982	3,255.0	5,189.3	0.6273	6.10%	30,980.4	8.60%
1983	3,536.7	5,423.8	0.6521	3.96%	32,827.1	5.96%
1984	3,933.2	5,813.6	0.6766	3.75%	34,715.5	5.75%
1985	4,220.3	6,053.7	0.6971	3.04%	36,553.9	5.30%
1986	4,462.8	6,263.6	0.7125	2.20%	38,131.1	4.31%
1987	4,739.5	6,475.1	0.7320	2.73%	39,989.8	4.87%
1988	5,103.8	6,742.7	0.7569	3.41%	42,303.2	5.79%
1989	5,484.4	6,981.4	0.7856	3.78%	44,946.3	6.25%
1990	5,803.1	7,112.5	0.8159	3.86%	47,408.4	5.48%
1991	5,995.9	7,100.5	0.8444	3.50%	49,955.0	5.37%
1992	6,337.7	7,336.6	0.8638	2.30%	51,933.7	3.96%
1993	6,657.4	7,532.7	0.8838	2.31%	54,227.5	4.42%
1994	7,072.2	7,835.5	0.9026	2.13%	56,527.6	4.24%
1995	7,397.7	8,031.7	0.9211	2.05%	58,837.4	4.09%
1996	7,816.9	8,328.9	0.9385	1.90%	60,871.5	3.46%
1997	8,304.3	8,703.5	0.9541	1.66%	63,257.2	3.92%
1998	8,747.0	9,066.9	0.9647	1.11%	65,405.5	3.40%
1999	9,268.4	9,470.3	0.9787	1.45%	67,605.0	3.36%
2000	9,817.0	9,817.0	1.0000	2.18%	70,037.6	3.60%
2001	10,100.8	9,866.6	1.0237	2.37%	72,964.4	4.18%
2002	10,480.8	10,083.0	1.0395	1.54%	75,530.4	3.52%
2003	10983.9	10,397.2	1.0564	1.63%	77,833.6	3.05%

To calculate the deflator we use the following relation:

$$\text{Deflator}_t = \frac{\text{GDP nominal}_t}{\text{GDP real}_{t-1}}$$

For year 2003

$$\text{Deflator}_{2003} = \frac{10,983.9}{10,397.2} = 1.0564$$

To calculate the inflation using the deflator we use the following expresión:

$$\text{Inflation}_t = \frac{\text{Deflator}_t}{\text{Deflator}_{t-1}} - 1$$

For year 2003

$$\text{Inflation}_{2003} = \frac{1.0564}{1.0395} - 1 = 1.63\%$$

To calculate the increase in Sales Revenues we use

$$\text{Increase in sales revenues}_t = \frac{\text{Sales revenues}_t}{\text{Sales revenues}_{t-1}} - 1$$

For 2003

$$\text{Increase in sales revenues}_{2003} = \frac{77{,}833.6}{75{,}530.6} - 1 = 3.05\%$$

3. With the increase in Sales Revenues and the change in the deflator we can calculate an estimate for the real growth of the industry to be used as the growth for the firm.

Year	Inflation (deflator)	Increase in Sales Revenues	Growth = (1+Increase in Sales revenues)/(1+deflator)-1
1980			
1981	9.39%	11.11%	1.6%
1982	6.10%	8.60%	2.4%
1983	3.96%	5.96%	1.9%
1984	3.75%	5.75%	1.9%
1985	3.04%	5.30%	2.2%
1986	2.20%	4.31%	2.1%
1987	2.73%	4.87%	2.1%
1988	3.41%	5.79%	2.3%
1989	3.78%	6.25%	2.4%
1990	3.86%	5.48%	1.6%
1991	3.50%	5.37%	1.8%
1992	2.30%	3.96%	1.6%
1993	2.31%	4.42%	2.1%
1994	2.13%	4.24%	2.1%
1995	2.05%	4.09%	2.0%
1996	1.90%	3.46%	1.5%
1997	1.66%	3.92%	2.2%
1998	1.11%	3.40%	2.3%
1999	1.45%	3.36%	1.9%
2000	2.18%	3.60%	1.4%
2001	2.37%	4.18%	1.8%
2002	1.54%	3.52%	2.0%
2003	1.63%	3.05%	1.4%

To estimate the real growth we use:

$$\text{Real growth}_t = \frac{1 + \text{increase in sales revenues}}{1 + \text{inflation}} - 1$$

For instante, for 2003 we have

$$\text{Real growth}_t = \frac{1 + 0.0305}{1 + 0.0163} - 1 = 1.4\%$$

Calculate the average of these growth rates. In this example it is 1.9%. Use this average as the forecast.

