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Operational Finance: Analysis and Diagnosis

Although it is not so common nowadays, it is still possible to find managers in operational roles who have only a very hazy idea of their company's financial management. To them, financial management is something incidental, something for the staff departments to deal with. They feel that it is so far removed from their own functions and responsibilities that they do not have to worry about it. And yet the decisions made by operations management can, and very often do, have at least as much impact on a company's finances as basic decisions of financial structure. For this reason, it is important that operations managers understand that the company's finances are not a matter for financial management alone. They concern every manager who holds responsibility for the company's funds –and there are not many managers who don't. In this note we shall be looking at issues of financial analysis and diagnosis. These are functions normally performed by financial management; but the aim of every diagnosis is to detect potential problems as early as possible –before they actually occur– so as to identify those responsible and prompt them to take corrective measures. If the managers who have to take these corrective measures are not aware of the problems and do not feel responsible for them, the problems will become endemic, and the mutual incomprehension between financial management and operations management will grow.

Operational Finance and Structural Finance

We shall therefore stress two basic ideas, which embody the essential message of this note:

- Every manager of a functional area (purchasing, production, sales, personnel, etc.) who has to make decisions about company funds should be thoroughly trained in the finances associated with operations.
- The coordination between financial management and operational management should be at least as close as the coordination between different areas within operational management.

This technical note was prepared by Professor Josep Faus. September 1995. Revised in September 2016. In the original text the figures were in pesetas, the currency in use at the time, but they have been changed into euros to make them more understandable now.

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To most managers it will be obvious that purchasing must be matched to production plans, and that production planning must take sales forecasts into account. What we aim to show here is that managers must also consider the financial implications of each of these actions, i.e. the impact not only on the income statement but also on the balance sheet. A lack of coordination between functional departments can have a very major impact on the company's finances (due to accumulation of stocks, inappropriate pay and collection periods, etc.).

It is vital to have proper mechanisms for diagnosing problems, and procedures for ensuring that corrective action is taken by the managers concerned. The economic crises of recent decades have made this very clear. These crises have exposed weaknesses in the way companies handle their finances. A great many companies have failed as a result, and many jobs have been lost. In some cases, the problem was so deeply rooted in the organizational structure that there was little anyone could have done to save the company. In many other cases, however, the company ran into difficulties because it failed to detect the unmistakeable signs of imminent operational problems, which eventually grew out of control. If the problems had been detected in time, steps could have been taken to ensure the company's survival.

The crisis usually starts with cash flow problems, which gradually deteriorate until the company is forced to suspend payments.

Some suspensions of payments[1] are entirely avoidable. The most typical case is that of the company that runs at a loss and allows the losses to accumulate until it becomes decapitalized. Shareholders' equity is replaced by high-interest, short-term debt. This adds to the losses, until the situation becomes unsustainable. This is typical of companies that were only ever viable in a buoyant economy but are incapable of surviving in times of crisis.

But it does not always happen like that. Some companies run into serious financial difficulties without ever posting a loss in their income statement. Mostly, the difficulties have to do with poor management of the funds used in operations, i.e. what we usually call operational financial management.

The basic mission of financial management is to obtain the right quantity of funds at the right cost and in the right time horizon to finance the investment needed to achieve the company's objectives. "Investment" is to be taken in a broad sense to include any application of funds, permanent or temporary. Thus, we can talk about investment in accounts receivable, or in stocks, or even in bank accounts.

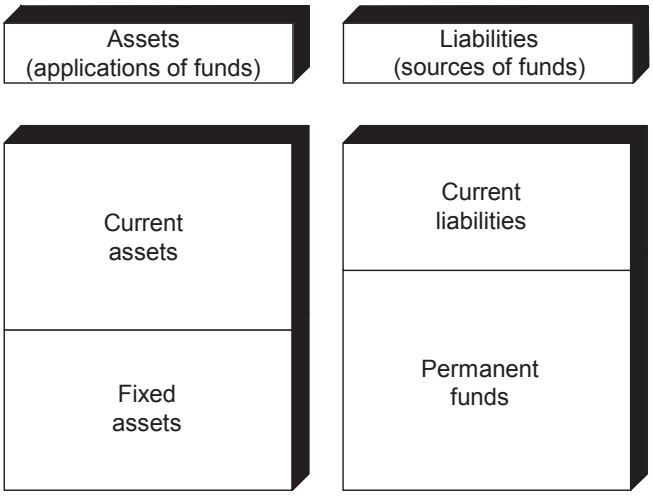
Two aspects of the above definition need pointing out. Firstly, the definition refers both to "obtaining" funds and to "investing" them. It thus underlines the fact that financial management is responsible for both the source and the application of funds. Secondly, the criteria for deciding what are the "right" funds include not only quantity and cost but also the time horizon. These two ideas are illustrated in the simple diagram of a company's balance sheet given in Figure 1.

The balance sheet shown in the Figure is made up of two blocks. The blocks are equal in size because both represent the same thing: the volume of funds used by the company. The block on the left –the assets– classifies these funds according to their application (where they are

[1] Equivalent of "Chapter 11" in USA.

used). The block on the right –the liabilities– classifies them according to their source (where they come from). Obviously, the diagram does not show the details of each source or application of funds. It simply subdivides the assets and liabilities according to their time horizon, which is extremely appropriate for the type of analysis we shall be doing in this note.

Figure 1
Diagram of a Company's Balance Sheet



The short-term or current assets will typically include bank deposits, accounts receivable and other debtors, stocks of raw materials, work in progress and finished goods, etc. The fixed assets will include land and buildings, plant and equipment, and other permanent investments. On the liabilities side, the current liabilities will include the money lent to us by our suppliers, banks and other creditors, etc. And the long-term liabilities, or permanent funds, will consist of shareholders' equity (capital and reserves) and long-term loans.

The problems associated with managing the different types of investments and funds are very different, but the above diagram gives us a simple guideline for classifying problems according to certain features they have in common.

Many financial textbooks start from a classification based on the time horizon criterion, and talk of "short-term finance" and "long-term finance". The idea is basically that short-term finance is about managing current assets and current liabilities, while long-term finance has to do with managing fixed assets and long-term liabilities. We have no objection to this distinction; as we said, it fits perfectly with the time horizon classification criterion. In this note, however, we shall adopt a thoroughly practical approach, based less on concepts, however attractive, and more on problems, solutions, and the people responsible for putting them into effect. For this reason we shall use the term operational finance rather than short-term finance, and structural finance rather than long-term finance. Operational finance is concerned with problems associated with what we shall call operational issues, as opposed to problems associated with the way the company manages its structural finances, i.e. with structural issues.

