4
An evaluation of the state-of-the-art of corporate risk management

4.1 Introduction

Chapters 2 and 3 gave a comprehensive framework and overview of the theoretical and empirical literature rationalizing corporate risk management. Here we will integrate the results of these chapters with the practice of corporate risk management in order to evaluate the current state-of-the-art. What do we know about the economic benefits of corporate risk management? What are the remaining puzzles? Which theoretical contributions are most necessary? What are important lessons for practitioners? The purpose of this chapter is to answer these questions. More specifically, we will use case studies and large scale surveys on the use of derivatives and confront these with the insights developed in the former chapters to evaluate the current state of the theory and practice of corporate risk management.

Surveys among non-financial corporations on the use of derivatives have been conducted on a regular basis since the beginning of the 1980's. Especially interesting are the surveys that build upon those initiated by Wharton Business School (Bodnar, Hayt, Marston and Smithson, 1995; Bodnar, Hayt and Marston, 1996 and 1998). The Wharton studies are not only important because they provide some perspective on the development of corporate risk management over time for a sample of firms in the US; their value also lies in the fact that many other studies have copied their research design to examine corporate risk management practices in other countries.

Both intertemporal and international comparisons are relevant for this thesis. Comparisons over time are important since risk management is a developing area. We therefore expect progression over time in the use of derivatives. Second, with an increased knowledge about derivative usage in non-financial corporations questions have become more specific. International comparisons in the corporate use of derivatives may further enhance our understanding of common factors that drive the corporate risk management decision. Especially interesting is whether
risk management is universal or whether there are important differences between countries. One would expect these differences to be related to specific institutional characteristics of financial systems and different corporate governance systems.\(^1\) International comparisons may help to shed light on these issues.

Another valuable source to increase our knowledge of the day to day practices in corporate risk management are case studies. For example, Harvard Business School, the Journal of Applied Corporate Finance and Risk have published case studies on corporate risk management issues. We will occasionally refer to these case studies to support the insights developed in this chapter.

This chapter is organized as follows. Section 4.2 first presents the lessons that we can draw from the two previous chapters. Section 4.3 then confronts these insights with the current practices. It draws some additional lessons from survey studies on the corporate use of financial derivatives. Section 4.4 discusses the remaining puzzles in corporate risk management and provides some suggestions for future research. Section 4.5 concludes.

4.2 Lessons from theoretical and empirical work

Chapters 2 and 3 have shown that risk management potentially serves a wide variety of objectives. Risk management may be tax driven, with the intention to reduce expected taxes. It may further serve to reduce expected bankruptcy costs, reduce investment distortions due to financial contracting problems or, more opportunistically, may serve self-interested managers in achieving their own private objectives. For each rationale we have derived the optimal risk management strategy. More explicitly, we have shown where to direct risk management at (e.g. reducing cash flow volatility or reducing volatility in accounting earnings). Rather than looking at risk management as an isolated decision, we think that a fundamental lesson established in the literature is that it is intimately related to both financial structure and managerial incentives. Obviously, risk management also comes with a cost. It is important to have insights into such costs. This section will elaborate on these issues. In the subsequent subsections we will look at:

1. Risk management as a way to fine-tune the firm's financing decisions;
2. risk management and managerial incentives;
3. costs of corporate risk management.

The following subsections explore the insights that the literature brings to practitioners/policy and add those from relevant case studies. The interactions are complex and therefore hard to

\(^1\)Note that these may also be related.
look through. Theoretical models still fail to generate testable implications with respect to necessary trade-offs. Moreover, there is some evidence that even financial structure decisions and management compensation are not unrelated, further complicating the analysis.\(^2\)

### 4.2.1 Risk management: fine-tuning the firm's financing decisions

We think that the major benefit of financial risk management lies in the fine-tuning of the firm’s (future) financing needs. The theoretical literature has established that risk management may support firms in achieving a more optimal financial structure. Risk management reduces expected bankruptcy costs and agency costs of debt. As a result, we observe that firms active in risk management generally take on more debt and as such benefit from the advantages that it generates (increased tax shields, more discipline due to reduced free cash flows, etc.). Apart from this, risk management enables firms to more precisely target internal cash levels to future investment decisions. This reduces the amount of financial slack required to overcome costly external financing, which is especially important for growth firms.

To derive clear practical implications it is helpful to roughly divide the world into growth firms and firms in mature stable industries. First, consider the optimal risk management strategies of firms in a mature industry. The optimal financing strategy for these firms is to take a relatively high level of debt.\(^3\) A high level of debt implies high interest tax shields and reduced costs of managerial discretion (better disciplines managers). To reduce the agency problems of managerial discretion firms should further follow a high dividend payout policy\(^4\) and use debt with relatively short maturity. However, high levels of debt may also lead to some under-investment and costs of financial distress. A well-defined risk management program for firms in mature industries should therefore be directed to minimize the costs associated with a more aggressive financing strategy. Risk management here should be structured in such a way that it

\(^2\)For example, Smith and Watts (1992) have established that firms where growth opportunities are important also tend to have lower leverage, a lower dividend yield, and make greater use of stock option plans.

\(^3\)See for example, Brealey and Myers (1996) Chapter 18.

\(^4\)This is in line with empirical research showing that derivative usage is positively related to dividend payout ratios; the larger the dividend payout, the more firms generally use derivatives (see Chapter 3). Also, in case studies protecting future dividends has been mentioned as an important objective in corporate risk management (e.g. in a case study on corporate risk management at Merck (see Lewent and Kearney, 1991)). If we look at firms' financing strategies, it appears that firms first set (long-term) payout ratios and then subsequently develop an investment and financing plan (see for example Graham and Harvey, 2000). This sequence suggests that, given a high dividend payout scheme, liquidity constraints (due to costly external finance, as in FSS) may drive a firm’s risk management strategy. The sequence of these decisions, however intriguing, is not very well understood.
optimizes the firm's capital structure; allowing the firm to take more debt in its capital structure, a higher dividend payout ratio and even shorter debt maturity.

A firm in an industry where growth is important, however, should have its risk management strategy focused in a different direction. Managerial discretion is, in general, less of a problem since investment opportunities in growth sectors are abundant. Having financial flexibility (slack) is of crucial importance in a growth industry to exercise (future) investment opportunities and prevent underinvestment due to high costs of external financing. A risk management program should therefore be directed to further enhance financial flexibility. For these firms risk management also fine-tunes the financial strategy, but the focus here should be on the amount of cash needed to finance future investments. There are clear signs that firms use financial engineering to tailor their cash needs. Corporate managers seem to be aware of the costs of external financing, and often refer to these costs (and the availability of funds) as an important rationale for risk management. The costs of external financing they generally refer to are underwriting fees, expenses, underpricing and market impact. Moreover, firms often claim to hedge in order to protect their credit rating (Graham and Harvey, 2000). For growth firms a (good) credit rating is important to keep access open to financial markets in order to execute the firm's strategic plan (and therefore its investments).

In line with these rationales for corporate risk management, we expect that future research will develop models that give guidance by directly linking the amount and type of risk management to the optimal amount of cash/equity needed to accomplish the firm's objectives. In that sense, non-financial corporations may learn much from tools developed by and for financial institutions. Regulatory developments have considerably stimulated financial institutions to think about the amount of economic (equity) capital these firms should set aside in order to protect themselves against a variety of risks. Models like Value at Risk and Creditmetrics help firms estimate the minimum level of such economic capital required. We think that in the near future - adapted versions of such tools become important measures for risk management for corporations as well. To further develop such a model, however, it is important to link this to future investments/strategies and to the firm's objectives. This implies the most likely approaches, that estimate whether at certain points in time sufficient cash flow is available to finance investments given some confidence interval, may become an important tool for corporate risk management of firms in industries where growth opportunities are important. With respect to firms in more mature industries, the optimal risk management strategy should be linked to the level of equity.

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5For example, both Merck (in Lewent and Kearney, 1991) and Cephalon (in Chacko, Tufano and Verter, 2000, p. 14) have indicated that the ability to pursue their investment plans and costs of external financing were important reasons for their risk management strategy.


7These types of models are also known as cash flow at risk.
Maybe such an approach can be extended and linked to some kind of corporate asset liability model (ALM). An important advantage is that it allows for integration with other (market and non-market) risks. The key driving forces behind such an ALM model should be the firm’s primary objectives for risk management.

