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# DERIVATIVES USAGE IN RISK MANAGEMENT BY U.S. AND GERMAN NON-FINANCIAL FIRMS: A COMPARITIVE SURVEY

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## ABSTRACT

This paper is a comparative study of the responses to the 1995 Wharton School survey of derivative usage among US non-financial firms and a 1997 companion survey on German non-financial firms. It is not a mere comparison of the results of both studies, but a comparative study, drawing a comparable subsample of firms from the US study to match the sample of German firms on both size and industry composition. We find that German firms are more likely to use derivatives than US firms, with 78% of German firms using derivatives compared to 57% of US firms. Aside from this higher overall usage, the general pattern of usage across industry and size groupings is comparable across the two countries. In both countries, foreign currency derivative usage is most common, followed closely by interest rate derivatives, with commodity derivatives a distant third. In contrast to the similarities, firms in the two countries differ notably on issues such as the primary goal of hedging, their choice of instruments, and the influence of their market view when taking derivative positions. These differences appear to be driven by the greater importance of financial accounting statements in Germany than the US and stricter German corporate policies of control over derivative activities within the firm.



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# I. Introduction

One undeniable characteristic of the past few decades is greater concern with the volatility in foreign exchange rates, interest rates, market prices for securities, and commodity prices than in previous decades. These fluctuations in financial prices can have significant effects on the fortunes of companies. For example, large scale changes in exchange rates have lead to dramatic changes in the competitive structure of markets that have caused companies to be nearly driven out of markets where they formerly held comfortable market shares. Well known examples are the US firms Caterpillar and Kodak or the experiences of the German car producers Volkswagen[1] and Porsche on the US market. Often times, management became aware of the importance of these price risks for the financial results of companies only after incurring significant losses.

Previously, shareholders and stakeholders accepted explanations that unfavorable and unforeseeable movements of prices not under the control of management resulted in poor financial results. Nowadays, they increasingly expect management to be able to identify and manage exposures to such market risks. The task of managing these risks has been facilitated by the increasing availability of a variety of instruments to transfer financial price risks to other parties. In particular, markets for derivative instruments such as forwards and futures, swaps and options, and innovative combinations of these building blocks of financial instruments have developed and grown at a breathtaking pace in the past few decades.

While companies have been using derivatives for many years, little has been known about the extent or pattern of their use because firms have not been required (until recently in the US, at least) to publicly report their derivatives activity. Unfortunately, the use of derivatives by companies only appears to receive attention in response to special cases of huge derivative related losses such as Barings, Procter&Gamble or Metallgesellschaft.[2] The normal beneficial use of derivative instruments in the daily risk management activities of companies receives much less attention in the financial press. As a result, relatively little is known about the patterns of use or firms' attitudes and policies regarding derivative use.

Recently, however, there have been several studies on the use of derivatives by US non-financial companies. Among these are the surveys of the Treasury Management Association (1996), Greenwich Associates (1996), and especially two large-scale surveys conducted by the Wharton School: one in 1994 (Bodnar, Hayt, Marston, and Smithson (1995)) and another in late 1995 (Bodnar, Hayt, and Marston (1996)). These studies have provided some insight into the use of derivatives for risk management and other purposes as well as reporting and control issues for US non-financial firms.

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1 See *Srinivasulu (1981*) p. 13-23.

2 See *Po (1997),* p. 41-55 for a report on derivative disasters.

There have also recently been some studies on the use of derivatives by non-US companies. For example, Downie, McMillan, and Nosal (1996) survey Canadian firms, Yanagida and Inui (1995) survey Japanese firms, and Price Waterhouse (1995) surveys a set of large international firms on derivative usage and related issues. Given these studies of derivative usage in different countries, an interesting direction for further study is cross-country comparisons of the patterns of and attitudes towards derivatives usage. However, careful comparison across surveys is typically hampered by the lack of comparability of the survey design and questions.

Anticipating this problem, the Downie, McMillan and Nosal (1996) survey of Canadian firms was structured to ask question similar to those of the Wharton surveys of US firms. The responses of the Canadian firms were quite similar to those of the US firms limiting the informativeness of a comparative study. Most likely, the similarity in results is due to the geographical and cultural proximity of Canada to the US as well as the similarities in the structure of the corporate sector. From the perspective of a cross-country study, a more interesting case would be to contrast US firms to those of another economically significant country where industrial structure and corporate culture are not as similar. With this is mind, a study of derivatives usage of German non-financial companies was conducted by Gebhardt and Russ (1998). It was designed as a parallel study to the 1995 Wharton survey in order to allow direct comparison with the US results.

This paper reports on a comparison of the US and German firms use of and attitudes towards derivatives from the responses to this German survey and the 1995 Wharton survey. It is not a mere comparison of the results of both studies but a comparative study. It draws the comparable subsample of firms from the US study to match the sample of German firms on both size and industry composition. The comparability of the questions as well as the firms responding allows us to draw relatively clean comparisons of the firms' uses of and attitudes towards derivatives.

The analysis of the survey responses suggests that German firms are more likely to use derivatives than US firms. This is true across all three classes of derivatives examined: foreign exchange (FX), interest rate (IR), and commodity price (CM). However, controlling for this country effect, the general pattern of usage across industry and size is very comparable, suggesting that the general tendency to use derivatives is driven by economic issues such as operational activities and firm characteristics. While firms in both countries overwhelmingly indicate that they use derivatives mostly for risk management, differences appear in the primary goal of using derivatives, with German firms focusing more on managing accounting results whereas US firms focused more on managing cash flows. German firms are more likely to incorporate their own market view on price movement when taking positions with derivatives than US firms. Despite this, German firms are also more relaxed about derivatives, indicating a significantly lower level of concern about issues related to derivatives than US firms. This attitude is consistent with the German firms' consistently stricter attitudes and policies towards controlling derivatives activities within the firm.

The remainder of the paper is organized as follows. The next section discusses the samples for each survey and reports on the overall use and non-use of derivatives. Section III compares the responses to detailed questions regarding derivative use and attitudes towards derivatives in each country. Sections IV, V, and VI compare derivative usage across the two countries in the areas of foreign exchange, interest rates and commodities, respectively. Section VII examines responses to question on corporate policies on control and reporting for derivatives, and Section VIII concludes.

## II. Comparative Sample Selection and Overall Usage or Non-Usage

### A. Comparative Sample Selection

This comparative study is based on the questionnaire of 1995 Wharton Survey of US non-financial firms that was used with only minor modifications in the 1997 German study. The US questionnaire was sent out to a broad-based sample of 2000 US companies including all Fortune 500 firms in the fall of 1995. Three hundred and fifty firms responded to the questionnaire. The German questionnaire was sent to 368 firms comprising large private firms and quoted companies with an annual turnover of DM 200 million or more with the exception of regional breweries, regional public utilities, and local public transportation companies. The German questionnaire was sent in the spring of 1997 and 126 firms responded.

To make these two samples more directly comparable in terms of firm size, we dropped 150 US respondents with sales below $133.3 million (DM200 million assuming DM/$ = 1.5). In addition, to improve the matching on the industry structure side, we eliminated three US companies in the gold mining industry, as there are no comparable companies in Germany. This created a group of US firms that are structurally comparable to the German respondents from which the responses to the questionnaires will be compared.

The Total columns in Table 1 show a breakdown by six size groups (measured by sales) of the 197 remaining respondents to the US questionnaire and the 126 respondents to the German questionnaire. The breakdown indicates that the percentages of responding companies are higher for the German companies in the larger size groups and higher for the US companies with the smaller size groups. For the top three size groups, the absolute numbers of responding companies are close for both surveys.

