

Agency Conflicts and Hedging Financial Risks Decisions – Evidence on Corporate Governance Influence

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Abstract

We examine whether underinvestment problems and the influence of corporate governance strength in non-financial firms in UK are related to corporate hedging decisions for financial risks exposures. We structure probability regressions to identify motives to hedging foreign currency, interest rate and commodity price risk exposures in 265 non-financial firms listed in FTSE-All share index, period 2005-2012. The analysis reveals a strong influence of corporate governance factors on hedging decisions for financial risks exposures. Overall, hedging using derivatives financial instruments is not always determined by economic impact of firms' characteristics such as size but the probability of hedging using financial instruments is captured by other factors such as managerial incentives, information asymmetry and corporate governance influence.

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JEL CLASSIFICATION:

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1. Introduction

Important and highly debated argument in the financial literature is the determinants of hedging with regards to financial risks. Yet, empirical tests offer explanations for hedging financial risks in related to foreign exchange price exposures, interest rate volatility price and commodity price risks using various samples and methodologies. This reflects, among others, differences in erroneous conclusions in the risk management literature to capture the determinants of hedging from different dimensions. Many questions remain open when trying to understand beyond determinants of corporate hedging strategies in nonfinancial firms. For example, why firms should hedge financial risks or particular risk exposures? What motives beyond hedge decisions? What type of derivatives financial instruments that most common used in hedging practices? Is there selective derivatives type in hedging strategies? If so, our paper sheds the light on these questions.

In the academic finance literature, Smith and Stulz (1985), for instance, provide developed theory that shows some incentives on why corporations should hedge and others do not. This puts forward considerations on tax reductions, transactions costs of financial distress, information asymmetry, managerial compensations and risk aversion. Several empirical studies extend the hedging theory by Smith and Stulz (1985) by identifying determinants of hedging influencing corporations' decisions to use type and level of derivatives in financial risk exposures. For example, Aretz et al. (2007), Albuquerque (2007), and Afza and Alam (2011) document that financial decisions behind hedging motives exist in imperfections capital market that corporate hedging policies can help firms to reduce agency costs, costly external financing, costs of bankruptcy, convex tax, volatility cash flows, and unsystematic risk. As a result of this theory the motives towards using derivatives financial instruments in corporate hedging practices are still in debate for providing wide explanations. Conceptually, several empirical studies examined why and how corporations implement corporate hedging policies in risk management against risks they face².

However, in a corporate risk management framework, hedging strategies is the extent to which corporations seek to determine whether to hedge or not based on benefits and incentives. Recently, Ameer (2010) investigates the determinants of hedging practices outside the developed countries in context to which a comprehensive study conducted on the firms in Asia-Pacific region. Although the similarity of common factors with regards to motives of hedging decisions that consist with the most empirical studies conducted in USA, UK, Canada, and Australia etc., his findings document that the

² Walsh (1995) argues that hedging risks by any types of derivatives securities (future, forward, option, and swap) in financial risk management has considered an essential part of managerial incentives. See, e.g., Allayannis and Ofek (2001) find that the decision to use derivatives depends on explanatory variables largely associated with firms' foreign sales, foreign trade, and firms' characteristics such as size and R&D expenditures. Also, there are other theories that suggest why it may be essential for firms to hedge in optimal positions using financial derivatives for risk aversion, investment and financing opportunities (e.g., Stulz, 1984; Smith and Stulz, 1985; Froot et al., 1993; DeMarzo and Duffie, 1995).

firm specific factors on the use of derivative instruments has a significant impact on the determinants of hedging strategies³. More precisely, foreign sales, liquidity, firm growth, managerial ownership and size are the most important firms' characteristics.

Current financial literature does not provide wide explanations on hedging practices behaviour. Several theoretical models predict why and how non-financial firms may use selective derivatives financial instruments (Brown et al., 2006) to hedge their financial risk exposures rather than other choices contracts. For example, Adam (2009) show that firms' hedging instrument choices, between options and forwards contracts in commodity price risk exposures, are based on current market conditions and financial constraints. Allayannis et al. (2012) suggest that firms' motives behind the use of derivatives for purely hedging purposes are more correlated with positive corporate governance which could lead to a firm's value premium in optimal positions. Adam and Fernando (2006) find an important motive for firms in gold mining industry to use selective derivatives instruments (e.g., forward and options contracts) in hedging financial risk exposures because of economically significant cash flow gains from their derivatives transactions. A large part of the previous empirical literature concerns on a firm's determinants to use derivatives investigated foreign currency, interest rate and commodity derivatives separately or combined more than one risk type in structural models. Selective derivatives instruments types (e.g., future, forward, option, and swap) with regards to type of financial risk exposures have received little attention in the finance literature on corporate hedging strategies.

Bodnar et al. (2013) examine the selective derivatives choice by managerial preferences in related to hedging commonly currency exchange exposures and interest rate volatility risk and document that forward, option and swaps contracts are the most common choice statistically indexed in currency derivatives, but swap contracts in interest rate derivatives are the most popular instruments usage, followed by forward and option contracts. The selective choice in hedging decisions shed the light on the few questions consequently related to the determinants of hedging such common financial risk exposures, in which why high percentage of choice on determinants of derivatives type reply on one or two choices for each type of risk rather than others. The literature in finance yet does not support full explanations on the determinants of hedging financial risks and the decisions beyond the selective choice of derivatives use. Birt et al. (2013) show that forward and options contracts are the most common use in hedging financial risks in corporations. This is also reflects the most commonly usage of selective types of derivatives in corporate hedge practices⁴.

³ See for instance, Berkman et al. (2002) conduct a research study on sample of random firms listed in Australian Stock Exchange investigating the determinants of derivative financial instrument use.