4. Forecast the inflation for the deflator for future years.

Year	Inflation
2004	1.04%
2005	0.97%
2006	0.90%
2007	0.83%
2008	0.77%

5. Now we have enough information to forecast the Sales Revenues: future inflation, estimated real growth that is composed by the growth in units and the real increase in prices. When we combine these two inputs we can calculate the increase in Sales Revenues and we apply it to the last historical Sales Revenues for 2003.

Increase in Sales Revenues$_t$ = (1 + inflation$_t$)×(1 + real growth$_t$) − 1

Year	Inflation PPI	Real growth	Increase in Sales Revenues	Sales Revenues
2003				77,833.6
2004	1.04%	1.9%	2.99%	80,161.7
2005	0.97%	1.9%	2.92%	82,500.2
2006	0.90%	1.9%	2.85%	84,848.2
2007	0.83%	1.9%	2.78%	87,204.8
2008	0.77%	1.9%	2.71%	89,569.0

In a similar fashion we could do it with the inflation from the PPI or the CPI. The advantage in using this procedure is that we do not use an increase in Sales Revenues based on the historical increases. For instance, in this case the average increase in Sales Revenues was 5.0%. This estimate is not consistent with the inflation perspectives and would over state the increase in Sales Revenues for years 2004 to 2008. Besides, the procedure allows us to perform an enriched sensitivity analysis.

When introducing the input variables we have to realize that what we call in this example as real growth is a mixture of real increase in prices and growth in units. The relationship between these two components is not additive but multiplicative, as follows:

Real growth = (1 + Increase in volume) × (1 + Increase in real prices) − 1.

Knowing this relationship we could explore several combinations of increase in volume and/or increase in real prices. The combination of these two variables should always give the 1.9% on the average. For instance,

Growth in units, g	Real increase in prices, Rrp	"Real" growth
0.00%	1.90%	1.90%
0.25%	1.65%	1.90%
0.50%	1.39%	1.90%
0.75%	1.14%	1.90%
1.00%	0.89%	1.90%
1.25%	0.64%	1.90%
1.50%	0.39%	1.90%
1.75%	0.15%	1.90%
2.00%	-0.10%	1.90%

Now we have a wide range of values for g or Rrp to choose from. One way to pick a proper value is to compare growth in units with the Industry GDP growth or any other real measure of growth.

Appendix D. An example of plugs and their problems

In the following tables we show a very simple example for one month. First we show a simplified Income Statement and a Balance Sheet. In the next tables we also show how using arbitrary values for items different than the plug, we keep the balancing in the BS.

In a model different items are the result of a formulation inside the model, not input variables. However, what we intend to show is that even doing a wrong formulation (or even a silly mistake of misplacing cells) we can introduce "arbitrary" or wrong numbers in the model and a plug still declares that the model is correct because it keeps the balancing in the BS, intact.

Table D1. Income Statement and Balance Sheet using ST Debt as plug

Month	0	1
Earnings Before Interest and Taxes (EBIT)		5.0
Return (interest) from ST investment		0.0
Interest payments		2.6
Net Income		2.4
Cumulated retained earnings		2.4
Month	**0**	**1**
Assets		
Cash	0.0	0.0
ST investments		
Total fixed assets	45.0	36.0
Total	45.0	36.0
Liabilities and equity		
Short term debt **PLUG**	0.000	-7.400
LT Debt	20.0	16.0
Equity investment	25.0	25.0
Retained earnings	0.0	2.4
Total Liabilities and equity	45.00	36.00
Check	0.0	0.0

In the BS we have ST debt as the plug. As follows

ST debt = Total assets – LT debt – Equity investment – Retained earnings   (D1)

If we arbitrarily change *any* number from the right hand side of equation 1, the balancing is kept. This means that the analyst could make any mistake and the checking of the balancing will keep saying everything is correct.

In the next table we show this for two results: one is the value of the plug itself and the other is for the checking of the BS. In Panel A we have the value of the plug and the checking of the balance. We change *arbitrarily* Cash and Total fixed assets. As can be seen the balancing is kept. In Panel B we examine the checking of the BS changing *arbitrarily* Retained earnings, Cash, Dividends payments and Equity. The same: the checking of the balancing is kept.

