The Use of Derivatives in Nordic Firms

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This version: December 7, 2009

ABSTRACT

We contribute to the previous literature on the use of derivatives by studying separately the determinants for profit seeking versus hedging in a sample of firms from four different Nordic countries. While the hedging motive clearly dominates, more than half of the firms in our sample give some weight for additional income as a motive for the use of derivatives. Combining survey data on the use of derivatives with financial variables, data on management and blockholder ownership, as well as data on firm level diversification, we find that very different determinants drive the use of derivatives for these two motives. Firm level diversification is negatively related to hedging, but positively to the use of derivatives for additional income. Financial firms use derivatives more for profit than for hedging.

KEYWORDS: Derivatives, Risk Management, Hedging, Degree of Diversification, Impact of Ownership

JEL Classification: F3, F4, G13, G3, G34, G39, J33

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We contribute to the previous literature on the use of derivatives by studying separately the determinants for profit seeking versus hedging in a sample of firms from four different Nordic countries. While the hedging motive clearly dominates, more than half of the firms in our sample give some weight for additional income as a motive for the use of derivatives. Combining survey data on the use of derivatives with financial variables, data on management and blockholder ownership, as well as data on firm level diversification, we find that very different determinants drive the use of derivatives for these two motives. Firm level diversification is negatively related to hedging, but positively to the use of derivatives for additional income. Financial firms use derivatives more for profit than for hedging.

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1. Introduction

Firms can use derivatives both for speculative purposes (for profit seeking), which lead to increases in firm risk, as well as for hedging. The determinants of the use of derivatives in firms, as well as the determinants of hedging, have been studied in many papers. However, while survey studies, e.g. Bodnar et al (1998), report that derivatives are fairly often also used for profit seeking, the literature on derivatives have mainly studied determinants derived from the hedging literature, or tested managerial motives. Support has also been obtained for both hedging motives (see e.g. Allayannis and Ofek (2001) who find a negative relationship between the use of FX derivatives, and the stock price sensitivity to exchange rate movements) as well as managerial motives (see e.g. Knopf et al (2002)), who find a relationship between managers' portfolio composition and the derivative usage of the firm). However, if different reasons drive the positions taken for profit seeking, and those for hedging, testing the determinants of the sum of all open derivative positions at the firm level is testing a mixed variable.

We study separately the determinants for profit seeking versus hedging in a sample of firms from four different Nordic countries. While the hedging motive clearly dominates, more than half of the derivative users in our sample give some weight for additional income as a motive for the use of derivatives. Combining survey data on the use of derivatives with financial variables, data on management and blockholder ownership, as well as data on firm level diversification, we find that very different determinants drive the use of derivatives for these two motives. Firm level diversification is negatively related to

hedging, but positively to the use of derivatives for additional income. Financial firms use derivatives more for profit than for hedging.

We contribute to the prior literature in several ways. First, we study separately the determinants of two (in terms of risk taking, opposite) motives for the use of derivatives. Second, we include firm level diversification as a determinant for the use of derivatives, and find that once the hedging and profit seeking motives are separated, it is significant with opposite signs for the two motives. Third, we provide recent evidence for four Nordic countries, and study the difference between firms in an Eurozone country (Finland, with potentially smaller reasons to hedge exchange rate and interest rate risk) versus firms in Sweden, Denmark or Iceland. We also include financial firms, and compare the use of derivatives in them versus in non-financial firms.

The structure of this paper is as follows. In section 2, we survey prior literature on the use of derivatives. In section three, we present our data. In section four, we present descriptive statistics on the use of derivatives in the Nordic countries, obtained on the basis of our survey study. In section five, we report results on test of determinants for the use of derivatives, both for profit seeking as well as hedging. Concluding comments are given in section six.

2. Previous studies

There are a few main categories of studies on derivative use. The first line of studies mostly follows the format of the Wharton surveys for the U.S. (Bodnar et al, 1995, 1996 and 1998), i.e. analyzing the use of derivatives (and later also e.g. their valuation, as well as

control and reporting procedures) using survey results for firms.[1] In such studies, the use of firm level determinants is typically limited to data on e.g. firm size and their degree of foreign trade, collected through the questions asked in the survey. Such studies produce information on some general patterns such as the use of derivatives across industries and size categories. Especially in the 1990's, derivatives usage was not widespread in the U.S., with 35% and 41% of firms using them in 1994 and 1995, respectively (Bodnar et al, 1995 and 1996).[2] International firms more exposed to currency risk seem to be more active users, e.g. 53.1% in New Zeeland (Berkman et al 1997), 52% in Sweden (Hagelin and Alkebäck 1999), 78% in Germany (Bodnar et al 1999), 78% also in the combined dataset on Hong Kong and Singapore (Sheedy 2001), 60% in U.K. (Mallin et al 2001) and 60% also in the Netherlands (Bodnar et al 2003). Derivative users are large, often concentrated in industries such as manufacturing / primary products (rather than e.g. services (excluding financials) and retail trade). The most common instruments used are forwards (for FX risk) and swaps (for interest rate risk), and currency followed by interest rate risk are the main risks hedged for. In general, patterns of derivative usage seem to be rather similar across countries.

Another line of studies starts from data in corporate annual reports, both on open derivatives positions as well as firm characteristics, and studies the determinants of hedging, or derivatives use in general. Sometimes financial data is also combined with survey data as in the early study by Nance et al (1993) for the U.S. This line of literature has tested theoretical predictions from the hedging literature, and reported some interesting additional findings on the determinants of derivatives use. Nance (1993) finds support for

[1] Examples of such studies outside the U.S. are Berkman et al (1997) and Naylor and Greenwood (2006) for New Zeeland, Bodnar and Gebhardt (1999) on German data, Hagelin and Alkebäck (1999) using Swedish data, De Ceuster et al (2000) for Belgian firms, Sheedy (2001) for Hong Kong and Singapore, Grant and Marshall (1997) and Mallin et al (2001) for U.K., and Bodnar et al (2003) for Dutch firms.

[2] See also Guay and Kothari (2003), whose results for the U.S. indidate that corporate derivatives appear to be only a small piece of non-financial firms' overall risk profile.

tax related reasons (firms which hedge seem to be facing more convex tax functions)[3], costs of financial distress (hedgers have less coverage of fixed claims, Smith and Stulz 1985), and agency costs (hedgers have more growth options, i.e. hedgers may want to reduce an underinvestment problem that might otherwise be present, Froot et al 1993). Hedgers also employed less hedging substitutes (such as the use convertibles, or having financial flexibility).

The dependent variable used by Nance was a binary variable from a survey, measuring whether firms use derivatives or not. Later, a continuous measure for derivatives use, derived from financial accounts, has often been used in studies of the determinants of derivatives usage. Using data for New Zeeland (Berkman and Bradbury 1996), U.S. (Geczy 1997, and Howton and Perfect 1998, Graham and Rogers 2002), U.K. (Judge 2006), support for largely similar variables as in Nance et al (1993) has been obtained.[4]

Besides cost-related variables such as taxes, costs of financial distress, and agency costs, variables related to the diversification level of contracting parties have been used. The theoretical argument for such variables comes from the general hedging literature, see e.g. Stulz (1984) and Smith and Stultz (1985). In the latter of these, the authors analyze the relationship between managerial risk aversion, managerial compensation, and the willingness to hedge in more detail. They show that if the manager's wealth is a concave function of firm value, the managers have incentives to hedge, whereas it might be better not to hedge if their wealth is a convex function (if they e.g. own options on firm stock).

[3] See also e.g. Smith and Stulz (1985) for tax related arguments to hedge,and Graham and Smith (1999) for a simulation analysis of tax incentives to hedge.

[4] Not all results are naturally similar. E.g. Graham and Rogers (2002) did not find any support for tax convexity, but do get results supporting the prediction that firms hedge with derivatives to increase debt capacity, and because of expected costs of financial distress.