⁴ Other studies examining selective derivatives instruments types in determinants of hedging financial risks include: forward contracts (Bessembinder, 1991); futures and options contracts (Colquitt and Hoyt, 1997); swap contracts in interest rate exposures (Alkeback and Haglin, 1999); options contracts (Adam, 2009); forward contracts (Wojakowski, 2012), forward rate agreements and options contracts are the most common type of derivatives use (Birt et al., 2013)

At the meanwhile, it is challenging to assess the extent to which existing empirical studies conclude evidence on the motives beyond derivatives usage in hedging strategies from particular dimensions of views underlying structural models or specific explanatory variables. In the context to which, Aretz and Bartram (2010) document a comprehensive review in risk management literature and show that recent empirical studies capture the motives beyond corporate hedging and use of derivatives in general without intensively test for complexity of wide vision of the determinants of hedging behaviour changes over time. Testing these theories regarding the determinants of hedging strategies entails critical challenges. Also, this highlights the importance of endogeneity concerns with regards to explanatory variables that describe the motives of derivatives in the type of risk exposures identified and firm level. Bartram et al. (2009) suggest that the determinants of hedging strategies related endogenously with other financial and operating decisions in which context, for example, differences in corporate governance measures in the firm-level is critical base for better corporate risk management policies. Thus, according to Baek et al. (2004) corporate governance practices is strongly promoted by wider investors especially in the complicated financial decisions in considering reaching optimal levels like in corporate hedging. Consequently, Bartram et al. (2011) find evidence that the determinants of derivatives are associated with reducing cash flow volatility, idiosyncratic volatility, and systematic risk in the firm-level with higher financial risks exposures. Also, Bligh (2012) document that hedging practices can provide certainty cash flows beyond the reduction in cash flow volatility, which is another beneficial determinants of hedging future financial risks, that could support firms with motives to reduce under-investment claims and consequently agency costs. Mitigating under-investment problems that are subject to greater information asymmetry is associated with financial hedging decisions. Specifically, the use of derivatives is associated with better growth opportunity (Choi et al., 2013). Hence, the importance of corporate hedging strategies assists to reduce overall risks and in particular financial risks related to exchange rate risk, exposures to interest rate risk and commodity price volatility risk.

Belkhira and Boubaker (2013) argue that in the context to which corporations' hedging decisions seek to implement derivatives financial instruments in ways of attempting to protect themselves from the default risk of bankruptcy costs, financial distress costs, and potential increasing levels of systematic risk exposures. Specifically, using leverage variables as proxies for financial distress could help to capture the relationship between the determinants of foreign currency hedging decisions and stimulatingly the capital structure. Clark and Judge (2008) document evidence that financial distress costs is increasingly important factor in determinants of foreign currency hedging. Furthermore, the literature finance in risk management theories has so far inducing the importance of managerial stock ownership and management compensation contracts in hedging decisions practices (Tufano, 1996; Graham and Rogers, 2002; Rogers, 2002; Geczy, 2007).

The objective of this study is to examine the determinants of hedging financial risk exposures with regards currency derivatives, interest rate derivatives and commodity derivatives. Furthermore, we report evidence on the hedging decisions in most common selective derivatives choice, in particular future, forward, option and swap contracts. Although previous empirical studies provide mixed results on motives beyond the use of derivatives financial instruments, in our knowledge, our study is the first attempt to report comprehensive evidence on the multiple dimensions of determinants of hedging financial risks and selective derivatives choice. We reply on logistic regressions analysis based on a binary choice of derivatives use decision with equal to 1 if a firm use derivative type in hedging risk exposure, and 0 otherwise. Although the difficulties beyond collecting the notional amount of derivatives instruments usage for each type of financial risk exposures in our sample, Borokhovich et al. (2004) argue that gathering notional principal of the derivatives position is useful proxy indication for derivatives use in hedging practices but still limited to the level of maturities. In our sample, we find that the notional amounts of derivatives instruments use for each type of risk exposures, with regards to foreign exchange, interest rate and commodity derivatives, are not consistently reported yearly in firms' annual reports. Thus, in our knowledge, up-to-date there is no a compete reliable date set reporting the notional amount of derivatives use for firms listed in FTSE-All in London Stock Exchange (LSE).

2. Motivating theories and hypotheses

In this section we provide a brief summary on the determinants of the use of derivatives financial instruments that mostly examined on nonfinancial firms in the literature. Having appropriate understanding of the theoretical background in corporate hedging in risk management strategies, we shed the light on these motivating theories. We also explain how new financial standards (IFRS) that has been implemented in April 2005 for hedge accounting can play a critical role beyond managerial incentives in corporate hedging decisions. The section concludes with these hypothesis developments, which has been constructed in five hypotheses.

2.1 Firms Characteristics

It is not surprising that the most of the previous studies have focused primarily on the firms characteristics on corporate hedging strategies. Ameer (2010) documents that firm's characteristic is part of any integral decisions in hedging financing policies. More precisely, hedging decisions are strongly associated with size, profitability, investment growth, diversification, liquidity and foreign sales. Afza and Alam (2011) find that firms having higher foreign sales are more likely to use foreign exchange derivatives. Allayannis and Ofek (2001) also find evidence that firms use foreign currency derivatives for hedging is significantly associated with firms which have higher foreign sales, foreign trades and increasing trend of R&D expenditures. Chong et al. (2014) conducted a survey on the determinants of the factors influencing the use of financial derivatives in Malaysia. They found that the factors driving the use of derivatives in non-financial firms are based on firms' characteristics and

related risk exposures. The motives beyond the firms' characteristics could be main driven factors that consist the base of firms to be able to conduct hedging decisions. For example, small firms are less likely to implement derivatives instruments in hedging financial risks. Consistently, Lievenbruck and Schmid (2014) find that firm's size has important economic impact in any financial policies and, in particular, hedging decisions. Furthermore, firm age is increasingly related and influences the firm size over time. However, this influence is stimulatingly affects each other in the probability of hedging decision choices over time. Likewise, the level of firm profitability is more likely to affect hedging decision choices. Bonaimé et al. (2013) provide evidence of substitution between hedging and payout decisions over dividends, in which is negatively related to financial hedging within a firm.

2.2 Convex Taxation

Empirically, several studies have focused on the tax incentives could lead to progressive hedging decisions (Smith and Stulz, 1985; Tufano, 1996, Allyannis and Ofek, 2001; Lin and Smith, 2007; Bartram et al., 2009).