Table D2a. Using items from the BS

Panel A				Panel B			
ST debt		*Cash*		Check balance		*Retained earnings*	
		5	20			5	50
Total fixed assets	20	-18.4	-3.4	*Cash*	5	0	0
	50	11.6	26.6		50	0	0
Check balance		*cash*		Check balance		*Dividends payment*	
		5	50			5	50
	20	0	0		5	0	0
Total fixed assets	50	0	0	*Equity*	50	0	0

The danger of using plugs is that we could even make ***accounting mistakes*** and the model does not have means to identify that a mistake has been occurred. Remember that double entry principle has as a major advantage the possibility to identify a numerical or accounting mistake. Well, when using plugs this advantage is lost because plugs are blind to internal errors.

Let us see how the financial statements will look when we ***arbitrarily*** select Cash as 5 and Total fixed assets as 20.

Table D2b. Matching of the financial statements with plug.

Month	0	1
Earnings Before Interest and Taxes (EBIT)		5.0
Return (interest) from ST investment		0.0
Interest payments		2.6
Net Income		2.4
Cumulated retained earnings		2.4
Month	0	1
Assets		
Cash	0.0	**5.0**
ST investments		
Total fixed assets	45.0	**20.0**
Total	45.0	25.0
Liabilities and equity		
Short term debt **PLUG**	0.000	-18.400
LT Debt	20.0	16.0
Equity investment	25.0	25.0
Retained earnings	0.0	2.4
Total Liabilities and equity	45.00	25.00
Check	0.0	0.0

Notice that we have changed total assets (cash = 5 and fixed assets = 20) and hence the plug shows that balancing is correct.

Observe that using plugs the analyst lose control over what is happening in the model. For instance, when arbitrarily we changed the level of cash, the model, in order to keep the balancing, changed the amount of ST debt and converted it to a higher ST investment (a more negative debt)! The Income statement for year 1 does not change because decisions made in year 1 (regarding debt, for instance), will affect the IS for year 2.

What happens if we have a negative debt? We can think that negative debt is investment. Will the firm receive a return equal to the cost of debt? As the interest charges

in the following month will be negative, will this mean an income? To avoid these inconsistencies, the model needs some logical statements in the spreadsheet.

In the previous tables we **arbitrarily** changed items from the BS itself. Now we can see that even changing items in the Income Statement we keep celebrating the balancing of the BS. In this case we **arbitrarily** change Interest payments, Return on ST investment, Net Income and Retained earnings. The balancing not suffered.

Table D2c. Using items from the IS

Check balance		Interest payments	
		5	50
Return from ST investment	5	0	0
	50	0	0
Check balance		*Net income*	
		5	50
Retained earnings	5	0	0
	50	0	0

A conclusion for this simple example is that you can even make ANY kind of mistakes and never will find what occurred.

Another drawback of plugs is that depending on what you do choose as "correct" (either the total assets or liabilities and equity total) you might get a different answer regarding the balancing figure. In the next table we show the same example as the depicted in Table D1 and use cash as plug.

Table D3a. Income Statement and Balance Sheet using Cash as Plug

Month	0	1
Earnings Before Interest and Taxes (EBIT)		5.0
Return (interest) from ST investment		0.0
Interest payments		2.6
Net Income		2.4
Cumulated retained earnings		2.4
Balance Sheet	0	1
Assets		
Cash **PLUG**	0.00	7.40
ST investments		
Total fixed assets	45.0	36.0
Total	45.0	43.4
Liabilities and equity		
Short term debt	0.0	
LT Debt	20.0	16.0
Equity investment	25.0	25.0
Retained earnings	0.0	2.4
Total Liabilities and equity	45.0	43.4
Check	0.0	0.0

In this case

Cash = Total Liabilities + Equity – Total Fixed Assets – ST investments　　　(D2)

Observe that now total assets are 43.4 compared with 36.0 in Table D1 where plug is ST debt. This means that "Accounting Truth" depends on what the analyst decides if she chooses one or another plug. The difference lies in the fact that when we used ST debt as

plug the plug had a negative value that has to be interpreted either as cash or as short term investment. Again, who decides what the negative debt is?