First studies including managerial ownership as a determinant for the use of derivatives came up with discouraging results. Berkman and Bradbury (1996) did not find a clear support for a positive connection between ownership and hedging. The results by Géczy et al (1997) were also contrary to expectations, as a significant positive relationship between managerial option ownership and the use of forwards was found. Later studies of derivatives usage have come up with results more in line with Smith and Stultz (1985). Whidbee and Wohar (1999) found for firms in the banking industry, that firms with a high percentage of CEO shareholdings are less likely to use derivatives. In a study of the relationships between derivative usage by U.S. firms, and management ownership of stocks and options, Rogers (2002) obtains results supporting a negative relationship between CEO's risk-taking incentives and the use of corporate derivatives. Using more detailed data on option sensitivities, Knopf et al (2002) finds evidence of a negative (positive) relationship between the sensitivity of the manager's portfolio to stock price (volatility) increases, and the hedging behavior of the firm.

The diversification level of contracting parties has been proxied also by measures other than managerial ownership. Borokhovic et al (2004) report weak support for a positive relation between outside blockholdings and the use of interest rate derivatives.

Whereas hedging due to costs related reasons should be value increasing for the firm, hedging caused by managerial risk related reasons may not be. Some papers study the relationship between firm value and hedging. Allayannis and Weston (2001) finds a positive relationship between firm value and the use of foreign currency derivatives. They

report an average hedging premium of 4.87% of firm value for U.S. firms.[5] Bartram et al (2009) find in an international setting (48 countries) that the positive valuation effect of derivatives use is primarily present for firms using interest rate derivatives. Also Allayannis et al (2007) extend the analysis to a sample from 35 countries, and find that hedging is profitable. The hedging premium is economically large for firms with strong internal corporate governance (such as those with a large blockholder). Lel (2009) continues in these lines and finds for firms from 34 countries that strongly governed firms use FX derivatives to mitigate currency exposure and to overcome market frictions, whereas weakly governed firms use them for managerial reasons and engage in selective hedging.

Despite the large amount of studies on the use of derivatives, some lines of research seem to be open. Although alternatives to the use of derivatives for risk reduction (hedging substitutes) have been tested (such as increased liquidity, preferred stock, dividend restrictions, or the use of convertibles), the relationship between corporate diversification and the use of derivatives has seldom been tested in the literature on derivatives usage. Lin et al (2007) suggest that diversified firms might use of derivatives to reduce informational asymmetries and thus to reduce the diversification discount. Using data for large U.S. firms, the direct relationship between derivatives usage and firm level complexity has been tested by Dolde and Mishra (2007). Theoretically, they motivate the relationship between firm complexity and hedging by higher benefits of hedging (e.g. to reduce informational asymmetries, and in terms of higher scale benefits from hedging in terms of netting transactions, massing transactions, and lower transaction costs) in complex firms. Hedging in turn is proxied by the use of derivatives, with a reference to overwhelming evidence on

[5] That it is a premium for hedging, finds additional support in Allayannis and Ofek (2001). They find a relationship between the use of FX derivatives, and the stock price sensitivity to exchange rate movements.

derivatives positions seen as hedges, not speculative positions in non-financial firms. They find support for a positive relationship between complexity (measured e.g. through the number of four-digit SIC codes representing 5% or more of sales) and the use of derivatives.

However, survey studies have documented that derivatives are also used for profit seeking (arbitrage, speculation). E.g. Bodnar et al (1998) report that 4% (6%) of firms frequently take active positions in interest rate (FX) derivatives, and up to 37% (26%) do it sometimes in the U.S. The international evidence is directionally similar. Alkebäck and Hagelin (1999) report that 15% of firms frequently use derivatives for arbitrage in their Swedish sample, and another 23% do it but seldom. De Ceuster et al (2000) report that trading for profit is an important motive for more than 20% of the Belgian firms in their data set. In a later study for Sweden, Pramborg (2005) reports that 38% (10%) of Korean firms use derivatives to do arbitrage (to speculate), with corresponding values of 35% (33%) for Swedish firms. However, there are hardly any studies which investigates the determinants for such speculation / profit seeking with derivatives. The reason for the shortage of such papers is that few studies combine survey data (where questions on the motives for derivatives usage can be asked) with data on determinants for hedging.

We contribute to the literature on the use of derivatives by combining survey data on derivatives (the use of derivatives) with a rich set of data from other sources, including financial data, data on management and board ownership, as well as blockholder ownership. We also measure the degree of firm level diversification and test it as a determinant for hedging or profit seeking with derivatives. Finally, we separately test the

determinants for hedging versus profit seeking, and also study the relationship between firm valuation and the use of derivatives for Nordic firms.

3. Data

3.1. Survey data

This paper is based on the results of a survey sent to all CFOs of firms listed at the Nordic OMX Exchanges (now NASDAQ OMX Nordic), i.e. listed firms from Denmark, Finland, Iceland, and Sweden. The firms were targeted in a survey sent by physical mail in early December 2007. All in all, the questionnaire was sent to 592 firms. The questionnaire was sent directly to the named respondents (using a hand collected database of the names of the CFOs). The overall response rate was 18.92%, ranging from 9.1% for Iceland to 24.2% for Sweden. Table 1 reports the response rates per country.

3.2. Financial and other data

The respondents were promised total anonymity, i.e., their names or the company cannot be identified from the study although the company and the corresponding response were identifiable and could thus be matched with background information on financials and ownership.

The financial data has been collected from three sources. The primary source has been the Amadeus database, complemented by missing data from Datastream, or as a last resort, annual reports.

The financials are from the last reporting year prior to the questionnaire was sent out, i.e. they are mainly from the year-end 2006 except for firms with accounting years ending later than 31.12.2006, but earlier than the time of the survey. Year-end exchange rates have been used to convert all financials to the same currency, which was chosen to be euro (which already is the currency for Finland). Financial data was collected not only for responding firms, but for the whole market, so that we can relate our sample to the whole population in the survey. Table 2 reports descriptive statistics for our sample of firms and the whole population, separately for financial firms and non-financials due to their different financial characteristics.[6]

Table 2 shows that our non-financial firms are larger than the population of firms to which the questionnaire was sent, but very close to them in terms of ROA and Solidity. Our financial firms in turn are somewhat smaller in terms of average values, but larger in terms of medians. They are also more profitable and have a higher average solidity. The differences are statistically significant for three measures (number of employees, total assets, and solidity) for of financial firms. Since the the differences between the sample and the population were smaller in the much larger group of non-financials, it seems that our sample represents the total population reasonably well.

[6] Many studies restrict their sample strictly to industrial firms, since financial variables such as solidity, and the value of total assets, are on a very different level for financials versus non-financials. Since we above all study survey data (answers to questionnaires), we want to keep all respondents included. However, when relating responses to variables which may take very different values for financial versus nonfinancial firms, we keep the subsamples separated.

Ownership data for the firms has been collected primarily from Amadeus, and secondary from annual reports . The Amadeus data represents the ownership situation at the time of the survey, while data from the annual reports is from the last reporting year prior to the survey. We collected data on the ownership share (percent of equity) of the largest shareholder , and also tried to identify the type of that owner (institutional or other owner). Data on management ownership was collected from the annual reports for the firms for the last accounting year before the survey (typically end of 2006). We summed up all stocks owned by the management group, and divided the sum by the number of stocks outstanding at the end of the reporting year. We also created dummies for whether the management owned options, warrants or convertibles on firm stock.

Data on firm level diversification was collected from Worldscope. We used the SIC codes for the firm to identify whether the firm was involved in several different sectors at the 2-digit level (our SIC-code variable is the sum of all different sectors at this precision level). We also collected market data from Datastream to calculate annual stock return volatility, as well as the market-to-book ratio.

4. Survey results on the use of derivatives in Nordic firms

In this section, we report briefly descriptive statistics for our survey responses. Our first question concerned the use of derivatives ("Do you use derivatives?" with response alternatives "Yes" or "No"). We obtained 112 responses on this question, out of which 69 (61.6%) were affirmative. The derivatives use in the four Nordic countries (Denmark, Finland, Iceland and Sweden) is thus substantially higher than in the older study for Sweden (Hagelin and Alkebäck 1999), which reported a number of 52%. The derivatives

use if also slightly higher than in the U.K. (60%, both according to Mallin et al. 2001, and Bodnar et al 2003), but lower than in Germany, Hong Kong and Singapore (78% both in Bodnar et al. 1999, and Sheedy 2001). Figure 1 reports the use of derivatives across industries in our sample.