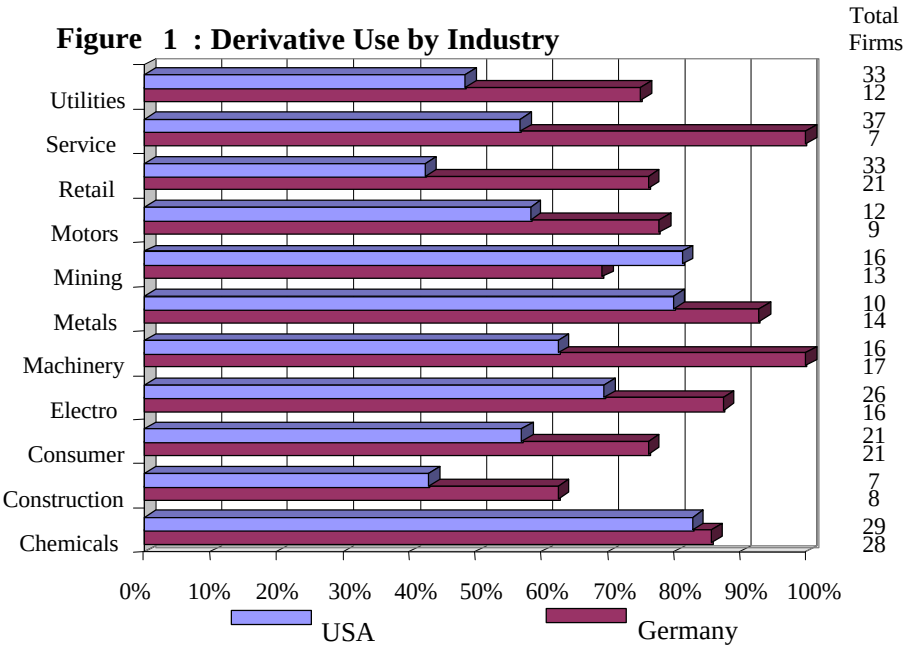
Figure 1 splits the responding companies by industry groups with the total number of firms in each group shown on the right-hand side of the figure. Industry classification is based on the official classification index of the European Community NACE and comparable US SIC code groups.[3] To deal with industrially diversified

[3] The correspondence between NACE and SIC codes is as follows: Mining = SIC 10 (excluding gold mining), 12, 13, 14; Construction = SIC codes 15 – 17; Consumer = SIC codes 20-25, 27, 31, and 39; Chemicals = SIC codes 28 – 30; Metals = SIC codes 33 and 34; Machinery = SIC codes 35 (except 357 computers); Electro = SIC codes 357, 36, and 38; Motor Vehicles = SIC codes 37; Services = SIC codes 40-42, 44-45, 47, 48, and 70-88; Utilities = SIC codes 46 and 49; and Retail

**Table 1: Use of Derivatives - by Size**

| | USA | | | Germany | | |
|---|---|---|---|---|---|---|
| Sales Groups | Num (% of Total) | Yes (% of Num) | No (% of Num) | Total (% of Total) | Yes (% of Num) | No (% of Num) |
| > DM10b (> $ 6.66b) | 30 15.2% | 27 90.0% | 3 10.0% | 36 28.6% | 27 75.0% | 9 25.0% |
| DM5b - DM10b ($6.66b - $3.33b) | 24 12.2% | 19 72.9% | 5 20.8% | 18 14.3% | 17 94.4% | 1 5.6% |
| DM2,5b -DM5b ($3.33 b - $1.67b) | 28 14.2% | 16 57.1% | 12 42.9% | 24 19.0% | 21 87.5% | 3 12.5% |
| DM1b - DM2,5b ($1.67b - $0.66b) | 45 22.8% | 29 64.4% | 16 35.6% | 25 19.8% | 21 84.0% | 4 16.0% |
| DM0,5b - DM1b ($0.66b - $0.33b) | 32 16.2% | 14 43.8% | 18 56.3% | 11 8.7% | 6 54.5% | 5 45.5% |
| < DM0,5b (< $0.33b) | 38 19.3% | 7 18.4% | 31 81.6% | 12 9.5% | 6 50.0% | 6 50.0% |
| **Total** | 197 | 112 56.9% | 85 43.1% | 126 | 98 77.8% | 28 22.2% |

**Figure 1 : Derivative Use by Industry**




= SIC codes 50-59.

firms, companies active in more than one industry group were assigned to up to three industry-groups based on their three most-important industry activities that each constitutes 10% of total sales. Thus the sum of industry classifications exceeds the number of responding firms (US industry classifications: 240; German industry classifications: 166). The absolute numbers of respondents are very close in five of the eleven industry groups. Major differences in subgroup composition show up only in the service industry and with utilities where the numbers of US companies are considerably larger.

### B. Derivatives Usage and Non-usage by Size and Industry

The overall results on derivative usage are displayed in Table 1. The first result to note is that the percentage of responding companies using derivatives is larger for the German companies (77.8%) than for US companies (56.9%). This result is consistent over all size groups with the exception of the largest group of companies where the percentage of US companies using derivatives is higher. The second result to note is that common to both countries, the percentage of firms using derivatives increases with firm size. Again the exception to this pattern is the largest group of German firms which are less likely to use derivatives than the next three smaller groups of German firms. A closer look at the largest German firms reveals that four of the nine non-derivative users are subsidiaries of foreign groups that reported in additional comments that they were integrated in the central risk management of the group. Another four non-users belong to the construction and retail industries where derivatives use is less common. The result that derivative usage increases with firm size, although not predicted by earlier positive theories of hedging (see, e.g., Smith and Stulz (1984)), is consistent with other empirical evidence and is suggestive of a significant fixed cost to a firm's hedging program. The fixed costs of the hedging program make derivative usage uneconomical for small firms despite potentially larger benefits. Thus, larger firms for whom the fixed costs can be spread out across a greater number of transactions are more likely to use derivatives.

Figure 1 indicates that the result of German companies being more prone to use derivatives is also consistent across industries groups, with only one exception (the mining industry). Again, exception can be explained by the fact that many firms in the German mining industry are subsidiaries of foreign groups. For the chemical industry we observe a near tie on a high level of derivatives usage in both countries.

One possible explanation for the greater propensity to use of derivatives on the part of German firms is the different extent of exposure to the risks of international operations. Typically, international operations form a larger part of the activities of German companies as compared to comparable US companies, which have the advantage of a much larger single-currency home market.[4] For firms with similar economic characteristics, a greater exposure, and thus more potential risk, would increase the incentive to use derivatives to manage the risk. However, while this would explain currency greater derivative use, as we shall see German firms are also more

[4] This will change with the introduction of the EURO as a single European currency by 1999.

likely to use interest rate and commodity price derivatives than US firms. Figure 1 also demonstrates that the pattern of derivative use across industries is broadly similar in both countries. Companies in the construction, consumer goods retail, service (only in the US) and utilities industry use derivatives to a smaller extent than companies in the chemical, electro, machinery, or metals industry. Companies in the first group of industries are typically more focused on their national markets and thus less exposed to the price risks of international operations (especially currency risk) than companies in the second group. One might then expect a higher percentage of derivative users in the German motors industry, which is well known to be an industry following global strategies. Again two of the non-using companies are subsidiaries of foreign groups. Of the six responding motor companies with German headquarters all use derivatives. This similarity in the pattern of derivative use across industries supports the view that derivative usage is driven (at least partially) by underlying economic factors rather than random choice.

Companies not using derivatives were asked to choose the most important reasons for non-usage from a list of seven possibilities. The most important argument cited by both US firms (47.1%) and German firms (61.1%) is that the exposures are not large enough. Next came the statement that exposures could be managed using other means (e.g. home currency denomination of export sales, operational strategies). 20.0% of the US and 16.7% of the German non-using respondents listed this argument first. Another important issue was concern over public perceptions of derivative usage, cited as a reason for not using derivatives by 16.5% of US firm and 11.1% of German firms. 10.6% of US firms cited lack of knowledge about derivatives as the "most important" reason for not using derivatives whereas no German firm claimed this as a "most important" explanation. Instead 11.1% of German firms said that they did not use derivatives because they perceived the costs of hedge to exceed the benefits while this view was shared by just 5.9% of US firms. Difficulties in pricing derivatives and concerns about disclosure were cited as reasons for not using derivatives by less than 10% of the firms in both countries. Thus it appears that in both countries, the primary reason for not using derivatives is that they are not needed (no exposure). Other German non-users tended to cite reasons suggesting that derivatives were not needed, whereas other US non-users tended to cite reasons suggesting a possible role for derivatives but a hesitation to use them for some reason.

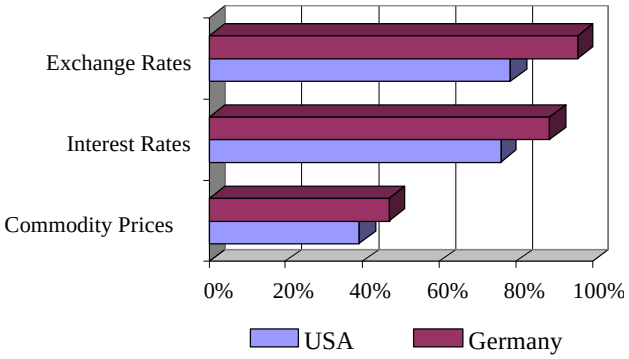
## III. Derivatives Usage

### A. Areas of Use

Figure 2 reveals that US and German companies use derivatives primarily to manage foreign exchange (FX) and interest rate (IR) risk. Almost all German users, 95.9% employ derivatives in FX management and 88.8% employ derivatives in IR management. The comparable figures for the US firms are once again smaller, 78.6% and 75.9%, respectively. Considerable attention is placed also on commodity price (CP) risks by US and German

companies with around 40% of firms in each country reporting usage.[5]

**Figure 2: Derivative Use Across Risk Classes**




The smaller US involvement in FX derivatives arises mainly from companies in the utilities (where 31.3% of US derivative users use FX derivatives versus 100% of German users), retail (42.9% of versus 100%), and consumer goods, (66.7% versus 100%). Lower levels of IR derivatives use by US industries is found in the machinery (where 40.0% of US derivative users use IR derivatives versus 94% of German users), consumer goods (58.3% versus 88%), retail (64.3% versus 88%), and electro (66.7% versus 71%) industries. For Germany, only the utilities industry reports an exceptional low usage of IR derivatives (22.2% of German derivative users compared to 94% of US derivative users). Levels of CM derivatives usage are closer than the other two, primarily because of the greater representation in the US sample of utilities and mining firms, which are the activities most likely to use CM derivatives.