Now we show another plug: equity. In this case we have

Equity = Total assets – ST debt – LT debt – Retained earnings   (D3)

Table D3b. Income Statement and Balance Sheet with Equity as Plug

Month	0	1
Earnings Before Interest and Taxes (EBIT)		5.0
Return (interest) from ST investment		0.0
Interest payments		2.6
Net Income		2.4
Cumulated retained earnings		2.4
Balance Sheet	0	1
Assets		
Cash	0.0	0.0
ST investments		
Total fixed assets	45.0	36.0
Total	45.0	36.0
Liabilities and equity		
Short term debt		
LT Debt	20.0	16.0
Equity investment	25.0	17.6
Retained earnings	0.0	2.4
Total Liabilities and equity	45.00	36.00

In this case what have happened is that the plug says that there is neither a short term investment, nor extra cash in hand, but there has been a repurchase of stock. This situation, in terms of cash flows has very different meaning. When cash is retained, that is not a cash flow, while repurchase of equity is a cash flow to be distributed to the equity holders.

Appendix E. Constructing the financial model

In this Appendix the reader finds a guide for constructing the model used in the body of the chapter. We indicate the formulas that have to be utilized in the construction of the financial model. We have constructed the formulas in such a way that they can be used to construct part of or the complete model. In the first line and in the first column we have written the letters and numbers corresponding to the Excel spreadsheet in order to make it easier the localization and the construction of the different formulas. In the last column we have written those formulas. The formulas correspond to year 6. Shaded cells are for the input data. This text has been revised several times however it is possible that some mistake appears. In that case please inform to the author using the below mentioned email addresses.

Construct the model trying to understand why we use the different cells that appear in the formula and do not use this assignment as a typing exercise.

Remember that the tables and formulas come from an English version of Excel. You should use the proper configuration in your Excel file in order to obtain the same appearance in the formulas. For instance, if you are using Spanish configuration in Excel, then the function IF will be shown as SI and the function Sum will be shown as SUMA. On the other hand, the argument separators when you use the Spanish configuration in Excel is ";" semicolon and when you use the English configuration is "," comma.

Any trouble or typo should be reported to the author at www.cashflow88.com, http://www.cashflow88.com/decisiones/decisiones.html or to the following email accounts ivelez@unitecnologica.edu.co, nachovelez@gmail.com.

In the next table we show the input data.

Table E1. Input data

	B	J	K	L	M	N
2		6	7	8	9	10
3						
4	Input data.					
5	Fixed assets.					
6	Lineal Depreciation (4 years)					
7	Equity investment.					
8	Corporate tax rate.	35.0%	35.0%	35.0%	35.0%	35.0%
9	Initial inventory (units)					
10	Initial purchase price.					
11	Estimated Overhead expenses.					
12	Administrative and Sales payroll.					
13	Long term (LT) years Loan 1 at (N years).					
14	Long term (LT) years Loan 3 (M years).					
15	Short term loan 2 (1 year).					
16	Taxes are paid the same year as accrued.					
17	Inflation rate.	4.0%	3.5%	3.0%	3.0%	3.0%
18	Real increase in selling price.	1.03%	1.03%	1.03%	1.03%	1.03%
19	Real increase in purchase price.	0.55%	0.5%	0.5%	0.5%	0.5%
20	Real increase in overhead expenses.	0.85%	0.9%	0.9%	0.9%	0.9%
21	Real increase in payroll expenses.	1.91%	1.9%	1.9%	1.9%	1.9%
22	Real increase in price fixed assets.	0.20%	0.2%	0.2%	0.2%	0.2%
23	Increase in sales volume (units).	3.0%	3.0%	3.0%	4.0%	4.0%
24	Real interest rate.	2.4%	2.4%	2.4%	2.4%	2.4%
25	Risk premium for cost of debt.	5.08%	5.1%	5.1%	5.1%	5.1%
26	Risk premium for ST investment	-0.39%	-0.39%	-0.39%	-0.39%	-0.39%
27	Policies and goals.					
28	Promotion and advertising as % of sales.					
29	Inventory as % of volume sold.	5.96%	5.96%	5.96%	5.96%	5.96%
30	Accounts receivable as % of sales.	5.20%	5.2%	5.2%	5.2%	5.2%
31	Accounts payable as % of purchases.	9.50%	9.5%	9.5%	9.5%	9.5%
32	Payout ratio.	71.75%	71.8%	71.8%	71.8%	71.8%
33	Minimum cash required. As % of sales revenues	2.69%	2.69%	2.7%	2.7%	2.7%
34		65.0				
39	Repurchase of equity as a % of funds generated by depreciation.	0%	0%	0%	0%	0%

In this table we show intermediate tables that help to construct the financial statements.