Our second question concerns the motive for the use of derivatives ("Please state Your reasons for using derivatives" with response alternatives: "To hedge" and "To receive additional income", with scales from 1, less important, to 5, very important). In figure 2a, the distribution of the responses on the motives for derivatives are graphed in the scale from 1 to 5 given, while 2b reports the average responses across industries.

Figure 2a shows that the hedging motive dominates. We obtained 68 responses to this question, and all responses range between 2 and 5, with 4.51 as the average. For the profit motive, we obtained 54 responses, ranging between 1 and 5, with a mean of 1.96. 29 firms give a score at least equal to 2, and 17 firms give a score greater than 2 for derivatives use for profit. Out of our 69 firms using derivatives, these responses stand for 42% and 25%, respectively. Our results are thus only slightly higher than those of Alkebäck and Hagelin (1999), who report that 38% of Swedish firms at least occasionally use derivatives for profit, and 15% use them frequently for that reason. Figure 2b shows that while there is little cross-sectional variation across industries concerning derivatives use for hedging, their use for profit is more concentrated, as can be expected, to financial firms, and lowest in the sector for consumer goods.

Our next question concerned the type of derivatives used ("What sort of derivatives do you use" with alternatives Forwards, Futures, Swaps, OTC Options, Exchange Options,

Structured Derivatives, and Hybrid Debt, and where the respondents could indicate if they use or not use a given type of derivative). Figure 3 reports the frequency of use of of different derivatives contracts as a percent of the sample who indicated that they use a given type of derivative, while Figure 4 reports the importance of different risks hedged for by the means of derivatives. Here the question was "What is the purpose of the use of drivatives?" with response alternatives Exchange rate, Interest rate, Commodity Price, equity, and None, and with scales from 1, less important, to 5, very important, for each. In line with previous research on different markets, we see that forwards and swaps are most commonly used, and that the main risks are FX and interest rate risks.

We also asked about the objective of the hedging strategy ("What is the most important objective of you hedging strategy?" with alternatives Cash flow, Accounting earnings, Balance sheet accounts, and Firm value, and scales from 1, less important, to 5, very important, for each). These responses are reported in Figure 5. As can be expected, cash flow hedging is most common.

Finally, we also asked more detailed questions concerning how different risks are hedged for, how actively positions are changed, and what the main concerns concerning derivatives use are. These results are not reported here. In general, the derivatives use in the Nordic countries seems to be in line with that on other international markets.

5. Determinants of derivatives use

5.1. General use of derivatives

In this section, we will mainly separately estimate models for non-financial and financial firms, since these groups may have differently measured financial variables. This choice is furthermore motivated by our results in section 5.2, where we report some interesting differences in the direction of impact from certain determinants for the use of derivatives, when these two groups are concerned.

We will start by studying the determinants of derivatives use in general. Prior literature suggests that derivatives use is related to firm size and the degree of foreign trade. We proxy SIZE by the natural logarithm of turnover in euros.[7] Unfortunately, we do not have information on the degree of foreign trade by the firms, but the Nordic markets being very export oriented, there are not likely to be as large differences between the firms in this aspect as e.g. on the U.S. market. Since all the other Nordic countries have their own currencies, but Finland is part of the Eurozone, we include a country dummy EUR for Finland.[8] Being in the Eurozone can have two opposite effects for hedging. On one hand, currency exposure within the Eurozone is eliminated, which may reduce the need of hedging for FX risk. On the other hand, the company has, in relative terms a better access to credit markets in euro (see e.g. Korkeamäki 2009), which may increase the amount of securitized (Euromarket) borrowing and also the use of credit derivatives on that market.

[7] Robustness tests show that our results are robust to different specifications of size, such as the logarithms of total assets or the number of employees.

[8] We also performed robustness tests include a country dummy also for Denmark, who has pegged its currency to the euro within the ERM2 system. The coefficient for that dummy has the same sign as that for Finland, but was insignificant, and the regression results for the other variables were robust to this change in specification.

The derivatives are also likely to be less expensive (smaller spreads when traded in euros, as compared to derivatives in local currencies), which may increase the use of derivatives.

The literature on the determinants of derivatives use suggests that a lower solidity (higher costs of financial distress, Smith and Stulz 1985) and growth options (due to an agency problem, Foot et al 1993) may be positively related to derivatives usage. We include LT-DEBT measured as long term debt to assets, as a determinant. Growth options are proxied by the firm's market-to-book ratio MB.

Our key interest lies in firm risk and ownership variables. Firm risk and derivatives use are naturally endogenously related; derivatives use can reduce firm risk, but on the other hand, firms in a riskier industry can be more inclined to use derivatives to offset some risk. We include VOL, the stock return volatility of the firm during the previous accounting year (and in a few cases, a shorter time period due to data availability), to test whether there is a relationship between firm risk and the use of derivatives remaining on a "net" basis. We also include the variable SIC, measuring firm level diversification, i.e. the number of different sic-codes for the firm at a 2-digit level. Better diversified firms could be expected to be less inclined to use derivatives for hedging purposes. On the other hand, Lin et al (2007) suggest that diversified firms might benefit from the use of derivatives since derivatives use might reduce information asymmetry and reduce the diversification discount. In the derivatives usage literature, SIC-codes have been used by Dolde and Mishra (2007), who find that firm complexity is related to hedging behavior.

Managerial ownership has been suggested to influence firm risk taking by Stulz (1984) and Smith and Stultz (1985). As discussed previously, empirical studies have come up with

mixed results concerning its sign and explanatory power as a determinant for derivatives usage. However, using more detailed data on option sensitivities, Knopf et al (2002) found evidence of a negative (positive) relationship between the sensitivity of the manager's portfolio to stock price (volatility) increases, and the hedging behavior of the firm. Dolde and Mishra (2007) obtained the expected signs (negative for managerial option ownership, and positive for managerial wealth), but the latter variable was insignificant as an explanatory variable for the use of derivatives. We include both MAN_OWN, managerial ownership as a percent of total equity, MAN_OPT, a dummy for managerial options, and also, as an alternative, a combined variable MAN_OWN_D, a dummy for either managerial stock ownership, convertibles, and / or options.

We also test for the impact of ownership concentration. In the Nordic markets, stock ownership can be highly concentrated, and the largest blockholder can own a sizeable part of the equity of the firm. Such a large owner may be poorly diversified, and therefore have a preference for hedging at the firm level. We use two alternative measures: BLOCK_OWN, the percentage of equity owned by the largest shareholder, or a dummy variable OWN_20, taking the value of 1 it the largest owner owns more than 20% of the equity of the firm.

Finally, we will include sector dummies for two sectors which typically use more derivatives: Industrials, and Energy and Materials, leaving IT & Telecom, Consumer, and Healthcare without a sector dummy in models were financials were excluded.

Table 3 describes the financial and other variables created and used to test for the determinants of the use of derivatives, while Table 4 reports descriptive statistics for some

key variables (other than the financials in Table 2) in our data set, grouped by derivatives users and non-users. As Table 4 shows, the derivative users are significantly larger, come significantly more often from the Eurozone, and have a lower return volatility (VOL) and higher firm level diversification (SIC). The management also significantly less seldom owns stocks, options, or other instruments issued by the firm (as measured by the dummy MAN-OWN-D) among the users. Concerning volatility, these results are in contrast with the ones by Hentschel and Kothari (2001), who found that the large U.S. firms, nonfinancial as well as financials, using derivatives had insignificantly different volatilities, although the average volatilities for derivatives users were somewhat higher for both nonfinancial as well as financial firms.

Our full model for the use of derivatives has the following form:

$$USE_i = \alpha_i + \beta_1 SIZE_i + \beta_2 EUR_i + \beta_3 LT-DEBT_i + \beta_4 MB_i + \beta_j RISK_i + \beta_k OWN_i + \beta_l SECTOR_i + \varepsilon_i \quad (1)$$

where USE_i is a dummy that takes the value of one if the firm has responded confirming on the question on derivatives use, $SIZE_i$ is the logarithm of turnover in euros, EUR_i is a dummy for Finland which is part of the Eurozone, LT-$DEBT_i$ is a proxy for costs of financial distress, MB_i i.e. the market-to-book ratio proxies for growth options, $RISK_i$ is a vector of *j* variables measuring firm risk (the degree of diversification, SIC, and stock return volatility, VOL), OWN_i is a vector of *k* ownership variables (management ownership and blockholder ownership), $SECTOR_i$ is a vector of *l* sector dummies, and ε_i is a cross-sectional error term. We also include interaction terms between a financial sector dummy and the variables LT-DEBT and firm diversification (SIC) to allow for a different relationship between derivatives use and these variables for

the financial sector. In this specification, we will loose one observation because of missing data for management ownership.