More critically, we like to stress that despite the strong relationship between risk management and financing decisions there are some puzzles remaining. For example, if fine-tuning of the firm’s financing needs is an important rationale for corporate risk management, we would expect much more tailoring of risk management strategies than we observe. Investment opportunities come and go. The costs of external financing also are not constant. For example, the amount of underpricing is largest in times of high uncertainty. The amount of underpricing becomes lower after some of the uncertainty has been revealed. This suggests that a firm’s risk management strategy will vary over time. We have strong doubts whether this is the case. We think that the majority of firms generally use a rather mechanical risk management policy. This is not in line with what we might expect if the costs of external financing are an important rationale for corporate risk management.

Furthermore, firms may want to use risk management to affect what they perceive as the fundamental source of external financing costs. For example, they may believe that fluctuations in cash flows or large changes in accounting income, earnings surprises, etc. affect such costs of external financing and use risk management to reduce such volatility. This may also imply that firms use risk management to affect market expectations. However, there is an important paradox here. In Section 2.6, we have shown that because firms have the ability to engage in risk management strategies, a firm’s income may become less informative about firm value rather than more informative. Note that accounting disclosure about derivatives usage plays a fundamental role here. This can be taken one stage further; the possibility of risk management not only reduces the information content of income/cash flows with respect to firm quality, it also reduces the possibility for a firm to use financing instruments as signalling devices (see Ligterink, 1995a). This is an important result implying that the costs of external financing for good quality firms increase. Therefore, risk management becomes more important for good firms to use internal capital markets to finance future investments.

From a theoretical and empirical point of view an interesting avenue of future research lies in the trade-off between the costs of external financing versus that of a risk management program. Hence, although most of the theories assume that risk management has no costs, this assumption is debatable, especially if firms engage in risk management to tailor their future financing needs.

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8 Where there is variation, this is more determined by the manager’s view on the market rather than on differences in investment opportunities or changes in external costs of financing (see Section 4.4).

9 This links risk management to income smoothing. There is a considerable literature on rationalizations of income smoothing (for example, Goel and Thakor, 2000).
Uncertainty will then also be reflected in the value of the derivatives contract that the firm uses for risk management. A good example is the case of Cephalon, a firm in the biotech industry that used call options on its own stock to tailor its future financing needs. If the FDA approved one of their drugs, considerable investments would be needed. The firm argued that external financing was too expensive (due to deadweight costs) and therefore engaged in a derivatives contract with an investment banker. However, it was not likely, that the investment banker would not price the uncertainty (about the drug approval) in the risk management contract. Here there was also a cost of risk management and it is not clear whether this cost would have been lower than the future financing costs. Therefore, if there is a cost associated with risk management then a trade-off between the costs of risk management and the costs of external financing become apparent.

4.2.2 Managerialism and risk management

Managers in a firm have private incentives to engage in corporate risk management. To a large extent these incentives follow from the structure of the management compensation package. Managers with shares in a firm and/or options that are deep in the money have incentives to reduce risk. In this respect it is important to stress that the literature on executive compensation shows that an important part of managers’ income is in terms of a performance related bonus. Often such bonuses are set in terms of achieving a certain (often earnings based) target. These bonuses give managers incentives to engage in risk management through the firm. More specifically, once the manager reaches his targets, he may want to protect the level of earnings through hedging. On the other hand, if the target has not yet been reached, a manager in a firm may under certain conditions want not to hedge/speculate hoping that this will increase the probability of receiving a bonus.

An alternative rationale for corporate risk management focuses on the informativeness of corporate earnings about managerial ability. Risk aversion and career considerations make managers concerned with respect to the informativeness of earnings (about their ability) and give the incentive to engage in risk management. Paradoxically, due to the opportunity to engage in risk management corporate earnings become less rather than more informative on the whole. Managers aware of their abilities, may have incentives to engage in risk management in order to affect the informativeness of these earnings.

Lastly, risk management provides managers with the opportunity to create an internal capital market. This gives them more discretion in the selection of investment projects and in the end may result in less efficient lower-valued firms.

In conclusion, we observe a wide variety of managerial incentives to engage in risk management. There is however very little empirical testing on managerial rationalizations of corporate risk management (except for the relation with managerial compensation contracts). Risk man-
agement can easily be in conflict with the interests of shareholders. In particular, there are several managerial incentives to engage in corporate speculation. Spectacular debacles with derivatives signal the further need of studying managerial rationalizations of risk management. In order to achieve adequate control one should have a thorough understanding of managerial incentives. Only with such an understanding can one think of ways to align these managerial incentives with those of the firm’s shareholders. Research in this direction is therefore of great importance in order to develop better tools for performance measurement and control.

4.2.3 Costs of financial risk management

Important implications from the literature (discussed in Chapters 2 and 3) are: (i) that firms more often hedge rather than speculate; (ii) that the impact of hedging is not all that impressive (in terms of reducing exposures); and (iii) that risk management contributes to firm value. The literature, however, generally emphasizes the benefits of corporate risk management and neglects its costs. There are obvious costs associated with corporate risk management that may explain some of these implications. It is therefore very important to have a clear idea what the costs are and how significant they might be.

First, there are the costs of setting up a treasury (risk management) department. These costs can be significant, especially for small and medium-sized firms. Second, there are the transaction costs of hedging. Hedging transactions (like many other financial transactions), are a zero-sum game in itself, but, due to all kinds of market imperfections (e.g. transaction costs of trading, the margins of the intermediaries or exchanges, etc.), can even be a negative NPV investment. Although these transaction costs are considered to be relatively small these may still be important.10

A second cost of risk management is the loss in option value for the firm's shareholders. As explained in Chapter 2, the equity of a firm can be seen as a call option on the firm's assets with an exercise price equal to the firm's face value of debt. Reducing the volatility in cash flows reduces the value of this option and therefore is costly. This cost is higher the more the option is at the money, i.e. the closer the firm is to insolvency.

Risk management furthermore requires liquidity (for margin calls) and therefore comes with financing. You need to be sufficiently solvent to enter an OTC derivatives contract or alternatively you need to deposit margins. Thus, hedging requires financing as well. These costs may be especially important for small and financially distressed firms.11

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10 One may argue that these costs have decreased considerably in the last decade (due to an increased liquidity of derivatives market and intense competition among financial intermediaries). However, especially for the more complex derivatives, transaction costs can still be significant.

11 Apart from these more well-known costs, we think that there may also be some hidden costs. For example, in a recent case study on the US biotech firm Cephalon, Chacko, Tufano and Verter (2000)
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We think that in future research the costs of risk management will receive more attention. More insight into these costs will help managers to optimally shape the corporate risk management strategy and make better trade-offs.

4.3 Surveys on the corporate use of derivatives

4.3.1 Introduction

In this section we present some additional evidence from recent large scale surveys on the corporate use of derivatives. These surveys focus on the day-to-day management of financial price risks. Questions addressed are:

- How many corporations do actually use derivatives?
- How do corporations manage financial price risks?
- What risks do they care about?
- Which financial instruments do firms use?
- What is the objective of the use of these derivatives?
- Where do they focus upon? In which area do firms use derivatives?

Answers to these questions enable us to discuss the (ir)relevance of insights developed in the former chapters.

The setup of this section is as follows. Section 4.3.2 provides background information on the design of the existing survey studies. In subsequent sections we will discuss the prevalence of derivative usage (4.3.3), the objective in corporate risk management (4.3.4), the types of risk firms focus on and how they hedge these exposures (4.3.5), the importance of a treasurer's view on the market (4.3.6), and accounting guidelines (4.3.7) on corporate risk management. Finally, Section 4.3.8 summarizes and confronts these results with the insights developed in Chapters 2 and 3.

