6 Measuring the impact of exposure

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In recent years, the financial management literature has featured many articles exploring foreign exchange exposure measurement and management. Most of the contributors to this literature are academic researchers and all of the reviews reflect the substantial amount of academic research carried out on this topic. These theoretical developments suggest methods for measuring the impact of foreign exchange rate changes on various aspects of corporate value and performance.

Although these developments have come at a propitious time for managers — a time when foreign exchange risk has to be managed in an increasingly risky environment — they have also generated some confusion. The numerous theoretical improvements occurring rapidly in this field have overtaken their effective application, and managers are experiencing some problems.

The preceding chapters of this book describe various measures of foreign exchange exposure which are based on these theoretical developments, for example, accounting exposure, operational exposure and strategic exposure. The description and discussion of these measures here and elsewhere are complete and sophisticated. Taken together, these measures recognise all of the elements of the economic and corporate environment which we now know contribute to the presence or absence of corporate foreign exchange risk.

This list of potential definitions of exposure may be somewhat overwhelming. Most treasurers, senior corporate officers, and foreign exchange managers admit to some bewilderment at the choice of available exposure measurement techniques. In other words, although the need to measure exposure is greater than ever, so is the number of measurement systems from which to choose. Therefore, both because of and in spite of the rapid expansion of knowledge, managers face the pressing question: ‘Which is the “right” definition of exposure for my company?’

The objective of this chapter is to offer guidelines for answering this question. All types of exposure should be considered, as each offers insights which are neglected or even ignored by the others. The recommendation is that a ‘portfolio’ is designed including elemental methods that are most appropriate to the corporate situation. This portfolio will represent an appropriate balance of the concerns which are addressed by each of the systems independently.

As a guide to developing this balance, the strengths and shortcomings of each method are reviewed, and situations identified where a reliance on a single method alone seriously biases the risk management process. Also demonstrated is that one of the perspectives, value-based exposure, combines the other methods into a single cohesive framework. It is through measurement choices made while using the value-based system that the portfolio is customised for each particular corporate situation.

Choosing a definition of exposure: Considerations

Selection of the appropriate measure of exposure is the first and most important challenge of currency risk management. Choosing a measurement scheme which is not appropriate to your corporate situation can have disastrous consequences.
For this reason, it is important to examine both the characteristics of the available measurement approaches and the requirements of the situation. The task is to match those requirements to the capacities of the various systems and to design a system that meets the requirements. Although each of the available definitions of exposure offers unique advantages, there are three important considerations which should inform your selection.

The foremost consideration is the match between the corporate or situational objective and the objective implied by the measurement system. Failure to ensure this match makes it likely that the resulting exposure management decisions will succeed in protecting some relatively unimportant aspect of performance while failing to protect primary corporate objectives.

A second important consideration is matching the scope of both the problem and the system, i.e. all important elements of the business situation must be reflected in the exposure measure. The use of a measurement that fails to capture the important elements of the situation can introduce dangerous distortions into the hedging and risk management process.

Finally, the amount of time and the quality of information available are also important determinants of choice. Measuring some types of exposure, such as accounting exposure, is quite straightforward and the required information is a natural by-product of the existing corporate information system. Other systems, such as operating or value-based exposure, require a substantial amount of additional information — information not usually collected by corporate treasury. Also, because this information will be more subjective, the resulting measurement of exposure will be less precise.

Measuring the impact of exposure: The choices

Currency exposure is the sensitivity of some corporate objective variable to changes in foreign exchange rates. The different types of exposure represent different perspectives, each focusing on the sensitivity to foreign exchange rate changes of a different measure of corporate performance. For each type of exposure, that variable or measure is the 'objective' of the exposure measurement system which that type implies. Accounting exposure is the sensitivity of net worth, and in some situations reported profits, to changes in the foreign exchange rate. Cash flow exposure is the sensitivity of cash flow to foreign exchange rate changes. Operating exposure and strategic exposure are, respectively, the sensitivities to foreign exchange rate changes of operating profit and strategic opportunities. Value-based exposure is the sensitivity of the company's value to changes in foreign exchange rates.

