

## **The distinctive role of foreign debt in foreign exchange risk management**

Alternative title:

### **Foreign Debt Usage in Non-Financial Firms: A Horserace Between Economic and Balance Sheet Exposure Hedging**

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#### **Abstract**

Finance theory suggests that a positive (long) foreign exchange exposure can be offset by debt denominated in foreign currency (“foreign debt”) and empirical studies confirm that foreign debt is used for hedging purposes. We use detailed exposure information on a sample of medium-sized non-financial firms and show that in its practical hedging application, foreign debt is used to hedge balance sheet exposure (stock measure) as opposed to economic exposure (flow measure). Thus, in a multivariate setting the use of foreign debt is associated with foreign assets and foreign subsidiaries but not with foreign revenues. Our study employs detailed exposure information at the firm level which makes it possible to go deeper than previous studies in detecting the actual drivers behind foreign debt usage.

*Keywords:* Exchange rate exposure management; Foreign debt; Foreign assets; Foreign subsidiaries; Balance sheet exposure hedging

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## 1. Introduction

The foreign sales ratio is the traditional measure of foreign exchange exposure and has been used in a number of studies on exchange rate exposure management in non-financial firms. Shapiro (1975) shows that one of the major factors affecting a multinational firm's exchange rate risk is sales in export markets. A firm that receives revenue in foreign currency has two alternative ways of eliminating such positive (long) foreign exchange exposure by financial means. One way is the use of financial derivatives whether in terms of a forward contract, a future, a swap or an option. Another way is the use of debt denominated in foreign currency ("foreign debt") whether in terms of raising new foreign debt or in terms of changing the currency denomination of existing debt.<sup>1</sup> Géczy, Minton, and Schrand (1997) note that foreign debt can displace the need to hedge with derivatives by acting as a hedge of foreign revenues. However, foreign debt cannot be used as a hedge against *costs* in foreign currency because foreign debt would increase the negative cash flows in the particular currency.

The use of foreign debt as a hedge against operating revenues in foreign currency is in line with a flow perspective in which the firm reduces the volatility of its future cash flows. Such economic exposure (whether in terms of transaction exposure or in terms of anticipated future cash flows in foreign currency) is emphasized by mainstream finance textbooks as being far more important for the long-run

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<sup>1</sup> In exposure terms it makes no difference if e.g. a German firm chooses to hedge a positive cash flow of one million US dollar (USD) that the firm expects to receive in three months time based on a sales contract 1) by selling forward today with settlement in three months time one million USD against Euro (EUR) or 2) by borrowing an amount in USD today (instead of borrowing in EUR) which together with accrued interest is settled by paying back a total of exactly one million USD in three months time.

health of a firm than accounting exposure (see e.g. Eiteman, Stonehill, and Moffett, 2010)<sup>2</sup>. In spite of the supposed dominance of economic exposure over accounting exposure and the cash flow hedging ability of foreign debt, foreign debt can, however, also be used to hedge accounting exposure. A firm that has foreign assets (e.g. in the form of a subsidiary abroad) can hedge its balance sheet by creating an offsetting liability in the form of foreign debt and thus protect its equity from fluctuations caused by unexpected changes in foreign exchange rates. Such an approach emphasizes stock measures as opposed to flow measures. A priori it is not clear – and indeed remains an empirical question to address – which avenue a firm is likely to pursue in terms of its use of foreign debt for hedging purposes.

Due to the lack of detailed exposure information, the empirical literature has been vague in addressing whether foreign debt usage is primarily motivated by flow considerations (matching of positive operating cash flows in foreign currency with negative cash flows from servicing foreign debt) or stock considerations (matching of firm assets in foreign currency with foreign debt). The purpose of this study is to investigate whether foreign debt usage is primarily linked to operating income in foreign currency or to operating assets in foreign currency / subsidiaries abroad. Stated in an alternative way, the research question of this study is: Is foreign debt usage in non-financial firms in accordance with economic exposure hedging or in accordance with balance sheet exposure hedging?

The empirical literature supports the notion that foreign debt is used for hedging purposes. Graham and Harvey (2001) find that a popular reason for issuing foreign debt is to provide a natural hedge against foreign currency devaluation. Elliott, Huffman, and Makar (2003), Kedia and Mozumdar (2003), and

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<sup>2</sup> Foreign exchange exposure is traditionally grouped in three categories: transaction exposure, translation exposure (also called accounting exposure), and economic exposure (also called operating exposure, strategic exposure, or competitive exposure. For an elaboration see e.g. Eiteman, Stonehill, and Moffett (2010).

Keloharju and Niskanen (2001) also support the notion that foreign debt is used for hedging purposes. However, few studies hint on the relative importance of economic exposure hedging versus balance sheet exposure hedging. Allayannis and Ofek (2001) investigate the exchange rate exposure management of a sample of S&P 500 non-financial firms for 1993 and find that US exporters tend to prefer foreign currency derivatives to foreign debt but that multinational firms with operations abroad have no strong preferences. Aabo (2006) investigates the exchange rate exposure management of a sample of listed non-financial Danish firms and finds that the relative importance of foreign debt compared to derivatives is positively related to the extent of foreign subsidiaries. Clark and Judge (2009) investigate the exchange rate exposure management of a sample of non-financial firms of the top 500 firms in the U.K. and find that foreign debt is used to hedge long-term exposures from foreign operations. All three studies suggest that foreign debt usage is positive linked to a physical presence abroad. This could be interpreted as a use of foreign debt for balance sheet exposure hedging but it could also signify that operating cash flows from sales abroad are deemed of a more long-term character (and thus more adequate for hedging by the use of foreign debt) if the firm has a physical presence abroad. Caves (1971) notes that the existence of foreign subsidiaries can be viewed as a commitment to a foreign market and indicate long-term cash flows.

The studies above are restricted in terms of the exchange rate exposure information and thus the depth of the analysis in relation to foreign debt usage. Allayannis and Ofek (2001) use 1) foreign sales ratio and 2) an aggregated industry export share; Aabo (2006) uses 1) foreign sales ratio and 2) number of foreign countries in which the firm has subsidiaries; and Clark and Judge (2009) use two foreign sales ratios (“foreign sales ratio by destination” and “foreign sales ratio by origin”) where the former captures traditional export activities and the latter captures sales from operations outside the U.K. (thus

indicating the importance of foreign sales subsidiaries). The studies do provide evidence that a physical presence fosters foreign debt usage but they do not clarify whether foreign debt usage is in accordance with economic exposure hedging or in accordance with balance sheet exposure hedging.