Results from estimating model (1) using a PROBIT estimation with robust standard errors are reported in Table 5.[9]

As Table 5 shows, in line with prior literature, SIZE is a significant determinant for derivatives use. Our variable EUR for the Eurozone is also positive and significant, supporting our expectation that being in the Eurozone increases derivatives use, since access to a broader supply of derivatives contracts in one's home currency is available. LT-DEBT and MB have the expected signs but are not significant.

Our two risk variables, VOL and SIC, are also significant. The signs for both risk variables indicate that less risky firms use significantly more derivatives. For the SIC variable, the sign is also in line with Lin et al (2007) and Dolde and Mishra (2007), both focusing on the relationship between firm level diversification, and derivatives use for the reduction of informational asymmetry / hedging. We will return to this observation later, when analyzing whether the primary reason for the use of derivatives according to the responses is to hedge or to make profit.

The convexity of the managerial position to the stock price would be expected to determine the sign for it as a determinant for hedging. Consequently, a positive sign might be expected for stock ownership (since a higher stake in the firm means a less diversified position for a risk aversive manager, and thus a higher hedging demand), whereas the

[9] Our results are rather robust to other specifications such as multivariate LOGIT, and other for standard errors such as bootstrapped standard errors (or unadjusted standard errors).

convexity of an options position might (through higher profit opportunities which come with higher volatility) lead to less hedging. However, both our managerial ownership variables (management ownership, and the dummy for managerial options) obtain a negative sign. When jointly included, they are insignificant, but when replaced by a single dummy for any type of managerial stake in the firm, that variable is negative and highly significant at the 1% level (a z-score in excess of 4 in columns B and D). Our results are therefore somewhat in line with Dolde and Mishra (2007), who only got significant support for a negative relationship (through their options variable).

Our other ownership variable (the ownership stake of the largest owner) is also negative but insignificant, but when replaced by a dummy for control levels above 20%, it is significant at the 5% level in column B. Hence, all our ownership variables indicate that a higher ownership level either by the management or a blockholder, is negatively related to the use of derivatives.

Our sector dummies for both industrials and the energy and materials sector are highly significant, indicating as expected that derivatives use is more common among industrials, and firms from energy and materials sectors. Our coefficient estimates are rather robust across model specifications in Table 5 (columns A to D).

Next, we estimate a model also including financials (and a sector dummy FINSIC for them), but because of their different financials (above all different levels for LT-DEBT), we also include an interaction variable i.e. LT-DEBT × FINSIC. When no other interaction variables are included, all coefficients remain rather stable except the one for SIC, which becomes insignificant in that model (not reported here). We therefore include also an

interaction variable for SIC, i.e. SIC times the dummy for Financials, to test for different relationships between firm level diversification and the use of derivatives in financial versus non-financial firms. The results are reported in column E of Table 5. We see that SIC as well as FINSIC are significant but with opposite signs, indicating that the positive relationship between firm level diversification and the use of derivatives does not hold in the group of Financial firms. Another finding from column E in Table 5 is that dummy for FINSIC is positive but insignificant, showing that even if the use of derivatives as such was also reasonably high in the Financial sector, once other determinants are controlled for, the sector dummy is not significant as those for Energy and Materials, and Industrials are.

5.2. Derivatives for hedging or additional income?

Next, we turn to an analysis of the motives given for the use of derivatives. The respondents were given a scale from 1 (low) to 5 (high), and were asked to indicate to what extent they use derivatives for hedging, and for additional income. We obtained 68 responses to the first question, and 54 to the latter.

In the previous section, we obtained results supporting a positive relationship between derivatives use and firm complexity as measured by our variable SIC in the group of non-financial firms (but not among financial firms). But is that caused by a greater hedging demand by more complex firms? A study of the determinants for hedging versus profit seeking with derivatives may help to answer that question.

We start by analyzing the responses to the hedging question. First, we estimated a full model including all the explanatory variables used in column D, Table 5. We estimate

this for all firms, but include a dummy for Financials. These results are reported in column A in Table 6. As the results show, all but the degree of firm-level diversification (SIC) are insignificant, including the dummy for Financials. But SIC now obtains a negative coefficient of -0.3894 (with a z-score of -2.21). SIC is also negative and significant, together with the sector dummy for Materials and Energy, in the forward stepwise ordered probit model (i.e. a stepwise model starting from an empty set) at the 20% probability level, reported in column B of Table 6. These results are contrary to the finding by Dolde and Mishra (2007) on firm complexity being positively related to hedging, and instead indicate that diversified firms use derivatives less for hedging than more focused firms.

We now turn our attention to motives for derivatives use for profit seeking. Again, we start by estimating a full ordered probit models using robust standard errors. We use the explanatory variables from column D, Table 5, as explanatory variables, and include both non-financial and financial firms (and a dummy for Financials). The results are reported in column C of Table 6. SIC and the dummy for Financials are now the only significant variables, and they obtain signs opposite to those in the hedging equation: positive ones for both. They also remain as the only significant ones in the forward stepwise ordered probit model (column D in Table 6). Finally, we estimate the same models as in columns A and C (for hedging and profit) in Table 6, but excluding financial firms. Again, SIC is significant with opposite signs in the two models, and also volatility (VOL) and OWN_20 are now significant with negative signs for non-financials in the latter model (derivatives for profit). When comparing the coefficients for SIC in models E (for hedging, a coefficient of -0.4214 and F (for profit, +0.6282), we also see that the latter is

larger and highly significant (a z-score of 3.00), giving an indication of why the positive net effect from SIC on derivatives use in general may be the dominating one in Table 5.

Taken together, the results from Table 5 and 6 indicate that firm complexity (SIC) is a (positive) driver for derivatives use, but not because of a need for hedging, but because of profit seeking. The results also support a negative relationship between derivatives use and volatility (as in Table 5), but again, coming more strongly from the motive for profit seeking in less risky non-financial firms.

Our results indicate that some variables have very different effects on derivatives use for hedging, and derivatives use for additional income. Not separating between these two motives, and e.g. treating the derivatives use automatically as a hedging demand, as has been done in most of the studies of derivatives use, may thus be highly misleading. The earlier obtained empirical support for a higher use of derivatives in diversified firms may also be driven by arguments other than those proposed by e.g. Lin et al (2007) and Dolde and Mishra (2007), i.e. it may be an effort to increase profits by arbitrage in firms where risk level otherwise is lower.

5.3. Derivatives and market valuation

Next, we analyze the question of whether the use of derivatives increase the value of the firm, either due to reduced risk, or the profits from profit making using derivatives. Positive valuation effects have been reported e.g. by Allayannis and Weston (2001) and Bartram et al (2009). Besides the use of derivatives (our variable of interest), we include in our model variables which in other studies have been shown to be related to firm valuation. These

include size (for a small firm effect), tangible to total assets (to measure value firms in contrast to growth firms), cash-flow to total assets (as a measure for potential agency problems), firm level diversification (for a diversification discount), management ownership (for reduced agency problems), block ownership (for a potential negative entrenchment effect when a large owner is present), and institutional ownership (for value increasing governance). Finally, we include financials (return on equity and long-term debt to assets) as well as sector dummies for Financials, Industrials, and Energy and Materials.

We estimate a regression model of the following form:

$$MB_i = \alpha_i + \beta_1 USE_i + \beta_2 SIZE_i + \beta_3 TANG\_TO\_TOT_i + \beta_4 SIC_i + \beta_j OWN_i + \beta_k CONTROLS_i + \beta_l SECTOR_i + \varepsilon_i \quad (2)$$

where MB_i is the market-to-book ratio, USE_i is a dummy that takes the value of one if the firm has responded confirming on the general (first) question on derivatives use, $SIZE_i$ is the logarithm of turnover in euros, TANG-TO-TOT_i to separate between value versus growth firms, SIC_i is a measure for firm level diversification, OWN_i is a vector of *j* ownership variables (management, institutional, and blockholder ownership), $CONTROLS_i$ is a vector of *k* financial control variables (long-term debt to assets, LT-DEBT, and return-on-equity, ROE), $SECTOR_i$ is a vector of *l* sector dummies, and ε_i is a cross-sectional error term. The results are reported in Table 7.