Most companies manage more than one price risk using derivatives. This is especially true of the German users, with 44.9% using derivatives in all three classes (FX, IR and CP), and 84.7% using the combination of FX *and* IR derivatives. The comparable number of US firms is 26.7% for all three classes and 58.0% for FX and IR. There are a few US firms, but no German ones, which use only CP derivatives.

Beyond the data given in Figure 2, we observed the use of IR derivatives and CP derivatives increasing with size in the German sample whereas there is no such pattern in the US sample. Surprisingly the use of CP derivatives decreases with the size of US companies.

### B. Goals of Derivatives Usage

The most important role for derivatives is for risk management, and an important issue in risk management is defining its goals. The theoretical financial literature strongly recommends focusing on cash flows or on the value of the company. A focus on accounting numbers is generally discarded.[6] However, the results in Table 2 reveal that managers are also concerned with accounting numbers and use earnings and/or balance sheet accounts (especially equity) as objectives in risk management.

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[5] The questionnaires further asked for the importance of equity price risk management, which turned out to be of lesser importance both in the US and the German survey. Therefore, we do not present results here. For the US results see *Bodnar/ Hayt/ Marston (1996)*, for the German results see *Gebhardt/ Russ (1998).*

**Table 2: Most Important Objective of Hedging Strategy (by Size)**

| USA | Accounting Earnings | Cash Flows | Balance Sheet Accounts | Firm Value |
|---|---|---|---|---|
| >$6.6b | 23.1% | 65.4% | 0.0% | 15.4% |
| $6.6 - 3.3b | 36.8% | 57.9% | 0.0% | 5.3% |
| $3.3 - 1.6b | 50.0% | 37.5% | 0.0% | 12.5% |
| $1.6 - .67b | 65.5% | 34.5% | 0.0% | 0.0% |
| < $.67b | 38.1% | 42.9% | 4.8% | 9.5% |
| **Total** | 44.0% | 48.6% | 0.9% | 8.3% |
| Not Important | 5.5% | 3.7% | 21.1% | 23.9% |

| Germany | Accounting Earnings | Cash Flows | Balance Sheet Accounts | Firm Value |
|---|---|---|---|---|
| > DM10b | 37.0% | 48.1% | 3.7% | 18.5% |
| DM10 - 5b | 50.0% | 25.0% | 6.3% | 12.5% |
| DM5 - 2.5b | 70.0% | 30.0% | 20.0% | 10.0% |
| DM2.5 - 1b | 55.0% | 35.0% | 5.0% | 10.0% |
| < DM1b | 81.8% | 18.2% | 0.0% | 0.0% |
| **Total** | 55.3% | 34.0% | 7.4% | 11.7% |
| Not Important | 10.6% | 19.1% | 36.2% | 42.6% |

The responses to the primary goal of using derivatives in risk management are different for US and German firms. A relative majority of US companies (48.6%) focus their use of derivatives in risk management primarily on minimizing the variability in cash flow with minimizing variability in accounting earnings (44.0%) coming in a close second. However, only 5.5% of the US companies think of minimizing the variability of accounting earnings as *not* being an important hedging objective.

A striking absolute majority (55.3%) of German companies chose minimizing variability in accounting earnings as their most important objective of risk management using derivatives. Another 7.4% placed managing balance sheet accounts first as a hedging objective. Minimizing volatility in cash flows is the most important goal for only a third of German derivative users. However, another 19.1% of the German firms claim that the cash flow objective is not important for their risk management programs using derivatives.

The use of derivatives to minimize the variation in the market value of the firm (the present discounted value of the stream of future cash flows), which is often stressed in the theoretical finance literature, is not a goal shared by most firms. Managing the volatility of firm value is a primary objective of risk management with derivatives for only a small number of US and German companies (8.3% and. 11.7% respectively). Again a striking result is that 23.9% of the US and 42.6% of the German firms distinctly denoted this as a non-important goal.

These results raise an interesting question: why do so many US and German managers ignore the recommendations of the theoretical finance literature? Looking at the breakdown by size in Table 2 one is tempted to argue that the results depend on the level of sophistication of management. The relevance of the cash flow as well as the firm value objective of risk management using derivatives increases and the relevance of the accounting earnings objective decreases with size. For two thirds of the largest US companies and for almost half of the largest German companies derivatives hedging is primarily directed to a cash flow objective. There are no US and

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[6] See *Buckley (1996)*, p. 167-171, *Eiteman/ Stonehill / Moffett (1995)*, p. 267 f.

only three German firms in the largest size group that think of cash flow as an unimportant hedging objective. Larger companies in both countries are more often concerned with firm value when designing hedging strategies.

However the sophistication argument is not fully convincing as even in the largest size group there still are considerable numbers of companies focusing primarily on accounting earnings both in the US (23.1%) and Germany (37.0%). Only few of the largest US (7.7%) and German (11.1%) firms think of minimizing the volatility of accounting earnings as not being an important goal. Thus we have to conclude that cash flows *and* accounting earnings are important objectives for hedging strategies even in the group of the largest companies in both countries. One is tempted to argue that accounting earnings matter to managers because of their relevance to analysts' perceptions and predictions of future earnings and because of their relevance in management compensation. Both arguments are less relevant for smaller companies that are typically more often closely held and hence should have less incentive to focus on earnings. However, from Table 2 we can infer that smaller companies stress accounting earnings more often as a hedging goal than larger companies.

Why is there this striking difference in the relevance of accounting earnings between the US and Germany? This question is easier to answer when one recognizes that accounting earnings play a more important role in the German environment. The function of accounting is not restricted to provide information[7] but serves an important role in the distribution of dividends to shareholders and in taxation. There is a strong link between German financial accounting and German tax accounting. Further dividends may only be paid out of accounting earnings; if there are positive accounting earnings shareholders have a claim on dividends.[8] As a result of those institutional features there is a strong focus on accounting earnings in all business decisions and consequently also in hedging decisions.

These results point to a different perception as to the goals of risk management: a greater focus on cash flow in the US and a greater focus on accounting earnings in Germany. However, one should be careful not to overestimate this distinction as both cash flows and accounting earnings objectives can lead to similar hedging decisions in many situations.

### C. Concerns about Derivatives

The questionnaires next identified some areas of possible concerns by management when using derivatives and asked firms to rate their degree of concern with each issue. Figure 3 summarizes the results.

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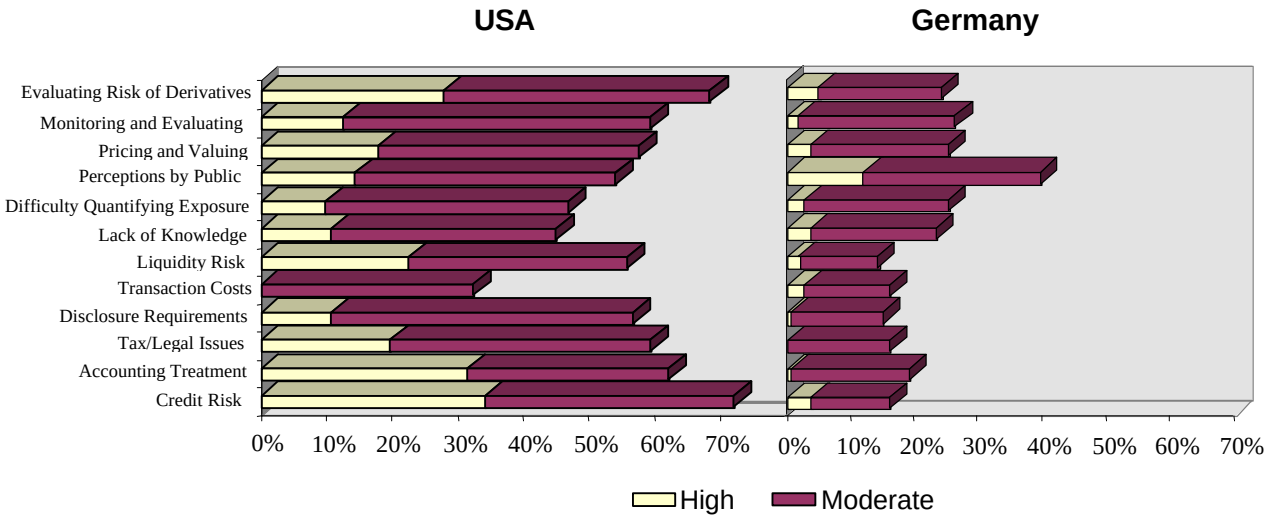
[7] This is the prime accounting objective in US accounting. See *FASB (1978):* SFAC No. 1, par. 33-34: "The role of financial reporting in the economy is to provide information that is useful in making business and economic decisions. ... Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions."