2.3 Information Asymmetry and Managerial Incentives

In the theory of agency costs, managerial incentives could lead to higher hedge positions taken with derivatives contracts in a way of indirect influence on shareholders to avoid indicating agency replacement in their annual reviewing meetings. The agency conflicts arise when the ownership of insider holders and institutional ownership might exceed boundaries to shareholders' rights (Bartram et al., 2009).

2.4 Financial Flexibility

Recently, Amaya (2014) develops a dynamic risk management model to investigate the determinants of a firm's optimal hedging decisions and finds that when leverage exceeds to high levels, the firm fully stops hedging. Firms accordingly hedge in connection with the level of financial flexibility to avoid financial distress and underinvestment (Bonaimé et al., 2013). Though empirical evidence concerns only on the relation between capital structure and hedging policy show mixed results, but financial distress and bankruptcy costs play significant determinants. For example, Byoun et al. (2013) document that firms use more leverage when the presence of risk is high. Using leverage variables as proxies for financial distress are significantly related to derivatives use in non-financial firms (Clark and Judge, 2008). In this study, we include the financial flexibility factors as important in hedging decisions and difficult to be excluded or empirically tested its relation.

2.5 Underinvestment and growth strategy

In a related analysis, Colak (2010) documents that diversifications proxies in terms of industrial and geographical strategy are important factors beyond other various factors, such as firm's characteristics, and is quite difficult to be dropped in studying firms' financial choice decisions. In contrast, theories of

corporate hedging by Campbell and Kracaw (1990), Aggarwal and Samwick (2003) Suggest that managers diversify their firms for two reasons: to reduce idiosyncratic risks and relatively to managerial incentives. Thus, even if diversification, whether through geographic operations or industry base, has a strong relation with regards to hedging policy, a firm may reduce a type of financial risks such as foreign exchange risk through operational hedging. In which context, a firm could match foreign revenues with foreign costs in the same currency in geographic diversification (Aabo and Ploeen, 2013). Empirically, this is consistent with the view in our paper that although a proportion of our sample has a geographical diversification, but still has no hedging strategy with regards to using derivatives instruments. Similar concerns apply to research on related motives behind the use of derivatives instruments for each type of derivatives. In particular, geographical diversification is associated with foreign trading and operational activities that include foreign revenues and foreign costs as a result of internationalisation number of segments. In this paper, we develop and implement related motives associated with each type of financial risks being hedged through derivatives instruments: (i) foreign sales ratio, foreign expenditures and number of multinational segments are associated with foreign currency derivatives, (ii) floating rate borrowings and fixed rate borrowings are associated with interest rate derivatives – even if foreign borrowings exist , and (iii) commodity purchase, raw materials purchase and oil & gas supply are associated with commodity derivatives.

2.6 Corporate Governance

The strength of corporate governance can lead to better corporate hedging decisions or optimal hedging positions. The strength of corporate governance is represented in the board size, the percentage of the independence of board, the number of annul meetings of the board and committees, and the corporate governance index.

2.7 Hypotheses

In the following, we develop detailed hypotheses for the determinants of corporate hedging decisions. In our empirical analysis, we follow Arnold et al. (2014) that conducted meta-analysis for the main hypotheses of corporate hedging decisions in literature review comparing researchers' analysis in the field of risk management and, in particular, the determinants of hedging and why firms (not) do hedging. Furthermore, in the best of our knowledge we find that collecting information about “derivatives fair value” in firms' annual reports and the strength of corporate governance in our sample could lead to good contributions in literature finance that not yet collected.

2.7.1 Underinvestment problems

Agency conflicts in growth opportunities could create potential problems for firms maximising growth opportunities and firm value in return. Conflicts between shareholders and agency (directors) could be possible in the presence of directors' ownership to delay accepting more investment projects

when the financial distress is quite high in the firm, while shareholders' interests more willing to undertake more projects.

Hypothesis H₁. Underinvestment and agency conflicts lead to positive probability of hedging decisions.

2.7.2 *Corporate Governance Influence*

In literature, the influence of corporate governance might play a critical role in financial policies such as hedging financial risks exposures.

Hypothesis H_{2a}. Strong corporate governance leads to more hedging financial risks decisions.

Hypothesis H_{2b}. Independence of directors leads to more hedging financial risks decisions.

3. Data and Methodology

3.1 Data

In this section, we describe the construction of the sample, the process of data collection, and the methodology used to address the research question and related hypotheses. Our data was collected from Bloomberg, DataStream, non-financial firms in FTSE-All Share listed in LSE, with matching hand-collected data from firms' annual reports for 8 years between 2005 and 2012. DataStream database, provided by Thomson Reuters, divides firms into categories designed to reflect the primary search of firms' styles that indicate which classifications the firm belongs to. Bloomberg database has provided us with comprehensive information about corporate governance and indexes of the strength of corporate governance. Hedging information for this sample is manually gathered by scanning words indicate hedging activities and derivatives usage in firms' annual reports. To avoid unofficial annual reports, we open firms' websites and downloaded their annual reports. Then, we use key words in searching hedging activities in firms' annual reports as follows.

Keywords: "risk management", "hedging", "derivatives", "hedge accounting", "derivatives fair value", "risk exposure", "foreign exchange risk", "interest rate risk", "commodity risk", "future", "forward contracts", "options", "swaps", "floating rate", and "fixed rate".

These keywords were quite useful to quickly capture hedging activities in firms' annual reports, and then carefully interpret them into binary data collection. Furthermore, any comments reported under the "Derivatives Financial Instruments" that explains the firms' corporate hedging policies and activities in detailed information has also collected to well-understand the hedging policies to sum up the determinants of hedging decisions beyond these usage. In general, we find inconsistent information about "notional" contracts of these financial derivatives instruments for our sample in the period 2005-2009, but becoming mostly available recently. Thus, on the basis of this information, we prefer binary derivatives use to be conducted to analysis the determinants of corporate hedging in non-financial firms since hedge accounting has been presented by the code of IFRS accounting standards from April 2005 to all firms listed in LSE. As a next step, we search in DataStream (Thomson Reuters) for related

financial information, and in Bloomberg dataset we collected rich information about corporate governance indexes.