Significant variables at least at the 5% level are the use of derivatives i.e. USE (positive), SIZE (negative, supporting for a premium for small firms, which is contrary to our expectations), CF (negative, in line with higher agency costs), ROE (positive, i.e. a higher

valuation for profitable firms), and LT-DEBT (negative, in line with a higher default risk). In column B, we report the results only for non-financial firms, which are highly similar to those for the larger sample. While in both of these models, USE is significant, it is still the least significant of the significant variables, and in a forward stepwise regression (at the 20% probability level), it looses its significance (column C in Table 7). In summary, our results give some albeit weak support for the value increasing effect of derivatives use.

6. Robustness tests

We performed several robustness tests of our models in Table 5. To begin with, we replaced LT-DEBT i.e. long-term debt to assets by solidity, measured as equity to total assets. That variable was insignificant, supporting LT-DEBT as a more powerful determinant for derivative use. LT-DEBT may capture several causes for derivatives use: higher costs of financial distress, but also a higher need for interest rate derivatives due to potentially higher amounts of foreign / fixed rate debt. We also included ROE, return-on-equity, as an explanatory variable. A higher profitability may reduce the costs of financial distress and reduce the hedging need. However, ROE was insignificant when added to the model specifications in Table 5. ROE is also highly collinear with size and SIC (correlations coefficients of 0.48 and 0.38, by far the highest among our explanatory variables). The inclusion of ROE did, however, not have any marked effect on our other explanatory variables i.e. their coefficients and significance levels were very robust to the addition of ROE.

We also performed more robustness tests with ownership variables. Since institutional owners should be well diversified, and therefore not very keen on firms hedging since they

can hedge themselves, we added the variable INST, a dummy that takes the value of one if the largest owner is an institution. The models in columns A and B in Table 5 were re-estimated with INST replacing the blockholder variable BLOCK_OWN, and also by just adding INST. The variable obtained a positive coefficient but was insignificant.

7. Summary and conclusions

Typically, the determinants of derivatives use are derived from motives such as hedging, agency costs, or managerial compensation systems. However, many firms report that also the use of derivatives to make profit is an important motive. We study the joint and separate motives (profit seeking versus hedging) in a sample of firms from four different Nordic countries. While the hedging motive clearly dominates, more than half of the derivatives users in our sample give some weight for additional income as a motive for the use of derivatives.

We find that somewhat different determinants drive the use of derivatives when these two motives are concerned. When only looking at derivatives use, irrespectively of the motive, our results are in line with the finding of Dolde and Mishra (2007), who found a positive relationship between derivatives use and firm level diversification. However, once we separately study the determinants of the two motives, our results indicate that the motive for derivatives use in diversified firms is not hedging, but profit seeking. Our results also support a negative relationship between derivatives use and volatility, but again, coming above all from the motive for profit seeking in less risky non-financial firms. In summary, we find that riskier non-financial firms hedge more using derivatives, while less risky non-

financial firms use them for profit. Financial firms use derivatives more for profit than for hedging.

We contribute to the prior literature in several ways. First, we study separately the determinants of two (in terms of risk taking, opposite) motives for the use of derivatives. Second, we contribute to the scarce literature on firm level diversification as a determinant for the use of derivatives, and find that once the hedging and profit seeking motives are separated, it is significant with opposite signs for the two motives. A research design that does not capture such differences may yield insignificant net results for that variable as a determinant for derivatives use. Third, we provide recent evidence for four Nordic countries, and study the difference between firms with national currencies (Sweden, Denmark or Iceland) versus an Eurozone country (Finland), and find a significant difference in the use of derivatives. We also include financial firms, and compare the use of derivatives in them versus in non-financial firms.

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Table 1. Response rates

Descriptive statistics are reported for the responses received from a survey directed to the Chief Financial Officers (CFO) of all companies listed at the Nordic OMX Stock Exchanges at the end of 2007. A total of 592 companies were included in the study.

	Number of questionnaires sent	Number of responses	Response rate
Denmark	188	29	15.43%
Finland	130	20	15.38%
Iceland	22	2	9.09%
Sweden	252	61	24.21%
TOTAL	592	112	18.92%

Table 2. Descriptive statistics for responding firms and target population

The table reports descriptive statistics for the listed firms in Denmark, Finland, Iceland, and Sweden (the "Population", a total of 592 firms), which were targeted in the survey (whose CFOs obtained the questionnaire). We also report statistics for responding firms (the "Sample", a total of 112 firms), i.e. firms from which a respondent returned a filled-in questionnaire. The firms are divided into Financials (banks, investment and insurance companies) and Non-financials, based on the sector codes used by the OMX exchanges. We report averages, medians, standard deviations, and the number of firms for which the financial information item has been obtained ("Obs"), for the following variables: Turnover (in 1000 euros), Number of employees, Total assets, Return on total assets (ROA, defined as Net Profit to Total Assets) and Solidity (defined as Equity to Total Assets). Financial data is for the last available reporting year prior to the date for sending out the questionnaire (typically 2006, unless the reporting period has differed from the annual one), and has been collected from Amadeus, Datastream, and annual reports for the companies. * and **denotes a significant difference between the sample and the population at the 10 per cent or 5 per cent significance levels, respectively.

		Non-financials		**Financials**	
		Sample	**Population**	**Sample**	**Population**
Firms		**92**	**443**	**20**	**149**
Turnover, 1000 EUR	Mean	1 848 330	1 117 219	297 587	460 123
	Median	156 987	122 864	59 800	54 358
	St.dev.	4 868 059	3 642 577	511 782	1786913.2
	Obs	92	438	20	131
No of exployees	Mean	8 165	5 752	496	1 522**
	Median	754	655	194	159
	St.dev.	26 156	25 692	769	4 737
	Obs	92	430	17	128
Total assets	Mean	1 810 164	1 075 111	3 610 447	12 097 719*
	Median	142 472	107 153	706 763	621 759
	St.dev.	5 330 572	3 595 192	6 509 201	53 804 975
	Obs	92	443	20	149
ROA	Mean	5.14	5.08	7.98	5.73
	Median	7.34	7.39	5.56	2.40
	St.dev.	17.25	16.06	8.51	7.94
	Obs	92	441	20	146
Solidity	Mean	49.56	49.50	50.53	37.93*
	Median	47.34	46.68	54.44	29.00
	St.dev.	19.88	19.45	31.22	29.54
	Obs	92	439	20	147

Table 3. Variable definitions

Descriptions of the variables used in the analyses. Financial statement data is from Amadeus, complemented by data from Datastream and annual reports for the firms. Stock return and price data are obtained from the Datastream, while SIC codes are from Worldscope. Data on the largest shareholder (blockholder) is from Amadeus, while management ownership data is from annual reports. All data items are for the last reporting year (typically 2006) prior to the survey.

Variable	Description
USE	A dummy variable which takes the value of 1 if the firm uses derivatives (according to the survey responses).
SIZE	Ln (turnover), where turnover measured in 1000 euros
EUR	A dummy variable which takes the value of 1 for Finland as part of the Eurozone
LT-DEBT	Long term debt to total assets
TANG-TO-TOT	Tangible to total assets
CF	Cash-flow to total assets
MB	Market value of equity / book value of equity.
ROE	Net profit / total equity.
VOL	Prior 1-year stock return volatility
SIC	A measure for firm level diversification, calculated as the number of different sic-codes for the firm at the 2nd digit level
MAN_OWN	Percent of total equity owned by the management group
MAN_OPT	A dummy variable which takes the value of 1 if the management owns options, warrants, or convertibles on firm stock
MAN_OWN_D	A dummy variable which takes the value of 1 the management owns stocks, options, or other instruments issued by the firm
BLOCK_OWN	Percent of total equity owned by the largest shareholder in the firm
OWN_20	A dummy variable which takes the value of 1 if the largest blockholder in the firm owns more than 20% of total equity
INST_OWN	A dummy variable which takes the value of 1 if the largest owner is an institutional owner, and zero otherwise
SECTOR_DUMMIES: INDSEC, EN_MAT_SEC	Dummies for Industrials, and Energy and Materials, leaving IT & Telecom, Consumer, and Healthcare without a sector dummy in a model where Financials are excluded
SECTOR_DUMMY: FIN	A dummy variable which takes the value of 1 for Financials

Table 4. Descriptive statistics for key variables

Reported are descriptive statistics (mean, median, and standard deviation) for our key variables, separately for derivatives users and non-users. For variable definitions, see Table 3. In the last column, a t-test statistic, testing for differences in the averages of the two groups, and assuming different subgroup variances, is reported. Boldface denotes significance at the 5% level, double-sided tests.

