

Corporate foreign exchange speculation and integrated risk management

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Abstract

The purpose of this paper is to investigate how non-finance departmental involvement in the management of exchange rate risks impacts the extent of foreign exchange speculation in non-financial firms. We survey non-financial firms in a small open economy (Denmark) to investigate the extent of foreign exchange speculation and how it is related to the degree of non-finance departmental involvement in the management of exchange rate risks. We employ binary and ordered probit regression analysis. We find a positive link between 1) the extent to which other departments than the finance department is involved in the management of exchange rate risks and 2) the extent to which the firm is likely to speculate – whether in the form of selective hedging or active speculation – on the foreign exchange market. Our findings indicate that the trend towards a more integrated risk management approach in which the finance department is not the only department responsible for risk management may have the (unforeseen) consequence that foreign exchange speculation increases. The findings are important because the link between the extent of foreign exchange speculation and a more integrated risk management approach has not been addressed previously.

Keywords Exchange rate exposure management, Selective hedging; Active speculation;
Non-finance departmental involvement, Integrated risk management

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1. Introduction

In a corporate risk management framework, speculation is the extent to which financial positions are established based upon the firm's own view or forecast of future market prices. Current financial theory does not provide a consensus on the optimal hedge ratio and as such any view that can have an impact on hedging behaviour can be regarded as speculative (Brown, 2001). Despite the spread of the efficient financial markets doctrine, there is an abundance of managers who are convinced of their own ability to predict future interest rates, exchange rates, and commodity prices (Stulz, 1996). In addition, the desire to gamble is deeply rooted in the human psyche (Kumar, 2009), raising the possibility that managers would often choose to take speculative positions.

Stulz (1996) argues that speculative actions by firms are only rational in the case of financially distressed firms near bankruptcy (when managers choose to add risk at the expense of debt holders) or in the case of firms with specialized information (e.g. a major producer or consumer of a specific commodity). According to Stulz (1996), there is no reason for mainstream firms that are not in financial distress to speculate. This conclusion is supported in an inter-temporal model by Kuersten and Linde (2011) who show that risk-shifting is only relevant for firms in financial distress. Furthermore, as noted by Brown et al. (2006), non-financial firms are unlikely to have superior information in the highly liquid markets for foreign exchange. Thus, for the majority of firms, speculation is a zero-sum game at best and in most cases a value reducing game for the exact same reasons that various market imperfections are argued to make foreign exchange hedging value increasing for non-financial firms – e.g. reduce financial distress (Levi and Sercu, 1991), increase ability to make value-adding investments

(Froot et al., 1993), reduce taxes (Smith and Stulz, 1985), and protect non-diversified shareholders and stakeholders (Wang et al., 2003).

The underlying motivation for this paper is 1) anecdotal and survey evidence of corporate foreign exchange speculation (e.g. Géczy et al., 2007) and 2) the increasing focus on an integrated risk management approach (Meulbroek, 2002; Miller, 1998; Nocco and Stulz, 2006; Simkins, 2008; among others). The integrated risk management approach is a departure from the traditional, “silo based” risk management (e.g. Lessard and Zaheer, 1996) in which management of specific risks is allocated to specific departments without a coherent framework and strategy for handling risks across the firm. Belk (2002) finds foreign exchange rate risk management primarily to be the preserve of the treasurer. The purpose of this paper is to contribute to the existing literature by investigating the link between 1) the extent of foreign exchange speculation in non-financial firms and 2) the non-finance departmental involvement in the management of exchange rate risks. Thus, the research question is:

“Does the involvement of non-finance departments in the management of exchange rate risks increase or decrease the extent to which the firm selectively hedges and actively speculates on the foreign exchange markets?”

We use the survey approach in order to strike a balance between the benefits and problems of large sample analysis and clinical studies (Graham and Harvey, 2001) and to overcome the constraints imposed by limited information on speculation in publicly available financial statements (Géczy et al., 2007). Thus, information from annual accounts is insufficient to distinguish adequately between

speculation and hedging. No firms explicitly admit speculation while many firms state that they are not speculating.

Our results are based on a questionnaire survey and the responses of 186 medium-sized and large non-financial Danish firms with foreign operations. We focus on medium-sized and large firms because they are large enough to have a minimum of financial expertise (thus excluding small firms) and they generally lack the geographically well-diversified production and sales network of very large firms (thus excluding very large firms) thus making medium-sized and large firms particularly exposed to changes in exchange rates. Denmark is a small, open (exports plus imports equals GDP) economy with its currency, Danish Krone (DKK), pegged to the Euro. Denmark's three main trading partners are Germany (Euro), Sweden (Swedish Krona), and the U.K. (British Pound).

We find that selective hedging and active speculation is enhanced by the involvement of non-finance departments in the management of exchange rate risks. Three quarters of the firms with foreign operations take a view / make a forecast of exchange rates that causes their firm to 1) alter the timing of hedges, 2) alter the size of hedges, and/or 3) actively take positions in currency derivatives or issue debt in foreign currency. The larger the involvement of non-finance departments in the management of exchange rate risks, the more the firm speculates both in terms of selective hedging (alter timing and size of hedges) and in terms of active speculation. Such speculative activities are also positively related to the size of the firm and the international involvement of the firm but unrelated to profitability, capital structure and the economic sector to which the firm belongs.

Our study contributes to the existing literature by explicitly analyzing the impact on selective hedging and active speculation of non-finance departments' involvement in the management of exchange rate risks. Such analysis is especially important given the increased focus on an integrated risk management perspective in which the finance department does not bear the sole responsibility for managing the risks – including foreign exchange risks – that face the firm. Furthermore, our study replicates previous studies that focus on non-financial firms and confirms the existence of widespread foreign exchange speculation also in the case of Danish non-financial firms. Géczy et al. (2007) note that the existing theoretical and empirical literature presents an abundance of evidence about why firms should, and do, use derivatives to hedge, but little about firms' speculative use of derivatives. To the best of our knowledge, no other studies have related the extent of foreign exchange speculation to integrated risk management.

The paper proceeds as follows. The next section provides a short review of the literature on foreign exchange speculation by non-financial firms. The third section explains the methodology of the study. The fourth section lists descriptive statistics and reports survey results on foreign exchange speculation and non-finance departmental involvement in the management of exchange rate risks. The fifth section analyzes the relationship between foreign exchange speculation and such non-finance departmental involvement through univariate and multivariate regression analysis. The last section concludes.

2. Literature review

One of the most cited surveys on exchange rate exposure management in non-financial firms is the “Wharton Survey of Financial Risk Management” by Bodnar et al. (1998) on U.S. firms. Bodnar et al.

find that derivatives usage is higher in large firms than small firms, is concentrated at the short horizon, and that a majority of the firms incorporate their own view of the market. Bodnar et al. note that *“although financial research has suggested that it is virtually impossible to outperform the expectations of future rates embedded in the market rates, financial managers have typically found it difficult to avoid letting their own view of the currency market affect their risk-management activities”*. In a comparative study, Bodnar and Gebhardt (1999) find that German firms of the same size and industry classification as their US counterparts are more likely to use foreign exchange derivatives and are more inclined to let their market view 1) alter timing or size of hedges and 2) lead to active position taking.