<div align="center">Table E2. Intermediate tables</div>

	B	J	J	K	L	M	N	
	Year	5	6	7	8	9	10	
40	Nominal increase in prices.							
41	Selling.		5.1%	4.6%	4.1%	4.1%	4.1%	=(1+J$17)*(1+J18)-1
42	Purchase.		4.6%	4.1%	3.6%	3.6%	3.6%	=(1+J$17)*(1+J19)-1
43	Overhead expenses.		4.9%	4.4%	3.9%	3.9%	3.9%	=(1+J$17)*(1+J20)-1
44	Payroll expenses.		6.0%	5.5%	5.0%	5.0%	5.0%	=(1+J$17)*(1+J21)-1
45								
46								
47								
48	Increase factor in volume.		1.030	1.030	1.030	1.040	1.040	=+(1+J23)
49								
50	Basic input variables calculation.							
51	Sales in units.	54.2	55.8	57.5	59.2	61.6	64.0	=I51*J48
52	Selling price.	9.5	10.0	10.5	10.9	11.3	11.8	=I52*(1+J41)
53	Total sales.		557.9	600.8	643.9	696.9	754.1	=+J52*J51
54								
55								
56	Factor for increase in prices for fixed assets							
57	Price of asset in year 4				65.0			=+J34 ➔ Year 8
58	Return of short term investment		6.10%	5.18%	4.67%	4.67%	4.67%	=+J59+J26
59	Risk free rate, Rf		6.50%	5.57%	5.06%	5.06%	5.06%	=((1+J17)*(1+J24)-1)
60	Cost of debt, Kd, from CAPM= Rf + risk premium in cost of debt		11.58%	10.65%	10.14%	10.14%	10.14%	=J59+J25
61	Minimum cash		15.0	16.1	17.3	18.7	20.3	=+J33*J95
62	Depreciation schedule							
63								
64	Beginning fixed assets		42.2	42.2	42.2	107.2	107.2	=+I74
65	Depreciation Investment year 4	14.1	14.1	14.1	14.1			
66	Depreciation Investment year 5		0.0	0.0	0.0	0.0		=+I73/D6
67	Depreciation Investment year 6			3.5	3.5	3.5	3.5	=+J73/D6
68	Depreciation Investment year 7				4.4	4.4	4.4	=+K73/D6
69	Depreciation Investment year 8					21.7	21.7	=+L73/D6
70	Depreciation Investment year 9						7.4	=+M73/D6
71	Annual depreciation		14.1	17.6	22.0	29.7	37.1	=SUM(J65:J70)
72	Cumulated depreciation		73.2	90.7	112.7	142.4	179.5	=+J71+I72
73	New fixed assets		14.1	17.6	87.0	29.7	37.1	=J57+J71
74	Net fixed assets		42.2	42.2	107.2	107.2	107.2	=+J64-J71+J73
64								
76	Inventory valuation using FIFO							