Operational Issues Versus Structural Issues

It will be easier to understand the distinction between these two types of issues, and the balance sheet items they affect, if we consider what happens when a group of friends decide to set up a new company.

In establishing the basic set-up or *structure* of the company, the first issue to be decided is how much money each partner will put in as capital. A number of other structural issues relating to fixed assets tend to be considered at the same time: whether the building should be bought or rented, whether the plant and equipment should be bought or leased, etc. Normally, the possibility of raising long-term finance from third parties is also explored. In a word, the set-up or structure of a company determines the capital, the long-term debt and the fixed assets it starts with. The money left over after fixed assets are deducted from long-term liabilities can be used to tackle the issue of actually *operating* the company. These two aspects –structure and operations– are associated with very different types of problems, which we must learn to recognize.

What do we mean by *operational* issues? Generally speaking, the items included in the current assets and a large portion of the current liabilities are directly connected with the volume of the company's operations. If sales increase, so do accounts receivable. If purchases increase, so does the volume of accounts payable. And so on. Some of these items are also affected by changes in the environment in which the company operates. If bad debt increases, the volume of accounts receivable to be financed will also increase. If shortages of a particular raw material are expected, the company may need to build up stocks, which will also increase its financing needs. In other words, the balance sheet items that make up the current assets and the current liabilities are deeply affected by the day-to-day running of the business, seasonal factors, and other operational issues.

The volume of fixed assets and permanent funds, by contrast, is much more stable (except at the time the company is actually founded). Basically, it only ever changes as a result of specific decisions –to buy a machine, to increase capital, etc. And these decisions are usually formulated precisely in terms of the impact they will have on specific balance sheet items (whether or not to buy a machine that costs 30 million thousand euros, whether to increase capital by 100 thousand, whether to pay out 2 million in dividends, etc.). The purpose of this type of decision is to maintain a balance between long-term funds and investments, in line with the desired structure.

Managing the investments and funds associated with operations involves a completely different set of problems and decision makers. Nobody says, "Let's increase our accounts receivable by 45 thousand euros". And yet, indirectly, through mechanisms that nobody in the company fully understands (unpaid bills, lengthening of the collection period, customers demanding value dates, compensating accounts associated with bill discounting, etc.), the real investment in accounts receivable may grow by a lot more than 45 million without anyone explicitly authorizing it, and sometimes without anyone even noticing.

RIUS Y CAMPS, S.R.C.
A well structured company with operational problems

For many years it has been the tradition at IESE to begin Finance courses by discussing a case study, "Rius y Camps, S.R.C.", about an apparel manufacturer. The case gives only a brief description of the company, along with its balance sheets and income statements.

The discussion immediately brings to light a liquidity problem: the company has barely enough cash to cover one day's purchases, or less than 1% of short-term debts; and the pay period to suppliers has been stretched by more than 30 days beyond the agreed terms. The situation looks ominous, as some of the main suppliers have already threatened to withdraw credit unless outstanding and overdue debts are settled; if they cut off supplies, production will come to a halt. Yet at the same time, the company is profitable and has growth potential.

The first question is: What has gone wrong? The problem would go away, at least for the time being, if the partners put more money into the business. But will that solve the problem? Is it just that the company has the wrong capital structure because the partners have not put in enough money?

A quick look at stocks reveals that the manufacturing process is fairly efficient, with stocks of goods in progress being maintained within reasonable limits. There also seems to be good coordination between production and sales, given that stocks of finished goods have been kept at 15 days' production, which is very reasonable. However, a problem emerges when we look at the stock of raw materials. The company is holding enough raw materials to cover more than 4 months' production, and some are obsolete. In operational terms, the volume of funds invested in excess raw materials turns out to be more than twice what would be needed to meet all the company's outstanding debts.

The company has an operational problem. Probably in order to get a "better deal" and improve its bottom line, it has made massive purchases without considering the effect this would have on the balance sheet in terms of the availability of funds.

Misconceived operational decisions, motivated originally by a desire to improve results, have brought the company to the brink of failure, even though it is not, in fact, badly structured, considering its volume of business and the industry it operates in.

This is the root cause of many companies' downfall, especially the smaller ones. It is not unusual to find company managers spending a lot of time weighing up the pros and cons of an investment in fixed assets worth, say, 100 thousand euros, and investigating how to get the money for this investment, while at the same time the volume of current assets the company has to finance increases by far more than 100 thousand without their realising this is happening or doing anything to stop it or to meet the extra financing needs.

To sum up, we can say that if a company starts to show signs of financial problems –normally, difficulties in paying off its debts and a general shortage of cash– the first thing is to find out what is causing the problem. The crucial question is whether the company is badly set up, or whether it is badly run. Any method of analysis or diagnosis that ignores this question is fundamentally flawed.

On the basis of the above ideas, we shall now look at the financial management of operations in more detail. To do this, it will be useful to divide the subject into three large areas:

- Analysis and diagnosis.
- Forecasting and financial planning of operations.
- Practical management of each item of current assets and current liabilities.

In the rest of this note we shall concentrate on analysis and diagnosis. Forecasting and planning, and practical management will be dealt with in technical notes FN-387-E[2] and FN-388-E[3].

Operational Finance. Analysis and Diagnosis

In what follows, we shall deal with two different subjects. First, we shall focus on a series of issues related to a company's financial structure, and their implications for the management of the company's operational finances. We shall discuss the concepts of working capital and working capital requirements, and the most typical scenarios for working capital requirements. Second, we shall look at the actual tools of analysis: ratios, and statements of source and application of funds.

Working Capital Requirements Versus Working Capital

To start our discussion of financial analysis and diagnosis we shall introduce and define two simple yet very powerful concepts that are crucial for understanding the financial implications of operations: working capital requirements (WCR) and working capital (WC).

The financial literature has given great importance to the concept of working capital, which people tend to associate with issues of operational finance. In fact, as we shall soon see, the association is somewhat indirect.

There are two ways to calculate a company's working capital:

- Current assets less current liabilities
- Permanent funds less net fixed assets.

If we look at Figure 1, we can see that the two are equivalent. In this note, however, we shall adopt the second definition, as we feel that it gives a much clearer idea of the true nature of working capital.