Exchange rate movements are thought to affect the value of non-financial firms but empirical studies have difficulties verifying this effect. Bartram and Bodnar (2007) argue that this exposure puzzle may simply reflect the fact that empirical studies estimate exchange rate exposures net of corporate hedging. However, the results of derivatives usage on firm value are mixed (e.g. Allayannis and Weston (2001) and Adam and Fernando (2006) for positive results and Jin and Jorion (2006) for insignificant results). As noted by Fauver and Naranjo (2010), the use of derivatives for speculative purposes may explain why the results of derivatives use on firm value are mixed. Stulz (1996) calls the practice of letting a view of exchange rates influence hedge ratios “selective” hedging (alteration of the size or the timing of a hedge) and notes that such selective hedging is more popular than “naked” speculative positions (active position taking). Géczy et al. (2007) define the firms that actively take positions as speculators but does not view selective hedging as speculation. This more narrow definition of speculation is consistent with the type of speculation that concerns regulators and the public. Furthermore, a broader definition of speculation that includes selective hedging, would allow “confusion about whether *not*

hedging is a form of speculation”. Géczy et al. find that speculation is positively related to size, low leverage, operating revenues in foreign currency, operating costs in foreign currency, and tangible operations located in foreign countries. However, supporting a more broad definition of speculation Brown (1) notes that current financial theory does not provide a consensus view on optimal hedge ratios. Thus, any impact of views of future exchange rates on hedging behavior can be viewed as speculative. Given the controversy about the most appropriate definition of speculation, we will employ a broad measure (selective hedging *and* active speculation) as well as a more narrow measure of speculation (active speculation) in our study.

Stulz (1996) states two situations in which speculation is rational: 1) financially distressed firms near bankruptcy and 2) firms with a comparative advantage in terms of market information. Brown et al. (2006) note that non-financial firms are unlikely to have superior information in the highly liquid markets for foreign exchange, and therefore speculation in foreign exchange markets by non-financial firms is only rational for firms close to bankruptcy. Since the majority of firms are not close to bankruptcy, rational behavior focusing on maximizing shareholders’ wealth cannot explain why so many mainstream non-financial firms around the world speculate on the foreign exchange markets as evidenced by numerous authors (Aabo, 2007; Bodnar et al., 1998; Dolde, 1993; Glaum, 2002; Géczy et al., 2007, among others). Adam Smith (1776) suggests a reason for non-rational speculation: “*The overweening conceit which the greater part of men have of their own abilities is an ancient evil remarked by the philosophers and moralists of all ages. Their absurd presumption in their own good fortune has been less taken notice of. It is however, if possible, still more universal.*” In this line of reasoning, Géczy et al. (2007) argue that a major motivation behind speculation is the belief that it is profitable.

3. Methodology and hypotheses

This study is based on public information from WEB-DIRECT (a database from Experian A/S containing information on Nordic firms including information on some 630,000 Danish firms) and on responses to questionnaires sent to Danish medium-sized (and large) non-financial firms. We exclude subsidiaries of foreign corporations and define “medium-sized” as firms fulfilling two criteria: 1) a balance sheet total from DKK 75 million to DKK 750 million (EUR 10 million – EUR 100 million) and 2) a number of employees from 50 to 499. The European Commission defines medium-sized firms as firms that have a headcount from 50 to 249 employees, and either a turnover from EUR 10 million to EUR 50 million or a balance sheet total from EUR 10 million to EUR 43 million. As can be seen, our definition of medium-sized firms is broader in the upper end – that is we focus on medium-sized and large firms but exclude the very large firms. We exclusively use figures on balance sheet total as many of our target firms do not report figures for their turnover. We focus on non-financial firms; that is we exclude firms with a NACE industry code beginning with the letter “K”. Furthermore, we restrict the number of firms to unlisted firms (few medium-sized firms are listed) that are private limited companies with accounting numbers available. Finally, for simplicity we exclude NACE economic sectors that have less than 20 firms after the implementation of the before-mentioned selection criteria. The total number of firms in our population is 1055 firms divided into seven NACE economic sectors as shown in Table 1.

* Please insert Table 1 approximately here *

These 1055 firms were contacted in the last quarter of 2008 via email and asked to complete an online, web-based questionnaire. Personalized e-mails with the specific name of the financial director were sent to 859 firms (81%), e-mails addressed generally to the financial director were sent to 165 firms (16%), e-mails through the web page of the firm were sent to 17 firms (2%), and for 14 firms (1%) no email address could be found and no attempt was made to contact these firms by alternative means. An invitation e-mail and a maximum of 4 follow-up e-mails were sent to the firms. 368 firms chose to participate in the survey reaching a response rate of 35 percent (Table 1). The response rates vary from 31 percent to 54 percent across the seven NACE economic sectors. Three minor NACE sectors (F, M, and N) have a significantly higher response rate than the population as a whole. In terms of size (number of employees and total assets), profitability (return on equity), and capital structure (solvency ratio) there is no significant non-response bias. All in all, the sample seems to be representative for Danish medium-sized (and large) non-financial firms.

The first question in the Questionnaire (please refer to the Appendix) divides firms into firms that have operating revenues, operating costs, operating assets, and/or financial debt in foreign currency (= firms with foreign operations) and firms that have none of these items in foreign currency (= firms without foreign operations). Based on the above criteria, 186 firms (51%) out of the 368 participating firms have currency exposure and 182 firms (49%) do not have foreign operations (Table 1). Firms from the first group were asked to proceed with the questionnaire while the latter group was excluded from answering further questions. Manufacturing (C) has the highest percentage of firms with foreign operations (71%) while Construction (F) has the lowest percentage (18%). Service sectors (G, H, J, M and N) are between these two extremes in terms of percentage of firms with foreign operations. Our focus is on the 186 sample firms with foreign operations. Even purely domestic firms may be exposed

to changes in exchange rates through competitive effects (Aggarwal and Harper, 2010) but we choose to focus on the firms for which foreign exchange exposure is more direct.

We state two competing hypotheses on how the extent of speculation will be impacted by non-finance departmental involvement in the management of foreign exchange risks. Following Smith (1776), we expect speculation in non-financial firms to be primarily driven by an irrational belief in a comparative information advantage and in good luck. The question then is whether such an irrational belief will be strongest among “experts” in the finance departments or among “non-experts” in the non-finance departments.

One line of reasoning is that the experts in the finance department in fact believe (not justified) that they are experts with a comparative information advantage as opposed to the non-experts in non-finance departments who know little about foreign exchange markets. This line of reasoning supports a negative relationship between speculation and non-finance departmental involvement because the involvement of managers from other departments will “put a lid” on the speculative behavior of the finance manager.

An alternative line of reasoning is that the experts in the finance departments actually realize that they do not have superior information but that the non-experts in the non-finance departments do not realize their own limitations and do not realize the liquidity and efficiency of the foreign exchange markets. Such reasoning supports a positive relationship between speculation and non-finance departmental involvement and is in line Kumar (2009) who finds that “poor, young, less educated single men who live in urban areas, undertake non-professional jobs, and belong to specific minority groups” are more

likely to gamble in the stock market. Furthermore, Barsky et al. (1997) find that people's risk-taking propensity in one setting is positively correlated with risky behavior in other settings. Non-finance managers are primarily confronted with markets (markets for raw materials, semi-manufactured goods, and finished goods) that do not resemble the foreign exchange markets in terms of depth and liquidity and for which some qualified guessing as to the future development of prices may make sense. Non-finance managers are paid to have an opinion on these markets and may transfer this attitude to the foreign exchange markets (a spill-over effect).

Thus, our two competing hypotheses are:

- 1) The involvement of non-finance departments in the management of exchange rate risks *decreases* the extent to which the firm selectively hedges and actively speculates on the foreign exchange markets.
- 2) The involvement of non-finance departments in the management of exchange rate risks *increases* the extent to which the firm selectively hedges and actively speculates on the foreign exchange markets.