	B	J	J	K	L	M	N	
	Year	5	6	7	8	9	10	
77	Inventory and purchases in units							
78	Units sold		55.8	57.5	59.2	61.6	64.0	=+J51
79	Final inventory in units		3.3	3.4	3.5	3.7	3.8	=J78*J29
80	Initial inventory in units		4.6	3.3	3.4	3.5	3.7	=I79
81	Purchases in units		54.6	57.6	59.3	61.7	64.2	=J78+J79-J80
82	Unitary cost of purchase		6.95	7.24	7.49	7.76	8.04	=+I82*(1+J42)
83								
83								
84	Cost of goods sold (COGS) calculation							
85	Initial inventory in dollars		30.3	23.1	24.8	26.4	28.5	=+I87
86	Purchases in dollars		379.5	416.7	444.5	479.0	515.9	=+J81*J82
87	Final inventory in dollars		23.1	24.8	26.4	28.5	30.7	=+J79*J82
88	COGS		386.7	415.0	442.8	477.0	513.7	=+J85+J86-J87
89	Overhead expenses. Gastos generales		31.1	32.4	33.7	35.0	36.3	=I89*(1+J$43)
90								
[…]	[…]							
94								
95	Administrative and selling expenses	69.2	73.3	77.4	81.2	85.2	89.5	=+I95*(1+J44)
96								
97	Sales and purchases							
98	Total sales revenues		557.9	600.8	643.9	696.9	754.1	=+J53
99	Inflow of sales revenues for current year		528.9	569.6	610.4	660.6	714.9	=+J53*(1-J30)
100	Credit sales (1 year)	15.5	29.0	31.2	33.5	36.2	39.2	=+J98*J30
101	Total purchases		379.5	416.7	444.5	479.0	515.9	=+J86
102	Purchases paid the same year		343.5	377.1	402.2	433.5	466.9	=+J86*(1-J31)
103	Purchases on credit (1 year)	28.8	36.1	39.6	42.2	45.5	49.0	=+J101-J102
104								
105	Inflows from sales							
106	Inflow of sales revenues for current year		528.9	569.6	610.4	660.6	714.9	=+J99
107	Inflows from Accounts Receivables		15.5	29.0	31.2	33.5	36.2	=I100
108	Total inflows		544.3	598.6	641.7	694.1	751.1	=+J107+J106
109	Purchases paid the current year		343.5	377.1	402.2	433.5	466.9	=+J102
110	Payment of Accounts Payable		28.8	36.1	39.6	42.2	45.5	=I103
111	Total payments for purchases		372.3	413.1	441.8	475.7	512.4	=+J110+J109

This table shows the forecast for the Cash Budget

Table E3. Forecasted Cash Budget

	B	I	J	K	L	M	N	
	Year		6	7	8	9	10	
113	Cash Budget.							
114	Module 1: Operating activities. Modulo 1:							
115	Cash inflows.							
116	Total AR plus sales on cash.		544.3	598.6	641.7	694.1	751.1	=+J108
117	Total inflows.		544.3	598.6	641.7	694.1	751.1	=J116
118	Cash outflows.							
119	Total payments for purchases.		372.3	413.1	441.8	475.7	512.4	=+J111
120	Overhead and Administrative and selling expenses		104.4	109.8	114.9	120.2	125.8	=+J95+J89
121	Income Taxes.		17.3	19.8	22.1	23.2	26.1	=+J193
122	Total cash outflows.		494.0	542.7	578.8	619.1	664.3	=SUM(J119:J121)
123	**Net cash balance NCB before fixed assets purchase.**		50.3	55.9	62.9	75.0	86.8	=J117-J122
124	Module 2: Investment in assets.							
125	Purchase of fixed assets.							
126	Purchase of fixed assets Year 4.		14.1	17.6	87.0	29.7	37.1	=+J73
127	**NCB of investment in assets.**		-14.1	-17.6	-87.0	-29.7	-37.1	=-J126-J125
128	**NCB after fixed assets investment.**		36.2	38.3	-24.1	45.3	49.8	=+J123+J127
129	Module 3: External financing.							
130	Inflow of loans.							
131	**LT Loan 1 - 5 years.**							
132	**ST Loan 2.**		0.0	0.0	0.0	0.0	0.0	=IF((J123-J137-J138)>0,0,-(J123-J137-J138))
133	**LT loan 3 10 years.**	0.0	0.00	0.00	8.81	0.00	0.00	=IF((I154+J128+J132-J135-J136-J137-J138-J139-J140+J146+J149+J150-J$61)>0,0,-(I154+J128+J132-J135-J136-J137-J138-J139-J140+J146+J149+J150-J$61))
134	Payment of loans.							
135	**Principal LT loan 1.**		0.0	0.0	0.0	0.0	0.0	=+J161
136	**Interest LT loan 1.**		0.0	0.0	0.0	0.0	0.0	=+J160
137	**Principal ST loan 2.**		0.0	0.0	0.0	0.0	0.0	=+I132
138	Interest ST loan 2.		0.0	0.0	0.0	0.0	0.0	=+J168
139	**Principal LT loan 3.**		5.2	5.2	5.2	6.0	6.0	=+J298+J306
140	Interest LT loan 3.		5.1	4.2	3.5	3.8	3.2	=+J175
141	NCB of financing activities.		-10.3	-9.3	0.2	-9.9	-9.3	=SUM(J131:J133)-SUM(J135:J140)
142	Module 4: Transactions with owners.							
143	Initial Invested equity.							
144	Dividends payment.		15.8	23.1	26.3	29.4	30.9	=+I195
145	Repurchase of stock.		0.0	0.0	0.0	0.0	0.0	=+J197
146	NCB of transactions with owners.		-15.8	-23.1	-26.3	-29.4	-30.9	=+J143-J144-J145
147	NCB for the year after previous transactions		10.1	5.9	-50.2	6.0	9.6	=+J146+J141+J128