4.3.2 Design and sample characteristics of recent surveys

In this section we discuss the design and sample characteristics of the most important large scale surveys (see Table 4.1). We emphasize surveys conducted by (or in line with) Wharton Business identify costs of a risk management strategy that are closely related to its purpose (preventing costly external financing), see Section 4.2.1.
4.3 Surveys on the corporate use of derivatives 125

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bodnar, Hayt and Marston (1996)</td>
<td>2000 Compustat + Fortune 500 firms (US)</td>
</tr>
<tr>
<td>Bodnar, Hayt and Marston (1998)</td>
<td>2000 Compustat + Fortune 500 firms (US)</td>
</tr>
<tr>
<td>Bodnar and Gebhardt (1998)</td>
<td>368 large firms (Germany)</td>
</tr>
<tr>
<td>Yanagida and Inui (1996)</td>
<td>2065 listed firms (Japan)</td>
</tr>
<tr>
<td>Berkman, Bradbury and Magan (1997)</td>
<td>124 listed firms (New Zealand)</td>
</tr>
<tr>
<td>Alkeback and Hagelin (1999)</td>
<td>213 listed firms (Sweden)</td>
</tr>
<tr>
<td>De Jong, Macrae and Nijman (2000)</td>
<td>157 listed firms (Netherlands)</td>
</tr>
</tbody>
</table>


School. In 1994, Bodnar, Hayt, Marston and Smithson (1995) sent 2000 surveys to a randomly selected sample of large US non-financial firms included in Compustat. The questionnaire was sent out again in 1995 and 1998, with the sample extended to include all Fortune 500 firms. The results of these questionnaires have been published by Bodnar, Hayt and Marston (1996, 1998). It should be noted that, although the survey was mailed to the whole sample group, not all of the companies responded every year. As a result, one should be careful in interpreting the time series component of these surveys.

The size of the firms in the US surveys is generally large. For example, approximately 40% of the firms sampled in Bodnar et al. (1998) have sales over $1.2 billion, 30% have sales between $150 million and $1.2 billion, and 30% have sales below $150 million. With respect to the type of industry, approximately 20% are active in the primary sector, 49% in manufacturing and 31% in services.

The study performed for Germany by Bodnar and Gebhardt (1998) incorporates on average even larger firms. Despite this difference in size, Bodnar and Gebhardt are able to make valid comparisons with the US sample since they have the ability to correct the results of the US sample by leaving out the smaller firms. Qualitative conclusions with respect to differences in results between these countries presented here are based on these corrected figures.

Berkman, Bradbury and Magan (1997) study the risk management decisions of non-financial corporations listed on the New Zealand Stock Exchange. They do not give detailed information with respect to sample characteristics such as firm size or industry. However, given their focus is on listed companies, relatively large firms dominate this sample as well.

12 These are not the only surveys that have been done with respect to corporate risk management. Other interesting surveys are: Dolde (1993) and Phillips (1995) for the US; Grant and Marshall (1997) for large UK firms; De Ceuster, Darinck, Laveren and Lodewijckx (2000) for Belgium firms; and Price Waterhouse (1995) for Multinationals. Generally, the findings are consistent with those presented here. Where necessary, we will complement our findings with results from these other studies.
4. An evaluation of the state-of-the-art of corporate risk management

<table>
<thead>
<tr>
<th>Authors</th>
<th>Derivatives usage</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHMS (1995)</td>
<td>35% 12% 30% 69%</td>
<td>US</td>
</tr>
<tr>
<td>BHM (1996)</td>
<td>41% 12% 48% 59%</td>
<td>US</td>
</tr>
<tr>
<td>BHM (1998)</td>
<td>50% 13% 45% 83%</td>
<td>US</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>78% na na na</td>
<td>Germany</td>
</tr>
<tr>
<td>YI (1996)</td>
<td>41% 18% 37% 55%</td>
<td>Japan</td>
</tr>
<tr>
<td>BBM (1997)</td>
<td>53% na na 100%</td>
<td>New Zealand</td>
</tr>
<tr>
<td>AH (1999)</td>
<td>52% 18% 43% 86%</td>
<td>Sweden</td>
</tr>
<tr>
<td>JMN (2000)</td>
<td>60% 43% 59% 88%</td>
<td>Netherlands</td>
</tr>
</tbody>
</table>

TABLE 4.2. Frequency of firms using derivatives.

The Japanese survey by Yanagida and Inui (1996) is comparable to the US with respect to firm size. However, with respect to the distribution of firms over industries there are some significant differences.\(^1^3\) Alkeback and Hagelin (1999) study the use of derivatives in Swedish firms listed on the Stockholm Stock Exchange and have their headquarters located in Sweden. Although, they use the same classifications as Bodnar et al. (1995) and Berkman et al. (1997), detailed information about sample characteristics with respect to size and industry classification are not presented.

Finally, for the Netherlands, De Jong, Macrae and Nijman (2000) sent a survey to 157 firms listed on the Amsterdam Stock Exchange. Of the sample, 52% of the respondents are active in manufacturing, 23% in trade and 25% in services. With respect to size, 31% of firms have sales over fl.1.5 billion, 27% with sales between fl.0.5 and fl.1.5 billion, and 42% with sales below fl. 0.5 billion. Note that these sales brackets do not coincide with those of the US surveys.

4.3.3 How many firms use derivatives?

The first question the surveys generally ask is whether non-financial corporations use derivatives or not. Table 4.2 summarizes the results of the different studies.\(^1^4\) In the three Wharton studies reported in Bodnar et al. (1995, 1996, 1998) respectively 35%, 41% and 50% of the firms responded that they used derivatives. This suggests that derivative usage has been increasing over time. However, with respect to the answers of firms that responded in all three surveys, it appears that derivatives usage is strikingly constant (41%) over time (Bodnar et al., 1998).

From the studies in the US it appears that large firms use derivatives considerably more than medium sized firms, who in turn use derivatives more frequently than small firms. Derivative

\(^1^3\) Also a different classification has been used making the comparison slightly harder.

\(^1^4\) In the table and all those that follow we refer to studies using the first letters of the authors.
usage was largest among primary product producers (68%) followed by firms in manufacturing (48%) and firms from the services industry (42%) (Bodnar et al., 1998).

Derivatives usage in Japan is strikingly similar to that of the US. In Germany, New Zealand, Sweden and the Netherlands a relatively higher proportion of the firms use derivatives, which again is positively related to size. For example, in Germany 78% of the firms used derivatives (compared to 57% in the US after correction for size). A possible explanation is that since the economies of these countries are more open compared to the US, firms in these countries also face larger exposures to financial price risks.

Contrary to the US, firms in primary product markets are not the most frequent derivative users in Germany, Sweden, New Zealand and the Netherlands.15

Among the firms that did not use derivatives, most firms in the US mentioned that their exposure was not large enough or - to a lesser extent - that the costs of using derivatives exceeded the benefits (e.g Bodnar, Hayt and Marston, 1998). Other reasons for not using derivatives that were frequently mentioned are that exposures could be effectively managed by other means, and concerns about the perception of derivatives usage. These reasons were confirmed in the study on Germany.

4.3.4 Objectives for corporate risk management

An especially important question we wish to answer is what the primary objective of risk management is. Table 4.3 summarizes the results. For the US, most firms mention managing cash flow volatility as their main objective for the use of derivatives in risk management, directly followed by managing volatility in accounting earnings. Managing balance sheet accounts and the market value of the firm are less frequently mentioned as the most important objective in risk management.16

If we examine studies outside the US, a remarkable international difference can be observed with respect to the objective of derivative usage. While managing cash flow volatility is the main purpose for the use of derivatives in the US and the Netherlands, in Germany and New Zealand the primary focus of most firms is on reducing the variability in accounting earnings (which was second in the US).17 In Germany, only for the very large companies (more than DM 10 billion) their main objective is to reduce cash flow variability.

15 In Japan the distribution of derivative usage across industries is different being higher among firms in construction (47%), than those in public utilities (44%), manufacturing (41%) and trade and services (34%). In the Netherlands, 61% of the firms in trade uses derivatives, while this figure equals 66% and 48% for those in the manufacturing and services industries, respectively.
16 Figures for 1998 are not available.
17 Figures for Japan and Sweden are not available.
Another difference is that in Germany a relatively larger fraction of the firms (7%) uses derivatives primarily to reduce the variability in balance sheet accounts (compared to 0.9% of the comparable group in the US). These results suggest that in Germany managing volatility in accounting figures is more important while in the US managing cash flow volatility takes precedence.

What is the firm’s philosophy towards their derivatives portfolio? Do they take a portfolio approach or do they view their derivatives position as transactions linked to specific corporate exposures? The latter seems the case. In Bodnar et al. (1996), 67% of the respondents see them as individual transactions linked to specific corporate exposures, 18% see them as a portfolio linked to an aggregate exposure and 15% viewed the positions as a stand-alone portfolio for some purposes and as individual transactions for others. None of the respondents viewed the derivatives as solely a stand-alone portfolio.