In this study we investigate a sample of internationally involved medium-sized non-financial Danish firms for which we have obtained detailed exchange rate exposure information in terms of foreign operating revenues, foreign operating costs, foreign operating assets, financial debt in foreign currency, foreign subsidiaries, among others. Denmark is a small, open economy with its own currency, Danish Krone (DKK), which is pegged to the Euro. Its three main trading partners are Germany (EUR), the U.K. (Great British Pound, GBP) and Sweden (Swedish Krone, SEK). Danish firms are used to dealing in and being exposed to various currencies and have ready access to foreign debt primarily through the banking sector. Easy access to foreign debt is not a special Danish phenomenon. Allayannis, Brown, and Klapper (2003) find that non-U.S. firms raise a large proportion of their debt in foreign currency. The findings of Batten and Mellor (1993), Joseph (2000), and Keloharju and Niskanen (2001) support the notion that access to foreign debt is a widespread phenomenon.

Our study is based on medium-sized firms for two reasons. First, by focusing on medium-sized firms, we provide unique knowledge about an important part of the business world which tends to be neglected due to data constraints. In a European Union perspective, SMEs provide 75 million jobs and are a major source of entrepreneurial skills and innovation (European Commission, 2005). Second, in the sphere of exchange rate exposure management, medium-sized firms are interesting objects as they are generally large and sophisticated enough to be exposed to and react to volatile exchange rates but at

the same time they do generally not possess the large international network of foreign subsidiaries which makes truly multinational firms almost immune to exchange rate changes<sup>3</sup>.

In line with the arguments of Graham and Harvey (2001), we use the survey approach in order to balance the benefits and problems with large sample analysis and clinical studies. The survey approach has been used in numerous studies<sup>4</sup> on foreign exchange rate exposure management in non-financial firms - most notably by Bodnar, Hayt, and Marston (1998) who investigate publicly traded US firms. Our study distinguishes itself from previous studies by employing detailed exposure information which makes it possible to go deeper in understanding the factors driving the use of foreign debt.

We find that foreign debt usage among internationally involved medium-sized non-financial Danish firms is overwhelmingly related to stock measures (foreign operating assets and foreign subsidiaries) as opposed to flow measures (foreign operating revenue). Thus, the results of our study indicate that in its practical hedging application, foreign debt is used predominantly to hedge balance sheet exposure as opposed to economic exposure. This is an interesting and to some degree surprising result given that the traditional finance literature and textbooks (e.g. Eiteman, Stonehill, and Moffett, 2010) tend to almost neglect accounting exposures and favor the management of economic exposure. The question of whether or not non-financial firms' use of foreign debt to hedge balance sheet exposure as opposed to economic exposure is indeed rational – e.g. due to various market imperfections such as information

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<sup>3</sup> Pantzalis, Simkins, and Laux (2001) document the importance of operational hedges for managing foreign exchange risk. They find that multinational firms' ability to manage their foreign exchange rate exposures through operational hedges is positively related to the "breadth" of the foreign subsidiaries network where "breadth" is defined as the degree of a network's spread across many foreign countries.

<sup>4</sup> E.g. Aabo, Høg, and Kuhn (2010), Bodnar and Gebhardt (1999), Ceuster, De Durinck, Laveren, and Lodewyckx (2000), Hakkarainen, Joseph, Kasanen, and Puttonen (1998), Mallin, Ow-Yong, and Reynolds (2001), and Marshall (2000) among others.

asymmetry, the existence of debt covenants related to balance sheet ratios, or other factors - is outside the scope of this study and will not be addressed.

Our study contributes to the existing literature in two ways. Most importantly, by employing elaborate foreign exchange rate exposure information at the firm level, we show that the use of foreign debt is solely related to stock measures (foreign assets and foreign subsidiaries) and not related to flow measures (foreign sales ratio). To the best of our knowledge, the use of detailed exposure information in addressing the question of whether foreign debt usage in non-financial firms is in accordance with economic or balance sheet exposure hedging is novel. Second, by investigating the exchange rate exposure management of medium-sized firms, we provide a unique picture of a very important part of the business world that tends to be neglected due to data constraints.

The paper proceeds as follows. The next section gives a short methodology of the study. The third section reports survey results on internationalization and results of a univariate analysis on foreign debt usage. The fourth section analyzes the relationship between foreign debt usage and firm characteristics through multivariate regression analysis. The fifth section tests for robustness and the last section concludes.

## 2. Methodology of study

This study is based on public information from WEB-DIRECT<sup>5</sup> and on responses to questionnaires sent to Danish, medium-sized, non-financial firms. We focus on Danish firms; that is we exclude firms that are subsidiaries of foreign firms. We focus on medium-sized firms; we define medium-sized firms 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<sup>6</sup>. We focus on non-financial firms; that is we exclude firms with a NACE<sup>7</sup> industry code beginning with the letter “K”<sup>8</sup>. Furthermore, we restrict our sample to unlisted firms<sup>9</sup> that are private limited companies<sup>10</sup> with accounting numbers available. Finally, we exclude NACE economic sectors that after the implementation of the before-mentioned selection criteria has less than 20 firms. The total number of firms in our population is 1055 firms divided into four NACE groupings of economic sectors as illustrated in Table 1.

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<sup>5</sup> WEB-DIRECT is a comprehensive database from Experian A/S containing information on Nordic firms. In a Danish setting the database contains information on some 630,000 Danish firms.

<sup>6</sup> 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 a bit broader in the upper end. We exclusively use figures on balance sheet total as many of our target firms do not report figures for their turnover.

<sup>7</sup> WEB-DIRECT employs the NACE code (Statistical Classification of Economic Activities in the European Community), which is a comparable and equivalent industry classification system as the American NAICS code (North American Industry Classification System). The NACE code was revised as per January 1, 2008.

<sup>8</sup> NACE divides industries into 21 main categories: (A) Agriculture, forestry and fishing; (B) Mining and quarrying; (C) Manufacturing; (D) Electricity, gas, steam, and air conditioning supply; (E) Water supply; sewerage; waste management and remediation activities; (F) Construction; (G) Wholesale and retail trade; repair of motor vehicles and motorcycles; (H) Transporting and storage; (I) Accommodation and food service activities; (J) Information and communication; (K) Financial and insurance activities; (L) Real estate activities; (M) Professional, scientific and technical activities; (N) Administrative and support service activities; (O) Public administration and defence; compulsory social security; (P) Education; (Q) Human health and social work activities; (R) Arts, entertainment and recreation; (S) Other services activities; (T) Activities of households as employers; undifferentiated goods - and services - producing activities of households for own use; and (U) Activities of extraterritorial organisations and bodies. We exclude (K) Financial and insurance activities.

<sup>9</sup> We exclude listed firms for two reasons: 1) the number of medium-sized listed firms in Denmark is very limited and 2) we do not want to insert unnecessary heterogeneity into the sample.

<sup>10</sup> This corresponds to the Danish firm types “A/S” (“Aktieselskab”) and “ApS” (“Anpartsselskab”).