Choosing one exposure definition, to the exclusion of others, implies an exclusive choice of the attendant performance objective. A corporate concern for the stability of net worth, for example, prescribes both measurement and management of accounting exposure. Likewise, when the stability of operating profits is of prime concern operating exposure is the definition of choice.

In summary, there is an intimate connection between the corporate objective — stability of net worth, operating profit, or corporate value — and the chosen definition of exposure. The definition of exposure upon which the measurement system is based determines which performance variable will eventually be stabilised.

As a background to understanding both the potential and the shortcomings of each method, consider the process by which they were developed. Our understanding of foreign exchange exposure evolved against a background of progressive globalisation and a progressively greater need to measure the attendant risks. In a sense, each type of exposure was designed as a response to the shortcomings of the existing methods.

With this in mind, see Exhibit 1, which compares the basic economic and business considerations reflected in each of the models. Note that each definition of exposure relates to the risk of a particular variable and that this variable is the focus of the definition. In essence, each model accurately defines the exposure of its target, but ignores aspects of exposure which are reflected in the other models.
## Exhibit 1 Exposure models: Considerations

<table>
<thead>
<tr>
<th>Exposure definition</th>
<th>Implied corporate objective</th>
<th>Perspective and accuracy</th>
<th>Neglected considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting exposure</td>
<td>Networth/Reported profits</td>
<td>Exposure of financial assets and liabilities; current period financial performance</td>
<td>Cash flow; operating flexibility; future expectations; future growth; strategic options</td>
</tr>
<tr>
<td>Cash flow exposure</td>
<td>Current cash flow</td>
<td>Cash flow; short-term operational performance</td>
<td>Exposure of financial assets and liabilities; operational flexibility; future expectations; longer-term growth; strategic options</td>
</tr>
<tr>
<td>Operational exposure</td>
<td>Operating profit</td>
<td>Operational flexibility; short-term operating performance</td>
<td>Exposure of financial assets and liabilities; future expectations; longer-term growth; strategic options</td>
</tr>
<tr>
<td>Strategic exposure</td>
<td>Strategic options</td>
<td>Cash flow; short-term operational flexibility; longer-term operational flexibility; strategic options</td>
<td>Exposure of financial assets and liabilities</td>
</tr>
<tr>
<td>Value-based exposure</td>
<td>Corporate value/Stock price</td>
<td>Exposure of financial assets and liabilities; exposure of 'real' assets and liabilities; cash flow; short-term and longer-term operational flexibility; future expectations; future growth; strategic options; relevant time frame</td>
<td></td>
</tr>
</tbody>
</table>

Depending on the corporate objective for that situation, one model may provide a more or less appropriate measure of risk in a given situation. For example, in cases where strategic flexibility is of prime importance, one might measure strategic exposure and ignore accounting exposure. Before making such extreme choices, however, it is important to review the characteristics of each exposure system and exposure definition. This requires that we distinguish those aspects of the corporate and business situation which each system recognises and those aspects which it ignores.

**Accounting exposure** is, in some sense, the most basic of the methods. Its focus on the variability of the income statement and balance sheet drives its preoccupation with short-term financial results. The system is constrained by the underlying accounting conventions. These, of course,
eliminate the ability of the system to recognise operating flexibility and expectations of future performance.

There are situations in which accounting exposure is a useful measure. In particular, in situations where reported profits determine dividends, employee compensation, etc., stability of earnings may be an important corporate objective. Similarly, situations which require the company to adhere to ratio-related covenants and restrictions may raise reported results to a high level of importance.

Cash flow exposure expands the accounting measure to account for the distinction between cash flow and profits. With this definition, the concern broadens to include the timing of receipts, depreciation charges and increases or decreases in balance sheet items. Again, the use of this definition is appropriate in situations where corporate cash flow is a variable of concern.