[8] See for an overview of the functions of German accounting *Working Group on External Financial Reporting (1995)*; *Ballwieser (1995)*, p. 1401-1428.

**Figure 3: Concerns about Derivatives**




Many US firms report "high" or "moderate" concerned with all twelve issues raised whereas German firms express little concern with almost all of the issues. These results give rise to several questions: Why are US firms more anxious when using derivatives? Are German companies ignorant of the risks implied in the list of concerns or are they more confident in mastering those risks? The perception by the public is the only issue where slightly more than 20% of the German companies are highly concerned with another 15% indicating moderate concern. This is one of the major issues with the US firms but not the most important one.

US companies express their highest concerns with the evaluation of risks of derivatives, especially with credit risk (even though only one reported an actual loss on a derivative transaction), and with liquidity risk. These are not major issues with German firms. This difference can be explained by their more conservative approach to those issues to be outlined in section VII below. Other areas of major concern for US companies are quantifying exposures, pricing and valuation, and monitoring and evaluating derivatives. These risk management issues cause some moderate concerns at German companies but again on a much smaller scale.

Another group of important issues for US firms are the accounting treatment, the disclosure requirements, and tax and legal issues regarding derivatives. Those concerns reflect the very lively discussion currently underway on these topics in the US.[9] Because of the discussion in the previous section one might have expected German companies to be highly concerned with the accounting treatment and with the taxation of derivatives. However, only a few German companies report to be only moderately concerned with those issues. German GAAP currently include no specific accounting rules for derivative and hedging but require, on principle, the application of the general lower of cost or market rule to a derivative and to a hedged item. There is a controversy about the

[9] The discussion nowadays is even more lively and controversial as compared to the time when the 1995 Wharton Survey was conducted as the FASB moves ahead for a final statement on accounting for derivatives. See *FASB (1997).*

extent to which hedge accounting might be allowed with the ruling majority restricting this to effective micro hedges.[10] Because of the favorable tax implications of this approach, German companies are not too uncomfortable with this situation. However, a considerable number of the largest German companies voluntarily disclose information about their use of derivatives in their annual reports along the lines of the recommendations of the FASB or the IASC. [11] Still only occasionally, but increasingly, they report about an extended use of hedge accounting for their more advanced macro or portfolio hedging approaches.[12]

The current accounting treatment of derivatives in both countries does materially affect the behavior of a majority of firms. The accounting treatment alters the desired use of derivatives at 59.5% of the US firms and at 51.1% of the German firms. Of the 66 US companies whose derivative decisions are affected by the accounting treatment, 68.2% forego to choose certain types of derivative instruments, 53.0% reduce the amount hedged, and 37.9% alter the timing of the hedge. In comparison, of the 48 German firms whose derivative decisions are affected by the accounting treatment, less respond by reducing the amounts hedged (29.2%) than by choosing other hedging instruments (60.4%) or altering the timing of the hedges (58.4%). This indicates a greater concern with year-end results consistent with our discussion in the preceding section. We will come back to this argument soon.

## IV. Derivatives Usage in Foreign Exchange Risk Management

### A. Exposures Hedged

We already outlined in section III.A that the prime area of derivatives usage is FX management for both US and German firms. An important question to be considered is how companies define exposure. It is common in the international finance literature to distinguish between translation exposure, transaction exposure, and economic exposure.

Translation exposure results from translating local currency denominated financial statements of foreign subsidiaries to the currency to be used for group financial statements. The exposure depends on the translation method to be used. For US firms, Statement of Financial Accounting Standard No. 52 suggests the use of the current rate method for self-contained foreign subsidiaries and the use of the temporal method for integrated foreign subsidiaries and for subsidiaries in high inflationary countries.[13] The exposure under the current rate method is given by the net equity of the foreign subsidiary whereas under the temporal method it is the net amount of assets and liabilities translated at the current exchange rate. Changes in exchange rates on foreign operations

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[10] See *Brackert/ Prahl/ Naumann (1995); Gebhardt (1996); Arbeitskreis "Externe Unternehmensrechnung" (1997).*

[11] See *FASB (1993):* SFAS No. 115; *FASB (1994):* SFAS No. 119; *IASC (1995):* IAS 32. For a survey of German disclosure practices see *Gebhardt (1997).*

[12] See for example the annual reports of Siemens 1995/96, p. 47; VEBA 1996, p. 73-75. Siemens applies a portfolio hedge accounting approach also in the individual financial statements of the parent company thereby sacrificing tax advantages.

[13] See *FASB (1981):* SFAS No. 52.

thus always cause changes in group net equity and under the temporal method these change also affect group net income.

For Germany, there is no explicit legal requirement covering foreign currency translation. The law only requires to report on the method used (§ 313 sec. 1 Nr. 2 Commercial Code).[14] A proposed statement of the accounting professional organization (Institute of Chartered Accountants) offers companies the free choice of translation method.[15] As a result, German corporate translation practices generally reflect variations of the current-rate method or - less frequently - of the temporal method.

The recommendation of the finance literature is not to worry about this type of exposure as it is not a cash flow effect and more specifically not to hedge it.[16] From Table 3, we learn that the vast majority of US and German firms follows this recommendation. However, a considerable number of US companies do care as they declare to hedge translation exposure frequently (15.3%) or sometimes (14.1%). One might be surprised that German firms hedge this type of exposure less frequently. This result is not inconsistent with the particular emphasis placed by German companies on accounting earnings as discussed above in section III.B. It should be noted that in Germany corporate income taxes and dividend distributions are in principle *not* based on the consolidated group financial statements but on the individual financial statements of the parent company and its subsidiaries.[17]

From a theoretical point of view, economic exposure should be the relevant exposure concept. Economic exposure may be characterized as the value change of all future cash flows due to changes in exchange rates or in frequently (50.6%) or sometimes (43.5%). short as the change in the market value of the firm. Future cash flows may be based on contractual commitments or just cash flows from anticipated future transactions. In this view, transaction exposure is the part of economic exposure comprising the future foreign currency denominated cash flows resulting from contractual commitments. These commitments may either be reflected “on balance sheet” as receivables or payables or “off balance sheet” as pending commitments from executory contracts.

The German questionnaire introduced the above distinction between “on balance sheet” and “off balance sheet” transaction exposures whereas the US questionnaire only asked for the extent to which contractual commitments are hedged. From Table 3 it becomes evident that the vast majority of German firms hedge the “on balance sheet” transaction exposure frequently. German firms less frequently hedge future cash flows from pending foreign currency commitments. Several companies added comments that they always hedge all “on balance sheet” foreign currency receivables and payables. The results for the US firms do not appear to be much

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[14] There is a special rule applying to banks only in § 340h Commercial Code.

[15] See *HFA (1986).* There is deliberately still no final recommendation of the German accounting profession as the law requires no specific translation method to be used.

[16] See for example *Buckley (1996),* p. 167-171; *Shapiro (1996),* p. 196; *Sercu/ Uppal (1995),* p. 525.

[17] See *Working Group on External Financial Reporting (1995),* p. 99;

different as again more than 90% hedge the transaction exposure from foreign currency denominated contractual commitments either intra-firm foreign repatriations (e.g. dividends, royalties, interest and payments on intracompany loans) are a special group of contractual commitments or anticipated transactions. Both in the US and in Germany more than one third of FX derivative using firms hedge these types of exposures frequently while another third does so sometimes. This practice implies that hedging decisions are taken from the perspective of parent company and its shareholders. It is interesting to notice that the new US draft-statement on accounting for derivatives now reflects this view and allows for hedge accounting for qualified hedges on intracompany transactions.[18]

**Table 3: Exposures Hedged with FX Derivatives**

| | USA | | Germany | |
|---|---|---|---|---|
| Exposures | Frequently | Sometimes | Frequently | Sometimes |
| Contractual Commitments | 50.6% | 43.5% | | |
| Accounts receivable/payable | | | 77.2% | 16.3% |
| Pending commitments | | | 29.3% | 50.0% |
| Anticipated Transactions < 1yr | 55.3% | 36.5% | 28.3% | 41.3% |
| Anticipated Transactions > 1yr | 11.8% | 42.4% | 6.5% | 40.2% |
| Competitive Exposures | 7.1% | 16.5% | 8.7% | 14.1% |
| Foreign Repatriations | 37.6% | 37.6% | 38.0% | 37.0% |
| Translation of Foreign Accounts | 15.3% | 14.1% | 5.4% | 9.8% |

The other component of economic exposure is operating exposure. This is the impact of current price changes on future non-contracted cash flows. In turn operating exposure can be broken into two components: the exposure of identifiable anticipated transactions and the exposure of unidentifiable future cash flows (competitive exposure). These are typically exposures for which firms do not receive hedge accounting treatment for the offsetting derivative positions. We first asked firms about their hedging of anticipated foreign currency transactions, both within the next 12 months (the budget period) and those beyond 12 months. For anticipated foreign currency transactions within the budgeting period (next 12 months) a majority (55.3%) of US firms use derivatives to "frequently" manage these uncommitted future cash flows, while another 36.5% do so "sometimes". For the German firms we observe a slightly smaller percentage (70%) hedge this type of exposure at least "sometimes". Thus, it appears that a large majority of US and German companies are concerned with the effect of exchange rate changes on the financial results of the budget year and therefore hedge exposures originating not

[18] See *FASB (1997)*, par. 36. In former drafts the FASB took an entity view and would not have allowed hedge accounting for intercompany transactions.