\* Please insert Table 1 approximately here \*

These 1055 firms were contacted in the last quarter of 2008 via email<sup>11</sup> and asked to complete an online, web-based questionnaire. 368 firms chose to participate in the survey reaching a response rate of 35% (Table 1). The response rates vary from 31% to 54% across the four NACE groupings of economic sectors. Three minor NACE sectors (F, M, and N) have a significantly higher response rate – at the 1%, 1%, and 10% level (t-test) respectively - than the population as a whole. In terms of size (number of employees and total assets), profitability (return on equity) and capital structure (equity ratio) there is no significant non-response bias.

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 that are internationally involved) and firms that have none of these items in foreign currency (= firms that are not internationally involved). Divided through these lines 186 firms (51%) are internationally involved and 182 firms (49%) are not internationally involved as shown in Table 1. The former group of firms 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 that are involved internationally (71%) while Construction (F) have the lowest percentage (18%). Service sectors (G, H,

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<sup>11</sup> The e-mails were addressed to the financial director of the firms whenever possible. The names of the financial directors and most of the e-mail addresses of the firms were found in WEB-DIRECT. All in all, personalized 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 those firms by alternative means. An invitation e-mail and a maximum of 4 follow-up e-mails were sent to the firms.

J, M and N) are between these two extremes in terms of percentage of firms that are internationally involved.

Survey data on internationalization, descriptive statistics, and survey data on the difference in means between users and non-users of foreign debt are provided in the next section for our sample firms. Subsequent regression analysis is performed using binary probit and ordinary least squares regression analysis where the dependent variable is 1) use or non-use of foreign debt (binary) or 2) the degree of foreign debt usage (OLS).<sup>12</sup>

### **3. Internationalization and univariate analysis**

The focus group in this study consists of the 186 internationally involved firms (Table 1). Of these 186 firms, 173 firms (93%) have operating revenues in foreign currency and 179 firms (96%) have operating costs in foreign currency respectively. Furthermore, as can be seen from Table 2, 137 firms (74%) have operating assets in foreign currency, 129 firms (69%) have financial debt in foreign currency (“foreign debt”), and 121 firms (65%) have subsidiaries abroad (“foreign subsidiaries”). Roughly speaking, almost all of our sample firms have revenues and costs in foreign currency, three quarters have operating assets in foreign currency, two thirds use foreign debt, and two thirds have foreign subsidiaries. As such, our sample of 186 firms are heavily involved internationally not only in terms of the traditional measure of international involvement (operating revenue in foreign currency)

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<sup>12</sup> The binary regression analysis is performed with limited dependent variables. 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. Estimation is undertaken by maximum likelihood. Our models are (standard) probit models as opposed to logit models. The difference between the two approaches concerns the distribution of the error term, normal versus logistic. In practice, it is difficult to justify the selection of one over the other and our conclusions are not materially affected by our choice.

but also more broadly. It is the components of this broad international involvement and the implications for foreign debt usage that motivate our study.

\* Please insert Table 2 approximately here \*

Table 3 reports descriptive statistics for the 186 sample firms. The average (median) firm has total assets of DKK 222 million (DKK 173 million); a return on equity, ROE, of 16% (18%); an equity ratio, SOL, of 37% (30%); a percentage of operating revenues in foreign currency, FREV, of 49 (50); a percentage of operating costs in foreign currency, FCOST, of 34 (30); a percentage of operating assets in foreign currency, FASS, of 23 (10); a percentage of financial debt in foreign currency (foreign debt), FDEBT, of 23 (10); and 3 (1) foreign countries in which the firm has subsidiaries.

\* Please insert Table 3 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 as our internationalization measure. In the present study the two measures are close to being identical (correlation coefficient of 0.99 for the logarithmic version of the measures) and the conclusions of subsequent regression analysis is not affected by our choice.

Table 4 reports univariate analysis (t-statistics) on differences in mean values of variables between the 129 firms (69%) that use foreign debt and the 57 firms (31%) that do not use foreign debt (Table 2). The group of users of foreign debt and the group of non-users of foreign debt do not differ significantly

with respect to size (total assets) and profitability (return on equity). However, users of foreign debt are more leveraged (lower equity ratio) and more internationally involved in terms of all of four internationalization measures (operating revenues in foreign currency, operating costs in foreign currency, operating assets in foreign currency, and number of foreign subsidiaries).

\* Please insert Table 4 approximately here \*

Analyzing a sample of non-financial listed UK firms, Bradley and Moles (2002) find that 84% of the 202 firms that do have foreign subsidiaries use foreign debt while only 20% of the 87 firms that do not have foreign subsidiaries use foreign debt. The corresponding figures in our sample are 80% of 121 firms and 49% of 65 firms. Both samples show a significant difference in terms of foreign debt usage among firms with and without foreign subsidiaries. However, the results are only a reflection of a simple univariate analysis.

Table 5 reports correlation coefficients for variables used in subsequent multivariate regression analysis and shows that the correlation coefficients between the four internationalization measures are in the range of 0.33 to 0.50. The next section provides a multivariate regression analysis.

\* Please insert Table 5 approximately here \*

#### 4. Multivariate regression analysis on foreign debt usage

Although a univariate regression analysis may provide interesting results, a multivariate regression analysis is necessary to properly analyze the determinants of foreign debt usage. Tables 6, 7, and 8 report results of the following binary probit (Models 1 and 2) and OLS (Models 3, 4, 5, and 6) regression:

$$FDEBTBI_i \text{ or } FDEBT_i = C + \lambda_1 TA_i + \lambda_2 ROE_i + \lambda_3 SOL_i + \lambda_4 FREV_i + \lambda_5 FCOST_i + \lambda_6 FASS_i + \lambda_7 FCOUN_i + \lambda_8 Construction_i + \lambda_9 Trade_i + \lambda_{10} OtherServices_i + \omega_i \quad (1)$$

where

$FDEBTBI_i$  (Table 6) measures the use / non-use of foreign debt and is coded as 1 if the firm has foreign debt and 0 otherwise (responses to Question 2).

$FDEBT_i$  (Tables 7 and 8) measures the extent of foreign debt usage and is the percentage of the firm's consolidated financial debt in foreign currency (responses to Question 2; midpoints of intervals used).

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

$ROE_i$  is the net result of the firm divided by the equity of the firm.

$SOL_i$  is the equity of the firm divided by the total assets of the firm.

$FREV_i$  is the percentage of the firm's consolidated operating revenues in foreign currency (responses to Question 2; midpoints of intervals used).

$FCOST_i$  is the percentage of the firm's consolidated operating costs in foreign currency (responses to Question 2; midpoints of intervals used).

$FASS_i$  is the percentage of the firm's consolidated operating assets in foreign currency (responses to Question 2; midpoints of intervals used).