Operating exposure is an extremely important contribution which broadens the scope of measurement still further. Here the focus is on operational flexibility. Of course, flexibility is a function of the abilities of operating managers to adjust pricing, sourcing, costs, etc. With this extension of the concept of exposure, we recognise that management's ability to respond is largely determined by the structure of product and input markets. The operating exposure definition and its concomitant measurement system implicitly account for these market structures.

Operating exposure moves beyond exclusive recognition of the exposure of financial or contractual assets and liabilities, to allow evaluation of the extent to which 'real' assets and liabilities, contingent claims, are at risk. Clearly, the use of operating exposure in situations where market structures and management incentives provide a great deal of flexibility, is an important extension. Without recognition of this flexibility, exposure would appear much larger than it is. In other words, accounting and cash flow exposure may be useful in situations where management has little or no pricing or sourcing flexibility. However, in situations where flexibility is present exclusive reliance of cash flow or accounting exposure and neglect of operating exposure generally results in significant overstatement of the effect of foreign exchange rate changes on the company.

The important conclusion is that neither operating exposure nor accounting exposure alone give an accurate measure of the effects of exchange rate changes on a company. In most cases, both accounting or contractual exposure and operating exposure are present. Operational exposure is an important extension of accounting exposure, but it cannot stand on its own.

Strategic exposure stretches the concept of operating exposure further into the future. It also recognises the importance of longer-term expectations. The objectives which are implicit here may include preservation of earning power, maintenance of market position, or stability of sourcing arrangements. In other words, the object is to manage foreign exchange risk so as to maintain the company's strategic options.

What is required, of course, is a system and a comprehensive definition of exposure that recognises both contractual and operating exposure, captures aspects of cash flow that affect exposure, and reflects the effects of exchange rate changes on the longer-term strategic position of the company. These are the attributes of value-based exposure.

Value-based exposure is defined as the sensitivity of corporate value to unexpected changes in exchange rates. Value is taken to be the current value of cash flows which are expected to be received in the future. Although these cash flows are normally thought of as originating in a foreign country and currency and being exposed to an exchange transaction, expectations of future domestic cash flow are frequently also exposed.

Measuring the sensitivity of corporate value to changes in the exchange rate implies that value is the objective function of value-based measurement. However, this does not obviate the need to consider other objective measures such as net worth, reported profits, operating profits, or
strategic position. Rather, it recognises that changes in any of these measures may affect value and offers a system for evaluating the probable magnitude of the effect.

In value-based exposure, elements of value are broken into components which share exposure characteristics. Financial or contractual exposures, which are fully exposed, are separated from operating exposures. Further, operating exposures are separated from strategic exposures. These distinctions are drawn by determining the relative flexibilities of cash flows to be received in the near term versus the longer term. One also determines the shares of value which derive from nearer-term versus longer-term cash flow expectations.

In other words, elements of value are organised by key factors that determine sensitivity. The relative shares of these elements in total value are then used to develop a weighted sensitivity of value to changes in exchange rates.

Finally, value-based exposure recognises the message of modern capital market theory that markets reflect current information and that only ‘news’ causes changes in value. Thus, it is unexpected changes in exchange rates which generate changes in corporate value; changes in exchange rates which are fully anticipated are already reflected in the market price.

In this sense, value-based exposure is comprehensive. Accounting, operating, cash flow and strategic exposure are components of value-based exposure. In fact, with extreme assumptions, such as total inflexibility or total flexibility, the value-based definition can be collapsed into each of the other definitions.

Because value-based exposure is a comprehensive composite of the other measures, it offers a structure for evaluating the appropriate weights of each of the components. These weights are determined as we evaluate the extent to which the exposure of shorter-term results exceeds the exposure of the longer-term strategic options. The weights are also effectively described in our evaluation of the extent to which operating exposure mitigates, offsets, or aggravates contractual/accounting exposure.

In a real sense, this implied flexibility in the use of the value-based system allows us to customise the measurement of foreign exchange exposure to each corporate and business situation. This flexibility can be the most attractive aspect of value-based exposure.