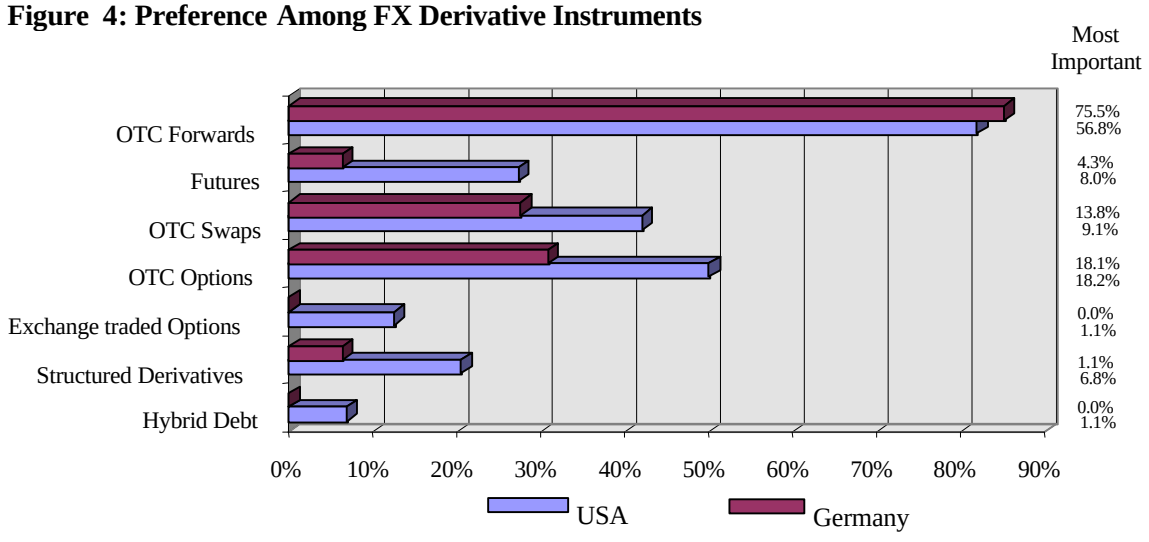
only from contractual commitments but also from anticipated transactions.[19] The hedging horizon for anticipated transactions is at least sometimes extended beyond one year by many US (54.2%) and German firms (46.7%); however, the percentage that do so frequently is dramatically lower in both countries.

When asked about hedging competitive exposure, it is remarkable that a considerable number of companies in both countries claim to hedge competitive exposures frequently (US: 7.1%; Germany: 8.7%) or sometimes (US: 16.5%; Germany: 14.1%). This is an ambitious hedging concept as it is difficult to quantify such an abstract exposure.

### B. Derivative Instruments Used in Foreign Exchange Risk Management

The financial markets offer a broad variety of derivative instruments for FX management including "plain vanilla" instruments such as forwards, swaps, or futures, "over the counter" (OTC) and exchange traded options, highly sophisticated structured derivatives consisting of combinations of derivative instruments (e.g. collars, swaptions), and hybrid debt with embedded derivatives. In Figure 4 the bars represent the proportion of users who report each type of instrument as one of their top three choices, while the percentage of companies who report that instrument as the most important type of FX derivative are displayed in the right hand side of the graph. Figure 4 clearly indicates that both US and German non-financial companies stick primarily with the simple FX instruments.[20] Currency forwards are by far the most important instruments in both countries. Moreover, the use of over-the-counter (OTC) instruments (forwards/swaps and options) dominates the exchange-traded instrument.

**Figure 4: Preference Among FX Derivative Instruments**




[19] Some German companies explained in additional comments that they hedge foreign currency cash flows for the period of the operating planning cycle (typically three to five years depending on the industry).

[20] See for an overview of FX instruments *Smithson/ Smith/ Wilford (1994)*, p. 30-42.

With S companies the use of futures is considerably higher than in Germany.[21]

OTC-currency options are more often labeled the first or second most important FX instrument by US firms. Exchange traded options only play a minor role at US companies and are irrelevant to German firms. This again might be explained by a lack of the availability of such instruments in the local German futures markets.

In the international finance literature it is often argued that specific instruments are better suited to hedging specific types of exposures. For firm commitments, forward-type (variance elimination) instruments are recommended whereas option-type instruments should be preferred for uncertain foreign currency denominated future cash flows.[22] Table 4 provides interesting insights in the instrument choice by type of exposure. There is a clear preference by most US and German companies for using forward-type instruments to hedge exposures from contractual commitments.

**Table 4: FX Instrument Choice by Type of Exposure**

| Most Important Instrument for each type of FX exposure | **USA** | | | G**erman**y | | |
|---|---|---|---|---|---|---|
| | Forwards | Options | Swaps | Forwards | Options | Swaps |
| Contractual Commitments | 82.5% | 7.5% | 7.5% | | | |
| Accounts receivable/payable | | | | 69.6% | 16.3% | 7.6% |
| Pending contracts | | | | 47.8% | 20.7% | 5.4% |
| Anticipated Transactions < 1 year | 60.0% | 28.8% | 5.0% | 47.8% | 20.7% | 5.4% |
| Anticipated Transactions > 1 year | 21.3% | 31.3% | 2.5% | 23.9% | 17.4% | 3.3% |
| Economic/Competitive Exposures | 5.0% | 16.3% | 2.5% | 8.7% | 5.4% | 2.2% |
| Repatriations | 82.5% | 7.5% | 7.5% | 58.7% | 4.3% | 12.0% |
| Translation of Accounts | 12.5% | 11.3% | 6.3% | 3.3% | 1.1% | 3.3% |

The relative importance of option-type instruments increases with increasing uncertainty of the cash flow exposures. For exposures from anticipated transactions beyond one year, options become the preferred instrument with US companies. However, a surprising result of this analysis is that a considerable percentage of German companies prefer options when hedging firm-commitment exposures. The use of options retains the opportunity to benefit from a favorable value change of the hedged item because of changing exchange rates - for the price of paying the option premium. An argument put forward in additional commentaries by some German respondents is that a strategy using options is easier to defend in hindsight discussions.

It should be further noted that forwards are the preferred instruments even when hedging more uncertain exposures from anticipated transactions. One can take account of the uncertainty of the exposures by adjusting the hedge ratio when using forwards.

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[21] It should be noted that there are still no currency futures traded at the German Futures Exchange (Deutsche Terminbörse). The Deutsche Terminbörse started trading an US$/DM-option contract only on January 20, 1997.

[22] See *Shapiro (1996)*, p. 263; *Giddy (1985); Giddy/ Dufey (1995)*.

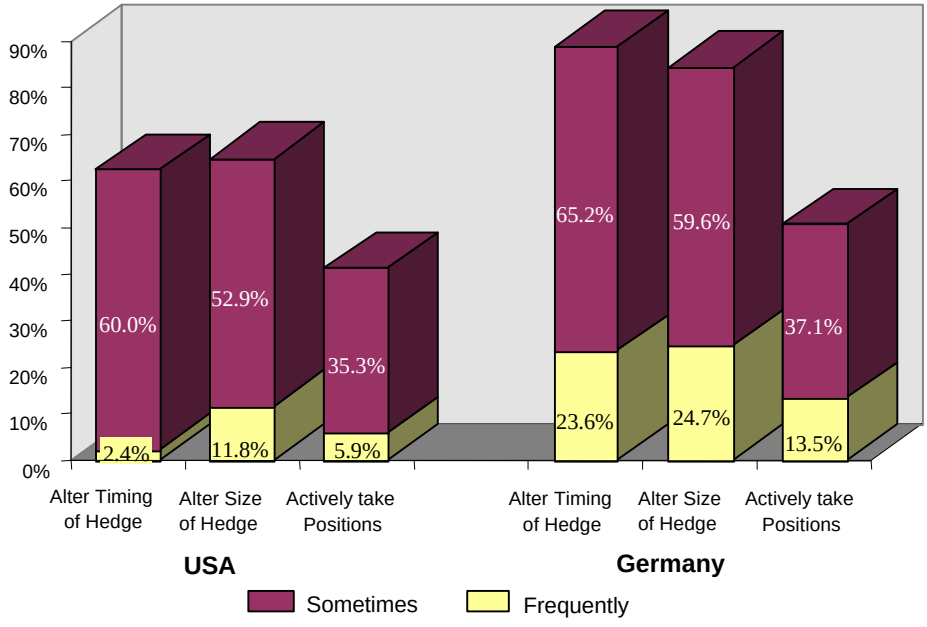
There is another argument explaining a preference for forward-type instruments: Typically forward contracts do not impact the balance sheet and therefore are less visible for higher management or for supervisory bodies, while with options the premium paid or received shows up in the profit and loss statement. The success of zero cost option products may be largely attributable to the elimination of this negative aspect of options.