$FCOUN_i$  is the logarithm of the sum of the number of countries in which the firm has subsidiaries (responses to Question 6) plus 1.

$Construction_i$ ,  $Trade_i$ , and  $OtherServices_i$  are NACE classification codes F, G, and H+J+M+N respectively (Manufacturing, C, being default) coded as 1 if the firm belongs to the specific sector and 0 otherwise.

Tables 6, 7, and 8 are all structured in the same manner. Models 1, 2, 3, and 4 in each table incorporates only the foreign revenues variable ( $FREV_i$ ), the foreign costs variable ( $FCOST_i$ ), the foreign assets variable ( $FASS_i$ ) and the foreign subsidiaries variable ( $FCOUN_i$ ) respectively while Model 5 in each table incorporates all four internationalization variables. This structure is chosen in order to disentangle the effect of each internationalization parameter given the positive correlation coefficients between the four internationalization parameters (Table 5). The dependent variable in Table 6 is a measure of use / non-use of foreign debt (binary) while the dependent variable in Tables 7 and 8 is a measure of the extent of foreign debt usage. Table 7 includes all 186 firms while Table 8 excludes the 57 firms that have no foreign debt.

Dolde and Mishra (2007) argue that firms face two levels of decisions about foreign exchange exposures: 1) The first level is a qualitative decision of whether the benefits of a hedging program exceed the costs (corresponding to our use/non-use decision); 2) The second level is a quantitative decision on the extent of hedging decisions (corresponding to our extent decision). The empirical findings of Spanò (2007) and Géczy, Minton, and Schrand (2007) support the separation of the use/non-use and the extent decisions. Table 6 represents the use/non-use decision, Table 8 represents

the “clean” extent decision, while Table 7 is a mix because it measures the extent decision but does include the firms that do not use foreign debt.

\* Please insert Tables 6, 7, and 8 approximately here \*

Tables 6, 7, and 8 indicate that the size (TA) of the firm does not influence neither whether to use foreign debt (Table 6) nor the extent of foreign debt usage (Tables 7 and 8). Thus, within the range of medium-sized firms we find no support for an economies of scale argument. Neither do we find support for a negative relation based on the financial distress argument related to hedging (disproportionately high financial distress costs for small firms). Nance, Smith, and Smithson (1993) find that the economies of scale argument dominates the financial distress argument in relation to hedging decisions for a sample of large US non-financial firms. Such an economies of scale dominance is not supported in our foreign debt investigation.

In relation to profitability (ROE), the picture is the same with no significant influence from profitability on whether to use foreign debt (Table 6) or how much foreign debt to use (Tables 7 and 8). Thus, again we find no support for the financial distress argument in relation to financial debt as a hedge (firms that are less profitable need more hedging).

The equity ratio (SOL) seems primarily to influence the decision whether to use foreign debt or not (Table 6) and not so much to influence the extent of foreign debt usage (Tables 7 and 8). However, if we transform our dependent variable from the foreign debt as percent of total financial debt to foreign

debt as percent of total liabilities<sup>13</sup>, the coefficient for equity ratio turns significant at the 1 percent level in all models in Tables 7 and 8. Thus, we find that the capital structure of the firm influences the degree of foreign debt usage. The negative relation between equity ratio and foreign debt usage indicates that firms with a high degree of debt financing (high leverage) are more inclined to use foreign debt than more solvent firms (low leverage). This could be interpreted as support for the financial distress argument. Purnanandam (2008) finds that firms with tighter financial constraints / higher leverage are more likely to use foreign exchange derivatives for hedging purposes. However, neither size (TA) nor profitability (ROE) lend support to the financial distress argument. Furthermore, the equity ratio has been criticized for being a poor measure of a firm's financial health. George and Hwang (2010) show that firms with high financial distress costs choose low leverage and vice versa. Thus, the significant and negative relation between the equity ratio and foreign debt usage may simply reflect the fact that the existence of a certain amount of financial debt is a prerequisite for the issuance of foreign debt – a sort of convenience argument – rather than being an argument for a low equity ratio triggering strong hedging needs. This convenience argument is also noted by Clark and Judge (2008).

The coefficients for all our internationalization variables are positive and strongly significant in Models 1, 2, 3, and 4 in Tables 6, 7, and 8 (the only exception being foreign subsidiaries in Table 8). From a cash flow hedging perspective, this is no surprise in relation to foreign revenue (*FREV*) in Model 1. Foreign debt creates future negative cash flows in foreign currency that in exposure terms provide a counter-weight to the positive cash flows from future operating revenue in foreign currency. However,

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<sup>13</sup> Foreign debt in percent of total liabilities is estimated by  $FDEBT*(1-SOL)$ . This is a rough measure for foreign debt in percent of total liabilities as it does not take into account e.g. commercial debt but it does to some degree take into account the capital structure of the firm and its implication in terms of potential non-comparability of the variable *FDEBT* across firms (e.g. 50 percent of financial debt in foreign debt (*FDEBT*) is less than 25 percent of financial debt in foreign debt if the former firm has a financial debt to assets ratio of 25 percent and the latter firm has a financial debt to assets ratio of 75 percent).

following this logic Model 2 provides a counterintuitive result in relation to foreign costs (*FCOS*). Whether the direction of the relationship makes intuitive sense from a flow (economic exposure) perspective in the case of foreign assets (*FASS*) and foreign subsidiaries (*FCOUN*) depends to some degree on the character of the assets / the subsidiaries<sup>14</sup>. Thus, based on the reasoning above the use of foreign debt makes intuitive sense in a cash flow (economic exposure) perspective in the case of sales subsidiaries but not in the case of production subsidiaries (a distinction for which we lack information).

Based on the fit of the data to the model ( $R^2$ ), Models 1, 2, 3, and 4 in Tables 6, 7, and 8 suggest 1) that the choice of whether to use foreign debt or not is primarily linked to foreign subsidiaries<sup>15</sup> (Table 6) and 2) that the choice of the extent of foreign debt usage is strongly linked to the amount of foreign assets. Models 1, 2, 3, and 4 in Tables 6, 7, and 8 are prone to omitted variable bias as we only include one single internationalization parameter in each model – however, we reduce the risk of multicollinearity.

Model 5 in Tables 6, 7, and 8 includes all four internationalization parameters and confirm our previous observations. Thus, Model 5 in Table 6 shows that the choice of whether to use foreign debt or not is only significantly linked to foreign subsidiaries (*FCOUN*)<sup>16</sup>. None of the other internationalization variables (*FREV*, *FCOST*, and *FASS*) are significant. Model 5 in Tables 7 and 8 shows that the extent of foreign debt usage is first and foremost a function of the amount of foreign assets. In both tables, the foreign assets variable is significant at the 1 percent level. Except for foreign costs in Table 7, none of

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<sup>14</sup> Only 34 firms (18%) have foreign assets without having foreign subsidiaries and the majority of these firms, 21 firms (11%), have less than a fifth of their total operating assets in foreign currency.