Descriptive statistics for our sample firms together with survey data for the degree of foreign exchange speculation and the involvement of non-finance departments in the management of foreign exchange risks are provided in the next section. Subsequent regression analysis is performed using binary and ordered probit regression analysis where the dependent variable is speculation versus non-speculation (binary) or the degree of speculation (ordered). Standard introductory discussion of these models can be found in Greene (2008). In the binary model, the dependent variable may take on only two values, 0 or 1, while in the ordered model the dependent variable may take more than two values. Estimation is

undertaken by maximum likelihood. Our models are (standard) probit models. The interpretation of the coefficient values is complicated by the fact that the estimated coefficients cannot be interpreted directly as the so-called marginal effect on the dependent variable. However, the sign of the coefficient is less ambiguous and because our focus is on the direction rather than the magnitude, we abstain from calculating marginal effects.

4. Speculation and non-finance departmental involvement

Table 2 reports descriptive statistics for the 186 firms (Table 1) in our sample. The average (median) firm has total assets of DKK 222 million (DKK 173 million); a return on equity, ROE, of 16 percent (18 percent); a solvency ratio (equity/total assets), SOL, of 37 percent (30 percent); a percentage of operating revenues in foreign currency, FREVENUE, of 49 percent (50 percent); a percentage of operating costs in foreign currency, FCOST, of 34 percent (30 percent); and 3 (1) foreign countries in which the firm has subsidiaries.

* Please insert Table 2 approximately here *

In subsequent regression analysis we use the number of foreign countries in which the firm has subsidiaries as one of our internationalization measures. Alternatively we could have used the number of foreign subsidiaries (irrespective of country) as an internationalization measure. In our sample the two measures are close to being identical (correlation coefficient of 0.99 for the logarithmic version of the two measures) and the conclusions of subsequent regression analysis are not affected by our choice.

Table 3 (Panel A) shows the degree of foreign exchange speculation by the sample firms. Following the structure of Bodnar et al. (1998), corporate speculation in foreign exchange markets basically takes three forms: 1) Alter the timing of hedges, 2) Alter the size of hedges, and 3) Actively take positions in currency derivatives or issue debt in foreign currency.

* Please insert Table 3 approximately here *

The first two categories of speculation are referred to as selective hedging (Stulz, 1996) while the latter category represents active speculation that is not related to specific hedge positions. As discussed earlier, Géczy et al. (2007) define a firm as a speculator based on an active position in the foreign exchange markets and do not regard an alteration of the timing or size of a hedge as properly indicating speculation. Given the ambiguity as to the proper definition of speculation, we use two measures of speculation – a broad measure (SPECALL) following Bodnar et al. (1998) and a narrow measure (SPECACT) following Géczy et al. (2007) – as shown in Table 3 (Panel B).

The first measure of speculation, SPECALL, incorporates all three categories of speculation and is an ordered variable with integer values ranging from 1 to 7 where 1 represents absolutely no selective hedging or active speculation and 7 represents a situation where the firm often alters the timing of hedges, often alters the size of hedges, and often actively takes positions in currency derivatives or issues debt in foreign currency because of the firm's view / forecast of exchange rates. According to this broad definition of speculation, 76 percent of the firms are speculators.

The second measure of speculation, SPECACT, is restricted to the active speculation element and is an ordered variable with integer values ranging from 1 to 3 where 1 represents absolutely no active speculation and 3 represents a situation where the firm often actively takes positions in currency derivatives or issues debt in foreign currency because of the firm's view / forecast of exchange rates. According to this narrow definition of speculation, 66 percent of the firms are speculators.

Table 4 shows the involvement of various departments in the management of foreign exchange risks (Panel A) and two measures of non-finance departmental involvement in such management (Panel B). As illustrated in Panel A, the sales and the production department are the departments most likely to be involved in the management of exchange rate risks.

* Please insert Table 4 approximately here *

Table 4 (Panel B) shows two measures, DEPINVOL1 and DEPINVOL2, of non-finance departmental involvement in the management of foreign exchange risks. The first measure, DEPINVOL1, is an ordered variable with integer values ranging from 1 to 9 where 1 represents absolutely no non-finance departmental involvement in the management of foreign exchange risks and 9 represents a situation where all four non-finance departments are involved regularly in the management of foreign exchange risks. As can be seen from this non-finance departmental involvement measure, few firms place themselves on the extreme ends of the scale which indicates a certain involvement of non-finance departments when managing foreign exchange risks.

It is unlikely that all firms in our sample are structured in a way corresponding to the implicit assumptions of Table 4 (Panel A) in terms of departments. Thus, marketing may be an integral part of the sales department and purchasing may be an integral part of the production department. Our second measure of non-finance departmental involvement, DEPINVOL2, is robust to such deviations. DEPINVOL2 is an ordered variable with integer values ranging from 1 to 3 where 1 represents that non-finance departments never are involved and 3 represents that at least one non-finance department regularly is involved in the management of foreign exchange risks. As can be seen from Table 4 (Panel B), 26 firms (14%) do not involve any non-finance departments in the management of foreign exchange risks, 83 firms (45%) involve at least one non-finance department to some extent but no non-finance department regularly, and 77 firms (41%) involve at least one non-finance department regularly.

5. The impact of non-finance departmental involvement on speculation

Before addressing the impact of non-finance departments on foreign exchange speculation in a multivariate regression analysis, Table 5 compares speculators and non-speculators in terms of mean values of variables used in subsequent regressions. In Table 5, Panel A, speculators and non-speculators are grouped according to the broad measure of speculation. Thus, we compare the 45 firms that never speculate in the form of 1) altering the timing of hedges, 2) altering the size of hedges, or 3) actively taking positions in currency derivatives or issuing debt in foreign currency because of the firm's view/forecast of exchange rates with the 141 firms (26 + 24 + 37 + 18 + 12 + 24) that speculate sometimes or often in at least one of the three dimensions. In Table 5, Panel B, speculators and non-speculators are grouped according to the narrow measure of speculation (active speculation). Thus, we

compare the 64 firms that never speculate in the form actively taking positions with the 122 firms (70+52) that actively speculate sometimes or often.

* Please insert Table 5 approximately here *

Independent of our measure of speculation – broad in Panel A and narrow in Panel B - Table 5 shows that speculators are significantly larger (1 percent level), have significantly higher operating revenues (5 percent level) and costs (1 percent level) in foreign currency, have subsidiaries in more countries (1 percent level), and have more departments involved in the management of foreign exchange risks (1 percent level and 5 percent level) than non-speculators. Table 5 also shows that speculators and non-speculators – independent of our measure of speculation – do not differ significantly in terms of profitability (ROE) and capital structure (SOL). We also tested (not shown) if speculators as a group had a higher variance in their profitability (ROE) than non-speculators - a difference that could at least partly be due to speculation. We found that the group of speculators had a higher variance in their profitability than the group of non-speculators but the significance of the difference was not robust to the exclusion of outliers.

Table 5 suggests that a high degree of non-finance departmental involvement in the management of foreign exchange risks is related to a high degree of foreign exchange speculation. However, this seemingly strong relation may be caused by e.g. larger firms being more likely to adopt integrated risk management and thus having more non-finance departments involved in the management of foreign exchange risks while at the same time speculating more because of economies of scale. The

determination of whether or not there is a more direct link between the involvement of non-finance departments and foreign exchange speculation calls for a multivariate analysis.

Table 6 reports correlation coefficients between the independent variables that are used in subsequent regression tests. The three internationalization measures - FREVENUE, FCOST and FCOUNTRY - are positively correlated with correlation coefficients in the range of 0.33 to 0.45. The three internationalization measures are positively correlated with size (correlation coefficients between 0.23 and 0.28). The correlation coefficient (not reported) between the broad and narrow speculation measures, SPECALL and SPECACT, is 0.81.

* Please insert Table 6 approximately here *

We use Equation 1 below as our main model to investigate the relationship between non-finance departmental involvement in the management of foreign exchange risks and the extent of speculation in a multivariate setting. We include elements that are traditionally included in the hedging literature (size, profitability, capital structure, foreign sales ratio, and economic sector dummies) together with more elaborate measures of international involvement which our survey approach facilitates. Our main focus is on the independent variable for the degree of non-finance departmental involvement.