Variable	Derivatives users			Non-users of derivatives			T test for diff
	Mean	Median	St.dev.	Mean	Median	St.dev.	
SIZE	12.8236	12.7572	2.1918	10.1134	10.7352	2.9569	**5.18**
EUR	0.2319	0.0000	0.4251	0.0930	0.0000	0.2939	**2.04**
LT-DEBT	0.1726	0.1232	0.1478	0.1509	0.0423	0.3515	0.38
MB	3.7713	2.7400	3.4321	3.8607	2.5800	3.4484	-0.13
VOL	29.8767	28.1400	10.2089	39.8954	37.9200	19.6989	**-3.09**
SIC	2.3913	2.000	1.3956	1.7907	2.000	1.1456	**2.48**
MAN-OWN	0.0150	0.0003	0.0517	0.0353	0.0084	0.0682	-1.67
MAN-OPT	0.4783	0.0000	0.5032	0.5714	1.0000	0.5009	-0.95
MAN_OWN_D	0.7391	1.0000	0.4423	0.9524	1.0000	0.2155	**-3.41**
BLOCK_OWN	26.4322	22.4000	18.7355	23.2481	16.9000	18.8368	0.87
OWN_20	0.5362	1.0000	0.5023	0.4419	0.0000	0.5025	0.97
OBS	69			43			

Table 5. Determinants of derivatives use

The table reports estimated coefficients and z-scores (within parentheses) as well as goodness-of-fit statistics for versions of model (1), i.e. from the estimation of probit models using the responses to thee question on whether the firm hedges or not as the dependent variable. For a description of the explanatory variables, see Table 4. The models are estimated with robust standard errors. In column E, results for the full sample including financials (with a dummy), and including all the initial variables in column D and two additional interaction terms: the dummy for financials multiplied by SIC, and by LT-DEBT (i.e. LT-DEBT × FINSEC, and SIC × FINSEC). Variables significant at least at the 10% level are denoted boldface.

Model	**Column A**	**Column B**	**Column C**	**Column D**	**Column E**
	No financials	**No financials**	**No financials**	**No financials**	**All**
SIZE	0.2539	0.2231	0.2627	0.2198	0.3176
	(**3.10**)	(**2.46**)	(**3.10**)	(**2.35**)	(**2.93**)
EUR	0.7761	0.8446	0.7766	0.8709	0.8862
	(**1.83**)	(**1.90**)	(**1.84**)	(**2.04**)	(**2.00**)
LT-DEBT	0.7807	0.4516	0.7186	0.4153	0.6515
	(1.41)	(0.92)	(1.33)	(0.84)	(1.26)
LT-DEBT					3.0306
×FINSEC					(1.47)
MB	0.1167	0.0879	0.1212	0.0972	0.1120
	(**2.32**)	(1.61)	(**2.52**)	(**1.87**)	(**2.18**)
VOL	-0.0268	-0.0412	-0.0309	-0.0428	-0.0291
	(**-1.89**)	(**-2.60**)	(**-2.22**)	(**-2.67**)	(**-2.28**)
SIC	0.4442	0.4959	0.4419	0.4745	0.4331
	(**2.44**)	(**2.72**)	(**2.44**)	(**2.62**)	(**2.44**)
SIC ×FINSEC					-0.6643
					(**-2.69**)
MAN-OWN	-1.2714		-0.9654		
	(-0.65)		(-0.48)		
MAN-OPT	-0.3983		-0.4137		
	(-1.05)		(-1.11)		
MAN_OWN_D		-2.5775		-2.3572	-1.8773
		(**-4.07**)		(**-4.39**)	(**-3.83**)
BLOCK_OWN	-0.0081	-0.0209			
	(-0.92)	(**-2.10**)			
OWN_20			-0.5118	-0.6629	-0.6443
			(-1.47)	(**-1.89**)	(**-1.96**)
EN_MAT_SEC	2.8938	2.9199	2.9045	2.8765	3.1189
	(**4.05**)	(**4.02**)	(**4.03**)	(**3.85**)	(**3.92**)
INDSEC	1.1305	1.1900	1.1432	1.2070	1.1808
	(**2.71**)	(**2.94**)	(**2.80**)	(**3.02**)	(**2.92**)
FINSEC					1.3069
					(1.46)
Wald Chi2	29.12	35.15	31.34	33.08	37.23
Pseudo R2	0.4165	0.4816	0.4259	0.4803	0.4734
OBS	91	91	91	91	111

Table 6. Determinants for the motives of derivatives usage

The table reports estimated coefficients and z-scores (within parentheses) as well as goodness-of-fit statistics for ordered probit models, using the responses to two question concerning the extent of derivatives use - for hedging or profit making (responses on as scale from 1, lowest, to 5, highest) - as the dependent variable. For a description of the explanatory variables, see Table 4. The models in columns A and C are estimated with robust standard errors, and including both non-financial as well as financial firms (but with a dummy for financials). The models in columns B and D are estimated using forward stepwise ordered probit with robust standard errors at the propability level of 20%, i.e. starting from an empty set, and adding variables from same set of variables as in A and C. The model in column E and F are the same as in A and C, but with Financials excluded.

Model	**Column A**	**Column B**	**Column C**	**Column D**	**Column E**	**Column F**
	Derivatives for hedging		**Derivatives for profit**		**For hedging**	**For profit**
	Full model	**Stepwise**	**Full model**	**Stepwise**	**Only non-financials**	**Only non-financials**
	0.0922		0.1064	0.1379	0.0486	0.1344
SIZE	(0.80))		(1.06)	(1.44)	(0.44)	(1.21)
	0.3392		-0.7431		0.2131	-0.8419
EUR	(0.88)		(-1.72)		(0.56)	(-1.55)
LT-DEBT	-1.4943	-1.1741	1.7008		-1.3284	1.1757
	(-1.39)	(-1.32)	(1.24)		(-1.21)	(0.60)
MB	-0.0495		-0.1136		-0.0516	-0.0427
	(-1.26)		(-1.16)		(-1.30)	(-0.44)
VOL	-0.0057		-0.0239		-0.0159	-0.0592
	(-0.36)		(-1.31)		(-0.86)	(**-2.63**)
SIC	-0.3894	-0.2449	0.3907	0.2761	-0.4214	0.6282
	(**-2.21**)	(**-1.98**)	**(2.16**)	(**2.11)**	(**-2.42**)	(**3.00**)
MAN_OWN_D	0.0843		0.6050	0.6219	0.0600	0.8250
	(0.26)		(1.54)	(1.64)	(0.15)	(1.62)
OWN_20	-0.0254		-0.4173		0.3485	-0.8963
	(-0.07)		(-0.96)		(0.88)	(**-1.82**)
FIN	-0.6795		1.9503	2.0845		
	(-1.24)		(**2.34**)	(**3.09**)		
EN_MAT_SEC	0.0843	0.7406	0.3858		0.1417	0.6580
	(0.15)	(**1.79**)	(0.60)		(0.26)	(0.87)
INDSEC	-0.4283		0.4585		-0.3476	0.6247
	(-1.22)		(0.81)		(-1.00)	(1.00)
Wald Chi2	11.74	8.36	21.45	14.41	6.88	49.17
Pseudo R2	0.115	0.0698	0.2089	0.1631	0.0776	0.2788
OBS	68	68	54	54	57	43

Table 7. Derivatives and firm valuation

The table reports estimated coefficients and t-values (within parentheses) as well as goodness-of-fit statistics for regressions of book-to-market values on potential determinants, including the use of derivatives (the responses to thee question on whether the firm hedges or not). For a description of the explanatory variables, see Table 4. The models are estimated with robust standard errors. We perform the estimations both including both non-financial as well as financial firms (but with 3 sector dummies), as well as only with non-financials. The model in column C is a result of a forward stepwise regression at the probability level of 20%.