<sup>15</sup> We obtain the same result if we make our foreign subsidiary variable a binary variable only distinguishing between firms that have no foreign subsidiaries and firms that have foreign subsidiaries.

<sup>16</sup> We obtain the same result if we make our foreign subsidiary variable a binary variable only distinguishing between firms that have no foreign subsidiaries and firms that have foreign subsidiaries.

the other internationalization variables are significant. The coefficient for foreign costs (*FCOST*) is *positive* and significant at the 5 percent level in Table 7 (and positive but insignificant in Tables 6 and 8). A positive coefficient is in direct contrast to a cash flow hedging argument.

The results in Tables 6, 7, and 8 lead to two main conclusions. First, the use/non-use of foreign debt is primarily tied to the existence of foreign subsidiaries and the extent of foreign debt usage is primarily tied to the amount of foreign assets. Second, the use of foreign debt does not seem to follow the conventional logic in terms of cash flow hedging. This lends support to the notion that the use of foreign debt is not just a simple alternative to the use of derivatives and that the use of foreign debt seems to be primarily guided towards balance sheet hedging (stock measures) rather than economic exposure hedging (flow measures). Thus, from a balance sheet hedging perspective it makes perfect sense to offset the translation risk of foreign assets with foreign liabilities (debt) and thus avoid major fluctuations in the consolidated accounts (although this may be directly counterproductive in a cash flow perspective in the case of a production subsidiary).

Furthermore, such a stock perspective may also make sense in terms of reducing the impact of lower tail outcomes. In a liquidation scenario, a firm with currency balanced assets and liabilities reduce its foreign exchange exposure. Since the shareholders have a call option on the firm's assets, reduction of risk does not make sense from a strict shareholder wealth maximization perspective. However, from a more broad corporate wealth maximization perspective and also in a situation where it is still plausible to avoid an actual bankruptcy situation, such balancing of assets and liabilities in terms of currency may prove valuable.

We identify a strong relation between 1) the choice of whether or not to use foreign debt and foreign subsidiaries and 2) the extent of foreign debt usage and foreign assets. For primarily descriptive purposes, these two relationships (Panels A and B) are depicted below in a cross-tabulation in Table 9.

\* Please insert Table 9 approximately here \*

In terms of economic sectors, Tables 6, 7, and 8 do not reveal a uniform pattern. Table 6 suggests that firms in Manufacturing (default) are more likely to use foreign debt than firms in the other economic sectors. However, on the extent of foreign debt usage (Tables 7 and 8) such an observation is not supported – rather on the contrary. Thus, we see no uniform economic sector pattern in relation to foreign debt usage.

## **5. Robustness considerations**

This section tests for the robustness of our results reported in the previous section. Thus, we transform our internationalization parameters; we use responses to alternative questions as our independent variable; we divide our sample into subsamples according to size; and we discuss other concerns.

We transform our four exposure variables (*FREV*, *FCOST*, *FASS*, and *FCOUN*) to four binary variables and re-run Model 5 in Tables 6, 7, and 8. Thus, foreign revenues (*FREV*) are coded as 0 if foreign revenues are less than 20% and 1 otherwise; foreign costs (*FCOS*) are coded as 0 if foreign costs are less than 20% and 1 otherwise; foreign assets (*FASS*) are coded as 0 if foreign assets are less

than 20% and 1 otherwise; and foreign countries in which the firm has subsidiaries (*FCOUN*) are coded as 0 if the firm has no foreign subsidiaries and 1 otherwise. Generally, the robustness test support our previous conclusions. Specifically, foreign subsidiaries is the only significant internationalization parameter for the use/non-use of foreign debt decision and foreign assets is the most important internationalization parameter for the extent of foreign debt usage decision.

However, when using these binary internationalization variables Model 5 in Table 8 shows a significant foreign revenue variable – although only at the 10 percent level. To investigate this further and try to balance between on the one hand not having too much influence from potential outliers and on the other hand not being too crude (the transformation to binary variables), we transform all our internationalization variables to a logarithmic version (log of the sum of the original variable plus 1) and rerun Model 5 in Tables 6, 7, and 8. The results support the notion that foreign revenue is not important in determining foreign debt usage neither for a use/non-use decision (Table 6) nor for an extent decision (Tables 7 and 8). The coefficient for foreign revenue is not significant in any of the three models, and the other results as to foreign costs, foreign assets, and foreign countries are in line with previous results.

Foreign revenue does not seem to be a relevant factor on its own in deciding foreign debt usage but it might be that it is the combination of foreign revenue and foreign subsidiaries and the combination of foreign revenue and foreign assets which triggers foreign debt usage as opposed to foreign subsidiaries and foreign assets by themselves. However, when we include interaction terms – *FREV\*FCOUN* and *FREV\*FASS* - in Model 5 in Tables 6, 7, and 8, the coefficients for such interaction terms are insignificant.

For a slightly alternative approach – and thus robustness - we investigate the determinants for whether or not the firm has issued debt in foreign currency during the last year (responses to Question 13 in the Questionnaire). We run Model 5 in Table 6 with the dependent variable being coded as 1 if the firm during the last year has issued foreign debt in order to manage foreign exchange risk and 0 otherwise (as opposed to coded as 1 if the firm has foreign debt). 129 out of 186 firms (69%) use foreign debt (Table 6) while 92 out of 186 firms (49%) have issued foreign debt during the last year. This leaves 37 firms out of 186 firms (20%) that use foreign debt but have not issued foreign debt during the last year. The results of such a slightly different approach are – as expected - in line with the results of Model 5 in Table 6. Both models indicate that the use / non-use of foreign debt is closely related to the leverage of the firm (negative relation between equity ratio and the use of debt) and the number of countries in which the firm has subsidiaries. In contrast to Model 5 in Table 6, the alternative approach reports a significant and positive relationship (only close to being significant in Model 5 in Table 6) between the degree of foreign assets and the use of foreign debt. However, the coefficients for foreign assets are not significantly different in the two models.

Question 8 in the Questionnaire asks how important foreign debt is for the firm in its management of exchange rate risks with 1 = unimportant and 5 = important (please refer to the questionnaire). If we exchange the binary dependent variable in Model 5 in Table 6 - the use/non-use of foreign debt – with this ordered variable measuring the perceived importance of foreign debt, we get qualitatively the same results. Thus, we find that the importance of foreign debt is negatively related to the equity ratio (5 percent level) and positively related to the foreign assets and foreign subsidiaries (both at a 5 percent

level). None of our flow measures for internationalization – foreign revenues and foreign costs – are significant.