### Table 4.3. Main objective of derivatives usage. Percentage of firms that indicate managing cash flow volatility, volatility in accounting earnings, balance sheet accounts, or volatility in market value as the main objective of risk management.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Cash flows</th>
<th>Acc. earnings</th>
<th>Balance Sheet</th>
<th>Firm value</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHMS (1995)</td>
<td>67%</td>
<td>28%</td>
<td>5%</td>
<td>-</td>
<td>US</td>
</tr>
<tr>
<td>BHM (1996)</td>
<td>49%</td>
<td>42%</td>
<td>1%</td>
<td>8%</td>
<td>US</td>
</tr>
<tr>
<td>BHM (1998)</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>US</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>34%</td>
<td>55%</td>
<td>7%</td>
<td>12%</td>
<td>Germany</td>
</tr>
<tr>
<td>YI (1996)</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>Japan</td>
</tr>
<tr>
<td>BBM (1997)</td>
<td>28%</td>
<td>62%</td>
<td>-</td>
<td>10%</td>
<td>New Zealand</td>
</tr>
<tr>
<td>AH (1999)</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>Sweden</td>
</tr>
<tr>
<td>JMN (2000)</td>
<td>60%</td>
<td>33%</td>
<td>7%</td>
<td>na</td>
<td>Netherlands</td>
</tr>
</tbody>
</table>

4.3.5 In which area do firms use derivatives (and how do they use them)?

With respect to the areas of use, all surveys find that firms primarily use foreign exchange derivatives, directly followed by interest rate instruments (see Table 4.4). For example, in the 1998 US survey, derivatives were used by 83% of the firms in foreign exchange risk management, 76% for interest rate risk management, 56% for commodity price risk management, and 34% for equity price risk management. In the other countries, the same pattern is observed but

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18This question was asked in the context of the control and performance measurement of derivatives usage.

19More or less the same pattern emerged from the Bodnar et al. (1998) study for the US.
4.3 Surveys on the corporate use of derivatives

<table>
<thead>
<tr>
<th>Authors</th>
<th>Forex</th>
<th>Interest</th>
<th>Commodity</th>
<th>Equity</th>
<th>Country</th>
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<tbody>
<tr>
<td>BMSH (1995)</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>US</td>
</tr>
<tr>
<td>BMH (1996)</td>
<td>76%</td>
<td>73%</td>
<td>37%</td>
<td>12%</td>
<td>US</td>
</tr>
<tr>
<td>BMH (1998)</td>
<td>83%</td>
<td>76%</td>
<td>56%</td>
<td>34%</td>
<td>US</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>96%</td>
<td>89%</td>
<td>40%</td>
<td>n.a.</td>
<td>Germany</td>
</tr>
<tr>
<td>YI (1996)</td>
<td>85%</td>
<td>80%</td>
<td>5%</td>
<td>5%</td>
<td>Japan</td>
</tr>
<tr>
<td>BBM (1997)</td>
<td>na</td>
<td>na</td>
<td>7%</td>
<td>na</td>
<td>New Zealand</td>
</tr>
<tr>
<td>AH (1999)</td>
<td>93%</td>
<td>50%</td>
<td>12%</td>
<td>na</td>
<td>Sweden</td>
</tr>
<tr>
<td>JMN (2000)</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>Netherlands</td>
</tr>
</tbody>
</table>

TABLE 4.4. Area of derivatives use. Percentage of firms that use derivatives in foreign exchange risk management, interest rate, commodity price or equity price risk.

derivatives were used to a much lesser extent for the management of commodities and equity price risk.20 21

In the following subsections, we will discuss more specific details about how firms use derivatives in these areas.

Managing Foreign Exchange Risk

How do firms use derivatives in foreign exchange risk management? Table 4.522 shows that firms use derivatives in foreign exchange primarily to hedge contractual commitments (I) and

20 It is not completely clear whether this follows from a different questionnaire. In Bodnar et al. (1995, 1996 and 1998) it was specifically asked whether firms manage the exposure from foreign exchange risk and what type of instruments were being used. In the Japanese study it was only asked which instruments were being used and from this it was established how many firms manage a certain type of risk.

21 For the US firms, Bodnar et al. (1998) also explicitly ask about options usage by non-financials. It appears that 68% of the firms using derivatives also use options. Moreover, they are primarily being used in foreign exchange (44%). To a lesser extent they are being used in interest rate risk management and commodity price risk management (both 28%). Standard European and American style options are dominant (respectively 42% and 38% of the firms use them). But also option combinations (like collars and straddles) are being used by 25% of the firms. Of the so-called exotics, the use of average rate options is most popular; 19% of the firms indicated that they used an average rate option during the last 12 months. Moreover, it appears that options usage is increasing in size. Of the large firms in the sample 78% indicated to have used options in the last year. For medium sized and small firms this was 58% and 47%, respectively. Options usage is highest for firms in manufacturing, followed by primary product and services firms.

22 The definitions that the authors use do not always fully correspond with the labels that we gave them. Bodnar et al. (1998) used on balance sheet commitments as a category rather than contractual commitments. De Jong et al. (2000) use a seventh category, existing contractual obligations off balance
4. An evaluation of the state-of-the-art of corporate risk management

<table>
<thead>
<tr>
<th>Authors</th>
<th>What do firms hedge?</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMHS (1995)</td>
<td>45(35) 46(31) 15(35) 25(20) 22(22) 16(24)</td>
<td>US</td>
</tr>
<tr>
<td>BMH (1996)</td>
<td>49(42) 50(41) 11(43) 34(38) 14(14) 8(16)</td>
<td>US</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>77(16) 28(41) 6(40) 38(37) 5(10) 9(14)</td>
<td>Germany</td>
</tr>
<tr>
<td>YI (1996)</td>
<td>na na na na na na</td>
<td>Japan</td>
</tr>
<tr>
<td>BBM (1997)</td>
<td>61(19) 71(12) 19(29) na na na</td>
<td>New Zealand</td>
</tr>
<tr>
<td>AH (1999)</td>
<td>55(26) 67(18) 18(41) 23(23) 54(17) na</td>
<td>Sweden</td>
</tr>
<tr>
<td>JMN (2000)</td>
<td>67(23) 8(40) 54(37) 41(44) 8(10) 8(36)</td>
<td>Netherlands</td>
</tr>
</tbody>
</table>

TABLE 4.5. How do firms use derivatives in foreign exchange risk management? Percentage of firms indicating that they use derivatives frequently (sometimes) for: I contractual commitments, II anticipated transactions within one year, III anticipated transactions beyond one year, IV foreign repatriations, V translation of foreign currency statements, and VI competitive and economic exposure.

anticipated transactions expected within the next year (II). Slightly less often, but still quite frequently, firms use derivatives to hedge foreign repatriations (IV), anticipated transactions beyond one year (III), and to hedge the translation of foreign currency statements (V). Finally, hedging the competitive/economic exposure (VI) is the least frequently cited area for the use of derivatives (although this seems to have increased over time if one compares Bodnar et al. (1998) with Bodnar et al. (1995, 1996).23 It is clear that the firm’s primary focus is on short term exposures, related to (anticipated) transactions.

Studies from countries other than the US confirm these results with respect to the use of foreign exchange derivatives.24 All studies find that derivatives are primarily used to hedge contractual commitments (on balance), directly followed by anticipated transactions within one year, foreign repatriations, and anticipated transactions longer than one year. Still, a considerable number of corporations use derivatives to hedge competitive exposures and the translation and find that 40 (46)% of firms frequently (sometimes) use derivatives for this purpose. Bodnar and Gebhardt (1998) use accounts receivables/payables and pending commitments.

23In Bodnar et al. (1998) the questions were slightly rephrased. The overall picture on how firms use derivatives to manage foreign exchange however remained the same. With respect to contractual commitments, Bodnar et al. (1998) found that firms used derivatives more to hedge on balance sheet commitments (54% of the firms used them frequently and 35% sometimes) than off balance sheet commitments (24% frequently and 40% sometimes). In addition, they found that derivatives were also regularly being used to arbitrage borrowing rates among countries (5% frequently and 35% sometimes).

24Some studies took a different approach to this question (e.g. the Japanese study did not ask specifically for foreign exchange risk while the study on New Zealand also phrased the question slightly differently).
of foreign accounts. Although there is some variation in the numbers, the magnitude of importance among these reasons is strikingly similar, especially given the differences in the goals of such risk management (see Subsection 4.2.4).