Choosing a definition of exposure: A review

In introducing the types of exposure definitions and measurement systems that are available, three practical concerns were listed which should guide an approach to exposure measurement.

The first is that the objective variable which is implied by the definition of exposure and attendant measurement approach should match most closely the relevant corporate objective.

The second consideration is that elements of the corporate, business, or economic situation which affect operating and financial performance must be recognised by the measurement system. This is important as each system, except the composite value-based system, specialises in the evaluation of particular aspects of the situation. A system which ignores or underestimates aspects of a situation which are actually very important, creates significant measurement bias that is frequently extremely costly. In essence, a chosen definition of exposure should recognise all of the important ways in which changes in foreign exchange rates have an impact on the particular corporation.

The third consideration is that the measurement process be as simple and effective as possible. The required information should either be readily available or easily obtained. Also, newly obtained information and periodic updates must be as accurate as possible.

Value-based exposure qualifies on the question of matching system and corporate objective measures, because it is a composite of the other measures. As a composite it allows us to recognise that, in most situations, accounting profits and net worth, strategic options, operating profits, and cash flow are all important objectives. Rather than force a single perspective and exclude the others, value-based exposure facilitates the recognition of all simultaneously.
Value-based exposure also supports a broad scope of measurement. Corporate, business, and economic factors which will influence outcomes all find a place in the model. The way in which the measurement model is used, not its internal structure, determines how broadly or narrowly the exposure measure is focused.

Finally, we arrive at the concern with the measurement efficiency and effectiveness. As one would expect, in broadening the measurement scope, cash flow, operating, strategic, and value-based measures of exposure require significantly more information than is required for measurement of accounting exposure. Further, although the information required by accounting exposure is already collected in the normal course of treasury and financial management, the information required for the more comprehensive measures is not. The more comprehensive systems require information regarding pricing, cost, and operating flexibility, sensitivity of strategic options, market structure, etc.

Fortunately, this additional information is extremely useful and the collection of such information frequently prompts very constructive reviews of previously ignored issues. Many companies have identified significant, unexpected benefits from the process of redesigning the corporate information system to capture and report a greater range of competitive and economic variables, and to allow for more input from line managers.

In sum, the weights assigned by value-based exposure to each of the component exposures depend on assumptions about operating and managerial flexibility, market structures, competitive response, and capital market evaluation. Abstract, all-or-nothing assumptions result in an abstract evaluation of exposure. Careful estimation of parameters and sensitivities yields more realistic estimates. In fact, the estimation process in itself frequently encourages review of strategic options, investment policies, etc.

Thus, although each of the basic approaches to measuring exposure is informative and important, none is sufficient in itself. Only the value-based system addresses each of the concerns raised. This is because the value-based system is essentially a composite of the others, and because the means of measuring value-based exposure prompts us to consider the appropriate weights to attach to each potential objective.

Future measurement of the impact of foreign exchange rate changes

The rapid globalisation of national economics is one of the most important economic forces of the 1980s. As this continues and accelerates, corporations are being forced to internationalise more completely. Although there are many positive consequences of corporate internationalisation, increased exposure to changes in foreign economies represents an important negative consequence. This exposure frequently presents itself as corporate performance results become demonstrably more sensitive to changes in foreign exchange rates.

In the author's opinion, insulating the outcomes of corporate initiatives and performance from such exposure is one of the most important responsibilities of today's senior corporate financial officers. Further, this responsibility for foreign risk management will become increasingly important as the impact of the globalisation process spreads and deepens.

In this environment, effective and efficient management of foreign risk is too important to be left to specialised measurement systems and specialised analysts. When faced with global competition, the failure of senior financial management to use the most effective measurement and management techniques weakens most prospects of competitive success.

The number of new methods for measuring exposure are described in earlier chapters of this book. Each brings unique insights into the problem of foreign currency risk management. Value-based exposure combines these insights in a single conceptual structure and recommends a measurement technique which can support senior management as it wrestles with these important responsibilities.