As an additional robustness test, we re-run Model 5 in Tables 6, 7, and 8 1) only including firms belonging to the smallest half of our sample (as measured by total assets) and 2) only including firms belonging to the largest half of our sample. The results for both sub-samples support our earlier conclusions. The coefficients for our four internationalization parameters are not significantly different from each other in Tables 7 and 8 (on the extent of foreign debt usage) when comparing the small firms sub-sample with the large firms subsample. Only in the case of Table 6 (on foreign debt usage / non-usage), the coefficients for foreign costs and foreign assets are significantly different from each other indicating that the use of foreign debt seems to also depend on foreign assets in the case of “small” firms and on foreign costs in the case of “large” firms. All in all, the separation of our sample into “small” and “large” firms does not lend support to the notion that our general results are unduly driven by either side of the size spectrum. This suggests that our results may be transferable to firms that are either smaller or larger than the firms in our sample.

Foreign debt usage could be influenced by other factors than foreign exchange exposure management concerns. If a large part of Danish foreign investments target less developed and more unstable countries, such factors could be a desire to reduce political risk and/or the availability of subsidized loans from host governments. However, figures from the Danish National Bank (Danmarks Nationalbank) do not support such reasoning. Approximately three fourths of the stock of direct investments abroad are in Europe and one tenth is in the U.S. This leaves approximately 15% to the rest of the world including countries such as Canada, Australia, and Japan. We do not have specific data on

our sample firms but we see no reason why our sample firms should deviate markedly from the country level data.

Another factor that could potentially influence foreign debt usage outside the reign of foreign exchange exposure management concerns is a positive correlation between foreign assets and the availability of foreign debt. Thus, if a prerequisite for obtaining debt in a particular currency is the existence of assets also denominated in the currency, we would see that foreign debt usage could be explained by a simple rationing of funds. This would also explain the positive correlation between the leverage of the firm and the use of foreign debt in the way that foreign assets lead to the availability of foreign funds (foreign debt). However, generally – and in particular related to the countries that constitute around nine tenths of the countries in which Danish firms invest – it is not a prerequisite for Danish firms to have assets in a foreign currency in order to obtain debt in foreign currency. Debt in foreign currency is readily available to Danish medium-sized firms through the Danish banking system.<sup>17</sup>

In conclusion, our findings seem to be robust. Foreign debt usage is overwhelmingly tied to stock measures (foreign assets and foreign subsidiaries) as opposed to flow measures (foreign revenues and foreign costs) and thus more in accordance with balance sheet exposure hedging than economic exposure hedging. A crude measure of internationalization in the form of the degree of operating revenue in foreign currency as predominantly used by previous studies hides a more complicated relationship between the internationalization of the firm and foreign debt usage. This study shows that such a complicated relationship is revealed when more internationalization measures are incorporated.

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<sup>17</sup> That the easy access to foreign debt in Denmark is not restricted to large firms, is best exemplified by the heavy borrowing in Swiss Franc (CHF) by Danish farmers. Danish farmers have no assets in CHF.

## 6. Conclusions

Based on a sample of medium-sized non-financial Danish firms and detailed foreign exchange exposure information at the firm level, we find that empirically foreign debt usage is important in order to hedge foreign exchange exposures originating from a physical presence abroad (foreign assets and foreign subsidiaries) but not important in order to hedge foreign revenues (foreign sales ratio) – the latter being the traditional foreign exchange exposure variable applied in previous studies. As such, foreign debt usage is not consistent with an economic exposure perspective on foreign exchange risk management (hedging the flow of foreign revenue) but is primarily driven by a balance sheet perspective in which stocks (foreign assets / foreign subsidiaries) are matched by liabilities (foreign debt). This study is the first to indicate that foreign debt usage is solely related to stock measures (foreign assets and foreign subsidiaries) as opposed to flow measures (foreign revenues).

The results of the study are important in order to understand the factors driving foreign debt usage in the foreign exchange risk management of non-financial firms. Our study is based on a sample of internationally involved medium-sized Danish firms but we see no reason why the results should not be applicable to other non-financial firms in other countries where firms also have ready access to debt denominated in foreign currency.

## Appendix

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	<input type="checkbox"/>						
Operating costs	<input type="checkbox"/>						
Operating assets	<input type="checkbox"/>						
Financial debt	<input type="checkbox"/>						

**5. How many foreign subsidiaries does your company have?**

(Please select one answer)\*

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

(Please select one answer)\*

**8. In order to manage the impact of exchange rate fluctuations on your company's operating cash flows or competitive position (i.e. operating exposure), how important are the following financial means for your company?** (Please check one option in each row)

	Important	Somewhat important	Neither important or unimportant	Somewhat unimportant	Unimportant
Shortsighted currency derivatives (forward contracts ( = "terminskontrakter" in Danish), options)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longsighted currency derivatives (swaps)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Choice of the currency in which the company's debt is denominated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**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)	<input type="checkbox"/>	<input type="checkbox"/>
Longsighted currency derivatives (swaps)	<input type="checkbox"/>	<input type="checkbox"/>
Debt in foreign currency	<input type="checkbox"/>	<input type="checkbox"/>

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**Table 1 Response Rates and Internationally Involved Firms**

This table lists survey results for Danish, medium-sized, non-financial firms. Firms are classified by economic sector (NACE). The population consists of 1055 firms. 368 firms responded reaching a response rate of 35%. Of these 368 firms 186 firms (51%) are internationally involved and 182 firms (49%) are not internationally involved (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 are internationally involved. Other services (H+J+M+N) include Transportation and storage (H), Information and communication (J), Professional, scientific and technical activities (M), and Administrative and support service activities (N).

<u>Economic sector</u>	<u>Pop.</u>	<u>Resp.</u>	<u>rate</u>	<u>Response</u>			
				<u>Respondents int. involved</u>			
				<u>Yes</u>		<u>No</u>	
Manufacturing (C)	455	140	31%	99	71%	41	29%
Construction (F)	62	33	53%	6	18%	27	82%
Wholesale and retail trade; Repair of motor vehicles and motorcycles (G)	308	98	32%	44	45%	54	55%
Other services (H+J+M+N)	230	97	42%	37	38%	60	62%
Total	1055	368	35%	<u>186</u>	51%	182	49%

**Table 2 Internationalization Information**

This table reports information on the internationalization of the 186 sample firms. Information on variables is obtained from responses to Question 2 and Question 6 in the Questionnaire (Appendix).