As an experiment, groups of finance students are often asked how they think the working capital of a typically seasonal company, such as a toy manufacturer, is likely to vary throughout the year. Taking the first definition (working capital = current assets less current liabilities), many students come to the conclusion that the working capital fluctuates dramatically. What happens if we take the second definition (working capital = permanent funds less net fixed assets)? Bearing in mind that toy companies' profits are concentrated towards the end of each year while other months may have close to zero profit, and leaving aside investment and long-term financing decisions, it turns out that, in this type of company, working capital is extraordinarily stable throughout most of the year and is totally unaffected by seasonal factors.

We can conclude that working capital, as a concept, has more to do with financial structure than with operations. For operational financial management, it is simply a starting point: the

[2] Josep Faus, "Operational Finance: Planning and Forecasting", FN-387-E, IESE, September 1995. (Available on IESEP)

[3] Josep Faus, "Operational finance: Management issues", FN-388-E, IESE, September 1995. (Available on IESEP)

surplus of long-term funds over net fixed assets, i.e. the volume of permanent funds initially available to finance operations. It belongs more to liabilities than to assets.

All the same, it would be very useful to have a financial concept that encapsulates the volume of financing needs arising from operations. In the toy company, working capital does not fluctuate, but something does. What is it?

The answer to this question lies in the concept of working capital requirements (WCR), which we define below and study in detail further on.

Working capital requirements = Operational current assets
less operational short-term liabilities

In symbols: WCR = OCA – OSTL

As we can see, the difference between this definition and the first definition of working capital, which we discarded as being unhelpful, lies in the addition of the adjective "operational" to both the current assets and the current liabilities. This is intended to indicate that we are referring exclusively to the current assets and liabilities deriving from the company's operations, without taking into account decisions on financing or the investment of surplus cash, even though they may be short-term.

By operational current assets we mean the sum of all the short-term accounts receivable, without deducting discounted receivables, plus provisions for bad debts (which are also, in a sense, receivables), plus stocks, plus operational cash. Operational cash is the volume of cash the company would need to have in order to meet its ordinary operating requirements. The difference between current assets as shown in the balance sheet and operational current assets lies basically in the difference between the *actual* level of cash and the *desired* level of cash. On the other hand, operational current assets includes excess accounts receivable (due to poor credit control or other causes), and surplus stocks (due to poor stock control). In other words, a company can have excessive working capital requirements due to bad management.

By operational current liabilities we mean all the funds that a company obtains more or less automatically –or spontaneously– by the mere fact of carrying on its business[4]. Typical examples are: accounts payable, deferred tax or Social Security contributions, provisions for liabilities, etc. Operational current liabilities would not include liabilities deriving from the discounting of bills, or other forms of bank credit or, in general, any short-term negotiated funds; nor would they include accounts payable past due, as a result of default or late payment by the company.

Clearly, unlike working capital, WCR cannot be derived directly from the balance sheet. If we take the current assets as shown on the balance sheet and deduct from them the non-bank ("spontaneous") current liabilities, we obtain what we might call the "accounting WCR", which are often very different from the "real WCR". In times of low liquidity, the accounting WCR tend to be lower than the real WCR because the level of cash as shown on the balance sheet is by then usually lower than the desired level of cash. Also, in using the balance sheet figures, we may deduct from the current assets a certain amount of theoretically spontaneous liabilities that are not really spontaneous because they are in excess of the agreed amount. Conversely,

[4] Operational current liabilities are also known as "spontaneous funds" (SF). Since this term is shorter, it is the one we use in class. Also we normally use the term "current asset" (CA), instead of the longer "operational current assets".

in situations of excess liquidity, the accounting WCR may be higher than the real WCR because the current assets as shown in the accounts include volumes of cash in excess of what is needed for operations. From here on, when we talk about "WCR" we mean "real WCR".

Thus, the concept of working capital requirements represents the net investment in current assets resulting from the company's operations. We use the term "net investment" because the current assets are already partly covered by the operational liabilities obtained spontaneously.

In any case, it is important to point out that the concepts of working capital requirements (WCR) and working capital (WC), though radically different, are in fact complementary. WC represents the volume of long-term liabilities (in excess of fixed assets) available to finance operations; in other words, it is a liability related to the company's basic financial structure. WCR, in contrast, represents precisely the volume of net investment generated by operations; in other words, it is an operational item that has nothing to do with the basic financial structure.

WCR and WC are not only different conceptually; they do not even necessarily coincide numerically. If a company's WC is greater than its WCR, this indicates that the surplus of long-term funds available to finance operations is more than enough to cover the company's operations; the difference will appear as a cash surplus. In the opposite case –which is more usual– the company will have negotiated funds requirements (NFR) equal to the difference between WCR and WC.

To sum up:

- If WC > WCR, then WC – WCR = CS (cash surplus)
- If WC < WCR, then WCR – WC = NFR (negotiated funds requirements)

We can now sum up the concepts introduced so far in a diagram. Figure 2 illustrates the definition of working capital (WC) as a liability, among the structural issues, and of working capital requirements (WCR) as an asset, among the operational issues.

Again, we can see here that the distinction between working capital requirements and working capital is not merely semantic or quantitative. It is crucial when it comes to diagnosing the difficulties a company is having; and it helps us to identify the root of the problem more precisely, as we said when we spoke in general terms of structural issues and operational issues.

If a company is having financial problems because its working capital is too small, then that company is badly set up or badly structured. If the financial problems come from an excess of working capital requirements, then it is because the company is badly run or operated. In either case, different people will be responsible, and different types of corrective action will have to be taken, again involving different managers. We have to be perfectly clear about this if we want to make the right decisions.

The two parts of the balance sheet in Figure 2 (artificially split in two to highlight what we have been saying) would not fit together if we tried to join them. That is because, although the WCR are larger than the WC, the diagram does not include the negotiated funds requirements (NFR). The volume of the NFR is precisely the difference between the WCR generated by the company's operations and the available WC, which is a consequence of the long-term structure or set-up. This idea is reflected in Figure 3A, which is basically no more than a summary of Figure 2. If the WC were greater than the WCR, the diagram would be as shown in Figure 3B.