3.2 Control Variables

In this section, we explain the contents of control variables which constructed in our models of determinants of hedging financial risks exposures (FX, IR and CM). We focus on the construction of the following control variables which are included in the regression models, and also governance variables are included in further robustness analysis. Our control variables are constructed as follows:

- FIRMS' CHARACTERISTICS include size, age, profitability, and dividend policy.
- TAX-LOSS CARRYFORWARD is the tax credit being forward in the following fiscal year as a compensation for the current year loss reported in income statement in the end of the fiscal year.
- ASYMMETRIC INFORMATION is related to that which the percentage of outstanding shares held by the institutional investors.
- FINANCIAL DISTRESS is related to the level of leverage and the percentage of cash flows to sales.
- UNDERINVESTMENT OPPORTUNITIES is related to market-to-book value of the firm and growth opportunities.
- DERIVATIVES FAIR VALUES CHANGES is defined as the percentage of derivatives fair values changes to market equity.
- OTHER SPACIFIC-CONTROLS combine the corporate governance factors which include corporate governance index, the independence of the board, and insider ownership. These other specific-controls are used in the robustness analysis to further investigation about the effects of the strength of corporate governance on corporate hedging decisions.

[Insert Table 1]

3.3 The methodology

In this section, we structure the models specifications in our regression analysis. To address the research question with regards the determinants of hedging in our selected sample which reflects non-financial firms listed in LSE, we use a pooled probit regression models with censoring at binary data (zero and one) for corporate hedging decisions to three financial risk exposures: foreign currency risk (FX), interest rate risk (IR), and commodity risk (CM). All regressions include a constant, and standard errors are presented in parentheses below each coefficient estimated. ***, ** and * indicate significance on the 1%, 5%, and 10% levels, respectively. Thus, the regression models specified as follows:

$$FXH_{i,t} = \alpha + \theta_1 FCH_{i,t} + \theta_2 TAX_{i,t} + \theta_3 INF_{i,t} + \theta_4 DIS_{i,t} + \theta_5 OPP_{i,t} + \theta_6 FV_{i,t} + \beta X'_{i,t} + \varepsilon_{i,t} \text{ (1)}$$

Where $FXH_{i,t}$ refers to binary hedging decisions for foreign currency contracts positions, $FCH_{i,t}$ includes firms' characteristics, $TAX_{i,t}$ refers to tax credits carry forward in the next fiscal year, $INF_{i,t}$ refers to information asymmetry and agency conflicts proxies, $DIS_{i,t}$ refers to financial distress, $OPP_{i,t}$

refers to growth opportunities, $FV_{i,t}$ refers to fair values changes, $X_{i,t}$ refers to other specific related variables in the regression analysis, and $\varepsilon_{i,t}$ refers to error term.

$$IRH_{i,t} = \alpha + \theta_1 FCH_{i,t} + \theta_2 TAX_{i,t} + \theta_3 INF_{i,t} + \theta_4 DIS_{i,t} + \theta_5 OPP_{i,t} + \theta_6 FV_{i,t} + \beta X'_{i,t} + \varepsilon_{i,t} \text{ ----- (2)}$$

Where $IRH_{i,t}$ refers to binary hedging decisions for interest rate contracts positions, and other variables in the equation as described in equation (1).

$$CMH_{i,t} = \alpha + \theta_1 FCH_{i,t} + \theta_2 TAX_{i,t} + \theta_3 INF_{i,t} + \theta_4 DIS_{i,t} + \theta_5 OPP_{i,t} + \theta_6 FV_{i,t} + \beta X'_{i,t} + \varepsilon_{i,t} \text{ ----- (3)}$$

Where $CMH_{i,t}$ refers to binary hedging decisions for commodity contracts positions, and other variables in the equation as described in equation (1).

4. Empirical Results

4.1 Descriptive statistics

Table 2 presents descriptive statistics in three categories including the full sample, and hedgers vs non-hedgers. Furthermore, we find strong differences between hedgers and non-hedgers sub-samples in panel B and C. This may be explained by the fact that high percentage of the sample is hedgers for the risk exposures of currency risk, interest risk and commodity price risk.

[Insert Table 2]

4.2 Univariate analysis

Table 3 shows the trend of hedgers vs. non-hedgers for the decision to hedge risk exposures (FX, IR, and CM) for the period of study 2005-012. There are, however, increasing trend of hedging financial risks after the financial crisis more over previous years instead. Overall, the percentage of hedgers for FX and IR are almost the majority of hedging decisions, while hedging CM price risk exposures seems quite closer to firms of energy or commodity suppliers or mainly buyers which consists 15% in average of the sample.

[Insert Table 3]

Table 4 presents pairwise correlation matrix between all variables used in the empirical analysis. Almost all of the pairwise correlations are below 0.50, and so the multicollinearity problem is not expected to be a major concern.

[Insert Table 4]

4.3 Multivariate analysis

Table 5 shows the regressions results for the decision to hedge (binary data, zero and one). The results are reported separately for FX, IR, and CM risks in probit regression models.

[Insert Table 5]

5. Robustness analysis

5.1 Time-series and marginal effects changes

[Insert Table 6]

Furthermore, in table 7, we present time-series probit regressions estimations of the likelihood of hedging decisions. Thus, margin effects at means are reported for each model.

[Insert Table 7]

5.2 Strength of Corporate Governance

In this section, we aim to present a further robustness analysis on the strength of corporate governance that links with the managers' hedging decisions. The specific corporate governance variables classify the full sample into sub-samples that show strong and weak corporate governance. Furthermore, the specific control variables which are related to corporate governance are related to the independence of board size, the board size, insiders' ownership and institutional ownership. The dataset has been collected from Thomson ONE banker and Bloomberg databases for the period of this study. Since the risk management strategies become part of corporate governance, it is essential to investigate furthermore the corporate governance consequences for these non-financial firms.