### C. Foreign Exchange Risk Hedging Strategies and Market View

It is generally known in international finance that it is difficult to outperform consistently market expectations as a predictor of future conditions.[23] However, despite this fact, it is well known that companies often make their hedging strategy contingent on their own view of the future development of the FX rates. This practice is confirmed by our results in Figure 5, which examines the impact of a firm's market view on its use of FX derivatives. In this case, the figure displays an interesting difference between US and German derivative using companies.

German companies are much more inclined to alter the timing or the size of the hedge based upon their market view. Almost 25% of German firms do this frequently whereas only a small group of US firms follow such active hedging strategies. In addition to altering time and size of hedges, a considerable number of German firms (50.6%) and US firms (41.2%) indicated that they at least sometimes take active positions based on their market

**Figure 5: Impact of a FX Market View**




view. This willingness to actively manage and even take FX risks using derivatives frequently increases with size for the German companies whereas no clear size pattern exists for US firms. Such strategies require skilled

treasury people and bank like computer and communication equipment typically available only at the headquarters of larger companies.[24]

## V. Derivatives Usage in Interest Rate Risk Management

### A. Exposures Hedged

As demonstrated by Figure 2, interest rate derivative usage is a close second in terms of frequency to foreign currency derivatives. This section compares issues regarding interest rate derivatives usage across US and German firms.

Table 5 displays the frequency of usage of interest rate derivatives activity across four common uses. Overall, the table indicates a more intensive use of interest rate derivatives by German firms than US firms. For

**Table 5: Uses of Interest Rate Derivatives**

| | USA | | Germany | |
|---|---|---|---|---|
| | Frequently | Sometimes | Frequently | Sometimes |
| Swap Fixed Rate Debt to Floating | 10% | 55.6% | 6.0% | 60.7% |
| Swap Floating Rate Debt to Fixed | 10% | 66.7% | 31.0% | 58.3% |
| Fix Spread on New Debt | 3.3% | 43.3% | 15.5% | 52.4% |
| Lock in Rate for Future Financing | 1.1% | 45.6% | 20.2% | 65.5% |

purposes of swapping from floating rate debt payments to fixed rate debt payments, fixing a spread on new debt, and locking in a future financing rate, German firms are more likely to use interest rate derivatives than US firms. In each of these circumstances, German firms are also more likely to be "frequent" users of interest rate derivatives for these purposes. Only for swapping from fixed rate debt to floating rate debt payments are US firms as likely to use interest rate derivatives as German firms, but in this case the US firms are more likely to use this type of swap "frequently". The most commonly used interest rate derivative in both countries is the swap from floating to fixed rate debt, with nearly 89.3% of German firms and 76.7% of US firms using this instruments at least "sometimes". German firms are also heavy users of interest rate derivatives for locking in future borrowing rates, with over **85%** of firms doing so at least "sometimes" compared with less than 50% of US firms. These differences in results might be influenced by the historic low of German interest rates during the survey period providing an incentive to lock in perceived low future interest rates.

### B. Derivative Instruments Used in Interest Rate Risk Management

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[23] See, e.g., Levich (1979).

[24] In the US taking FX risk "frequently" occurs mostly in the consumer, service and retail industries, whereas in Germany it occurs mostly in manufacturing industries such as chemicals, electro, machine, metal, mining, and motors.

**Figure 6: Preference Among Interest Rate Derivative Instruments**

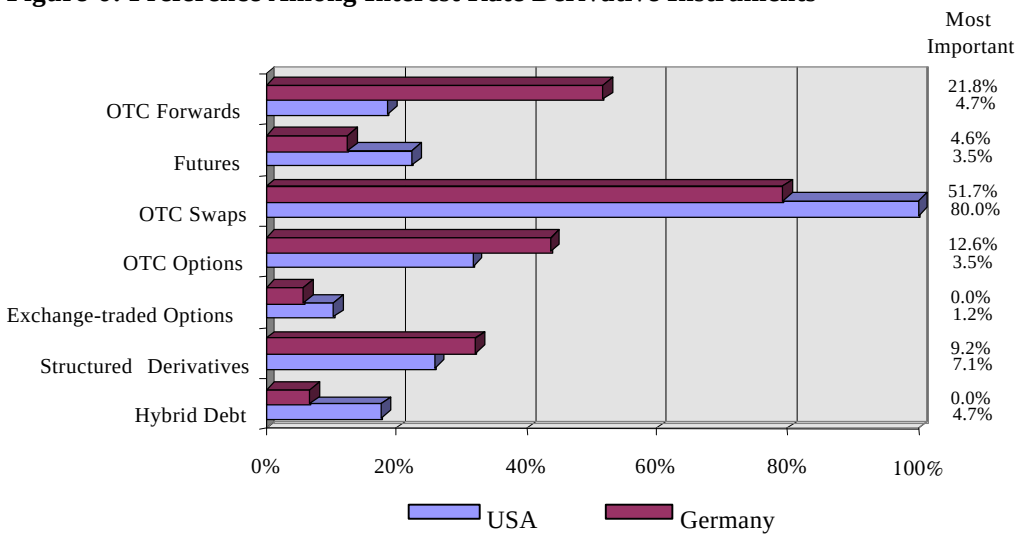
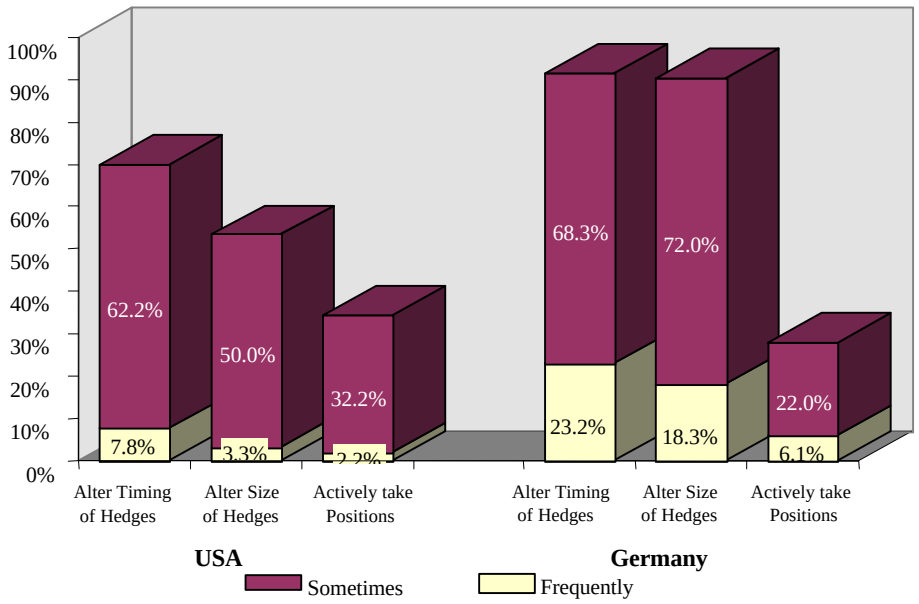



Figure 6 compares the popularity of the seven common forms of interest rate derivatives across the two countries. The bars represent the proportion of users who report each type of instrument as one of their top three choices, while the percentage of companies who report that instrument as the "most important" type of interest rate derivative are displayed in the right hand side of the graph. Not surprisingly, swaps are the most popular form of interest rate derivative, with nearly 100% of US firms and almost 80% of German firms listing it as a top three choice. However, it is clearly more popular in the US where 80.0% of firms ranked it as their "most important" instrument. In contrast, among the second and third most commonly used forms of interest rate derivatives, namely forwards and OTC options, more German firms rank them as both a top three choice and as their "most important" instrument. In particular, 21.8% and 12.6% of German firms rank forwards and OTC options, respectively, as their "most important" choice, compared to 4.7% and 3.5% of US firms. As with currency instruments, exchange traded interest rate instruments are not popular among firms, with both lagging structured derivatives for the fourth most popular form of interest rate instrument.

### C. Interest Rate Risk Hedging Strategies and a Market View

Just as with currencies, we asked firms to indicate the impact of their own view of the market on the timing and size of interest rate hedges and frequency with which they actively took positions based upon that market view. Figure 7 shows that the majority of interest rate derivatives users in both countries indicated to at least sometimes altering the timing and size of interest rate hedges due to their view of future interest rates. The tendency to do this either "frequently" or "sometimes" was consistently larger for German firms (around 90%) than US firms (70.0% for timing and **53.3%** for size). The inclination to alter timing or size of interest hedges at least "sometimes" decreases with size among the US companies whereas there is no clear size pattern to be found for

**Figure 7: Impact of an Interest Rate Market View**




German firms.