Figure 2
Operational Issues and Structural Issues

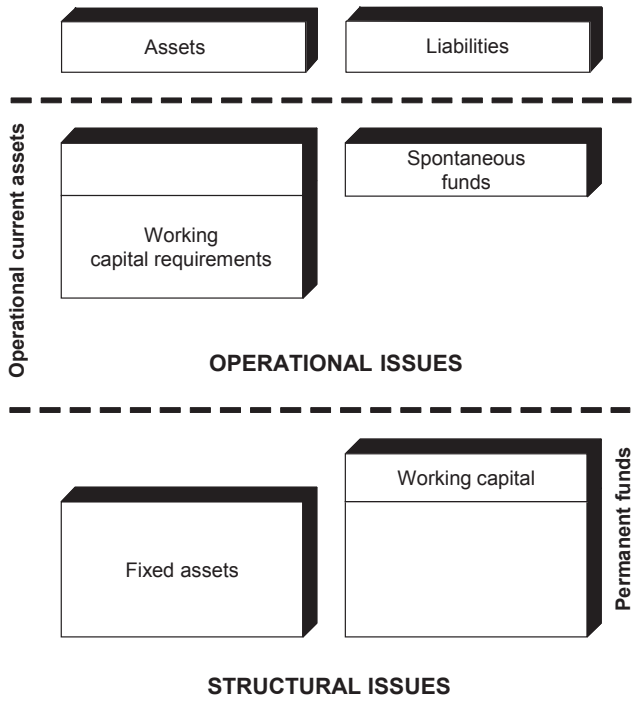
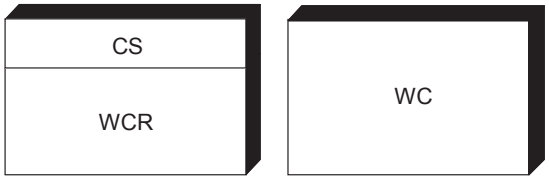


Figure 3A

Figure 3B



All these are very simple ideas, and yet they can be powerful tools of analysis. Indeed, operational financial management is largely a question of forecasting negotiated funds requirements in order to be able to negotiate those funds in good time without running into difficulties. However, given that the funds requirements depend on the level of WCR and WC, it is essential to understand the mechanisms that govern the way WCR change over time, and to distinguish them from those that govern changes in WC, as the two types of mechanisms tend to be very different.

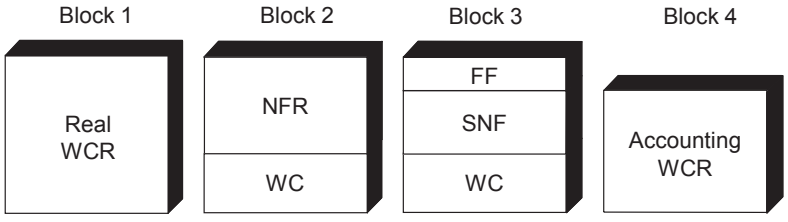
In the next section we shall give a more detailed analysis of situations in which it is possible to identify certain typical patterns of funds requirements associated with different types of financial structure or types of operations.

But before that, a last observation: the difference between real WCR and WC gives us, as we have seen, the negotiated funds requirements (NFR). If a company were always able to obtain sufficient short-term negotiated funds (SNF) to cover its negotiated funds requirements (NFR), the financial balance would be perfect. Everybody would get paid on time, and the company would maintain exactly the desired level of cash. But this is not always possible. If the SNF are higher than the NFR, there will be a cash surplus (CS). And if the SNF are less than the NFR, the difference will be covered by the "forced funds" (FF) that we spoke of earlier (typically, cash deficit and past-due debt). Because, at the end of the day, there is no escaping the general rule that assets and liabilities must balance.

From this point of view, it is easier to understand the relationship between real WCR and accounting WCR (balance sheet rule). Figure 4 illustrates a situation in which the negotiated funds requirements (NFR), which we derive from the difference between the real WCR and the WC (blocks 1 and 2), are not actually covered by short-term negotiated funds. The rest of the real WCR is covered with forced funds (FF) (block 3). But, as we saw earlier, the accounting WCR (Block 4) are calculated by deducting forced funds. From an accounting point of view, the difference between WCR and WC coincides with short-term negotiated funds (SNF) *by definition*.

In other words, the company is not paying its suppliers; and this provides extra financing that cannot be considered "spontaneous" but "forced". This extra financing artificially decreases the WCR, making them seem less than they really are.

Figure 4



In summary, real WCR will be always covered by WC+NF+FF. In a company that is well structured financially the forced funds (FF) will be zero. If a company is in financial distress and is unable to get enough credit from the banks (enough NF), the FF will inevitably increase.

Hopefully, this will make it clear yet again that the WCR we are interested in here are the real WCR. In the last section of this note, we shall apply all of these concepts to a real-life case: Comercial Ciurana, S.A. We have left the example to the end because it cannot be analysed in depth without first having introduced some extra tools of analysis.

Typical Patterns of Working Capital Requirements

Many of the financial difficulties that companies encounter are the result of an inability to diagnose in good time the volume of funds they will need in order to avoid a cash shortage. Although we cannot claim that the simple model

$$NF = WCR - WC$$

shown in Figure 3A will always give us a magic answer, it does provide some useful clues in situations that correspond to more or less typical patterns of working capital requirements. We shall look at a few examples to illustrate this point.

Growth

The WCR of a growth company increase more or less in line with the company's rate of growth. If sales increase by 30%, then, so long as there are no changes in the way the business operates (collection and payment terms, stock turnover, etc.), then accounts receivable, stocks, accounts payable, etc. will tend to increase at a similar rate.

WC, in contrast, will grow differently. Let us take a simple example. Let us assume, for the time being, a situation without long-term debt and without the possibility of a capital increase, which is fairly typical of small companies. Let us assume, again for the sake of simplicity, that new investments are approximately equal to depreciation, giving a steady process of renewal. In a situation such as this, WC can only grow through retained earnings. If the company wants to finance its growth without taking on further short-term debt, the rate of sustainable growth will be a direct function of the return on sales, but also of the ratio of WCR to sales. A numerical example will make this clearer.

Let us imagine a company with sales of 4 million euros, in which WCR represent 25% of sales, i.e. 1 million euros. Let us assume, first, that the company does not have any short-term negotiated funds and does not want to have any. To do this it keeps its WCR more or less equal to its WC. The WC will therefore also be 1 million euros. If the company earns a return on sales of 3% (0.12 million euros) and retains all this profit, using it to increase its WC, the WC will grow at a rate of 12% (0.12/1) per year. The company would therefore be able to sustain 12% annual growth in WCR, and thus also 12% growth in sales, by itself.