6. Conclusions

In this paper, we put forward the corporate governance consequences as a powerful tool in managers' hedging decisions. We analyse not just the determinants of corporate hedging in non-financial firms listed in FTSE-All share index in LSE. The main hypotheses of determinants of managers' hedging decisions mainly rely on tax incentives, information asymmetry, financial distress, and growth opportunities. Furthermore, we provide further developed hypothesis based upon derivatives fair values changes occur in the end of each fiscal year which probably leads to incentives to hedging decisions beyond others factors. Robustness tests provide evidence that the results are not driven only by firms' characteristics on the usage of derivatives, but also the influence of the strength of corporate governance represents who should keep in mind that managers' hedging decisions are also influenced by "strong or weak" corporate governance controls.

References

- Aabo, T and Ploeen, R., 2013, The German humpback: Internationalization and foreign exchange hedging, working paper, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2369474: Accessed [online] April 4, 2014.
- Adam, T., 2009, Capital expenditures, financial constraints, and the use of options, *Journal of Financial Economics* 92, 238-251.
- Adam, T., Fernando, C., 2006, Hedging, speculation, and shareholder value, *Journal of Financial Economics* 81, 283-309.
- Afza, T. and Alam, A., 2011, Corporate derivatives and foreign exchange risk management: A case study of non-financial firms of Pakistan, *The Journal of Risk Insurance* 12, 409-420.
- Aggarwal, R. and Samwick, A., 2003, Why do managers diversify their firms? Agency reconsidered, *The Journal of Finance* 58, 71-118.
- Albuquerque, R., 2007, Optimal currency hedging, *Global Finance Journal* 18, 16-33.
- Alkeback, P. and Hagelin, N., 1999, Derivatives usage by nonfinancial firms in Sweden with an international comparison, *Journal of International Financial Management and Accounting* 10, 105-120.
- Allayannis, G. and Ofek, E., 2001, Exchange rate exposure, hedging, and the use of foreign currency derivatives, *Journal of International Money and Finance* 20, 273-296.
- Allayannis, G., Lel, U., and Miller, D., 2012, The use of foreign currency derivatives, corporate governance, and firm value around the world, *Journal of International Economics* 87, 65-79.
- Aretz, K., Bartram, S., and Dufey, G., 2007, Why hedge? Rationales for corporate hedging and value implications, *The Journal of Risk Finance* 8, 434-449.
- Aretz, K. and Bartram, S., 2010, Corporate hedging and shareholder value, *The Journal of Financial Research* 33, 317-371.
- Arnold, M. M., Rathgeber, A. W., and Stöckl, S., 2014, Determinants of corporate hedging: A (Statistical) Meta-Analysis. *The Quarterly Review of Economics and Finance*.
- Amaya, D., 2014, Dynamic risk management: Investment, capital structure, and hedging in the presence of financial frictions, *The Journal of Risk and Insurance* xx, 1-14
- Ameer, R., 2010, Determinants of corporate hedging practices in Malaysia, *International Business Research* 3, 120-130.
- Bartram, S., Brown, G., and Fehle, F., 2009, International evidence on financial derivatives usage, *Financial Management* 38, 185-206.
- Bartram, S., Brown, G., and Conrad, J., 2011, The effects of derivatives on firm risk and value, *Journal of Financial and Quantitative Analysis* 46, 967-999.
- Baek, J., Kang, J., and Park, K., 2004, Corporate governance and firm value: Evidence from the Korean financial crisis, *Journal of Financial Economics* 71, 265-313.

- Belkhir, M. and Boubaker, S., 2013, CEO inside debt and hedging decisions: Lessons from the U.S. banking industry, *Journal of International Financial Markets, Institutions & Money* 24, 223-246.
- Berkman, H., Bradbury, M., and Innes, C., 2002, Derivatives financial instruments use in Australia, *Accounting and Finance* 42, 97-109.
- Bessembinder, H., 1991, Forward contracts and firm value: Investment incentive and contracting effects, *Journal of Financial and Quantitative Analysis* 26, 519-532.
- Bligh, C., 2012, Foreign currency hedging – Paper P3, *Financial Management*, CIMA publishing (March), 40-44.
- Birt, J., Rankin, M., and Song, C. (2013), Derivatives use and financial instrument disclosure in the extractives industry, *Accounting and Finance* 53, 55-83.
- Bonaimé, A., Hankins, K., and Harford, J., 2014, Financial flexibility, risk management, and payout choice, *The Review of Financial Studies* 27, 1074-1101.
- Borokhovich, K., Brunarski, K., Crutchley, C., and Simkins, B., 2004, Board composition and corporate use of interest rate derivatives, *The Journal of Financial Research* 27, 199-216.
- Brown, G., Crabb, P., and Haushalter, D., 2006, Are firms successful at selective hedging?, *Journal of Business* 79, 2925-2949.
- Byoun, S., Kim, J. and Yoo, S., 2013, Risk management with leverage: Evidence from project finance, *Journal of Financial and Quantitative Analysis* 48, 549-577.
- Chen, W., Tan, H. T., and Wang, E. Y., 2013, Fair value accounting and managers' hedging decisions. *Journal of Accounting Research*, 51(1), 67-103.
- Choi, J., Mao, C., and Upadhyay, A., 2013, Corporate risk management under information asymmetry, *Journal of Business and Accounting* 40, 239-271.
- Chong, L., Chang, X. and Tan, S., 2014, Determinants of corporate foreign exchange risk hedging, *Managerial Finance* 40, 176-188.
- Clark, E. and Judge, A., 2008, The determinants of foreign currency hedging: Does Foreign currency debt induce a bias?, *European Financial Management* 14, 445-469.
- Colak, G., 2010, Diversification, Refocusing and Firm Value, *European Financial Management* 16, 422-448.
- Colquitt, L. and Hoyt, R., 1997, Determinants of corporate hedging behavior: Evidence from the life insurance industry, *The Journal of Risk and Insurance* 64, 649-671.
- DeMarzo, P. and Duffie, D., 1995, Corporate incentives for hedging and hedge accounting, *The Review of Financial Studies* 8, 743-771.
- Froot, K., Scharfstein, D., and Stein, J., 1993, Risk Management: Coordinating corporate investment and financing policies, *Journal of Finance* 48, 1629-1658.
- Geczy, C., Minton, B., and Schrand, C., 2007, Taking a view: Corporate speculations, governance and compensation, *Journal of Finance* 62, 2405-2444.