	B	I	J	K	L	M	N	
	Year		6	7	8	9	10	
148	Module 5: Discretionary transactions.							
149	Redemption of short term ST investment.		31.1	42.2	49.1	0.0	4.6	=I151
150	Return from ST investments.		1.9	2.2	2.3	0.0	0.2	=J58*J149
151	ST investments.	31.12	42.17	49.09	0.00	4.63	12.94	=IF(J132>0,0,(IF((I154+J147+J149+J150-J61)>0,I154+J147+J149+J150-J61,0)))
152	NCB of discretionary transactions.		-9.1	-4.7	51.4	-4.6	-8.1	=+J149+J150-J151
153	Year NCB.		0.99	1.15	1.16	1.42	1.54	=+J152+J146+J141+J127+J123
154	Cumulated NCB.	14.0	14.99	16.14	17.30	18.72	20.26	=+I154+J153
155								
156								
157	LT Loan 1 schedule							
158								
159	Beginning balance		0.0	0.0	0.0	0.0	0.0	=I163
160	Interest payment LT1		0.0	0.0	0.0	0.0	0.0	=J164*J159
161	Principal payments LT 1							
162	Total payment LT1		0.0	0.0	0.0	0.0	0.0	=J160+J161
163	Ending balance	0.0	0.0	0.0	0.0	0.0	0.0	=J159-J161
164	Interest rate		11.58%	10.65%	10.14%	10.14%	10.14%	=+J60
165	ST Loan 2 schedule							
166			6	7	8	9	10	6
167	Beginning balance							
168	Interest payment ST2		0.0	0.0	0.0	0.0	0.0	=+I171*J172
169	Principal payments ST 2		0.0	0.0	0.0	0.0	0.0	=+I171/$D$15
170	Total payment ST2		0.0	0.0	0.0	0.0	0.0	=SUM(J168:J169)
171	Ending balance	0.0	0.0	0.0	0.0	0.0	0.0	=+I171-J169+J132
172	Interest rate		11.58%	10.65%	10.14%	10.14%	10.14%	=+J164
173			6	7	8	9	10	6
174	Beginning balance	49.5	44.4	39.2	34.0	37.7	31.6	=+I179
175	Interest payment LT3	5.7	5.1	4.2	3.5	3.8	3.2	=+J180*I179
176	Principal payments LT 3	5.2	5.2	5.2	5.2	6.0	6.0	=+I176+I133/$D$14
177	Total payment LT 3	10.9	10.3	9.3	8.6	9.9	9.3	=J175+J176
178	New debt		0.0	0.0	8.8	0.0	0.0	=+J133
179	Ending balance	44.4	39.2	34.0	37.7	31.6	25.6	=+J174-J176+J133
180	Interest rate		11.58%	10.65%	10.14%	10.14%	10.14%	=J164

In the next table we show the forecast for the Income Statement
Table E4. Forecast for the Income Statement

	B	I	J	K	L	M	N	
	Year	5	6	7	8	9	10	
182	Income Statement.							
183	Sales revenues		557.9	600.8	643.9	696.9	754.1	=+J53
184	COGS		386.7	415.0	442.8	477.0	513.7	=+J88
185	**Gross Income**		171.2	185.8	201.1	219.9	240.4	=J183-J184
186	**Overhead expenses**		31.1	32.4	33.7	35.0	36.3	=+J89
187	Administrative and selling expenses		73.3	77.4	81.2	85.2	89.5	=+J95
188	Depreciation		14.1	17.6	22.0	29.7	37.1	=J71
189	**Earnings Before Interest and Taxes (EBIT)**		52.7	58.4	64.3	70.0	77.5	=J185-J187-J188-J186
190	Interest payments.		5.1	4.2	3.5	3.8	5.8	=+J160+J175+J168
191	Return (interest) from ST investment.		1.9	2.2	2.3	0.0	0.0	=+J58*I151
192	Earnings Before Taxes EBT		49.5	56.5	63.1	66.2	71.7	=J189+J191-J190
193	Income Taxes.		17.3	19.8	22.1	23.2	25.1	=IF(J192<=0,0,J192*$D$8)
194	**Net Income.**		32.2	36.7	41.0	43.0	46.6	=J192-J193
195	Dividends.		23.1	26.3	29.4	30.9	45.6	=IF(J194<0,0,J194*J32)
196	Cumulated retained earnings.	20.6	29.1	29.8	30.5	31.4	32.3	=+I196+J194-I195
197	Repurchase of equity.		0.0	0.0	0.0	0.0	0.0	=+J188*J39