Model	**Column A**	**Column B**	**Column C**
	All firms	**Non-financials**	**Non-fin., stepwise**
	1.7865	2.0522	1.5354
USE	(**1.83**)	(**1.86**)	(1.55)
	-0.5985	-0.6315	-0.7359
SIZE	(**-2.80**)	(**-2.94**)	(**-3.37**)
	-1.0103	-1.4969	-2.2686
TANG-TO-TOT	(-0.81)	(-0.94)	(-1.50)
	-3.6137	-4.0350	-3.2470
CF	(**-2.49**)	(**-2.63**)	(**-2.21**)
	-0.2329	-0.4725	
SIC	(-0.91)	(-1.53)	
	4.3133	5.1564	
MAN_OWN	(0.83)	(0.92)	
	0.7541	0.9507	
MAN-OPT	(1.28)	(1.50)	
	0.5416	0.8621	
OWN_20	(0.79)	(1.20)	
	1.2349	1.3203	1.4396
INST	(1.60)	(1.61)	(**1.80**)
	0.0509	0.0537	0.0568
ROE	(**3.18**)	(**3.35**)	(**3.57**)
	-5.2153	-5.9936	-4.9722
LT-DEBT	(**-2.56**)	(**-2.73**)	(**-2.34**)
Sector dummies	Include	Included	No
F-value / Wald Chi2	3.47	4.00	4.70
R2	0.3710	0.3667	0.3272
OBS	96	87	87

Figure 1. The use of derivatives across industries

The figure above reports the percentage of firms from specific industries that responded affirmatively on the question concerning derivatives use. “Industry” here includes both Industrial firms, IT and Telecom, “Finance” includes all firms classified as Financials (also including real estate investment companies), “Consumer” includes Consumer and Healthcare, and “Materials” here include Material & Energy.

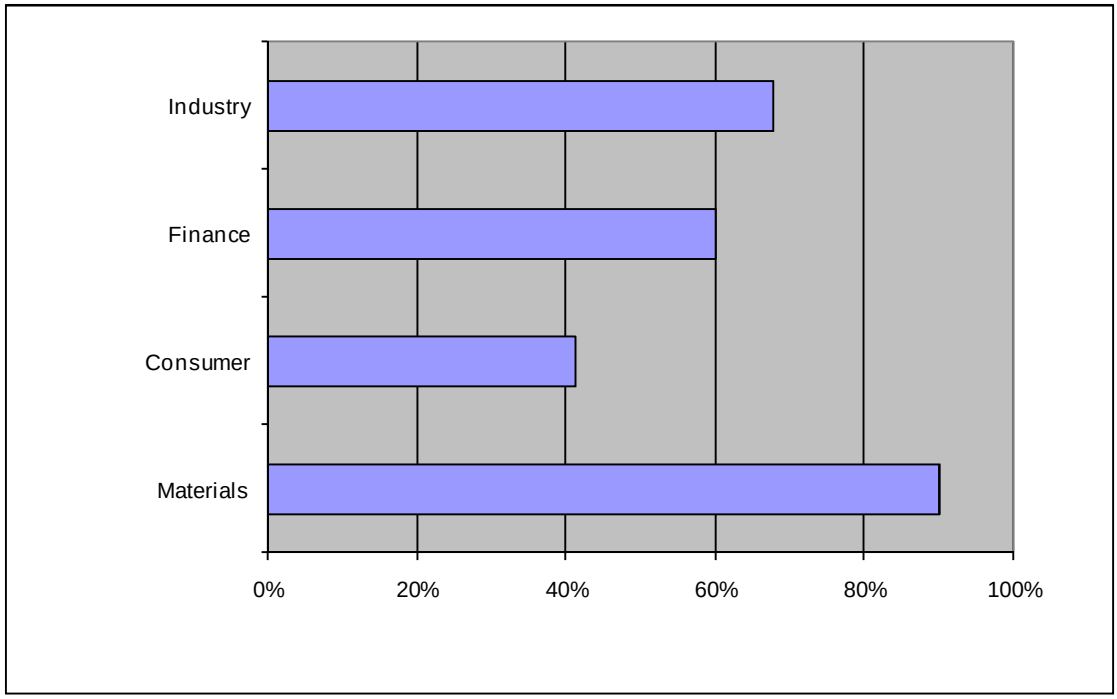

Figure 2a . The use of derivatives for hedging and profit

The figure above reports the distribution of the responses (given on a scale from 1, lowest, to 5, highest) on two questions concerning the use of derivatives: to what extent are derivatives used for hedging, and to what extent for profit.

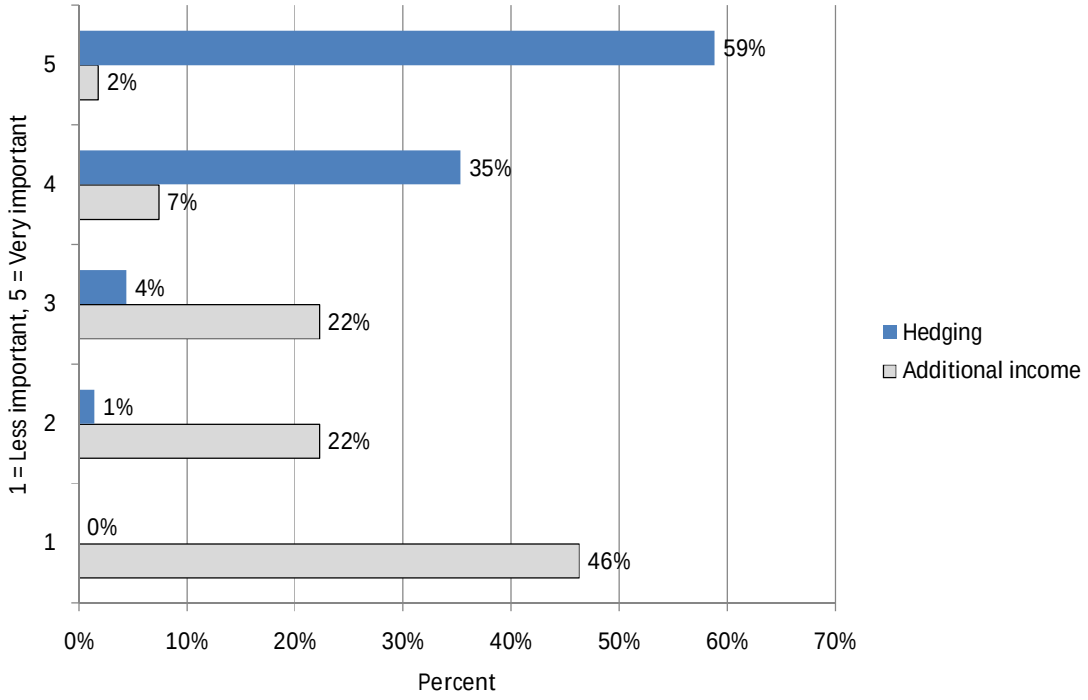

Figure 2b . The use of derivatives for hedging and profit across industries

The figure below reports the cross-industrial distribution of the averages of the responses (given on a scale from 1, lowest, to 5, highest) on two questions concerning the use of derivatives: to what extent are derivatives used for hedging, and to what extent for profit. "Industry" here includes both Industrial firms, IT and Telecom, "Finance" includes all firms classified as Financials (also including real estate investment companies), "Consumer" includes Consumer and Healthcare, and "Materials" here include Material & Energy.