There are, however, two remarkable international differences in the way firms manage their foreign exchange exposures. First, it is remarkable that German firms use derivatives to a lesser extent to hedge translation exposure (5.4% frequently and 9.8% sometimes) than US firms (15.3% frequently and 14.1% sometimes). In our opinion, this is remarkable since a larger proportion of German firms claimed to emphasize accounting figures as the objective of corporate risk management than in the US (see Section 4.3.4).

A second remarkable difference is the prevalence of hedging the balance sheet by Swedish firms where the practice is more common than in any of the other countries. Alkeback and Hagelin (1999) explain this from the higher interest rates in Sweden that caused the Swedish Krone to trade at a discount. An alternative explanation is that Swedish firms at the time of the survey may very well have been much closer to a violation of debt covenants. At the time of the survey Swedish firms had a relatively high leverage (Alkeback and Hagelin, 1999, p. 106).

What types of derivatives do firms use for foreign exchange risk management? The most dominant instrument is the forward contract. Bodnar et al. (1996) find that more than 75% of the US firms use this as either their first, second or third choice. OTC options rank second with over 50%, followed by swaps and futures. This general pattern is found for Germany, Japan and New Zealand. In Sweden futures contracts are remarkably popular; 45% of the firms use futures contracts while another 45% use forwards in the area of foreign exchange. Alkeback and Hagelin (1999, p. 112) do not find any institutional or economic explanation for this pattern.

It appears that in no other country exchange traded instruments are so popular as in Sweden.

Bodnar et al. (1996) for the US and Bodnar and Gebhardt (1998) for Germany also asked firms to indicate what the most important instrument is to hedge different types of exposure. Bodnar et al. (1996) find that with respect to contractual exposure, 86% of the firms use forwards or futures, while only 7% use options. For the anticipated transactions within one year, forwards

25 The patterns with respect to the way firms use derivatives in hedging in New Zealand are strikingly similar to that in the US. Firms in New Zealand only use derivatives relatively more frequently to reduce funding costs (69% compared to 43% for the US from the Bodnar et al., 1995 study).

26 See Bodnar and Gebhardt (1998).

27 Although options, futures and swaps were used considerably more in the US than in Germany, in Japan currency options and swaps were used significantly less than in the US. The survey in Japan did not include currency futures. For New Zealand the numbers were more comparable to the US except for the use of futures, which was considerably less.

28 Also, in the other areas of derivatives usage Alkeback and Hagelin (1999, p. 112) find relatively high overall usage of exchange traded derivatives, but do not find any institutional or economic explanation for this pattern.
An evaluation of the state-of-the-art of corporate risk management

<table>
<thead>
<tr>
<th>Exposure category</th>
<th>Average % of exposure hedged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BHM</td>
</tr>
<tr>
<td>On Balance sheet commitments</td>
<td>49%</td>
</tr>
<tr>
<td>Off Balance sheet commitments</td>
<td>23%</td>
</tr>
<tr>
<td>Anticipated transactions &lt; 1 yr.</td>
<td>42%</td>
</tr>
<tr>
<td>Anticipated transactions &gt; 1 yr.</td>
<td>16%</td>
</tr>
<tr>
<td>Economic/Competitive exposures.</td>
<td>7%</td>
</tr>
<tr>
<td>Translation of foreign accounts</td>
<td>12%</td>
</tr>
<tr>
<td>Repatriations</td>
<td>40%</td>
</tr>
</tbody>
</table>

TABLE 4.6. Percentage of foreign currency exposures hedged.

and futures still were the dominant instrument (66% compared to 30% using options). However, for anticipated transactions over a year and hedging competitive exposure, the majority of firms use options (51% and 67%, respectively) rather than forwards or futures (43% and 24%). For translation exposure, forwards and futures are again the dominant instrument (48% compared to 34% that use options for this exposure). This suggests that options are being used for more distant and perhaps more uncertain exposures.

This pattern is not observed in Germany. Bodnar and Gebhardt (1998) find that although forwards were the most dominant instrument for hedging contractual commitments, German firms tend to use more options to hedge this exposure than US firms. Moreover, the use of options is not increasing for longer term exposures (e.g. anticipated exposures greater than one year) or exposures that are harder to hedge (competitive exposures).²⁹

With respect to hedging intensity, Bodnar et al. (1998) and De Jong, Macrae and Nijman (2000) provide some interesting figures. It appears that most firms tend to hedge only part of their exposures. Table 4.6. gives the average percentage of exposure that firms hedge. From these studies, however, it appears that there is quite some variation in the hedge ratios. For example, the study on US firms by Bodnar et al. (1998) finds for on balance sheet commitments that 40% of the firms hedge between 0 and 25% of their exposure, while 35% choose to hedge between 75 and 100% of their on balance commitments. Also for anticipated transactions and repatriations there is quite some mass in both tails of the distribution. All other exposures are heavily skewed to the left (lower hedge ratios).³⁰

Another interesting issue is the maturity of derivatives contracts. Bodnar et al. (1996, 1998) find for the US that a large proportion is concentrated in short-term derivatives. For example, in Bodnar et al. (1996) 84% of the firms used derivatives with a maturity shorter than 90 days. Of these firms 53% hold only short-term (less than 180 days before the end of the fiscal year).

²⁹The other surveys did not cover this issue in their questionnaire.
³⁰The results of De Jong, Macrae and Nijman (2000) are in-line with these observations.
derivatives. On the other hand, for 16% of the firms more than half of the currency derivatives used have a maturity over one year. In 1998 this latter percentage dropped considerably and consisted only of large firms.

In conclusion, firms focus their foreign exchange risk management primarily on short-term exposures related to (contractual) transactions. The most popular instrument is the forward contract followed by OTC options (except for Sweden). Firms tend to hedge only part of their exposure with quite some variation in the hedge ratio. Finally, firms use predominantly short-term instruments.

Managing Interest Rate Risk

How do firms manage interest rate risks? Below we will present some evidence on the types of instruments that firms use and the types of exposure they focus upon.

In the area of interest rate risk the most dominant instrument used by firms is the interest rate swap. For the US, Bodnar et al. (1996) found that 95% ranked this as one of their top three choices (with 78% reporting it as first choice). Structured derivatives, OTC options, and futures are ranked among the top three choices by more than 20% of the firms. Swaps were also most popular in the German and New Zealand samples, however, OTC forwards were second there.\(^31\) Furthermore, the results were more or less comparable to the US. In Sweden, swaps are most popular followed by futures, forwards and options.

The main motive for using interest rate derivatives is to swap from a floating to a fixed interest rate (by 83% of the firms), followed by a swap from a fixed to floating interest rate (69% of firms). Another 58% of firms use derivatives to fix a spread on new debt. Finally, 60% of derivative users in this area use them to lock in a rate for future financing based on the firm's view on the market.\(^32\)

In the context of German firms, the results with respect to the first three motivations are largely similar. However, German firms appear to use derivatives relatively more intensively to lock in future borrowing rates. Over 85% sometimes (65.5%) or frequently (20.2%) use derivatives for this purpose, where, as for the comparable US group this was only 50%.

Managing Commodity and Equity Price Risk

The third and fourth major area where derivatives are being used are in commodity and equity price risk, respectively. Below we will present some additional information about the way firms manage these risks. Information on the management of commodity and equity price risk is

\(^{31}\) Although there are some charts in the paper on this question, we could not find the exact percentages of firms using the financial instruments in New Zealand and for the US in Bodnar et al. (1995).

\(^{32}\) These figures are from Bodnar et al. (1996) but are confirmed in the survey of Bodnar et al. (1998). Although the latter survey shows that more firms entered into floating to fixed swaps (96%).
relatively scarce; only Bodnar et al. (1996) and Bodnar and Gebhardt (1998) report on these topics.

Commodity price risk in the US is managed by 37% (Bodnar et al. 1996) of derivatives users. Futures, directly followed by swaps and forwards, and to a slightly lesser extent OTC options, are the main instruments being used in this area. In Germany, the overall usage of commodity derivatives is less frequent. Furthermore, it appears that German firms prefer forwards over futures, which is in contrast with the US survey evidence. Further results are, however, consistent with the US results; German firms prefer futures over swaps, followed by forwards and options.

Equity price risk is managed by only 12% of the US firms (Bodnar et al., 1996). The dominant instruments here are OTC options (over 50% of the respondents indicated that they use options as their first, second, or third choice), followed by exchange-traded options and structured derivatives. Firms express a high degree of interest in using equity puts in a share repurchase program (44%). Use of these instruments in pension or fund management is ranked second (Bodnar et al., 1996, p. 24). Hedging equity acquired in acquisitions is third. Monetizing an existing equity option position and managing tax or accounting implications of an existing equity position receive a high degree of interest by another 16% (Bodnar et al., 1996).