We expect a positive relationship between size and speculation based on the economies of scale argument (specialized personnel and information systems) and the financial distress argument (financial distress costs are proportionally higher for small firms). We expect a positive relationship between, on the one side profitability and a conservative capital structure, and on the other side

speculation based on the financial distress argument. We expect a positive relationship between various internationalization parameters and speculation. Per definition, hedges are related to the underlying business and as such altering the size or the timing of a hedge is almost bound to be related to the international involvement of the firm. For active speculation the relationship is not as straightforward but to the extent that international involvement increases the perceived information advantage, we expect a positive relationship in this regard as well. We do not have any particular expectations in relation to the impact on speculation from various economic sectors.

The following ordered probit regression is analyzed:

$$\begin{aligned}
 SPECALL_i = & \beta_1 TA_i + \beta_2 ROE_i + \beta_3 SOL_i + \beta_4 FREVENUE_i + \beta_5 FCOST_i \\
 & + \beta_6 FCOUNTRY_i + \beta_7 DEPINVOL1_i + \beta_8 SectorDummy_i + \omega
 \end{aligned} \tag{1}$$

where:

SPECALL is an ordered variable measuring the extent of speculation by 1) altering the timing of hedges, 2) altering the size of hedges, or 3) actively taking positions in currency derivatives or issuing debt in foreign currency because of the firm's view/forecast of exchange rates with 1 = 3 times "Never", 2 = 2 times "Never" and 1 time "Sometimes" ... and 7 = 3 times "Often". Alternatively *SPECACT* is used.

TA is the logarithm of total assets of the firm measured in million DKK.

ROE is the net result of the firm divided by the equity of the firm.

SOL is the equity of the firm divided by the total assets of the firm.

FREVENUE is the percentage of the firm's consolidated operating revenues in foreign currency.

FCOST is the percentage of the firm's consolidated operating costs in foreign currency.

DEPINVOL1 is an ordered variable measuring non-finance departmental involvement in the management of foreign exchange risks with 1 = 4 times “Never”, 2 = 3 times “Never” and 1 time “Involved to some extent” ... and 9 = 4 times “Involved regularly”. Alternatively *DEPINVOL2* is used.

SectorDummy is economic sector dummy for Construction (F), Wholesale and retail trade (G), Transporting and storage (H), Information and Communication (J), Professional, scientific and technical activities (M), and Administrative and support service activities (N), respectively. Manufacturing (C) is default.

ω is the error term.

Table 7 reports results of ordered (Models 1, 2, 3 and 4) and binary (Model 5) probit regression analysis. The dependent variable for the first four models is the broad speculation measure, *SPECALL*.

* Please insert Table 7 approximately here *

Model 1 in Table 7 represents the traditional model and only includes the most widely used internationalization measure – the percentage of the firm’s operating revenues in foreign currency (*FREVENUE*). Model 1 shows that speculation on the foreign exchange markets is positively related to size and to the internationalization of the firm. Model 2 extends the measurement of internationalization by including the cost side (*FCOST*) and the geographical dispersion of foreign subsidiaries (*FCOUNTRY*). When these new and more detailed measures of internationalization are included, the traditional measure of internationalization (*FREVENUE*) loses its significance, while the two new measures both show statistical significance. Model 3 includes the measure of non-finance

departmental involvement in the management of foreign exchange risks (DEPINVOL1). This new measure is highly significant. Overall, Model 3 suggests that speculation is positively related to 1) the size of the firm, 2) the internationalization of the firm in the form of costs in foreign currency and the number of foreign countries in which the firm has subsidiaries and 3) the degree to which non-finance departments are involved in the management of foreign exchange risks.

Models 4 and 5 in Table 7 are robustness tests of our non-finance departmental involvement measure (Model 4) and our speculation measure (Model 5) respectively. Model 4 is identical to Model 3 except that instead of using the more detailed involvement measure, DEPINVOL1, it uses the more crude involvement measure, DEPINVOL2. As explained previously, the latter involvement measure is less sensitive to the specific departmental structure of the firm. Model 4 confirms the significant impact of non-finance departmental involvement on the extent of speculation. Model 5 is equivalent to Model 3 except that the dependent variable, SPECALL, is transformed from an ordered variable to a binary variable, SPECALLBI. Thus, Model 5 represents a crude version of Model 3 in which no attempt is made to measure the degree of speculation. Model 5 confirms the significant role of non-finance departmental involvement.

The independent variable in Table 7 is the broad measure of speculation. As previously discussed, there is some controversy as to the extent to which selective hedging can be classified as speculation. Table 8 reports results of ordered (Models 1, 2, 3, and 4) and binary (Model 5) probit regression analysis on specific elements of foreign exchange speculation for the 186 sample firms. The first three models divide speculation into its three elements. The dependent variables in Models 1, 2 and 3 are ordered variables with integer values ranging from 1 (“Never”) to 3 (“Often”) measuring the degree to which the

firm alters the *timing* of hedges (SPECTIME), alters the *size* of hedges (SPECSIZE), and *actively* takes positions (SPECACT), respectively,. SPECACT is identical to our narrow speculation measure.

* Please insert Table 8 approximately here *

Table 8 shows that all three elements of speculation are positively and statistically significantly related to the size of the firm and the involvement of non-finance departments in the management of exchange rate risks. The internationalization measures - in the form of costs in foreign currency and the number of countries in which the firm has subsidiaries – are primarily related to selective hedging (altering the size and timing of hedges). This makes intuitive sense because selective hedging is by construction related to the internationalization of the firm since a hedge can – by definition – only be established if there is an underlying exposure.

Following the structure and argumentation of Table 7, Models 4 and 5 in Table 8 serve as robustness tests of our non-finance departmental involvement measure (Model 4) and our speculation measure (Model 5). Model 4 confirms the significant impact of non-finance departmental involvement on the extent of active speculation. Model 5 is identical to Model 3 except that the dependent variable, SPECACT, is transformed from an ordered variable to a binary variable, SPECACTBI. Thus, Model 5 represents a crude version of Model 3 in which no attempt is made to measure the degree of active speculation. In this model, the coefficient for our non-finance departmental involvement measure turns insignificant. However, if we – again for robustness – combine Model 5 with our alternative non-finance departmental involvement measure, DEPINVOL2, the coefficient for this measure is significant at the 10 percent level (not shown). Overall, the robustness tests show that our main

conclusions do not seem to be unduly distorted by extreme observations or to be dependent on very specific definitions of our main variables.

To summarize, the analysis on the impact on the extent of corporate foreign exchange speculation of non-finance departmental involvement in the management of exchange rate risks shows that the more non-finance departments are involved in the management of exchange rate risks, the more the firm speculates – regardless of whether we measure speculation in its broad definition (Model 3, Table 7), its narrow definition (Model 3, Table 8), or the two elements of selective hedging (Models 1 and 2, Table 8). In all these four models, the coefficient of the variable measuring non-finance departmental involvement in the management of exchange rate risks is statistically significant at the 1 or 5 percent level. Robustness tests confirm the important link between non-finance departmental involvement and the extent of speculation.

The univariate tests in Table 5 and the multivariate tests in Tables 7 and 8 uniformly and strongly indicate that speculation is subject to economies of scale (TA). The positive relation between size (TA) and speculation could alternatively be interpreted as a result of disproportionately higher financial distress costs for smaller firms. However, the financial distress argument is not confirmed in terms of profitability (ROE) and capital structure (SOL).