- Graham, J. and Rogers, D., 2002, Do firms hedge in response to tax incentives? *Journal of Finance* 57, 815-839.
- Lel, U., 2012, Currency hedging and corporate governance: A cross-country analysis, *Journal of Corporate Finance*, Vol. 18, 221-237.
- Lievenbruck, M. and Schmid, T., 2014, Why do firms (not) hedge? – Novel evidence on cultural influence, *Journal of Corporate Finance* 25, 92-106.
- Lin, C. M. and Smith, S. D., 2007, Hedging, financing and investment decisions: A simultaneous equations framework. *Financial Review*, 42 (2), 191-209.
- Miletkov, M. K., Poulsen, A. B., and Wintoki, M. B., 2014, The role of corporate board structure in attracting foreign investors. *Journal of Corporate Finance*, 29, 143-157.
- Rogers, D., 2002, Does executives portfolio structure affect risk management? CEO risk-taking incentives and corporate derivatives usage, *Journal of Banking and Finance* 26, 271-295.
- Smith, C. and Stulz, R., 1985, The determinants of firms' hedging policies, *Journal of Financial and Quantitative Analysis* 20, 391-405.
- Stulz, R., 1984, Optimal hedging policies, *Journal of Financial Quantitative Analysis* 19, 127-140.
- Tufano, P., 1996, Who manages risk? An empirical investigation of the risk management practices of the gold mining industry, *Journal of Finance* 51, 1097-1137.
- Walsh, D., 1995, Risk Management using derivatives securities, *Managerial Finance* 21, 43-65.
- Wojakowski, R., 2012, How should firms selectively hedge? Resolving the selective hedging puzzle, *Journal of Corporate Finance* 18, 560-569.

Table 1
Description of variables

This table provides the definitions and source of the variables used throughout the regressions. Notations are presented below for each variable in this analysis. The sample covers 288 nonfinancial listed firms in London Stock Exchange (LSE) under FTSE-All Shares for the period from 2005 to 2012. Data are collected from two sources, mainly, from firms' annual reports with regard to derivatives use for hedging financial risks, and firms' characteristics with regard to accounting details have been collected from DataStream. Combined both sources of data collected have given comprehensive visions of data to these firms listed in LSE that whether matching derivative use in nonfinancial firms in our analysis.

Variable	Notation	Definition	Data Source
<u>Derivatives use</u>			
Hedge dummy	H	Dummy variable with value 1 if firm uses financial derivatives instruments for hedging foreign currency, interest rate or commodity price risks, and 0 otherwise.	Firm annual report
Foreign exchange hedge dummy	FXH	Dummy variable with value 1 if the firm reports the use of foreign currency derivatives contracts for hedging purposes, and 0 otherwise.	Firm annual report
FXFU dummy	FXFU	Dummy variable with value 1 if firm uses foreign exchange futures and 0 otherwise.	Firm annual report
FXFO dummy	FXFO	Dummy variable with value 1 if firm uses foreign exchange forwards, and 0 otherwise.	Firm annual report
FXOP dummy	FXOP	Dummy variable with value 1 if firm uses foreign exchange options and 0 otherwise.	Firm annual report
FXSW dummy	FXSW	Dummy variable with value 1 if firm uses foreign exchange swaps, and 0 otherwise.	Firm annual report
Interest rate hedge dummy	IRH	Dummy variable with value 1 if the firm reports the use of interest rate derivatives contracts for hedging purposes, and 0 otherwise.	Firm annual report
IRFU dummy	IRFU	Dummy variable with value 1 if firm uses interest rate futures and 0 otherwise.	Firm annual report
IRFO dummy	IRFO	Dummy variable with value 1 if firm uses interest rate forwards, and 0 otherwise.	Firm annual report
IROP dummy	IROP	Dummy variable with value 1 if firm uses interest rate options and 0 otherwise.	Firm annual report
IRSW dummy	IRSW	Dummy variable with value 1 if firm uses interest rate swaps, and 0 otherwise.	Firm annual report
Commodity hedge dummy	CMH	Dummy variable with value 1 if the firm reports the use of commodity derivatives contracts for hedging purposes, and 0 otherwise.	Firm annual report
CMFU dummy	CMFU	Dummy variable with value 1 if firm uses commodity futures and 0 otherwise.	Firm annual report
CMFO dummy	CMFO	Dummy variable with value 1 if firm uses commodity forwards, and 0 otherwise.	Firm annual report
CMOP dummy	CMOP	Dummy variable with value 1 if firm uses commodity options and 0 otherwise.	Firm annual report
CMSW dummy	CMSW	Dummy variable with value 1 if firm uses commodity swaps, and 0 otherwise.	Firm annual report
<u>Firms' characteristics</u>			
Total Assets	AS	Firm total Assets	Data Stream
Profitability (ROA)	ROA	Earnings before finance costs and tax / book value of total assets.	Data Stream
Firm Market Value	MV	The share price multiplied by the number of ordinary shares in issue. The amount in issue is updated when the date completely collected by the mid of 2012.	Data Stream
Market-to-Book (lnQ)	lnQ	$\ln[\text{total assets} - \text{book value of equity} + \text{market value of Equity}] / \text{book value of assets}$. This measure is used as a proxy for firm value.	Data Stream
Firm Size (ln Assets)	lnZ	Natural log of the book value of assets.	Data Stream
Firm Age (ln Age)	lnG	Natural log of the number of years since the stock of the firm first appears in London Stock Exchange (LSE).	Data Stream
Leverage	LEV	Book value of total debt, including short and long debt / book value of total assets.	Data Stream
Dividends yield	DIVY	The income generated by a share of stock divided by share as disclosed on the income statement by the last share price.	Bloomberg
CAPEX/assets	CAPXAS	Capital expenditures / book value of assets.	Data Stream
R&D/assets	RDAS	Research & development expense / book value of assets.	Data Stream
Geographical diversification	GEO	Equals 1 if the firm has positive geographical diversification and operates in multinational segments locations, and 0 otherwise.	Data Stream
Tax-loss carryforwards	TAXM	Dummy variable with value 1 if firm has tax credit in the end of fiscal year as a result of earnings loss before interest and tax, 0	Bloomberg
Altman's Z-score	Z	Indicates the probability of a company entering bankruptcy within the next two years. Computed as: $Z = 1.2 \times (\text{working capital}/\text{total assets}) + 1.4 \times (\text{retained earnings}/\text{total assets}) + 3.3 \times (\text{EBIT}/\text{total assets}) + 0.6 \times (\text{market value of Equity}/\text{total liabilities}) + 0.999 \times (\text{sales}/\text{total assets})$.	Bloomberg
<u>Board characteristics:</u>			
Board size	lnBZ	Natural log of number of directors on the company's board, as reported by the company in the fiscal year end.	Bloomberg
Female%	FM	The percentage of women on the board of directors, as reported by the company in the fiscal year end.	Bloomberg
Independence%	INDD	The percentage of independent directors of board membership excluding the chairman (governance code requirements)	Bloomberg
Share options	OPM	Dummy variable with value 1 if directors granted share options during the year.	Bloomberg
Analysts	lnANA	Natural logarithm of number of analysts making recommendations for the security.	Bloomberg
Governance-index	GOV	Industrials, banks, financial, insurance, and utilities proprietary Bloomberg score based on the extent of a company's governance disclosure as part of environment, social and governance (ESG) data. Companies that do not disclose anything will show N/A.	Bloomberg