	<u>Percent in foreign currency</u>							
	<u>0</u>	<u>1-20</u>	<u>21-40</u>	<u>41-60</u>	<u>61-80</u>	<u>81-99</u>	<u>100</u>	<u>N</u>
Operating revenues	13	37	22	36	36	38	4	186
	7%	20%	12%	19%	19%	20%	2%	100%
Operating costs	7	65	41	45	18	10	0	186
	4%	35%	22%	24%	10%	5%	0%	100%
Operating assets	49	61	32	23	14	6	1	186
	26%	33%	17%	12%	8%	3%	1%	100%
Financial debt	57	51	31	26	13	8	0	186
	31%	27%	17%	14%	7%	4%	0%	100%
	<u>Number of countries</u>							
	<u>0</u>	<u>1</u>	<u>2-3</u>	<u>4-6</u>	<u>7-10</u>	<u>11-25</u>	<u>26-50</u>	<u>N</u>
Foreign subsidiaries	65	35	33	29	17	5	2	186
	35%	19%	18%	16%	9%	3%	1%	100%

**Table 3**      **Descriptive Statistics**

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. *FREV* 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). *FASS* is the percentage of the firm's consolidated operating assets in foreign currency (responses to Question 2; midpoints of intervals used). *FDEBT* is the percentage of the firm's consolidated financial debt 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). *FCOUN* is the logarithm of the sum of *Foreign countries* plus 1.

	<u>Mean</u>	<u>Medi.</u>	<u>Min.</u>	<u>Max.</u>	<u>Std.D.</u>	<u>Skew.</u>	<u>Kur.</u>	<u>JB</u>	<u>JB pr.</u>	<u>N</u>
Total assets	222	173	76	745	149	1.53	5.01	104.0	0.000	186
TA	5.2	5.2	4.3	6.6	0.6	0.40	2.31	8.5	0.014	186
ROE	0.16	0.18	-4.09	5.51	0.74	0.04	27.57	4680.2	0.000	186
SOL	0.37	0.30	-0.31	0.94	0.20	0.37	3.97	11.5	0.003	186
FREV	0.49	0.50	0.00	1.00	0.32	-0.10	1.65	14.4	0.001	186
FCOST	0.34	0.30	0.00	0.90	0.25	0.60	2.41	14.0	0.001	186
FASS	0.23	0.10	0.00	1.00	0.25	1.12	3.29	39.23	0.000	186
FDEBT	0.23	0.10	0.00	0.90	0.26	1.03	3.02	32.85	0.000	186
Foreign countries	3.0	1.0	0.0	45.0	5.0	4.56	32.68	7469.6	0.000	186
FCOUN	0.94	0.69	0.00	3.83	0.88	0.58	2.60	11.9	0.003	186

**Table 4 Comparison of Mean Values between Users and Non-Users of Foreign Debt**

This table reports univariate analysis (t-statistics) on differences in mean values of variables between two sub-samples of the 186 sample firms: 1) Users of foreign debt and 2) Non-Users of foreign debt (responses to Question 2 in the Questionnaire). Information on variables is obtained from WEB-DIRECT and from responses to the questionnaire (Appendix). Variables are defined in Table 3. \*, \*\*, \*\*\* indicate significance (t-test) at the 10%, 5%, and 1% levels respectively.

(mean values)	Users of foreign debt (129 firms)	Non-Users of foreign debt (57 firms)	Mean difference	
Total assets	225	216	9	
TA	5.2	5.2	0.1	.
ROE	0.16	0.16	0.00	
SOL	0.32	0.38	-0.06	**
FREV	0.56	0.35	0.21	***
FCOST	0.38	0.25	0.13	***
FASS	0.27	0.14	0.13	***
Foreign countries	3.6	1.5	2.1	***
FCOUN	1.12	0.52	0.61	***

**Table 5 Correlation Coefficients**

This table reports correlation coefficients for variables used in regression analysis for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). Variables are defined in Table 3.

	TA	ROE	SOL	FREV	FC.	FASS	FCO.	FDEBT
TA	1	0.05	0.11	0.24	0.23	0.23	0.28	0.11
ROE	0.05	1	-0.07	-0.11	0.03	-0.03	0.11	0.01
SOL	0.11	-0.07	1	0.05	0.06	0.09	0.01	0.09
FREV	0.24	-0.11	0.05	1	0.45	0.48	0.38	0.33
FCOST	0.23	0.04	0.06	0.45	1	0.50	0.33	0.41
FASS	0.23	-0.03	0.09	0.48	0.50	1	0.34	0.50
FCOUN	0.28	0.11	0.01	0.38	0.33	0.34	1	0.28
FDEBT	0.11	0.01	0.09	0.33	0.41	0.50	0.28	1

**Table 6 Regression Analysis on the Use / Non-Use of Foreign Debt**

This table reports results of binary probit regression analysis on the use / non-use of foreign debt for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). The dependent variable is  $FDEBTBI_i$  which measures foreign debt usage.  $FDEBTBI_i$  is coded as 1 if the firm has foreign debt and 0 otherwise (responses to Question 2). *Construction*, *Trade*, and *Other services* are NACE classification codes F, G, and H+J+M+N respectively (Manufacturing, C, being default). The remaining independent variables are defined in Table 3. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels respectively.

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
C	0.1826 (0.8387)	0.0864 (0.9240)	0.3688 (0.6854)	0.5657 (0.5429)	0.5677 (0.5524)
TA	0.0776 (0.6677)	0.1299 (0.4686)	0.1035 (0.5657)	0.0324 (0.8605)	-0.0438 (0.8191)
ROE	0.0137 (0.9296)	-0.0540 (0.7077)	-0.0328 (0.8261)	-0.1181 (0.4650)	-0.0865 (0.5874)
SOL	-1.1893** (0.0217)	-1.2087** (0.0184)	-1.2249** (0.0177)	-1.1639** (0.0254)	-1.2473** (0.0179)
FREV	1.1480*** (0.0008)				0.3454 (0.4058)
FCOST		1.4498*** (0.0017)			0.6390 (0.2296)
FASS			1.5741*** (0.0006)		0.8457 (0.1193)
FCOUN				0.5446*** (0.0001)	0.4090*** (0.0045)
Construction	-0.7596 (0.2042)	-1.0440* (0.0724)	-1.1871** (0.0398)	-1.0281* (0.0876)	-0.7756 (0.2222)
Trade	-0.3799 (0.1319)	-0.5516** (0.0274)	-0.5402** (0.0316)	-0.4924* (0.0505)	-0.5275** (0.0460)
Other services	-0.410 (0.1180)	-0.5477** (0.0370)	-0.6064** (0.0215)	-0.4882* (0.0688)	-0.4854* (0.0853)
N=0	57	57	57	57	57
N=1	129	129	129	129	129
N	186	186	186	186	186
McFadden R <sup>2</sup>	0.1164	0.1117	0.1222	0.1441	0.1865
LR statistic	26.6868	25.6101	28.0232	33.0417	42.7446
Prob(LR stat.)	0.0004	0.0006	0.0002	0.0000	0.0000

**Table 7 Regression Analysis on the Extent of Foreign Debt Usage**

This table reports results of OLS regression analysis on the extent of foreign debt usage for the 186 sample firms. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). The dependent variable is  $FDEBT_i$  which measures foreign debt usage.  $FDEBT_i$  is the percentage of the firm's consolidated financial debt in foreign currency (responses to Question 2; midpoints of intervals used). *Construction*, *Trade*, and *Other services* are NACE classification codes F, G, and H+J+M+N respectively (Manufacturing, C, being default). The remaining independent variables are defined in Table 3. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels respectively.