We also investigated the possibility that "pressure" on managers may lead to more speculation: in situations where the firm's management feels the need to "buck a trend", i.e. turn around a recent poor performance, those that are less able to correctly assess the true risk of foreign exchange speculation may trigger speculative behavior. However, we find no statistical support for this reasoning. When

introducing interaction terms of "pressure" proxies (i.e. SOL and ROE) with DEPINVOL in our main regressions (Table 7, Model 3 and Table 8, Model 3) the coefficients of these interaction terms are far from statistically significant. Thus, we find no support that the impact of "pressure" proxies on the non-finance departmental involvement effect on speculative behavior is important.

To some extent, one may argue that the relationship between profitability and capital structure on the one side and speculation on the other side should be non-linear following the reasoning of Stulz (1996). Thus, financially distressed firms near bankruptcy (very low ROE and SOL) should speculate; mainstream firms (medium ROE and SOL) should not speculate for the exact same reasons that they should consider hedging; very profitable and solvent firms (high ROE and SOL) should not fear financial distress and speculation is thus a zero-sum game and should not necessarily be avoided. However, we have no reason to believe that our sample firms include 1) many firms that are risk-seekers because they are very close to bankruptcy or 2) many firms that are financially so solid that they see financial distress costs as an almost unimaginable phenomenon.

The analysis indicates that the traditional measure of internationalization in the form of the foreign sales ratio is not adequate for fully capturing the complexity of the firms' international involvement and their propensity to speculate on the foreign exchange markets. Thus, speculation in the form of selective hedging seems to be more related to operating costs in foreign currency and foreign subsidiaries than to operating revenues in foreign currency. One explanation could be that sourcing from a country and especially having a physical presence (subsidiary) in a country enforce the belief of superior information about the country and its currency compared to the information gained from pure export activities.

In line with the “pressure” argument before, we also investigated the possibility that "comfort" at the part of managers may lead to more speculation: in a situation where the firm has operational hedges in place, speculation is more likely because of the (false) impression that it is done from a safe position. This could be exacerbated when more decision makers are not able to assess the true risks involved. However, we find no statistical support for this reasoning. When introducing interaction terms of "comfort" proxies (i.e. FCOUNTRY and a dummy for foreign debt usage) with DEPINVOL in our main regressions (Table 7, Model 3 and Table 8, Model 3) the coefficients of these interaction terms are far from statistically significant. Thus, we find no support that the impact of "comfort" proxies on the non-finance departmental involvement effect on speculative behavior is important.

Our three internationalization parameters are positively correlated (Table 6). If we incorporate each parameter one at a time in the regression on the broad measure of speculation (Model 3, Table 7) and on the narrow measure of speculation (Model 3, Table 8), our findings confirm the initial findings. Thus, in relation to the broad / narrow measure of speculation, operating revenues in foreign currency is significant at the 5 percent / 5 percent level, operating costs in foreign currency is significant at the 1 percent / 5 percent level, and foreign subsidiaries is significant at the 1 percent / 5 percent level. Geczy et al. (2007) find that firms with revenue in foreign currency or subsidiaries abroad are more likely to speculate as they believe that these activities give them an informational advantage in terms of the likely development of future exchange rates. More generally, our findings are in line with Pirinsky and Wang (2006) and Huberman (2001) who show that investment behavior is driven by familiarity.

Furthermore, it is interesting to note that the distinction between manufacturing firms and other firms (most notably service firms) do not seem to make a difference in terms of speculation. In fact, when looking at economic sectors, the only difference to be identified in this study is the larger percentage of firms in the manufacturing sector that have foreign operations compared to firms in the other sectors (Table 1). Subsequent analysis did not reveal any differences in terms of speculation and economic sectors.

The question of causality should be shortly addressed. Could it be that the causality is reversed compared to what is implicitly assumed in the above analysis? Could it be that the more the firm – e.g. through the finance manager’s decision - chooses to speculate, the more the other non-finance departments are drawn into the management of exchange rate risks? We find it difficult to find convincing arguments in support of such a sequence. It makes more intuitive sense that the more non-finance managers (= non-experts) are involved in the management of foreign exchange risks, the more the psychological biases in the form of the better-than-average effect (e.g. Svenson, 1981), the self-serving bias (e.g. Miller and Ross, 1975), and the reference group neglect (e.g. Carnerer and Lovallo, 1999) influence the decisions taken in relation to the management of exchange rate risks with the ultimate outcome of an increase in speculative behavior.

We find a positive relationship between the extent of non-finance departmental involvement in the management of exchange rate risks and the extent of foreign exchange speculation. This positive relationship is not a reflection of non-finance departmental involvement increasing the general level of foreign exchange rate risk management activities – hedging and speculation – but is primarily an isolated push towards an increased level of speculation. Thus, including the same independent variables

as in Model 3 in Table 7, we find no significant impact (for the sake of brevity not shown in a table) from the degree of non-finance departmental involvement in the management of exchange risks on the time horizon that the firm hedges its foreign exchange exposure by financial means (Question 14 in the Questionnaire). Furthermore, if we include this time horizon that the firm hedges its foreign exchange exposure by financial means as an independent ordered variable in Model 3, Table 7 (broad measure of speculation) and in Models 1, 2 and 3, Table 8 (timing, size, and narrow measure of speculation), such a new variable is significant at a 1 percent level – indicating that firms that hedge extensively also tend to speculate intensively - but more interestingly it only reduces the significance of our departmental involvement variable marginally. These findings indicate that the positive impact on speculation from the non-finance departmental involvement in the management of exchange rate risks cannot be seen solely as a reflection of a general expansion of the firm's activities on the foreign exchange markets but should be seen more as an isolated push towards more speculation.

6. Conclusions

This empirical study of non-financial firms finds that foreign exchange speculation is widespread among Danish firms with foreign operations and that the involvement of non-finance departments in the management of exchange rate risks increases such speculation. A majority of these firms take a view / make a forecast of exchange rates that causes their firm to 1) alter the timing of hedges, 2) alter the size of hedges, and/or 3) actively take positions in currency derivatives or issue debt in foreign currency. Such selective hedging and active speculation are positively related to the size and international involvement of the firms. We find that the more non-finance departments are involved in the management of exchange rate risks, the more the firm speculates both in terms of selective hedging

and in terms of active speculation. These findings are particularly interesting given the trend towards a more integrated risk management perspective in which risks are managed across the firm and several departments are involved as opposed to the more traditional silo-based risk management isolated to specific departments.

Our results are based on non-financial firms in Denmark. Denmark is a small, open economy so our results may not be readily transferable to e.g. firms in large, more closed economies – at least not in terms of the *level* of foreign exchange speculation. However, since for most firms foreign exchange speculation is simply not rational (Stulz, 1996), our main conclusion from the positive impact of non-finance departmental involvement in the management of exchange rate risks on speculation is based more on behavioral aspects than on rational behavior. Behavior and values are different across nations as documented by Hofstede (1980) but we see no reason why the direction (and maybe also the magnitude) of impact should be markedly different for other geographical settings.

Appendix

In this appendix the questions are displayed as simple text in order to show the basic wording of the questions and do not resemble the intelligent layout that was applied in the actual electronic questionnaire. The full questionnaire is available from the authors on request.

Questions from the Questionnaire

1. Think about your company's operating revenues, operating costs, operating assets and financial debt. Is at least one of these four categories to any degree denominated in a currency other than DKK?