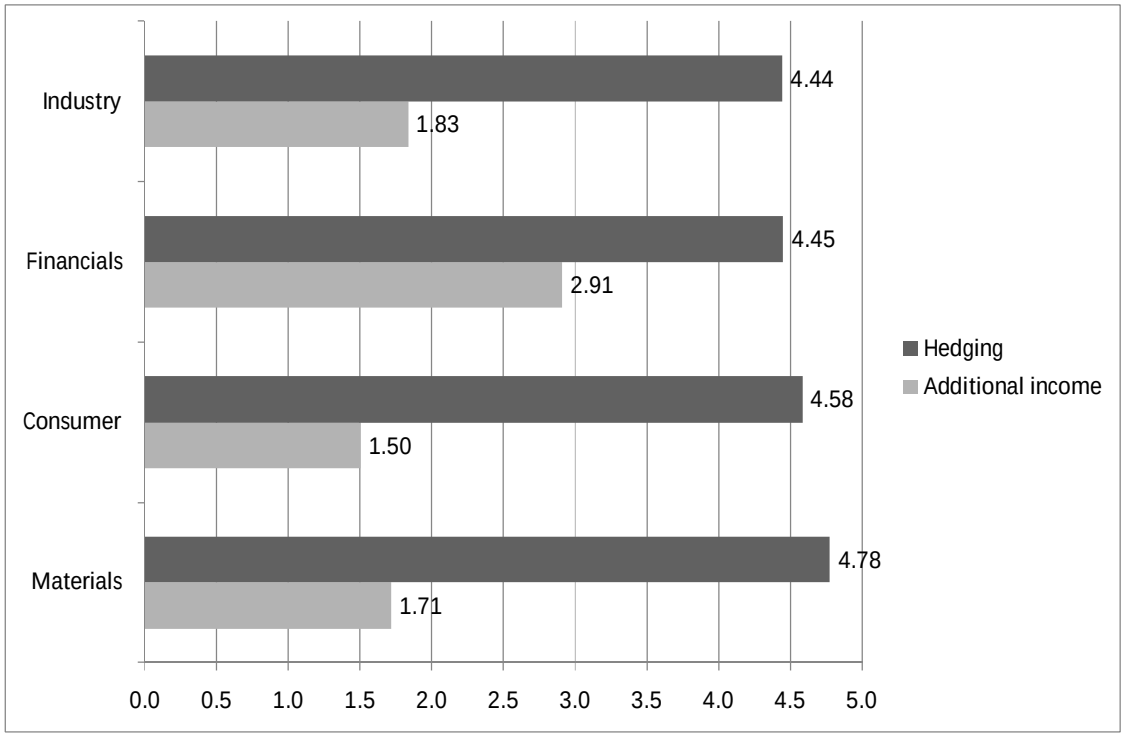

Figure 3. The use of different types of derivatives

The figure reports the responses on questions concerning the frequence of the use of different types of derivatives as a percent of the whole sample who indicated that they use the given type of derivative.

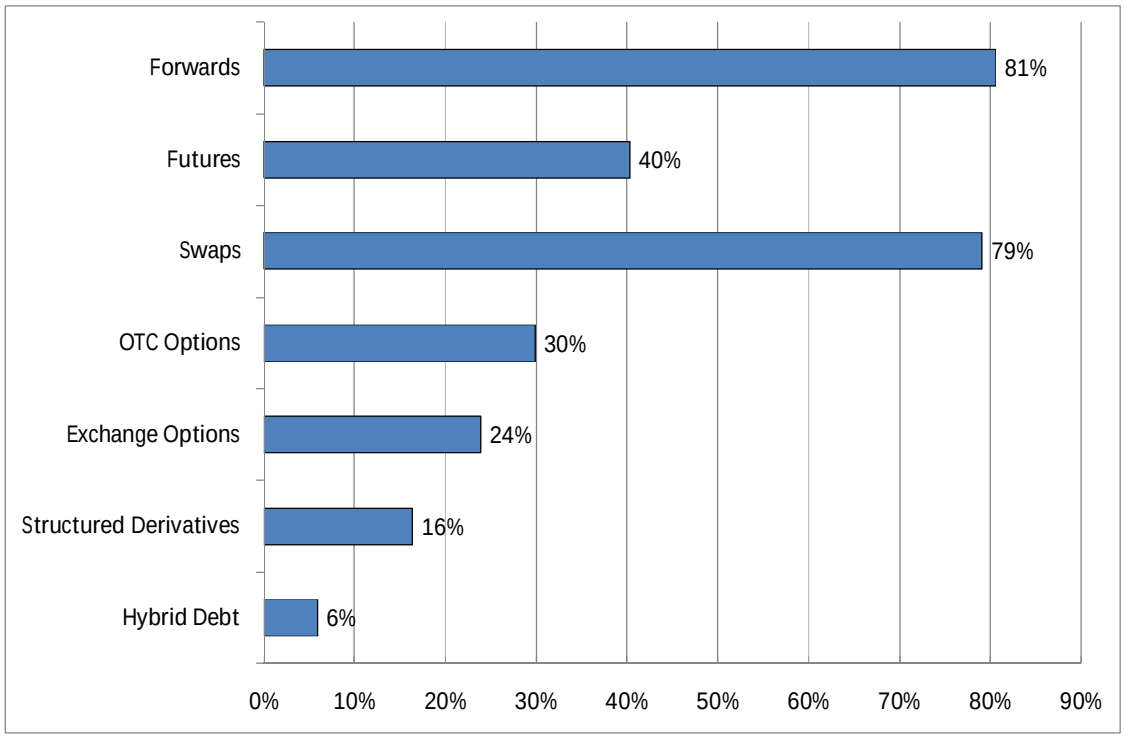

Figure 4. The purpose of derivative use

The figure reports the responses on questions concerning the importance of different types of risks hedged by the use of derivatives (given on a scale from 1, lowest, to 5, highest).

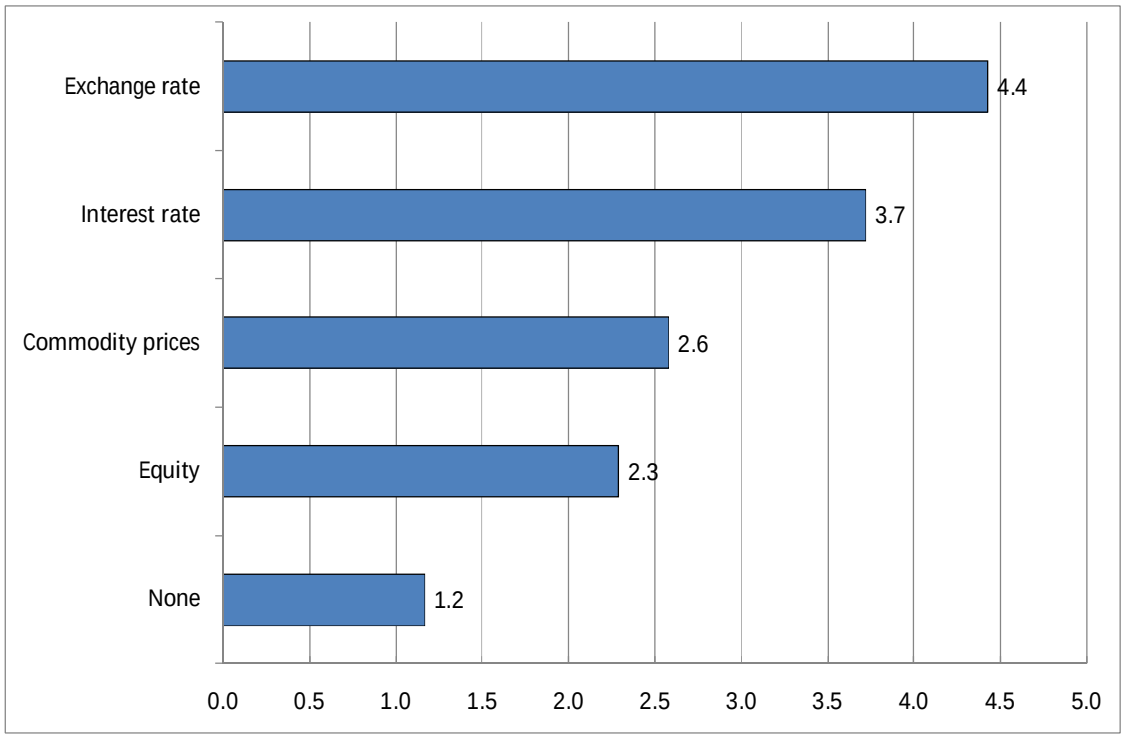

Figure 5. The objectives of derivatives use

The figure reports the responses on questions concerning most important objectives of the firm's hedging strategy (given on a scale from 1, lowest, to 5, highest).