4.3.6 The impact of market view

A very remarkable finding is that firms' use of derivatives is affected by the market view quite considerably (see Table 4.6). Both in foreign exchange risk management and in interest rate risk management, a majority of the firms alter the timing and the size of their hedge at least sometimes because of their market view. At least a third of these firms sometimes even take active positions based on their view of the market.

German firms, appear to alter the timing and size of a hedge more frequently and also more frequently take a position for these reasons than their US counterparts. For example, in the US only 6% of the firms frequently take active positions in foreign currency derivatives, while in Germany this percentage is 13.5%. German firms also alter the size of their hedge or the timing of their hedge much more frequently (20% versus 10% for the comparable US sample). Although market view has a profound impact on the firm's risk management decisions, 44% of the firms from the US report that they do not have a benchmark for evaluating their foreign

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33Bodnar et al. (1998) do not report any further details on either commodity price or equity price risk.
34Other research papers did not report further details on the use of derivatives in managing equity price risk.
35For the Swedish sample, Alkeback et al. (1999, p. 114) finds that 17% of the firms entered into derivatives frequently to speculate, while 15% of the firms indicated that they frequently used derivatives to arbitrage. These firms were all large firms.
4.3 Surveys on the corporate use of derivatives

<table>
<thead>
<tr>
<th>Authors</th>
<th>Impact of market view</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Timing</td>
<td>Size</td>
</tr>
<tr>
<td><strong>Forex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHM (1996)</td>
<td>11(61)</td>
<td>12(48)</td>
</tr>
<tr>
<td>BHM (1998)</td>
<td>10(49)</td>
<td>10(51)</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>24(65)</td>
<td>25(60)</td>
</tr>
<tr>
<td>JMN (2000)</td>
<td>4(47)</td>
<td>7(38)</td>
</tr>
<tr>
<td><strong>Interest rates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHM (1996)</td>
<td>8(64)</td>
<td>4(53)</td>
</tr>
<tr>
<td>BHM (1998)</td>
<td>6(60)</td>
<td>5(54)</td>
</tr>
<tr>
<td>BG (1998)</td>
<td>23(68)</td>
<td>18(72)</td>
</tr>
</tbody>
</table>

TABLE 4.7. Impact of market view on risk management decisions in forex and interest rate risk management. Percentage of firms that indicated that a view on the market frequently (sometimes) had an impact on the timing, size of the hedge contract or on position taking.

currency risk management (Bodnar et al., 1998). Also, in interest rate risk management almost half (47%) of the sample in the US has no benchmark.

The suggestion that firms often use derivatives for speculative objectives is moreover confirmed in the response to questions concerning their overall philosophy towards risk management. Firms were asked to identify one out of four statements that best described their philosophy about risk management. The first choice in Bodnar et al. (1998) and De Jong et al. (2000) was reducing volatility relative to a benchmark, chosen by 40% and 15%, respectively. The second most frequent response was increasing profits relative to a benchmark, chosen by 22% and 13% of the US and Dutch firms respectively, 21% of firms from both countries choose a risk adjusted performance and 18% (23%) choose to be evaluated on their absolute profits and losses. It is remarkable that 40% (36%) choose a profit-based approach to evaluate their risk management task.

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36 Of the firms that use a benchmark, 42% of the firms use the beginning of period forward rates, 24% use the beginning of the period spot rates and 17% of the firms indicate that they use some baseline percent hedging strategy (for example, 50% hedge strategy is the baseline). Another 17% indicate using another benchmark (for example, comparison against an average of rates over the period).

37 Of the firms that do have a benchmark, 45% choose to concentrate on the realized costs of funds relative to a market index, 38% use realized costs of funds relative to a fixed/floating mix, 21% choose the volatility of interest expenses relative to a specific portfolio, 16% choose realized costs of funds relative to a duration portfolio, and 12% use some other benchmark (e.g. benchmarking against the competitor’s cost of funds).

38 In the Netherlands, 33% of the firms do not evaluate the performance of risk management. Another 4% use an alternative approach not listed.
4. An evaluation of the state-of-the-art of corporate risk management

4.3.7 Accounting guidelines and risk management

Do accounting rules have an impact on the firm's risk management? Bodnar et al. (1996) find for the US that accounting rules for 57% of the firms using derivatives induce them to hedge a smaller percentage of the exposure. 43% responded that the current accounting rules have no impact on the firm's current hedging activities. 70% of the firms indicate that the accounting rules caused the firm to forgo certain derivatives that would otherwise be useful. Another 3% indicate that accounting rules affected the timing of the hedge. This seems to suggest that accounting rules in the US do have an effect on hedging practices.

In the US, new accounting standards (SFAS 119) were proposed and issued. Bodnar et al. (1996) asked what caused a major concern about the then still highly debated accounting procedures. It seems that uncertainty about qualifying for hedge accounting is the area which causes the most degree of concern.

4.3.8 Main findings and confrontation

We have given some detailed survey information on the day-to-day practice of corporate risk management. In this subsection we will confront these observations with our earlier findings.

The use of derivatives in corporate risk management is substantial and increases with firm size. Larger firms are more likely to use (more complex) derivatives compared to smaller firms. But the extent to which derivatives are used decreases with size; larger firms use relatively fewer derivatives than smaller firms.\(^39\) Furthermore, there is some evidence that the growth of derivatives usage is strongest for smaller firms.\(^40\) This suggests that the barriers for using these instruments have become lower. This is important since theory suggests the benefits for using derivatives are largest for smaller firms.\(^41\)

Corporations use derivatives primarily to reduce the volatility of their cash flows or the volatility in accounting earnings. Other reasons (like hedging the market value of the firm) receive considerably less attention. This is in line with the findings in Chapters 2 and 3. To reduce financial contracting costs (including the agency costs of debt) firms should focus on the volatility (or on the downside risk) of cash flows. Managerial and tax reasons may induce firms to focus more on accounting earnings, especially if compensation is linked to these earnings.

Firms primarily use foreign exchange derivatives, directly followed by interest rate derivatives. Commodity price derivatives and equity price derivatives are less common, especially

\(^39\) Especially after correction for exposure.

\(^40\) The most important reason for firms to not use derivatives is either that the firm has only a small (or no) exposure or that the firm has other means to reduce its exposure.

\(^41\) Because smaller firms are generally more financially constrained, have higher volatility in operating cash flows, face larger contracting costs, etc.
outside the US. The theoretical literature has little to say about the types of financial risk a firm should engage. A likely explanation for this observation is that, on average, foreign exchange exposures are larger than interest rate or other exposures for non-financial corporations. An alternative explanation is that foreign exchange and markets for interest rate derivatives have much higher liquidity.

In the area of foreign exchange risk management the primary focus is on hedging contractual commitments, directly followed by anticipated transactions within the coming year. Repatriations of foreign dividends and anticipated transactions beyond 12 months are also hedged by quite a number of firms. Over-the-counter forwards is the most dominant financial instrument, especially with respect to the hedging of contractual commitments. Hedging concentrates on the short maturity instruments. In interest rate risk management firms primarily use swaps.

It is not clear why firms tend to focus on short-term (transaction) exposures. Again, the theoretical literature has little to say about this issue. A potential explanation is that hedging concentrates on exposures that are relatively certain. Hedging uncertain exposures may even increase risk. Alternatively, the costs of hedging instruments with a longer maturity may force firms to enter into relatively short-term transactions. We observe that the liquidity of derivatives markets decreases considerably with the maturity and therefore the costs of longer term instruments contain a large liquidity premium that makes hedging longer term exposures relatively expensive. The finding that firms only hedge part of their exposures is not inconsistent with theory. In Chapter 2 we concluded that firms do not necessarily have to hedge completely in order to obtain the full benefits of a risk management program. Note that Tufano (1996) found large variations in the amount of hedging between firms in the same (gold mining) industry. Also, studies discussed in this chapter (see Table 4.6) suggest that there is a wide variety of hedging strategies. Part of this variation in hedging strategies among firms may be explained by alternative opportunities that firms have to substitute for financial risk management. A good example from the goldmining industry has been discussed in Section 3.7.3.

In that respect it is remarkable that firms tend to manage risk by risk rather than that they take a portfolio approach in risk management. If firms really want to reduce for example cash flow volatility such a more integrated approach seems the most optimal strategy.