Yes
No

2. What percentage of your company's consolidated operating revenues, operating costs, operating assets and financial debt is in foreign currency? (Please check the option in each row that is closest to your estimate)

0% 1-20% 21%-40% 41-60% 61-80% 81-99% 100%

Operating revenues:

Operating costs:

Operating assets:

Financial debt:

5. How many foreign subsidiaries does your company have?

6. What is the number of foreign countries in which your company has subsidiaries?

13. During the last year, has your company used currency derivatives or issued debt in foreign currency in order to manage foreign exchange risk? (Please check the appropriate option in each row)

Yes No

Shortsighted currency derivatives (forward contracts

(= "terminskontrakter" in Danish), options)

Longsighted currency derivatives (swaps)

Debt in foreign currency

14. At the present time, what is the average time horizon that your company has covered its foreign exchange exposure by using financial means (i.e. forward contracts (= "terminskontrakter" in Danish), options, swaps, debt in foreign currency)? (Please check one option)

0-1 months 1-3 months 3-6 months 6-12 months 1-2 years 2-5 years > 5 years

15. How often does your company's view/forecast of exchange rates cause your company to take the following financial actions? (Please check one option in each row)

	Never	Sometimes	Often
Alter the timing of hedges			
Alter the size of hedges			
Actively take positions in currency derivatives (forward contracts (= "terminskontrakter" in Danish), options, swaps) or issue debt in foreign currency			

20. In your company, are the following departments (or the people responsible for these areas) involved in the management of foreign exchange risk? (Please check one option in each row)

	Involved regularly	Involved to some extent	Never involved
Finance			
Sales			
Marketing			
Purchasing			
Production			

References

- Aabo, T. (2007), "The impact of individual-owners on currency speculation: the case of Danish non-financial firms", *International Journal of Managerial Finance*, Vol. 3, pp. 92-107.
- Adam, T.R. and Fernando, C.S. (2006), "Hedging, speculation and shareholder value", *Journal of Financial Economics*, Vol. 81, pp. 283-309.
- Aggarwal, R. and T. Harper, J.T. (2010), "Foreign exchange exposure of "domestic" corporations", *Journal of International Money and Finance*, Vol. 29, pp. 1619-1636.
- Allayannis, G. and Weston, J. (2001), "The use of foreign currency derivatives and firm market value", *Review of Financial Studies*, Vol. 14, pp. 243-276.
- Barsky, R. B., Juster, F.T., Kimball, M.S. and Shapiro, M.D. (1997), "Preference Parameters and Behavioral Heterogeneity - An Experimental Approach in the Health and Retirement Study", *Quarterly Journal of Economics*, Vol. 112, pp. 537-579.
- Bartram, S.M. and Bodnar, G.M. (2007), "The exchange rate exposure puzzle", *Managerial Finance*, Vol. 33, pp. 642-666.
- Belk, P.A. (2002), "The Organisation of Foreign Exchange Risk Management: A Three-Country Study", *Managerial Finance*, Vol. 28, pp. 43-52.
- Bodnar, G.M. and Gebhardt, G. (1999), "Derivatives Usage in Risk Management by U.S. and German Non-Financial Firms: A Comparative Survey", *Journal of International Financial Management & Accounting*, Vol. 10, pp. 153-187.
- Bodnar, G. M., Hayt, G.S. and Marston, R. C. (1998), "Wharton survey of financial risk management by U.S. nonfinancial firms", *Financial Management*, Vol. 27, pp. 70-91.

- Brown, G.W. (2001), “Managing foreign exchange risk with derivatives”, *Journal of Financial Economics*, Vol. 60, pp. 401-448.
- Brown, G.W., Crabb, P.R. and Haushalter, D. (2006), “Are Firms Successful at Selective Hedging?”, *Journal of Business*, Vol. 79, pp. 2925-2949.
- Camerer, C. and Lovallo, D. (1999), “Overconfidence and Excess Entry: An Experimental Approach”, *American Economic Review*, Vol. 89, pp. 306-318.
- Dolde, W. (1993), “The Trajectory of Corporate Financial Risk Management”, *Journal of Applied Corporate Finance*, Vol. 6(3), pp. 33-41.
- Fauver, L. and Naranjo, A. (2010), “Derivative usage and firm value: The influence of agency costs and monitoring problems”, *Journal of Corporate Finance*, Vol. 16, pp. 719-735.
- Froot, K.A., Scharfstein, D. and Stein, J. (1993), “Risk management: coordinating corporate investment and financing policies”, *Journal of Finance*, Vol. 48, pp. 1629-58.
- Géczy, C., Minton, B.A. and Schrand, C. (2007), “Taking a View: Corporate Speculation, Governance, and Compensation”, *Journal of Finance*, Vol. 62, pp. 2405-2443.
- Glaum, M. (2002), “The Determinants of Selective Exchange Risk Management - Evidence from German Non-Financial Corporations”, *Journal of Applied Corporate Finance*, Vol. 14(4), pp. 108-121.
- Graham, J.R. and Harvey, C.R. (2001), “The theory and practice of corporate finance: evidence from the field”, *Journal of Financial Economics*, Vol. 60, pp. 187-243.
- Greene, William H. (2008), *Econometric Analysis*, Sixth Edition, Prentice Hall: New Jersey.

- Hofstede, G. (1980), *Cultures Consequences: International Differences in Work-Related Values*, Sage Publications: California.
- Huberman, G. (2001), "Familiarity breeds investment", *Review of Financial Studies*, Vol. 14, pp. 659-680.
- Jin, Y. and Jorion, P. (2006), "Firm value and hedging: Evidence from U.S. oil and gas producers", *Journal of Finance*, Vol. 61, pp. 893-919.
- Kumar, A. (2009), "Who Gambles in the Stock Market?", *Journal of Finance*, Vol. 64, pp. 1889-1933.
- Kuersten, W. and Linde, R. (2011), "Corporate hedging versus risk-shifting in financially constrained firms: The time-horizon matters!", *Journal of Corporate Finance*, Vol. 17, pp. 502-525.
- Lessard, D.R. and Zaheer, S. (1996), "Breaking the Silos: Distributed Knowledge and Strategic Responses to Volatile Exchange Rates", *Strategic Management Journal*, Vol. 17, pp. 513-533.
- Levi, M.D. and Sercu, P. (1991), "Erroneous and valid reasons for hedging foreign exchange exposure", *Journal of Multinational Financial Management*, Vol. 1, pp. 335-344.
- Miller, K.D. (1998), "Economic Exposure and Integrated Risk Management", *Strategic Management Journal*, Vol. 19, pp. 497-514.
- Miller, D.T. and Ross M. (1975), "Self-serving biases in the attribution of causality: fact or fiction?", *Psychological Bulletin*, Vol. 82, pp. 213-225.
- Meulbroek, L.K. (2002), "A Senior Manager's Guide to Integrated Risk Management", *Journal of Applied Corporate Finance*, Vol. 14(4), pp. 56-70.
- Nocco, B.W. and Stulz, R.M. (2006), "Enterprise Risk Management: Theory and Practice", *Journal of Applied Corporate Finance*, Vol. 18(4), pp. 8-20.

Pirinsky, C. and Wang, Q. (2006), “Does corporate headquarters location matter for stock returns?”, *Journal of Finance*, Vol. 61, pp. 1991-2015.

Simkins, B. (2008), “Enterprise Risk Management: Current Initiatives and Issues”, *Journal of Applied Finance*, Vol. 18(1), pp. 115-132.

Smith, A. (1776), *An Inquiry into the Nature and Causes of the Wealth of Nations*, Methuen, London.

Smith, C.W. and Stulz, R.M. (1985), “The determinants of firms’ hedging policies”, *Journal of Financial & Quantitative Analysis*, Vol. 20, pp. 391-405.

Stulz, R.M. (1996), “Rethinking Risk Management”, *Journal of Applied Corporate Finance*, Vol. 9(3), pp. 8-24.

Svenson, O. (1981), “Are we all less risky and more skillful than our fellow drivers?”, *Acta Psychologica*, Vol. 47, pp. 143-148.

Wang, H., Barney, J.B. and Reuer, J.J. (2003), “Stimulating Firm-specific Investment through Risk Management”, *Long Range Planning*, Vol. 36, pp. 49-59.