Table 2
Descriptive Statistics

This table shows summary statistics for 288 nonfinancial firms listed in LSE for the period 2005-2012. Panel A presents derivatives use for hedging financial risks and firms' characteristics for the full sample. The descriptive statistics show hedging dummy variable, foreign exchange derivatives, interest rate derivatives and commodity derivatives use. Firms' characteristics include financial positions and related measures that indicate value and performance. Financial flexibility proxies show the leverage level and borrowings strategy which is presented in floating and fixed rated borrowing. Diversification strategy presents in geographical and industry dummy variables. We report related variables that indicate proxies for foreign trading and multinational activities with regards to foreign sales, foreign expenditures and number of international segments. Commodity purchase, commodity raw material and energy supplying present the motives for commodity derivatives use. Panel B and C compare hedgers vs. non-hedgers firms with regards to derivatives use and firms' characteristics. Last column presents difference in mean between hedgers vs. non-hedgers. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively. All variables are defined in Table 1.

	Panel A: Full Sample						Panel B: Sub-sample (Hedgers)						Panel C: Sub-sample (Non-hedgers)					
variable name	No. obs.	Mean	Std. dev.	Min.	Median	Max.	No. obs.	Mean	Std. dev.	Min.	Median	Max.	No. obs.	Mean	Std. dev.	Min.	Median	Max.
Hedge dummy	2304	0.831	0.375	0.000	1.000	1.000	1915	1.000	0.000	1.000	1.000	1.000	389	0.000	0.000	0.000	0.000	0.000
Foreign exchange hedge dummy (FXH)	2304	0.680	0.467	0.000	1.000	1.000	1915	0.818	0.386	0.000	1.000	1.000	389	0.000	0.000	0.000	0.000	0.000
FXFU dummy	2304	0.007	0.083	0.000	0.000	1.000	1915	0.008	0.091	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
FXFO dummy	2304	0.627	0.484	0.000	1.000	1.000	1915	0.754	0.431	0.000	1.000	1.000	389	0.000	0.000	0.000	0.000	0.000
FXOP dummy	2304	0.083	0.276	0.000	0.000	1.000	1915	0.100	0.300	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
FXSW dummy	2304	0.324	0.468	0.000	0.000	1.000	1915	0.390	0.488	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
Interest rate hedge dummy (IRH)	2304	0.638	0.481	0.000	1.000	1.000	1915	0.768	0.422	0.000	1.000	1.000	389	0.000	0.000	0.000	0.000	0.000
IRFU dummy	2304	0.007	0.080	0.000	0.000	1.000	1915	0.008	0.088	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
IRFO dummy	2304	0.049	0.216	0.000	0.000	1.000	1915	0.059	0.236	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
IROP dummy	2304	0.116	0.320	0.000	0.000	1.000	1915	0.139	0.346	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
IRSW dummy	2304	0.627	0.484	0.000	1.000	1.000	1915	0.755	0.430	0.000	1.000	1.000	389	0.000	0.000	0.000	0.000	0.000
Commodity hedge dummy (CMH)	2304	0.140	0.347	0.000	0.000	1.000	1915	0.169	0.375	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
CMFU dummy	2304	0.033	0.179	0.000	0.000	1.000	1915	0.040	0.195	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
CMFO dummy	2304	0.083	0.276	0.000	0.000	1.000	1915	0.100	0.300	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
CMOP dummy	2304	0.040	0.197	0.000	0.000	1.000	1915	0.049	0.215	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
CMSW dummy	2304	0.052	0.221	0.000	0.000	1.000	1915	0.062	0.241	0.000	0.000	1.000	389	0.000	0.000	0.000	0.000	0.000
Firms' characteristics																		
Total Assets (£m.)	2304	4.663	14.563	0.005	0.846	188.000	1915	5.488	15.838	0.025	1.052	188.000	389	0.000	1.236	0.005	0.226	18.757
Return on Assets (ROA)	2304	0.053	0.117	-2.790	0.054	1.430	1915	0.055	0.086	-0.786	0.053	0.631	389	0.045	0.212	-2.790	0.065	1.430
EPS (p.)	2304	35.600	59.600	-32.600	19.700	869.000	1915	38.300	57.500	-32.600	22.600	805.000	389	22.200	67.300	0.000	7.550	869.000
Firm Market Value (£m)	2304	3.663	10.886	0.000	0.634	134.000	1915	4.277	11.828	0.000	0.746	134.000	389	0.000	0.000	0.000	0.000	0.001
Tobin's Q (ln)	2304	0.407	0.497	-1.890	0.330	2.710	1915	0.382	0.455	-1.230	0.314	2.710	389	0.529	0.652	-1.890	0.491	2.600
Firm Size (ln Assets)	2304	13.700	1.750	8.590	13.600	19.100	1915	14.000	1.650	10.100	13.900	19.100	389	12.300	1.490	8.590	12.300	16.700
Firm Age (ln Age)	2304	2.900	0.911	0.000	3.040	4.530	1915	2.990	0.862	0.000	3.130	4.500	389	2.490	1.030	0.000	2.640	4.530
Leverage	2304	0.224	0.184	0.000	0.204	1.330	1915	0.242	0.180	0.000	0.227	1.330	389	0.135	0.177	0.000	0.072	1.220
Dividends payout (p.)	2304	12.700	19.000	0.000	7.360	195.000	1915	14.100	19.800	0.000	8.450	195.000	389	5.900	12.000	0.000	0.800	76.000
Capex/assets	2304	0.047	0.049	0.000	0.034	0.601	1915	0.046	0.044	0.000	0.035	0.383	389	0.053	0.068	0.000	0.025	0.601
R&D/assets	2304	0.018	0.056	0.000	0.000	0.755	1915	0.016	0.052	0.000	0.000	0.755	389	0.026	0.073	0.000	0.000	0.552
Geographical diversification	2304	0.805	0.396	0.000	1.000	1.000	1915	0.799	0.400	0.000	1.000	1.000	389	0.833	0.374	0.000	1.000	1.000