In this example, the rate of sustainable growth (in %) is obviously obtained by dividing the return on sales (3%) by WCR as a percentage of sales (25%). This shows that if the company were able to operate more efficiently (lower WCR due to a shorter collection period, fewer days of stock, etc.), WCR as a percentage of sales would be lower, and so the rate of sustainable growth would be higher. If, in the example we have given, the ratio of WCR to sales were reduced by half (12.5%), the rate of sustainable growth would be 24% instead of 12%. Indeed, if the WCR were 0.5 million euros instead of 1 million euros, the retained profit of 0.12 million

euros would represent a 24% increase in WC, which would make it possible to increase WCR (and therefore sales) by the same 24%.

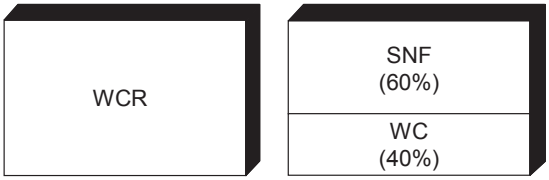
$$\Delta \text{ WCR\$} = \Delta \text{ WC\$}$$

$$\% \text{ WCR}.\Delta \text{ Sales} = \text{ROS} \cdot \text{Sales}$$

$$= \frac{\Delta \text{ Sales}}{\text{Sales}} = \frac{\text{ROS\%}}{\text{WCR\%}} = g$$

Leaving risks to one side, the sustainable rate of growth will also be higher if the company regularly uses negotiated funds to finance a certain proportion of its WCR. Let us assume that the company usually covers 40% of its WCR with WC, and 60% with negotiated funds (NF), as shown in Figure 5 below.

Figure 5



If the company is able to negotiate the maintenance of its usual financial structure in good time and without any trouble, for every 4 euros of retained profit it ought to be able to obtain 6 euros of negotiated funds. In other words, if its retained profit –all of which goes into working capital– is 0.12 million euros, it should be in a position to increase its NF by 0.18 million euros (0.12/40 x 60). Its WCR could then increase by 0.30 million euros –with growth of 30%, instead of the 12% we had under the initial set-up.

The point here is merely to show what can be done using the WCR-WC model as a tool of analysis. A crucial element in our analysis is the hypothesis that the company does not need to increase its fixed assets in order to grow, which may be possible in certain distribution companies. In companies in which all the balance sheet items, including fixed assets, remain more or less in the same proportion as the company grows, the rate of sustainable growth is given by retained earnings as a percentage of total shareholders' equity.

The WCR-WC model is useful not only for analysing the different rates of growth that are sustainable given a particular financial structure. Perhaps the most interesting idea to emerge from the model is that it is not true that growth finances itself, as some people seem to think. All growth presupposes an increase in WCR, and the WCR-WC model helps to quantify the funds that are needed to sustain that growth. In particular, it helps to determine what proportion of the funds ought to come from an increase in working capital, whether through retained profits or capital injections.

Seasonality

The simple model presented symbolically in Figures 3A and 3B can also throw light on short-term financial management in a highly seasonal company.

Given that working capital is relatively stable, or that any changes are much easier to foresee, annual fluctuations in negotiated funds requirements (NFR) will be determined basically by the estimated changes and fluctuations in WCR. These will have to be forecasted on the basis of purchasing, sales and manufacturing budgets, which will determine changes in stocks, accounts receivable, accounts payable, etc. But once the changes in WCR have been analysed, they will probably turn out to follow a typical annual pattern, which can be extremely useful when it comes to quantifying and negotiating loans for the annual sales campaign.

One implication of all this is that, as the lending institutions usually demand that a seasonal credit line be fully paid off for at least one or two months a year, the company will have to be set up with enough working capital to cover at least the minimum working capital requirements throughout the year. If the working capital is higher than this, the company will have cash surpluses for part of the year; but the above model will help them to quantify these surpluses and plan how best to invest them.

Special Financial Structures. Negative Working Capital

When the first hypermarket chains appeared, there was a certain amount of controversy in the financial literature over the way some of them structured their liabilities. Specifically, a number of analysts made a great to-do over the fact that one of the pioneers, Carrefour, in France, was growing fast and making excellent profits despite the fact that its working capital was negative, which to traditionalists was pure heresy.

In fact, what was happening was that the company had organized its operations so efficiently that, on average, goods spent so little time in the warehouse that they had been sold and paid for long before payment to suppliers was due. To put it another way, accounts payable was quite a lot higher than accounts receivable and stocks combined. Consequently, WCR were negative –and the more efficient the company, the more negative they became. The company could afford to operate with negative working capital because it had managed to make its WCR negative.

Obviously, we are not saying that having negative working capital is always a good thing. It is not very usual and, particularly in some companies, could easily be a sign of major structural problems. We shall not go into the many interesting questions concerning whether or not a situation such as that of Carrefour in its early days involves serious risks. The only thing we would like to stress is that the simple relationship between WCR and WC can explain singular (and sometimes highly advantageous) financial structures in the context of equally singular operational situations.

Classical Tools of Financial Analysis

We shall now move on to the second of the main subjects mentioned at the beginning of this section.

So as not to work in a vacuum, we shall illustrate our discussion of the classical tools of analysis with an example: Comercial Ciurana, S.A., a wholesaler of perspex sheets for industrial uses, whose most recent balance sheets and income statements are reproduced in Table 1[5].

Table 1
Comercial Ciurana, S.A., Balance Sheets and Income Statements (in thousands of euros)

INCOME STATEMENTS	1991	1992	1993
Sales	20,230	30,750	51,661
Cost of Goods Sold (CGS)	17,034	26,630	45,978
Gross margin (GM)	3,196	4,120	5,682
General, sales, administrative and financial expenses	1,782	2,774	4,359
Profit before tax (PBT)	1,414	1,346	1,323
Tax	471	448	441
Net profit (all retained)	942	897	882
Purchases	18,041	29,790	52,182
BALANCE SHEETS	**1991**	**1992**	**1993**
Assets			
Cash and bank and in hand	1,351	1,540	742
Accounts receivable	5,945	9,343	14,548
Inventories	4,428	7,589	13,793
Total current assets	11,725	18,473	29,084
Gross fixed assets	3,721	3,942	5,772
Accumulated depreciation	1,189	1,477	1,820
Net fixed assets (FA)	2,532	2,465	3,952
Total assets	14,258	20,939	33,036
Liabilities			
Accounts payable	4,469	7,689	16,013
Other creditors (including taxes)	874	1,070	1,090
Bank discount used	4,352	6,721	8,592
Bank credit	0	0	1,000
Total short-term liabilities	9,696	15,480	26,695
Capital and reserves	3,618	4,561	5,458
Profit for the year	942	897	882
Total shareholders' equity	4,561	5,458	6,340
Total liabilities + equity	14,258	20,939	33,036

[5] In Table 1, the figures for sales and purchases are given net of VAT. Accounts receivable and accounts payable include VAT at 16%.