Table 1
Response Rates and Sample Firms

<u>Economic sector</u>	<u>Popu- lation</u>		<u>Response rate</u>	<u>Foreign operations</u>		<u>Total</u>
	<u>Respondents</u>			<u>Yes</u>	<u>No</u>	
Manufacturing (C)	455	140	31%	99 (71%)	41 (29%)	140 (100%)
Construction (F)	62	33	53%	6 (18%)	27 (82%)	33 (100%)
Wholesale and retail trade; Repair of motor vehicles and motorcycles (G)	308	98	32%	44 (45%)	54 (55%)	98 (100%)
Transportation and storage (H)	91	30	33%	11 (37%)	19 (63%)	30 (100%)
Information and communication (J)	53	22	42%	7 (32%)	15 (68%)	22 (100%)
Professional, scien- tific and technical activities (M)	54	29	54%	13 (45%)	16 (55%)	29 (100%)
Administrative and support service activities (N)	32	16	50%	6 (38%)	10 (63%)	16 (100%)
Total	1055	368	35%	<u>186</u> (51%)	182 (49%)	368 (100%)

Notes: This table lists survey results for Danish medium-sized (and large) non-financial firms. Firms are classified by economic sector (NACE). Economic sectors with less than 20 firms are excluded. The population consists of 1055 firms. 368 firms responded reaching a response rate of 35 percent. Of these 368 firms 186 firms (51%) have foreign operations (operating revenues, operating costs, operating assets and/or financial debt in foreign currency) and 182 firms (49%) have no foreign operations (Question 1 in the Questionnaire). The sample of relevance through the remainder of the paper is the 186 firms that responded to the questionnaire and that have foreign operations.

Table 2
Descriptive Statistics for Sample Firms

	<u>Mean</u>	<u>Median</u>	<u>Minimum</u>	<u>Maximum</u>	<u>N</u>
Total assets	222	173	76	745	186
TA	5.2	5.2	4.3	6.6	186
ROE	0.16	0.18	-4.09	5.51	186
SOL	0.37	0.30	-0.31	0.94	186
FREVENUE	0.49	0.50	0.00	1.00	186
FCOST	0.34	0.30	0.00	0.90	186
Foreign countries	3.0	1.0	0.0	45.0	186
FCOUNTRY	0.94	0.69	0.00	3.83	186

Notes: This table reports descriptive statistics for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). *Total assets* is the total assets of the firm measured in million DKK. *TA* is the logarithm of *Total Assets*. *ROE* is the net result of the firm divided by the equity of the firm. *SOL* is the equity of the firm divided by the total assets of the firm. *FREVENUE* is the percentage of the firm's consolidated operating revenues in foreign currency (responses to Question 2; midpoints of intervals used). *FCOST* is the percentage of the firm's consolidated operating costs in foreign currency (responses to Question 2; midpoints of intervals used). *Foreign countries* is the number of countries in which the firm has subsidiaries (responses to Question 6). *FCOUNTRY* is the logarithm of the sum of *Foreign countries* plus 1.

Table 3
Speculation by Sample Firms

Panel A: Selective hedging and active speculation

	<u>Never</u>	<u>Sometimes</u>	<u>Often</u>	<u>N</u>
Alter the timing of hedges	79 42%	67 36%	40 22%	186 100%
Alter the size of hedges	81 44%	70 38%	35 19%	186 100%
Actively take positions in currency derivatives or issue debt in foreign currency	64 34%	70 38%	52 28%	186 100%

Panel B: Two measures of speculation

SPECALL (broad definition of speculation)	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>N</u>
	45	26	24	37	18	12	24	186
	24%	14%	13%	20%	10%	6%	13%	100%
	None						Full
SPECACT (narrow definition of speculation)	<u>1</u>	<u>2</u>	<u>3</u>	<u>N</u>				
	64	70	52	186				
	34%	38%	28%	100%				
	None	Full					

Notes: This table reports information on speculation by the 186 sample firms. Information on variables is obtained from responses to Question 15 in the Questionnaire (Appendix). Question 15: “How often does your company’s view/forecast of exchange rates cause your company to take the following financial actions?”. Panel A shows the responses for the specific elements of speculation. Panel B shows two measures of speculation. *SPECALL* is an ordered variable measuring the extent of speculation by 1) altering the timing of hedges, 2) altering the size of hedges, and/or 3) actively taking positions in currency derivatives or issuing debt in foreign currency because of the firm’s view/forecast of exchange rates with 1 = 3 times “Never”, 2 = 2 times “Never” and 1 time “Sometimes” ... and 7 = 3 times “Often”. *SPECACT* is an ordered variable only addressing the last part of Question 15 that relates to active speculation (“Actively take positions in currency derivatives or issue debt in foreign currency”) with 1 = “Never”, 2 = “Sometimes” and 3 = “Often”.

Table 4
Non-Finance Departmental Involvement in Foreign Exchange Risk Management

Panel A: Departmental distribution

	<u>Never involved</u>	<u>Involved to some extent</u>	<u>Involved regularly</u>	<u>N</u>
Sales	45 24%	84 45%	57 31%	186 100%
Production	55 30%	84 45%	47 25%	186 100%
Purchasing	132 71%	46 25%	8 4%	186 100%
Marketing	143 77%	28 15%	15 8%	186 100%

Panel B: Two measures of non-finance departmental involvement

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>N</u>
DEPINVOL1 (basic measure)	26 14%	27 15%	46 25%	26 14%	32 17%	11 6%	12 6%	4 2%	2 1%	186 100%
	None							Full	
DEPINVOL2 (robustness measure)	<u>1</u> 26 14%	<u>2</u> 83 45%	<u>3</u> 77 41%	<u>N</u> 186 100%						
	NoneRegularly								

Notes: This table reports information on the departments involved in foreign exchange risk management for the 186 sample firms. Information on variables is obtained from responses to Question 20 in the Questionnaire (Appendix). Question 20: "In your company, are the following departments (or the people responsible for these areas) involved in the management of foreign exchange risk?". Panel A shows the answers to Question 20 for the departments. Panel B shows two measures of non-finance departmental involvement in the management of foreign exchange risks. *DEPINVOL1* is an ordered variable with 1 = 4 times "Never", 2 = 3 times "Never" and 1 time "Involved to some extent" ... and 9 = 4 times "Involved regularly". *DEPINVOL2* is an ordered variable with 1 = 4 times "Never", 2 = at least one time "Involved to some extent" but no "Involved regularly", and 3 = at least one time "Involved regularly".

Table 5
Comparison of Mean Values Between Speculators and Non-Speculators

Panel A: Broad definition of speculators

(mean values)	Speculators (141 firms)	Non-Speculators (45 firms)	Difference
TA	5.3	4.9	0.4 ***
ROE	0.16	0.15	0.01
SOL	0.34	0.34	0.00
FREVENUE	0.53	0.39	0.14 **
FCOST	0.37	0.25	0.12 ***
FCOUNTRY	1.05	0.59	0.46 ***
DEPINVOL1	3.91	2.89	1.03 ***
DEPINVOL2	2.36	2.00	0.36 ***

Panel B: Narrow definition of speculators

(mean values)	Speculators (122 firms)	Non-Speculators (64 firms)	Difference
TA	5.3	5.1	0.2 ***
ROE	0.18	0.12	0.07
SOL	0.34	0.34	0.00
FREVENUE	0.53	0.41	0.12 **
FCOST	0.37	0.27	0.10 ***
FCOUNTRY	1.08	0.66	0.43 ***
DEPINVOL1	3.92	3.19	0.74 **
DEPINVOL2	2.38	2.08	0.30 ***