In contrast to the FX derivatives, firms in the US were more likely to actively take positions based upon the market view. 32.2% of US firms indicated that they "sometimes" took positions based upon market views while an additional 2.2% (only from the group of largest US companies) said they did so "frequently". Although the total percentage of German firms taking positions at least sometimes was lower (28.1%), a larger percentage of firms indicated they "frequently" took positions based upon their market view. No German company in the smallest size group reported actively taking positions. This IR risk taking increases with size in Germany whereas the number of US companies speculating this way sometimes is larger in the smaller size groups.[25]

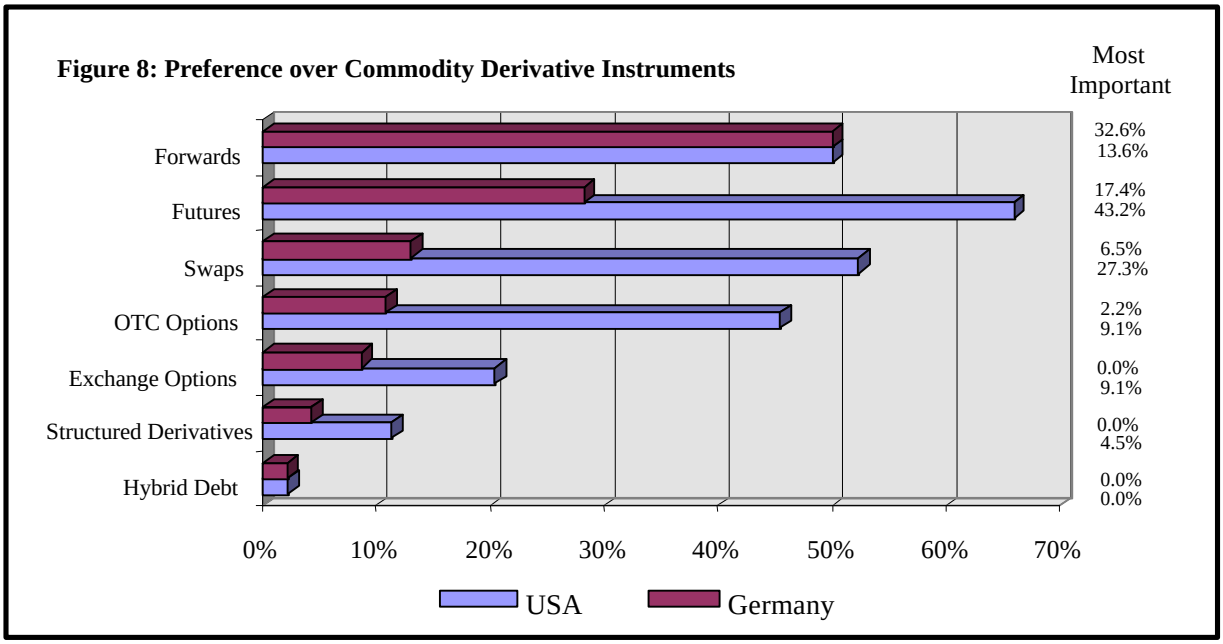
## VI. Derivatives Usage in Commodity Price Risk Management

Given the lower frequency of commodity derivative use among firms, we present only Figure 8 comparing the popularity of the seven different forms of commodity derivatives. The figure indicates that US firms use a broader array of commodity derivatives than German firms. German firms, it appears, tend to use primarily forwards to hedge commodity risk. US firms are more likely to favor futures, swaps, or options for commodity

[25] Companies that frequently take IR risk based on their market view are to be found only in the chemical industry and the mining industry in Germany whereas such US companies are to be found in the consumer, retail, and chemical industry. To do so at least sometimes is common for 16.7% (electro industry) to 66.7% (construction industry) in all US industries we considered. In Germany these percentages are smaller ranging from zero (construction industry and utilities) up to 50.0% in the electro industry.

hedges than are German firms. Whereas both 50% of German and US firms using commodity derivative use forwards as one of their top three instruments, more than 50% of US firms also report using futures and swaps, with another 45% indicating OTC options as one of their top three choices. As for the "most important" instrument, nearly one-third of German firms cite forwards, compared to only 13.6% of US firms. In contrast, US firms' "most important" instrument is the future contract, with over 40% of firms listing it as such. Swaps are the "most important" instrument for slightly more than one-quarter of US commodity derivative using firms while options (both OTC and exchange traded) qualify as the "most important" instrument for 9.1% of US firms.

**Figure 8: Preference over Commodity Derivative Instruments**




## VII. Reporting and Control Issues

In this section we compare and contrast the internal policies of US and German firms regarding their derivative use. Specifically, we examine the reporting issues, counter party and credit risk issues and derivative valuation risk measurement issues.

### A. Derivative Policy and Reporting

In light of the large-scale derivative disasters in 1994, in most cases where derivatives were being used for activities other than hedging, it has become common for firms to develop documented policy statements regarding their use of derivatives to prevent such disasters from occurring in their firm.

Table 6 reports the frequency of a documented policy with respect to derivatives for US and German firms. Overall the total proportion of derivative using firms with documented policies is similar across the two countries, at around 80 percent. Across the size groups there is no consistent pattern in the responses. It appears that smaller US firms are more likely to have a documented policy than are smaller German firms, whereas the pattern reverses as the firms get larger. Among the very largest of derivative users, US firms unanimously indicate having a documented policy while all but 2 of the 27 largest German firms indicate the existence of such a policy.

**Table 6: Documented Policy with Respect to Derivatives by Size**

| | USA | Germany |
|---|---|---|
| All Firms | 80.4% | 81.6% |
| > $6.6b sales | 100.0% | 92.6% |
| $6.6b - $3.3b | 68.4% | 94.1% |
| $3.3b - $1.7b | 75.0% | 85.7% |
| $1.7b - $667m | 86.2% | 71.4% |
| < $667m sales | 61.9% | 50.0% |

In addition to inquiring about a corporate policy regarding derivative use, we also asked about how frequently derivatives activity is reported to the board of directors for US firms and to the board of executive directors (Vorstand) as well as to the supervisory board for German firms.[26] Table 7 indicates that whereas in the US where a majority of firms tend to report only as needed to the board of directors, German firms are much more likely to have a set and frequent schedule of reporting to the board of executive directors and to the supervisory board. In fact, a majority of the German derivative using firms reports derivatives activity to the executive board at least as frequently as once a quarter. It is not uncommon that those reports are made on a weekly basis. The German questionnaire in addition asked for the frequency of reporting to the chief financial officer (CFO) being a member of the board of executive directors in many instances. At least monthly reporting is standard practice with more than 80% of the German derivative using companies. More than 30% even report daily to the CFO.

**Table 7: Frequency of Reporting Derivatives Activity**

| | **Monthly** | **Quarterly** | **Annually** | **As needed** |
|---|---|---|---|---|
| **USA** | | | | |
| Board of Directors | 3.5% | 24.6% | 21.1% | 50.9% |
| **Germany** | | | | |
| Chief Financial Officer | 80.2% | 7.0% | 1.2% | 11.6% |
| Board of Executive Directors | 35.3% | 27.9% | 14.7% | 22.1% |
| Supervisory Board | 8.1% | 30.6% | 32.3% | 29.0% |

[26] The German supervisory board only consists of non-executive directors. Depending on size and industry up to 50% of the supervisory board members are appointed by the workers and at least 50% are appointed by the shareholders. In situations of conflict the chairman of the board - always a representative of the shareholders - has a double vote. For a description of

### B. Counter Parties for Derivative Transactions

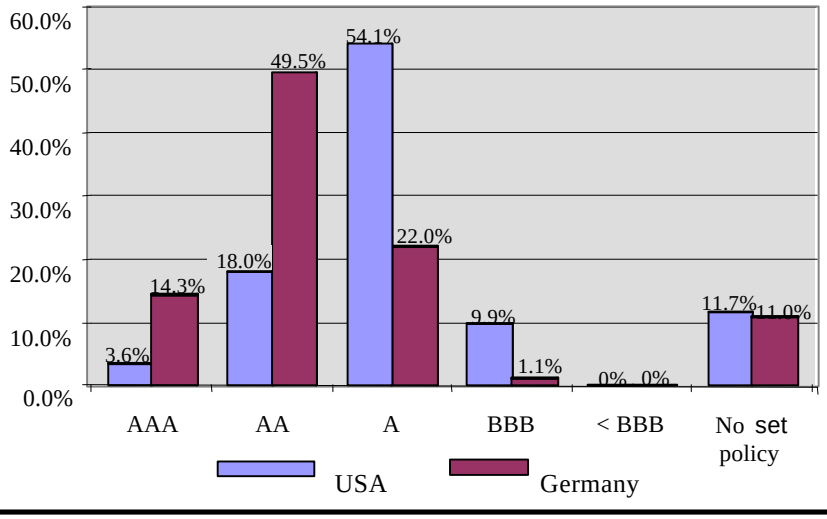
Another question about corporate policy regarding derivatives use is whom firms decide to purchase derivatives from or sell derivatives to. Firms in both countries were asked to rank the importance of commercial banks (for German firms this was broken down between domestic universal banks and foreign commercial banks), investment banks, special purpose vehicles (AAA rated subsidiaries), insurance companies, exchanges, or others. The pattern of responses suggested that while firms in both countries rely most heavily on commercial banks (universal banks in Germany), US firms are much more diversified in the use of alternative sources for derivative transactions than German firms are.