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
C	0.0459 (0.7748)	0.0739 (0.6350)	0.1551 (0.2956)	0.0977 (0.5551)	0.1819 (0.2138)
TA	0.0151 (0.6354)	0.0136 (0.6572)	0.0044 (0.8800)	0.0197 (0.5474)	-0.0168 (0.5667)
ROE	0.0138 (0.5806)	-0.0045 (0.8522)	0.0047 (0.8363)	-0.0102 (0.6856)	0.0011 (0.9622)
SOL	-0.1484 (0.1140)	-0.1645* (0.0709)	-0.1843** (0.0329)	-0.1356 (0.1567)	-0.1821** (0.0315)
FREV	0.2814*** (0.0000)				0.0392 (0.5557)
FCOST		0.4309*** (0.0000)			0.2009** (0.0137)
FASS			0.5193*** (0.0000)		0.3806*** (0.0000)
FCOUN				0.0796*** (0.0004)	0.0258 (0.2226)
Construction	0.0372 (0.7299)	-0.0190 (0.8506)	-0.0594 (0.5324)	-0.0488 (0.6468)	-0.0006 (0.9950)
Trade	0.0317 (0.4827)	-0.0101 (0.8177)	-0.0072 (0.8596)	0.0137 (0.7653)	-0.0088 (0.8300)
Other services	0.0521 (0.2822)	0.0185 (0.6687)	0.0041 (0.9248)	0.0266 (0.5853)	0.0185 (0.6718)
N	186	186	186	186	186
R-squared	0.1300	0.1838	0.2706	0.0950	0.3134
Adjusted R <sup>2</sup>	0.0958	0.117	0.2419	0.0594	0.2742
F-statistic	3.8000	5.7277	9.4324	2.6703	7.9886
Prob(F-statistic)	0.0007	0.0000	0.0000	0.0119	0.0000

**Table 8 Regression Analysis on the Extent of Foreign Debt Usage – Restricted Sample**

This table reports results of OLS regression analysis on the extent of foreign debt usage for the 129 sample firms that use foreign debt. Information on variables is obtained from WEB-DIRECT and from responses to the Questionnaire (Appendix). The dependent variable is  $FDEBT_i$  which measures foreign debt usage.  $FDEBT_i$  is the percentage of the firm's consolidated financial debt in foreign currency (responses to Question 2; midpoints of intervals used). *Construction*, *Trade*, and *Other services* are NACE classification codes F, G, and H+J+M+N respectively (Manufacturing, C, being default). The remaining independent variables are defined in Table 3. \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% levels respectively.

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
C	0.0602 (0.7550)	0.2004 (0.2904)	0.1967 (0.2597)	0.1115 (0.5817)	0.1972 (0.2746)
TA	0.0171 (0.6488)	-0.0032 (0.9306)	0.0024 (0.9427)	0.0287 (0.4698)	-0.0000 (0.9996)
ROE	0.0153 (0.5590)	-0.0025 (0.9211)	0.0087 (0.7072)	-0.0012 (0.9651)	0.0092 (0.7027)
SOL	0.0213 (0.8674)	-0.0410 (0.7412)	-0.1084 (0.3504)	0.0126 (0.9240)	-0.1104 (0.3482)
FREV	0.2394*** (0.0029)				0.0136 (0.8749)
FCOST		0.3574*** (0.0000)			0.0996 (0.3227)
FASS			0.4844*** (0.0000)		0.4362*** (0.0000)
FCOUN				0.0288 (0.2808)	-0.0168 (0.5010)
Construction	0.1825 (0.2942)	0.1368 (0.4114)	0.2963 (0.5469)	0.1028 (0.5620)	0.1075 (0.4953)
Trade	0.0877 (0.1040)	0.0690 (0.1876)	0.0610 (0.2078)	0.0885 (0.1120)	0.0584 (0.2320)
Other services	0.1456** (0.0137)	0.0981 (0.0831)	0.0871* (0.0964)	0.1186** (0.0490)	0.0872 (0.1085)
N	129	129	129	129	129
R-squared	0.1248	0.1793	0.2963	0.0669	0.3049
Adjusted R <sup>2</sup>	0.0741	0.1318	0.2556	0.0129	0.2460
F-statistic	2.4639	3.7764	7.2785	1.2396	5.1770
Prob(F-statistic)	0.0213	0.0010	0.0000	0.2865	0.0000

**Table 9**      **Cross Tabulation of Foreign Debt and Foreign Subsidiaries / Assets**

This table reports cross tabulation on 1) use/non-use of financial debt in foreign currency and the number of countries in which the firm has subsidiaries (Panel A) and 2) the extent of financial debt in foreign currency and operating assets in foreign currency (Panel B) for the 186 sample firms. Information on variables is obtained from responses to Questions 2 and 6 in the Questionnaire (Appendix).

Panel A:

<u>Foreign debt</u> (binary)	<u>Number of countries with foreign subsidiaries</u>							<u>Total</u>	<u>N</u>
	<u>0</u>	<u>1</u>	<u>2-3</u>	<u>4-6</u>	<u>7-10</u>	<u>11-25</u>	<u>26-50</u>		
Non-use	18%	6%	2%	3%	0%	1%	0%	31%	57
Use	17%	12%	16%	12%	9%	2%	1%	69%	129
Total	35%	19%	18%	16%	9%	3%	1%	100%	
N	65	35	33	29	17	5	2		186

Panel B:

<u>Financial debt</u> (% in foreign currency)	<u>Operating assets (% in foreign currency)</u>							<u>Total</u>	<u>N</u>
	<u>0</u>	<u>1-20</u>	<u>21-40</u>	<u>41-60</u>	<u>61-80</u>	<u>81-99</u>	<u>100</u>		
0	15%	9%	4%	1%	3%	0%	0%	31%	57
1-20	5%	15%	4%	3%	1%	1%	0%	27%	51
21-40	5%	3%	5%	3%	1%	0%	0%	17%	31
41-60	1%	4%	3%	4%	1%	1%	0%	14%	26
61-80	1%	2%	1%	2%	2%	0%	0%	7%	13
81-99	0%	0%	0%	1%	1%	2%	1%	4%	8
100	0%	0%	0%	0%	0%	0%	0%	0%	0
Total	26%	33%	17%	12%	8%	3%	1%	100%	
N	49	61	32	23	14	6	1		186