Notes: This table reports univariate analysis (t-statistics) on differences in mean values of variables between speculators and non-speculators among the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). In Panel A, a broad definition of speculation is used (a value of 2 to 7 of *SPECALL* in Table 3). In Panel B, a narrow definition of speculation is used (a value of 2 or 3 of *SPECACT* in Table 3). *TA*, *ROE*, *SOL*, *FREVENUE*, *FCOST*, and *FCOUNTRY* are defined in Table 2. *DEPINVOL1* and *DEPINVOL2* are defined in Table 4. *, **, *** indicate significance (t-test) at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 6
Correlation Coefficients for Sample Firms

	TA	ROE	SOL	FREV	FCOS	FCOU	DEP1	DEP2
TA	1							
ROE	0.05	1						
SOL	0.11	-0.07	1					
FREVENUE	0.24	-0.11	0.05	1				
FCOST	0.23	0.04	0.06	0.45	1			
FCOUNTRY	0.28	0.11	0.01	0.38	0.33	1		
DEPINVOL1	0.12	-0.09	0.05	0.26	0.19	0.14	1	
DEPINVOL2	0.11	-0.04	0.01	0.28	0.15	0.14	0.78	1

Notes: This table reports correlation coefficients for variables used in subsequent regression analysis for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). *TA*, *ROE*, *SOL*, *FREVENUE*, *FCOST*, and *FCOUNTRY* are defined in Table 2. *DEPINVOL1* and *DEPINVOL2* are defined in Table 4.

Table 7
Speculation and Non-Finance Departmental Involvement

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
Dependent variable:	SPECALL	SPECALL	SPECALL	SPECALL	SPECALLBI
C					-3.36 *** (0.0018)
TA	0.61 *** (0.0000)	0.53 *** (0.0003)	0.51 *** (0.0005)	0.50 *** (0.0005)	0.65 *** (0.0021)
ROE	0.03 (0.7634)	-0.02 (0.8398)	0.01 (0.9130)	-0.01 (0.9185)	0.01 (0.9369)
SOL	-0.07 (0.8588)	-0.10 (0.8073)	-0.15 (0.7197)	-0.01 (0.8096)	-0.31 (0.5885)
FREVENUE	0.70 ** (0.0105)	0.21 (0.5030)	0.12 (0.6938)	0.10 (0.7564)	0.07 (0.8736)
FCOST		1.02 *** (0.0061)	0.99 *** (0.0088)	1.03 *** (0.0060)	0.54 (0.3174)
FCOUNTRY		0.21 ** (0.0358)	0.21 ** (0.0379)	0.21 ** (0.0360)	0.20 (0.1612)
DEPINVOL1			0.12 *** (0.0096)		0.14 ** (0.0365)
DEPINVOL2				0.27 ** (0.0336)	
Sector dummies	Yes	Yes	Yes	Yes	Yes
N=0					45
N=1	45	45	45	45	141
N=2	26	26	26	26	
N=3	24	24	24	24	
N=4	37	37	37	37	
N=5	18	18	18	18	
N=6	12	12	12	12	
N=7	24	24	24	24	
N	186	186	186	186	186
Pseudo R-squared	0.0531	0.0725	0.0822	0.0790	
McFadden R-squared					0.1805
LR statistic	36.9 ***	50.5 ***	57.2 ***	55.0 ***	37.1 ***
Prob(LR statistic)	0.0000	0.0000	0.0000	0.0000	0.0004

Notes: This table reports results of ordered (Models 1, 2, 3 and 4) and binary (Model 5) probit regression analysis on speculation for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). Reported are the coefficients (and in parentheses the p-values of a two-tailed test of equality of each coefficient to zero). The dependent variables are *SPECALL* (Models 1, 2, 3 and 4) as defined in Table 3 and *SPECALLBI* which is a binary version of *SPECALL* coded as 1 if the firm sometimes or often 1) alters the timing of hedges, 2) alters the size of hedges, or 3) actively takes positions in currency derivatives or issues debt in foreign currency because of the firm's view/forecast of exchange rates and 0 otherwise (responses to Question 15). *TA*, *ROE*, *SOL*, *FREVENUE*, *FCOST*, and *FCOUNTRY* are defined in Table 2. *DEPINVOL1* and *DEPINVOL2* are defined in Table 4. Sector dummies

are NACE classification codes F, G, H, J, M, and N respectively (Manufacturing, C, being default). *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 8
Elements of Speculation and Non-Finance Departmental Involvement

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
Dependent variable:	<u>SPECTIME</u>	<u>SPECSIZE</u>	<u>SPECACT</u>	<u>SPECACT</u>	<u>SPECACTBI</u>
C					-2.15 ** (0.0205)
TA	0.44 *** (0.0046)	0.52 *** (0.0011)	0.41 *** (0.0090)	0.41 *** (0.0091)	0.39 ** (0.0351)
ROE	0.00 (0.9871)	-0.03 (0.7690)	0.06 (0.6031)	0.04 (0.7203)	0.10 (0.4891)
SOL	0.01 (0.9765)	0.10 (0.8288)	-0.32 (0.4748)	-0.28 (0.5344)	-0.24 (0.6402)
FREVENUE	0.13 (0.7018)	-0.02 (0.9480)	0.29 (0.3929)	0.26 (0.4323)	0.06 (0.8792)
FCOST	0.81 ** (0.0454)	1.28 *** (0.0018)	0.64 (0.1115)	0.69 * (0.0884)	0.61 (0.2053)
FCOUNTRY	0.23 ** (0.0369)	0.23 ** (0.0370)	0.15 (0.1651)	0.15 (0.1631)	0.23 * (0.0760)
DEPINVOL1	0.12 ** (0.0146)	0.10 ** (0.0373)	0.10 ** (0.0357)		0.09 (0.1149)
DEPINVOL2				0.23 * (0.0931)	
Sector dummies	Yes	Yes	Yes	Yes	Yes
N=0					64
N=1	79	81	64	64	122
N=2	67	70	70	70	
N=3	40	35	52	52	
N	186	186	186	186	186
Pseudo R-squared	0.1122	0.1351	0.0927	0.0887	
McFadden R-squared					0.1268
LR statistic	44.3 ***	52.5 ***	37.6 ***	36.0 ***	30.4 ***
Prob(LR statistic)	0.0000	0.0000	0.0003	0.0006	0.0042

Notes: This table reports results of ordered (Models 1, 2, 3 and 4) and binary (Model 5) probit regression analysis on specific elements of speculation for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). Reported are the coefficients (and in parentheses the p-values of a two-tailed test of equality of each coefficient to zero). The dependent variables are *SPECTIME* (Model 1), *SPECSIZE* (Model 2), *SPECACT* (Model 3 and Model 4), and *SPECACTBI* (Model 5). *SPECTIME* is an ordered variable from 1 (“Never”) to 3 (“Often”) measuring the degree to which the firm alters the timing of hedges because of the firm’s view / forecast of exchange rates (responses to the first part of Question 15). *SPECSIZE* is an ordered variable from 1 (“Never”) to 3 (“Often”) measuring the degree to which the firm alters the size of hedges because of the firm’s view / forecast of exchange rates (responses to the middle part of Question 15). *SPECACT* is defined in Table 3. *SPECACTBI* is a binary version of *SPECACT* coded as 1 if the firm sometimes or often actively takes positions in currency derivatives or issues debt in foreign currency because of the firm’s view/forecast of exchange rates and 0 otherwise (responses to the last part of Question 15). *TA*, *ROE*, *SOL*, *FREVENUE*, *FCOST*, and *FCOUNTRY* are defined in Table 2. *DEPINVOL1* and *DEPINVOL2* are defined

in Table 4. Sector dummies are NACE classification codes F, G, H, J, M, and N respectively (Manufacturing, C, being default). *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels respectively.