In compliance with current Spanish accounting standards, discounted bills are included among the liabilities as a specific source of negotiated funds, just as, on the assets side, accounts receivable includes both discounted and non-discounted receivables. This is very important for analyzing a company's short-term finances. When we discount a bill, we have not yet been paid. The customer still owes the company (not the bank) the amount of the bill. The bank simply advances us some money –grants us a loan– with the bill as security, which is not very different from the loans backed by receivables that are available in other countries, which are always recorded in the accounts as loans. Nowadays, these remarks are almost superfluous, and yet we insist on making them, as there has been a tradition in some countries of considering discounted bills as having been paid, at least for balance sheet purposes.

What can we say about Comercial Ciurana in the light of its financial statements?

Clearly, the figures show us a relatively small company which, in view of its growth in turnover, seems to have excellent prospects, and which has made a profit in each of the last three years. Yet it seems to be having financial difficulties, as shown by the decrease in cash and the increase in accounts payable, despite the use of short-term bank credit. Let's try to be more specific in our analysis and diagnosis.

Ratios

One way to be more precise is to look at the most important figures –not in absolute terms, but in the form of coefficients or ratios that relate each figure to other, related variables. For example, cash is better measured in terms of the proportion of the company's short-term debts it will cover than in terms of its actual euro value. Thus, we can see that although cash has declined, in absolute value, by just over half between 2001 and 2003, as a percentage of short-term debts it has fallen from 13.9% to 2.8% over the same period, a much larger decrease.

There is a great confusion of terminology with regard to ratios, and writers rarely agree which ratios or coefficients should be used in financial analysis and diagnosis.

In fact, the scope for theorizing is rather limited. The basic point is that common sense must decide which ratios are most useful in each case. Financial ratios may even have been somewhat overused, forgetting that the really important financing decisions (such as suspensions of payments) are measured in euros and not in percent.

Here we shall look at four sets of ratios, with no claim to be exhaustive. We shall apply each ratio to Comercial Ciurana, S.A., and comment briefly on its value as a tool of analysis and diagnosis.

Group 1. Profitability Ratios

The most common ones are:

- Gross margin ratio = Gross margin / Sales
- Net Return on Sales (ROS) = Net profit / Sales
- Return on Equity (ROE) = Net profit / Shareholders' equity

For Comercial Ciurana, S.A., the values are (in percent):

	1991	1992	1993
Gross margin ratio	15.80	13.40	11.00
Net return on sales	4.66	2.91	1.71
Return on equity	26.05	19.67	16.15

There are, of course, other profitability ratios, such as return on total assets, return on assets less spontaneous liabilities, etc. But the three we have highlighted are sufficiently representative of this group and require no further comment.

Return on equity has been calculated using shareholders' equity at the start of the financial year, which is perhaps the most usual way to calculate it, and the easiest when we want to know: the return obtained during the course of one year on the capital at the start of that year.

Another possibility is to calculate the return on average shareholders' equity, which for 2001 would be (36,187 + 5,614)/2. In our example, the return on average shareholders' equity would be 23.04%, 17.91% and 14.95% in 2001, 2002 and 2003, respectively.

These figures show very clearly that, although it is still profitable, Comercial Ciurana, S.A. has seen a steady deterioration in its results. There has been a moderate decline in gross margins, possibly due to somewhat forced growth via less profitable products and/or customers, which translates into a spectacular decline in return on sales, to the point where the company is now dangerously close to breakeven. As a consequence of all this, return on equity has also declined significantly.

As we can see, these relative figures, or ratios, complement, modify and clarify far more than the simple observation that profits have fallen slightly.

Group 2. Liquidity Ratios

These seek to relate cash (or cash equivalents) to other variables such as short-term debt, purchases, periodic payments, etc. The most common ones are:

- Cash ratio = Cash / Short-term liabilities
- Cash in days of purchases = (Cash / Annual expenses) x 360

For Comercial Ciurana, S.A., the values are:

	1991	1992	1993
Cash ratio (per cent)	13.94	9.95	2.78
Cash in days of purchases (days)	27	19	5

The figures speak for themselves and reveal the problems caused by the company's somewhat uncontrolled growth during last few years.

Sometimes people calculate what is known as a "quick ratio", which is the same as the cash ratio but adding "cash equivalents" to the numerator. Cash equivalents typically consist of marketable securities and those accounts receivable that are immediately recoverable or can be discounted. In the case of Comercial Ciurana, S.A., we have not calculated the quick ratio because the company does not own any marketable securities and, given its situation, will probably already have borrowed up to its discount limit.

There are, of course, other ways of establishing comparisons that relate cash to other variables, such as weekly wage costs, average total daily expenditures, etc. The choice of ratios will depend very much on the characteristics and problems of each individual company.

The names of some of these coefficients or ratios are somewhat misleading. For example, in some books (and in countries such as Spain), the current ratio is often referred to as the "liquidity ratio". However, it is possible for a company to build up unnecessary stocks and so find itself facing serious problems of liquidity in the ordinary sense of the term (availability of the means of payment), while its "liquidity ratio", which also includes stocks, is very high. If the company were to sell off most of its surplus stocks at book value, the "liquidity ratio" would remain unchanged, but its liquidity would change drastically. The same applies to the so-called solvency ratio if we insist on giving it a universal interpretation. There is no denying that a large bank can be a highly solvent enterprise, even though its solvency ratio may be very low.

Group 3. Financial Structure Ratios

A great variety of different ratios have been proposed, but the following are perhaps the most widely used:

- Current ratio = Current assets / Current liabilities
- Solvency ratio = Shareholder's equity / Total Liabilities
- Indebtedness ratio = Liabilities / Liabilities + equity
- Fixed asset coverage = Permanent funds / Net fixed assets
- Leverage (L) = Liabilities / Equity

For Comercial Ciurana, S.A., these ratios are:

	1991	1992	1993
Current ratio	1.2	1.2	1.1
Solvency ratio	0.5	0.3	0.2
Indebtedness ratio	0.7	0.7	0.8
Fixed asset coverage	1.8	2.2	1.6
Leverage ratio	2.1	2.9	4.2

People often ask what these ratios should be, and some authors even provide "magic" figures –such as a current ratio of 1.4 as "good", 1.25 as "average" and 1.10 as "bad". In practice, there is no simple answer. The most appropriate figure will depend to a large extent on the type of business and the particular circumstances. Take the case of the thriving hypermarket operator with negative working capital –by definition, if working capital is negative, the current ratio will be less than 1.