Perhaps the most striking result is that non-financial firms use their views on the market in formulating their risk management decisions. This affects both the timing and size of the hedge and even induces firms to take active positions in both foreign exchange and interest rate risk.

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42 Firms may use rollover hedges in short-term maturity instruments to overcome this problem. However, there are two problems to such a risk management strategy: basis risk and it generally requires sufficient funding.

43 However, this could partly be explained by the finding that firms use alternatives to financial derivatives in order to reduce risk.
Despite all evidence, that it is almost impossible to consistently outperform the market, corporate managers cannot resist the temptation to follow their own opinion even if they lack comparative advantage with respect to information. This furthermore contradicts many of the firms’ primary objectives of the use of derivatives (reducing cash flow or accounting earnings volatility). This is worrisome if we consider the way firms measure their performance or report on their use of derivatives. For example, in the US, only half of the firms use some benchmark to measure the performance of these activities and report on a regular basis to the board of directors about derivatives activity. Moreover, almost a quarter of all firms in the US sample that use derivatives indicate that they evaluate the risk management function based upon increased profitability relative to an index, while almost one fifth of the firms evaluate based on absolute profits or losses. This suggests that the perception of day-to-day risk management leans more towards making money than is apparent from the responses to questions on risk management. The response to the latter question by the overwhelming majority of the firms was to reduce cash flow or earnings volatility. Theories of corporate risk management do not explain this.

Another important finding that we would like to stress is that accounting guidelines seem to have an important impact on the firm’s risk management. Although some explanations in the theoretical literature explicitly stress the importance of accounting guidelines (see for example DeMarzo and Duffie, 1995), we feel that this topic deserves more attention in the literature.

Insights from international comparisons

An international comparison of risk management practices has shown that the more open an economy is, the more firms tend to use derivatives. This is in line with the fact that an important determinant of the firm’s use of derivatives is exposure. International differences have further been found with respect to the objective of risk management. While in the US and the Netherlands, reducing the volatility of cash flows is most important, firms in Sweden, Germany and New Zealand primarily focus on reducing volatility in accounting earnings.

Explanations for these observed differences are incomplete. First of all, they may be related to taxes. For example in Germany, unlike many other countries such as the Netherlands and the US, the accounting income statement is also used as the basis for tax calculations. This may force firms in Germany to focus more on accounting earnings. A second possible explanation is the way in which management compensation contracts are designed. For example, because

44 In addition, Graham and Harvey (2000, p. 14-15) find in a survey of 392 US CFO’s that executives attempt to time the market while issuing debt (especially for large firms).

45 Differences in results may also be due to the timing of the studies rather than (or in addition to) international differences. Hence, we should be careful not to overemphasize these as purely international differences.
in Germany management compensation more often takes the form of earnings related bonuses while in the US stock options are more important, this may explain why German firms tend to hedge more accounting earnings. Finally, differences in funding opportunities may cause international differences in risk management.

Despite these international differences in objectives, the practice of corporate risk management is not too different across countries. More surprisingly, international differences in these practices appear to be unrelated to differences in objectives.

Some differences have been found with respect to the use of forwards versus futures and the purpose of the use of options. In the area of foreign exchange it is found that German firms less frequently hedge translation exposure than US firms. Swedish firms however are more likely to hedge the balance sheet than of all the countries considered. There has been a considerable debate whether management of accounting exposures adds to the value of the firm. The consensus is that hedging such exposure is relevant only if a firm is close to violating of (solvency related) debt covenants. Hedging that prevents the violation of such contracts adds to the value of the firms, since it otherwise may lead to a serious disturbance of the firms’ real activities. However, the type of financing is also important; firms in countries where bank finance is important (like Germany) may have less problems renegotiating around covenants. Conversely, firms in countries where market finance is prevalent cannot as easily renegotiate around covenants. As a result we may expect US firms to hedge their accounting exposures more often. This leaves the case for Sweden unexplained; financial markets do not play a key role in firm funding. Swedish firms furthermore use exchange traded instruments more frequently than in any other country. German firms, on the other hand, tend to use more options for hedging contractual commitments than do US firms. We have no explanation for these observations.

In the area of interest rate risk management, some interesting differences have been found. In the US and Sweden, interest rate futures are more popular than OTC instruments while in Germany and New Zealand the reverse is the case. German firms furthermore use interest rate derivatives more often to lock in an interest rate on future borrowing compared to firms from other countries. Finally, German firms tend to alter the timing and size of hedges more often than US firms, based on their view of the market. This phenomenon increases with size, whereas in the US risk taking is sometimes larger in the small size groups.

In the area of commodity and equity price risk management, we observe that outside the US, derivatives are being used by a lower percentage of firms. We however think that the use of equity derivatives in Europe will rapidly increase either as an instrument to hedge share repurchase transactions (the number of share buy-backs has increased in Europe following the trend in the US) or as a solution to specific risk management problems. Most of these transactions were initiated by US investment bankers. One may expect that this trend will also be followed in Europe.
Some of these international differences might very well be due to the development of specific derivatives markets in particular countries. However, despite the differences across countries in the objective of financial risk management, international differences in the way firms actually manage financial risks do not seem to be very important. Future empirical research will shed more light on this issue.

Insights from intertemporal comparisons

Although one would expect important changes in corporate risk management over time, it is very hard to draw conclusions on intertemporal developments based on the surveys we have discussed in this section. Except for the US, surveys on derivatives usage have been done only once for each country. Even for the US, respondent behavior is so erratic across the different studies that it is very hard to draw strong conclusions with respect to developments over time. Only in terms of the percentage of firms that use derivatives is there some evidence suggesting a time trend. Among the firms in the US sample derivatives usage over time, however, was strikingly similar.

An interesting avenue for future research might be to follow a sample of firms over several years in order to get a better perspective on developments in the use of derivatives over time.

4.4 Puzzles in the literature; towards a research agenda

In this section we address what in our opinion are the main shortcomings in the finance literature on the rationalizations of corporate risk management.

4.4.1 Why do firms use a view on the market in risk management?

This is probably the most intriguing question of all. Despite all the evidence about the inefficiency and unpredictability of financial market prices such as exchange rates, interest rates and commodity prices, treasurers use their views on the market to guide their risk management decisions. Why do they do this? Is there an explanation for this behavior?

First, we should stress that in some areas where firms have a comparative (information) advantage acting on a market view seems perfectly rational. Hence, gold mining firms or oil producers may want to speculate if they are convinced that they have such a comparative information advantage. However, it is very unlikely that non-financial firms have such an information advantage.

46 There is an emerging literature that focuses on the design of financial markets. For example, Allen and Gale (1994) surveys some of the theoretical literature that explains the emergence of financial (derivatives) markets and innovations.

47 For example, these firms may have information with respect to the size of reserves that they can exploit.
advantage about exchange rates or interest rates. In the absence of such an advantage, we would not expect them to systematically outperform the market and therefore see no rationale why a firm should trade on its view of the market.

The current literature cannot explain why firms tend to act on their views. This phenomenon may simply imply that corporate treasurers do not believe in the unpredictability of financial market prices. However, the overwhelming evidence of unpredictable market prices implies that they act irrationally, unless there is another explanation.\(^{48}\) We think that the most obvious explanation of such behavior is managerial in nature.

Consider the managerial explanations explored in Section 2.4. Characteristic of this literature (although very disperse) is that it studies the relationships between one insider (a manager) versus outsiders (shareholders, the labor market etc.). Although this has improved our understanding considerably, it fails in one important area in that opportunistic behavior within the group of insiders cannot be explained. We think that models that allow for such opportunistic behavior within a group of insiders may generate additional insight relevant for corporate risk management.

Corporate treasuries often consist of a small group of professionals that are relatively high in the organizational hierarchy. One potential explanation why managers from time to time act on their views of the market is that they may have an incentive to excel in their work. Career considerations may drive treasurers to try to outperform the market in order to stand out. If corporate promotions are the outcome of a "tournament", then this may provide treasurers with incentives to take risks in order to get promoted.\(^{49}\) Perhaps, models that take this into account, can further enhance our understanding of such behavior.

An alternative rationalization is linked to potential herding behavior. Managers whose performance is evaluated relative to peers in the industry may have an incentive to herd.\(^{50}\) However, the risk management decisions of other firms are not observable and therefore the view of the market may be the mechanism that coordinates the actions of treasurers of different companies who follow market analysts in a more or less predictable way. These are potentially interesting avenues for future research.