Finally we show the Balance Sheet in the next table
Table E5. Balance Sheet

	B	C	I	J	K	L	M	N	
		Year	5	6	7	8	9	10	
199	Balance Sheet.								
200	Assets.	Year							
201	Cash.	CB	14.0	15.0	16.1	17.3	18.7	20.3	=J154
202	Accounts Receivable AR.	IT	15.5	29.0	31.2	33.5	36.2	39.2	=J100
203	Inventory.	IT	30.3	23.1	24.8	26.4	28.5	30.7	=+J87
204	ST investments.	CB	31.1	42.2	40.7	0.0	0.0	0.0	=+J151
205	Current assets.		90.9	109.3	112.9	77.2	83.4	90.1	=SUM(J201:J204)
206	Total fixed assets.	IT	42.2	42.2	42.2	107.2	107.2	107.2	=+J74
207	Total		133.08	151.52	155.08	184.45	190.67	197.38	=J206+J203+J202+J201+J204
208	Liabilities and equity.								
209	Accounts Payable AP.	IT	28.8	36.1	39.6	42.2	45.5	49.0	=J103
210	Short term debt.	CB	0.0	0.0	0.0	0.0	0.0	0.0	=+J171
211	Current liabilities.		28.8	36.1	39.6	42.2	45.5	49.0	=SUM(J209:J210)
212	Long term debt.	CB	44.4	39.2	34.0	55.9	56.9	54.4	=+J179+J163
213	Total Liabilities.		73.2	75.3	73.6	98.2	102.4	103.5	=+J212+J211
214	Equity investment.	ID	15.0	15.0	15.0	15.0	15.0	15.0	=+I214+J143
215	Retained earnings.	IS	20.6	29.1	29.8	30.5	31.4	32.3	=J196
216	Current year Net Income		24.3	32.2	36.7	40.8	41.8	46.6	=+J194
217	Repurchase of equity.		0.0	0.0	0.0	0.0	0.0	0.0	=+I217-J145
218	Total Liabilities and equity.		133.08	151.52	155.08	184.45	190.67	197.38	=SUM(J209:J217)-J213-J211
219	Check		0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	=J218-J207

Appendix F. Some Basic Information that an Analyst Should at Least Think About

In this Appendix we indicate some minimum variables to be considered in the forecasting of financial statements. Some of them are not variables *strictu sensu*, but goals and policies.

1. Historical financial statements in order to "discover" some policies, such as inventory, account receivables, account payables, price determination in relation with inflation
2. Depreciation method
3. Tax rate
4. Real and nominal growth rate for the economy and the industry.
5. Domestic inflation rate for the forecasted period
6. Devaluation rate for foreign exchange used
7. Exchange rate when the forecasting period starts
8. Foreign inflation rate for the countries involved in the project
9. Initial price of output units
10. Growth rate for real output prices
11. Initial price for input units
12. Growth rate for real prices of inputs
13. Overhead expenses in year 0
14. Growth rate for real Overhead expenses
15. Administrative, selling and operations payroll
16. Growth rate for real cost of payroll
17. Growth for real price of fixed assets
18. Sales commission (identify the basis for the calculation: orders, sales, accounts receivable AR, recovery…)
19. Advertising and promotions
20. Real rate of interest
21. Risk premium for cost of debt
22. Nominal Cost of debt Kd.
23. Inventory policy, for instance, months of sales as final inventory
24. AR policy, for instance, percent of sales received immediately, at 30 days, 60 days,
25. Payment policy, for instance, percent of payments made immediately, at 30 days, etc.
26. Payout ratio
27. Increase in volume, units
28. Minimum cash balance required for operations or "policy" derived as a percentage of sales revenues.
29. Price demand Elasticity for the output (if you prefer a more sophisticated model)
30. Price discount for volume in the inputs (if you prefer a more sophisticated model)
31. Fraction of sales in foreign exchange
32. Fraction of financing in foreign exchange

Table of Content