All the same, if we cannot generalize about ratios, how should we interpret them, and what use are they? In some cases, the value of the ratio itself is highly indicative. For example, an indebtedness ratio of 79% in non-financial companies will generally be a danger sign. But normally, apart from common sense, there are two ways of judging a set of ratios:

- Compare them with the ratios of the industry as a whole, or of some of the companies in the industry. This is not always possible, owing to lack of data, but sometimes the data are available.
- Analyze the way the company's ratios have changed over time.

To illustrate this, we can look briefly at the way Comercial Ciurana's financial structure ratios have evolved over recent years.

The current ratio has remained above 1 over the last three years, which indicates that the company's working capital is positive, although it has been shrinking steadily. This in itself is a warning sign, as it indicates an increase in short-term debt relative to current assets. If we look at the solvency and indebtedness ratios (which are complementary), we can see that short-term debt has increased relative to shareholders' equity, too. The company is already dangerously dependent on short-term financing, which already represents more than 80% of the total finance it uses. The steady deterioration of all the ratios tells us that something must change in the way the company is run; otherwise, depite never having made a loss, the company will go to the wall.

The first four ratios can be calculated for periods shorter than one year. If we choose to calculate them on a quarterly basis, in the first ratio we would consider the most recent quarter's sales, and the factor would be 90 instead of 360. This is particularly suitable for highly seasonal companies, as it allows us to compare the balance sheet figures with the daily purchases or sales that really matter. The stock turnover ratio is widely used, although it is difficult to interpret in manufacturing companies as it mixes up the different types of stock – raw materials, goods in progress, and finished goods– each of which is valued by a different method. Often, stock turnover is calculated using the figure for sales rather than the cost of goods sold. This again implies comparing units that have been valued on different bases and is therefore no more than an approximation, with a systematic upward bias.

These figures can help us understand what is happening in Comercial Ciurana, S.A. Sales are growing at the expense not only of a cut in unit margin, as we saw earlier, but also of a disproportionate increase in stocks. This (and other factors) generates financing needs which the company cannot cover by discounting bills. Besides resorting to bank credit, the company has started to delay payments to its suppliers, stretching the pay period by almost 19 days over the last two years. The slight improvement in the collection period over the last year is probably due to the company's trying to relieve its financial difficulties by offering customers big incentives for prompt payment.

Group 4. Operational Ratios

This last group of coefficients or ratios is of particular interest for the financial analysis and diagnosis of operations, as they relate investment and short-term financing to a number of operational variables that, very often, management can control.

Although here too there is a great choice of possible ratios, the most interesting ones are:

- Average collection period[1] = (Accounts receivable net of VAT / Sales) x 360
- Average pay period = (Accounts payable net of VAT / Purchases) x 360
- Raw materials in days of purchase = (RM stocks / Purchases) x 360
- Finished goods in days of sale = (FG stocks / Cost of goods sold) x 360
- Stock turnover = Cost of goods sold / Total stocks

Applying these ratios to Comercial Ciurana, S.A., we obtain:

	1991	1992	1993
Collection period ((Accounts receivable/1.16) / Sales) x 360[2]	91	94	87
Pay period ((Accounts payable/1.16) / Purchases) x 360[2]	77	80	95
Raw materials in days of sale[3]	88	92	95
Finished goods in days of sale	94	103	108
Stock turnover[4]	3.85	3.51	3.33

1 Its very nature, this ratio indicates the need, as we have already said, to take into account the total accounts receivable, whether they have been discounted or not.

2 Given that in our case the figures for accounts receivable and accounts payable include 16% VAT, when we come to calculate the collection and pay periods we have to divide the balance sheet figures by 1.16, so as to make them comparable with the income statement figures for sales and purchases, which obviously do not include VAT.

3 As this is a trading company, it is difficult to distinguish between raw materials and finished goods. Ratios 3 and 4 therefore simply establish a relationship between stocks, on the one hand, and purchases and sales on the other.

4 As there is only one type of stock, the turnover ratio is another way of expressing stocks in days of sale.

Our analysis of these ratios gives us a much clearer picture of Comercial Ciurana, S.A.'s financial position and problems than we could get from a cursory reading of its balance sheet and income statement.

To sum up, the main points to remember about ratios are:

Ratios: Points to Remember

- Ratios are useful, but they should not be overused. Some problems can only be clearly identified if they are valued in monetary terms.
- In all the ratios that include a figure for accounts receivable it is important to use total accounts receivable, including any that have been discounted. Similarly, the total discounted liability must be included in short-term debt.
- Some ratios can be interpreted directly from their numerical value (ratios of return, indebtedness, etc.). Others are not so easy to interpret, although they may be useful:
  - When compared to the ratios of other similar companies.
  - For studying the way the company's ratios have developed over a period of time.
- Given that there are no universal rules for interpreting ratios, the rule in applying and interpreting them is to use common sense.

Other Tools of Financial Analysis. Statements of Source and Application of Funds

At the beginning of this note we said that the liabilities on a company's balance sheet represent the sources of funds, and the assets the investments or applications of these funds. Within the framework of financial analysis and diagnosis, it is often useful and illuminating to look at how and why, in a given period, both the sources and the applications of funds have changed. The easiest way to do this is by means of a statement of source and application of funds.

By its very definition, a source of funds can be either an increase in liabilities or a decrease in assets. Funds can be obtained by taking out a loan (increase in liabilities) or by selling a machine or a piece of land for cash (decrease in assets). Conversely, applications of funds will be increases in assets or decreases in liabilities –funds can be applied to purchasing a computer or to repaying a loan.

In line with these definitions, a quick way of analysing a company's development over a given period is to obtain all the sources and applications of funds by subtracting the period-end balance of each balance sheet item from the opening balance. The sources will be the increases in liabilities and decreases in assets, while the applications will be the increases in assets and decreases in liabilities. Obviously, the fact that these figures are taken from the balance sheet means that the total sources must be equal to the total applications.

We shall illustrate these concepts by applying them to Comercial Ciurana, S.A. The reader can check for him or herself, as an exercise, that the statements of sources and applications of funds for the years 2002 and 2003 are as shown in Tables 2 and 3 below.