Commercial banks are the primary source for derivative transactions for 92.7% of US firms and universal banks are the primary source for derivative transactions for 83.4% of German firms. 18.4% of German firms also indicated that foreign commercial banks were a primary source for derivative transactions. US firms were much more likely to indicate investment banks as an important source of derivative transactions with 79.1% ranking them as either a primary or secondary source of derivative transactions. In contrast, over half of German firms indicated that they never used investment banks as a derivative counter party. Finally, US firms use insurance companies and exchanges more intensively for derivative transactions than German firms, with over 30% of US firms identifying these sources as either primary or secondary whereas less than 10% of German firm indicated similarly.

### C. Counter Party Risk

Another issue relating to corporate control policies regarding derivative usage is whether the firm has a policy regarding the creditworthiness of the counter parties it enters into derivative instrument contracts with. To

**Figure 9: Lowest Rated Counter Party for Derivative Transactions**




the German board system see *Edwards/ Fischer (1994)*, p. 75-79.

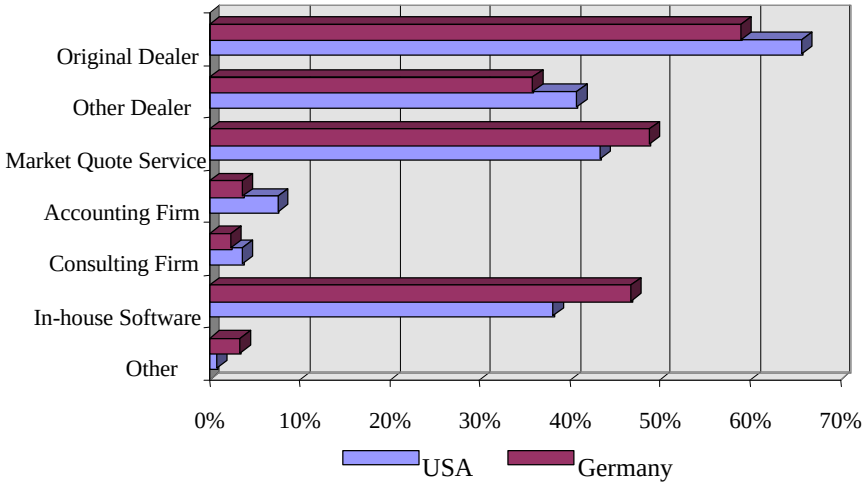
this end the firms were asked if they had such a policy and, if so, to indicate the lowest rated counter party that their corporate policy would allow then to enter a derivative transaction with. The responses to this question for derivatives of less than one year in maturity are displayed in Figure 9. For both countries, nearly 90% of firms had a policy regarding the creditworthiness of derivative counter parties. However, there is a stark difference in the minimum credit rating required by German firms versus US firms. Whereas the majority of US firms indicate that they are satisfied with counter parties that possess a single A or lower credit rating, the majority of German firms indicate that they require counter parties to have a credit rating of AA or higher. In response to the same question for derivatives with maturity longer than one year, the relative pattern of responses was very similar, although the mass of the distribution was uniformly shifted upward. In this case, nearly two-thirds of US firms required counter parties with a credit rating of AA or better while this was the requirement of fully 80% of the German firms.

Such a greater emphasis on counter party worthiness on the part of German firms is consistent with their significantly lower concern with credit risk on derivative transactions as discussed above in Section III.C. Alternatively, the lower counter party creditworthiness requirement of US firms may reflect the fact that in the early 1980, there were very few major US banks that possessed better than a single A credit rating. US firms wishing to do derivative transactions as part of their general banking activities with US banks had to settle for lower rated counter parties. Nonetheless, it is the case that firms in both countries worry more about counter party risk for longer dated transactions.

### D. Measuring Derivatives Value and Riskiness

Over the past few years, US regulatory authorities have begun requiring that firms disclose information about the current market value of their derivative positions. In Germany currently there exists no comparable

**Figure 10 : Sources of Derivative Values**



regulation but a considerable number of German firms voluntarily provides such information.[27] In addition, many firms value their derivatives at regular intervals as part of their corporate control over derivative usage. To examine this aspect of the control process across US and German firms, we asked three questions. We first asked firms to identify the source they used for valuing their derivatives, choosing among several outside sources or in house software. We next asked firms how frequently such valuations were done as part of corporate policy. Finally, we inquired about the methods firms used to evaluate the riskiness of their derivative positions.

Figure 10 displays the responses to the first question. The general pattern of responses between US and German firms is very similar. Firms of both countries tend to use some combination of derivative dealers, market quote services, or in-house software most intensively to value their derivatives. The use of third party experts such as accounting firms or specialized consulting firms was not common in either country. There is a slight difference in the pattern of responses in that fewer German firms use derivative dealers to value the derivatives and are more likely to value them internally, using either prices from a market quote service and/or their own in-house software. Such a pattern is consistent with one of the differences highlighted above in that German firms tend to be more intensive users of less complex derivative instruments, such as forwards, which are simple for the firm to value in-house using market prices.

**Table 8: Frequency of Derivative Valuations**

| | USA | Germany |
|---|---|---|
| Daily | 16.9% | 26.0% |
| Weekly | 8.5% | 19.8% |
| Monthly | 35.6% | 28.1% |
| Quarterly | 17.8% | 4.2% |
| Annually | 4.2% | 5.2% |
| As needed/ No schedule | 16.9% | 16.7% |

Table 8 displays the frequency of derivative valuations by US and German firms. In both countries, approximately 83% of responding firms have a specified frequency within which they value their derivatives. However, as might be expected based upon the responses to the reporting on derivative usage to the Board of Directors question displayed in Table 7, German firms value their derivative portfolios more frequently than US firms. Whereas the majority of German firms with a set frequency for revaluing derivatives do so at least weekly, the majority of US firms do so on a monthly, or quarterly basis. Just a small percentage of firms in both countries value their derivative on only an annual basis.

Finally, we asked firms to indicate their usage of a variety of common methods to evaluate risk of a derivative position, such as value-at-risk, stress testing, calculating option sensitivity measures such as delta, gamma, and vega, and duration measures.[28] The results suggested that firms in both countries were equally sophisticated in the techniques they used to evaluate the riskiness of their derivative positions. Stress testing derivatives is the most common choice, used by more than 45% of the derivative users in both countries. Value-at-

[27] See *Gebhardt (1997),* p. 391-397 .

[28] For a discussion of these risk measures see *Smithson/ Smith/ Wilford (1994),* p. 474-484 and *Jorion/ Khoury (1996),* p. 73-233.

risk is the second most popular technique, followed closely by duration methods (for interest rate derivatives). Option sensitivity measures are the least common technique with approximately 20% of the firms in either country indicating use of this approach. For firms that take a more transaction-by-transaction approach it is not obvious that there are enough benefits to be expected from using more advanced risk measurement approaches.

## VIII. Conclusions

This paper presents a comparison of the responses to parallel surveys on derivative usage conducted on comparable samples of US and German non-financial firms. The results of this comparison suggest that firms in both countries primarily use derivatives to manage risks from fluctuating financial prices. Given the responses, German firms are more likely to use derivatives than US firms, across all three classes of derivatives examined. This is consistent with Germany being a smaller more open economy, leading to greater exposure of its firms to financial price risk, especially foreign exchange rates and commodity prices.

Notably, the general pattern of usage across industry and firm size is very comparable for the two countries. This suggests that the determinants of derivative use are primarily driven by economic considerations such as activities and firm characteristics and not the result of corporate culture or other country-specific differences.

In contrast, firms across the two countries differed noticeably on such issues as their primary the goal derivatives use, their choice of particular instruments in each derivative class, and the influence of their own view of the market when taking their derivative positions. Firms in the two countries differ with respect to the primary focus of risk management with derivatives, with German firms focusing more on managing accounting results and US firms focusing more on managing cash flows. This result is consistent with the greater importance of the financial accounting statements in Germany (where they also act as the basis for taxation) relative to the US (where they are purely to provide information to investors). German firms are more likely to incorporate their own view on price movements when taking derivative positions than US firms. Also German firms indicate a significantly level lower of concern about issues related to derivatives than US firms. This appears to be partially a result of stricter policies of control over derivatives activities within the firm.

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