### 4.4.2 Risk management and accounting

As argued in the introduction and in Section 4.3.7, risk management (especially the choice among financial instruments) is affected by accounting principles. Qualification for hedge ac-

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\(^{48}\)An explanation sometimes heard in practice is that trading based on a view at the market makes the treasurer's job less mechanical and therefore more interesting. However, we think that this underestimates the challenges and importance of the treasurer's job.

\(^{49}\)Stulz (1996) also suggests that an explanation along this line is likely.

\(^{50}\)Other reasons for such herding behavior may follow from strategic product market interaction.
counting seems to be important to prevent fluctuations in net income. This concern suggests a link with the literature on corporate earnings smoothing which has not been fully explored yet.\textsuperscript{51} We have also seen in Chapter 2 that managerial reasons to use derivatives are affected by the accounting principles that are in place. We therefore think that the interaction between risk management and accounting (in particular earnings smoothing) is a fruitful area for future research.\textsuperscript{52}

4.4.3 Risk management for small firms: what do we know?

An important field, that in our opinion, deserves more attention is the risk management of small firms. First, since hardly anything is known about this topic. Second, the scarce empirical evidence that we do have suggests that existing theories have little explanatory power. Third, we think that in the near future smaller firms will have more opportunities to increase the use of financial derivatives due to the increased liquidity of derivatives markets and an increased knowledge over time about these matters. This will make entry barriers much lower.

Existing theories suggest that financial derivatives may play an important role for small firms. Small firms are generally less profitable, have a more volatile operating income, and as a consequence, are severely financially constrained. Moreover, small firms have concentrated ownership; often there is no separation between managers and owners. As a result, owners have a considerable amount of wealth (both financially and in terms of human capital) invested in the firm, and therefore do not hold a diversified portfolio. While this prevents all kinds of agency problems well-known in widely held firms, it also leads to risk-averse behavior. Risk management is an interesting way for managers/owners to sell that part of the risk over which they do not exercise control or have a comparative advantage in carrying. An important benefit then is that corporate risk management enables much more concentrated ownership structures.

Another line of thought is that for small firms long term relationships (with banks, clients in product markets, personnel, etc.) become more important. Crucial in such relationships is the financial health and stability over time. Risk management may play an important role here. For example, in order to become a subcontractor the firm needs to satisfy certain standards, one of which is financial stability. Therefore, small firms benefit from risk management on this front as well.

It is interesting to develop and test more specific hypotheses with respect to the risk management decisions of smaller firms.

\textsuperscript{51}See for example Goel and Thakor (2000) for a recent contribution in this area.
\textsuperscript{52}See also Duffhues (2000) for an interesting discussion.
4.4.4 Interaction among different forms of risk management.

In this section, we have explicitly focused on the use of derivatives as a form of corporate risk management. However, there are many other forms of risk management of which we hardly know anything about. For example, our knowledge on the costs and benefits of operational hedging is very limited. Also we have little knowledge with regard to the interaction between financial and operational hedging. With respect to the costs and benefits of the corporate purchase of insurance and diversification strategies there is some literature. However, we still lack insights as how these different forms of corporate risk management interact. An important area for future research therefore is to gain more insights in the benefits and costs of these alternative types of risk management and how they interact. Empirically, it would be most interesting to analyze whether they are complements or substitutes to each other.

4.4.5 How does risk management interact with the firm's securities.

In Section 4.2.2, we have stressed that risk management performs an important role; it enables to fine-tune the firm's financing decisions. The corporate finance literature has emphasized information frictions and market imperfections to explain risk management and financing decisions. The benefit of risk management to a large extent lies in structuring the most optimal (efficient) firm behavior. This is good for the firm's investors by increasing the cash flows that accrue to them. However, we feel that this approach is also restrictive. We think that the interaction between (opportunities to engage in) risk management and the design of a firm's securities goes much further. However, this requires a framework where there are frictions in trading securities which may cause markets to become incomplete and therefore also explain the demand for different types of securities.

There is some evidence that investors (shareholders) do care about changes in the firm's risk profile. For example, in Petersen and Thiagarajan (1997) firms in the gold mining industry referred to investor risk appetite as a reason (not) to hedge price risk of gold. More specifically, they argued that there was some clientele that wanted this exposure. However, this is not very well understood in finance; investors can take gold risk relatively easy by investing in gold futures. Why then do they want to be exposed via the firm's securities?

The demand side for the firm's securities has been neglected for a long time, as of recently has received considerable attention. What do investors see as the optimal structure of these claims and what is the role of risk management in this respect? Is it possible for firms to benefit by optimizing its claims along the risk preferences of investors? These are important future research questions, the answers to which may substantially increase our understanding of the potential benefits and the optimal way to transfer risks.

Firms furthermore often argue that they want to reduce their risk in order to reduce the amount of (expensive) equity. Risk management and equity are substitutes. However, the benefits of
such a transaction are not very well captured in a standard finance approach. If the risk reduction is with respect to diversifiable risks it will not affect the investors’ required rate of return and therefore is irrelevant to the firm’s shareholders. On the other hand, if it concerns non-diversifiable risks, finance theory suggests that such risk reduction can only occur at a price. Arbitrage will guarantee that the price of risk will be more or less the same (except for transaction and liquidity costs) for an investor or the firm. Hence, you pay for what you get and again it is unlikely that the shareholders benefit in the end.

Theoretically, it is interesting to study what happens if there is a market imperfection that hampers perfect risk sharing in financial markets. In incomplete financial markets, risk sharing may play an important role in shaping a firm’s securities towards the preferences of (groups of) investors. In Chapter 5 we explore the rationale for risk management via this demand-side approach.

4.4.6 The importance of product markets

Another important shortcoming in the literature on rationales of corporate risk management is that it neglects product markets. This is surprising for a variety of reasons. First, we have stressed that an important economic benefit of risk management is that it fine-tunes the firm’s financing decisions. But it is well known that product markets play an important role in a firm’s capital structure decisions (especially in the case of imperfect competition in the product market). If risk management is an important tool for fine-tuning the firm’s financing decisions we may also expect that it can play a role in the interaction between financing decisions and product markets and therefore that the risk management decision is also shaped by product market considerations. A second reason is that the impact of risk management on the firm’s competitiveness in the product market has been mentioned in several case studies and surveys. A closer examination of this impact on product market competitiveness may therefore bring additional insight concerning the economic benefits of corporate risk management.

A firm’s financial position (liquidity/financial slack) is an important determinant of its product market strategy. An aggressive product market strategy should not go hand in hand with

53Obviously, except for reasons discussed in Chapter 2. However, the standard-focus is on an increase in the expected cash flows of the firm.
54See for example Allen and Gale (1994).
55For example, Brown (2000) finds that one of the most important considerations in shaping the firm’s risk management strategy is what competitors are expected to do. Also, Belk and Glaum (1990) found that competitors’ hedging strategies are important determinants for shaping a firm’s own strategy. We will discuss more of this evidence in the motivations of Chapters 6 and 7.
an aggressive financing strategy. An interesting question is what risk management may add to this. How does risk management (together with financing decisions) help sharpen a firm’s strategic plan and therefore contribute to a firm’s value? How is this affected by the different types of competition a firm faces?

Moreover, an interesting question is to what extent the risk management strategies of a firm are affected by its competitors. Firms tend to disclose very little information on their risk management strategies because they consider such information to be highly sensitive (relevant to competitors); it may shape the optimal hedging strategy of their competitors. Is this true? We will explore the importance of product markets in risk management to answer these questions further in Chapters 6 and 7.

4.5 Concluding remarks

This chapter has revealed some important lessons. Firms generally act in accordance to what finance theory suggests as reasons to engage in corporate risk management. However, these theories are still partial and therefore incomplete. Nevertheless, we may conclude that finance theory offers some guidance to corporate risk management especially with respect to the decision to hedge, or not. We should at the same time conclude that for a further shaping of risk management the current theories are still preliminary and highly incomplete. In particular, we think that insights into the interaction between financing and risk management (together with the interaction with product markets) can be improved upon.

We have also identified some interesting puzzles that remain. Especially intriguing is why managers tend to act on their views on the market in formulating risk management decisions. Other interesting areas for future research include: the risk management decisions of small firms, the interaction among the various forms of corporate risk management and between corporate risk management and accounting.

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56 A very good example of this is the Massey-Ferguson Ltd. case (Harvard Business School case 282-043).