We shall very briefly point out some important aspects of the company's situation that emerge from these data:

- The increase in shareholders' equity in the form of retained earnings is minimal compared with the other sources of funds. It accounts for only 13.2% of total new funds in 2002, and only 6.8% in 2003. This situation is unsustainable, as it would lead the company to insolvency
- The increase in accounts receivable in 2003 is far greater than the increase in bills discounted. The company is going over its credit limit and creating new financing needs that are not covered by its negotiated agreements.
- The increase in accounts payable in 2002 is less than the increase in accounts receivable. This is as is to be expected in a normal situation, as accounts payable are measured at purchase price and accounts receivable at selling price. In 2003, however, the increase in accounts payable is considerably greater than the increase in accounts receivable. This, together with the decrease in cash, is a clear warning signal that the company is having serious difficulties in meeting its payment obligations.
- Also in 2003, the increase in stocks seems disproportionate in relation to the growth of other items.

Table 2
Sources and Applications of Funds for 1992 (in thousands of euros)

Sources	
Increase in accounts payable	3,219
Increase in other creditors	195
Increase in bank discount	2,369
Increase in credit	0
Increase in shareholders' equity	897
Decreases in net fixed assets	66
Total sources	6,747
Applications	
Increase in cash	188
Increase in accounts receivable	3,398
Increase in stocks	3,160
Total applications	6,747

Table 3
Sources and Applications of Funds for 1993 (in thousands of euros)

Sources	
Increase in accounts payable	8,324
Increase in other creditors	20
Increase in bank discount	1,870
Increase in credit	1,000
Increase in shareholders' equity	882
Decreases in net fixed assets	798
Total sources	12,895
Applications	
Increase in accounts receivable	5,204
Increase in stocks	6,203
Increase in net fixed assets	1,486
Total applications	12,895

Needless to say, we could draw many more conclusions from these financial statements. We could also group the items differently. In fact, the technique demonstrated here for analysing the sources and applications of funds is merely a simplified version of other methods that seek to classify the different sources and applications of funds according to homogeneous criteria, separating structural sources and applications from operational sources and applications.

Spanish legislation, like that of many other countries, includes this technique of analysis in the so-called "funds flow chart", which is the third financial statement alongside the balance sheet and the income statement.

Analysis of Comercial Ciurana, S.A. in Terms of the WCR-WC Model

The WCR-WC model, which we discussed at length in the first part of this note, is a good tool to round off the financial analysis of a company. It helps to explain the conclusions derived from other tools of analysis and gives them substance, especially with regard to the way the company's finances have developed over time.

We shall now apply it to Comercial Ciurana, S.A.

We shall leave it to the reader, as an exercise, to check that the accounting WC and WCR to be derived from the data in Table 1 are as follows, in thousands of euros:

	1991	1992	1993
Working capital	2,029	2,993	2,388
WCR (accounting)	6,381	9,714	11,980
Difference (NFR)	4,352	6,721	9,592

The difference between the two is the short-term negotiated funds (SNF), which in our case correspond to discounted bills and, in the last year, also the credit line.

The increase in working capital (decrease in 2003, due to net increases in fixed assets greater than retained earnings) is clearly out of proportion to the increase in WCR (due to the greater volume of activity). The figures for WC and WCR show that the company is not generating sufficient funds to finance its growth, with WCR that have almost doubled over the last two years.

This may lead us to suspect that, at the end of 2003, the company may be using "forced" funds. To confirm this, we would need to know the true cash ratio and pay period, which the company must obviously know. If we assume, for the time being, that the company considers that operational cash should be at least 8% of short-term debt, and that the maximum pay period is 90 days, then the 2001 and 2002 balance sheets reflect a trouble-free situation. In 2003, in contrast, we find a cash ratio of 2.78% and a pay period of 95 days. On the above assumption, the company has obviously "forced" its liquidity situation. Now we are in a position to calculate the volume of these forced funds in thousands of euros.

Cash below the desired minimum:

8% of short-term liabilities	2,135
Real cash	742
"Forced" cash	1,393

Accounts payable overdue:

90 days of purchase (52,182 / 360) x 90 x 1.16	15,132
Accounts payable	16,013
"Forced" accounts payable	881

In summary:

"Forced" cash	1,393
"Forced" accounts payable	881
Total "forced resources"	2,274

The company appears to have pushed its discount facility to the limit, and has arranged a 1 million euros credit line; but it still needs 2.3 million euros to end 2003 in a satisfactory situation. In view of what we said earlier, this means that the real WCR must be equal to the accounting WCR plus 2,273, i.e. 14,254 thousands euros. We can check that this is so by inserting into the balance sheet the "desired" values for cash and accounts payable.

We then have to modify the balance sheet of 2003 as follows:

Desired cash	2,135
Total accounts receivable	14,548
Stocks	13,793
Desired current assets	30,477
Desired accounts payable	15,132
Other creditors	1,090
Total desired spontaneous resources	16,223
Real WCR (difference)	14,254

wich coincides with the figure we calculated earlier.

A summary of Comercial Ciurana, S.A.'s operational finances at the end of 2003 would be as follows:

Negotiated funds requirements (in thousands of euros):

Real WCR to be financed	14,254
WC available	2,388
NFR (Negotiated Funds Required)	11,865

Short-term negotiated funds actually negotiated:

Bank Discount	8,592
Bank Credit line	1,000
Total NFR	9,592
Difference ("forced" funds)	2,273

The volume of forced funds represents the company's financing deficit at the end of 2003. As it lacks the funds to finance all its assets, the company has resorted to "squeezing" its cash below the desired level and not paying its suppliers on time. The above analysis helps us to measure these problems in euros, which is essential if we are to assess the scale of the problem and find a solution.

First of all, Comercial Ciurana, S.A. should try to determine whether the problems are operational or structural. If they are operational, the first question should be whether the volume of accounts receivable and/or stocks is appropriate. Can the company shorten its collection period? Is there any chance of negotiating an extension of the discount facility? Are stocks too high? If the answers to these questions reveal that poor operational management has effectively "buried" more than 2.27 million euros in unnecessary WCR, the company may not be having structural problems. In this case, efforts should be directed towards resolving the operational problems. However, if the problems are structural, either the partners must inject more capital into the company or they must look for new partners. In either case, the company should reconsider its rate of growth and how it manages this growth. This is an issue that is dealt with at greater length in technical note FN-387-E, "Operational finance: planning and forecasting".