Table 3								
Summary Statistics on Hedging the Popularity of Hedging and Derivatives Contracts								
Table 3 reports statistics on the popularity of hedging for each financial risk and derivative contract, for the period between 2005 and 2012. Panel A reports the number and the percentage of hedgers and non-hedgers for the FX, IR and CM risks. The percentage of hedgers and non-hedgers is computed based on a total sample of 275 firms. Panel B shows the popularity of each derivatives contract (FU, FO, OP and SW) for hedging different types of risks (FX, IR and CM).								
	2005	2006	2007	2008	2009	2010	2011	2012
Panel A: Hedging Activities								
<u>Foreign Exchange Rate</u>								
Hedgers	168 61.1%	177 64.4%	184 66.9%	188 68.4%	192 69.8%	195 70.9%	199 72.4%	200 72.7%
Non-hedgers	107 38.9%	98 35.6%	91 33.1%	87 31.6%	83 30.2%	80 29.1%	76 27.6%	75 27.3%
<u>Interest Rate</u>								
Hedgers	165 60.0%	168 61.1%	173 62.9%	177 64.4%	181 65.8%	183 66.5%	181 65.8%	173 62.9%
Non-hedgers	110 40.0%	107 38.9%	102 37.1%	98 35.6%	94 34.2%	92 33.5%	94 34.2%	102 37.1%
<u>Commodity Price</u>								
Hedgers	35 12.7%	38 13.8%	36 13.1%	41 14.9%	39 14.2%	40 14.5%	43 15.6%	43 15.6%
Non-hedgers	240 87.3%	237 86.2%	239 86.9%	234 85.1%	236 85.8%	235 85.5%	232 84.4%	232 84.4%
Panel B: Types of Derivatives								
<u>Foreign exchange Rate Derivatives</u>								
Future	1 0.4%	3 1.1%	3 1.1%	2 0.7%	2 0.7%	2 0.7%	2 0.7%	1 0.4%
Forward	155 56.4%	161 58.5%	167 60.7%	173 62.9%	178 64.7%	180 65.5%	183 66.5%	183 66.5%
Option	17 6.2%	22 8.0%	23 8.4%	23 8.4%	24 8.7%	23 8.4%	24 8.7%	19 6.9%
Swap	81 29.5%	81 29.5%	87 31.6%	90 32.7%	92 33.5%	93 33.8%	100 36.4%	96 34.9%
<u>Interest Rate Derivatives</u>								
Future	1 0.4%	1 0.4%	1 0.4%	1 0.4%	2 0.7%	3 1.1%	3 1.1%	3 1.1%
Forward	16 5.8%	13 4.7%	15 5.5%	14 5.1%	14 5.1%	12 4.4%	15 5.5%	14 5.1%
Option	36 13.1%	40 14.5%	36 13.1%	32 11.6%	30 10.9%	30 10.9%	28 10.2%	27 9.8%
Swap	162 58.9%	164 59.6%	169 61.5%	176 64.0%	179 65.1%	180 65.5%	177 64.4%	169 61.5%
<u>Commodity Price Derivatives</u>								
Future	9 3.3%	11 4.0%	10 3.6%	11 4.0%	8 2.9%	9 3.3%	9 3.3%	9 3.3%
Forward	17 6.2%	22 8.0%	22 8.0%	24 8.7%	25 9.1%	23 8.4%	24 8.7%	27 9.8%
Option	11 4.0%	13 4.7%	14 5.1%	12 4.4%	12 4.4%	10 3.6%	10 3.6%	11 4.0%
Swap	15 5.5%	14 5.1%	13 4.7%	16 5.8%	16 5.8%	16 5.8%	15 5.5%	14 5.1%

Table 4
Pairwise Correlation Matrix between Related Variables

This table presents a correlation matrix for the sample. Pearson correlation coefficients are shown in each column for all dependents and independents variables. All variables are defined in Table 1.

Panel A: Pairwise correlations between variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1. Return on Invested Capital	1.000																							
2. Return on Assets	0.697	1.000																						
3. Tobin's Q (ln)	0.319	0.296	1.000																					
4. Foreign Exchange Rate Hedge	0.072	0.073	0.022	1.000																				
5. Interest Rate Hedge	-0.037	-0.047	-0.225	0.267	1.000																			
6. Commodity Price Hedge	0.010	0.023	-0.048	0.177	0.190	1.000																		
7. Firm Size	-0.001	0.016	-0.247	0.297	0.468	0.409	1.000																	
8. Firm Age	0.010	0.006	-0.125	0.196	0.121	-0.005	0.139	1.000																
9. Dividends pay-out	0.138	0.120	0.084	0.153	0.169	0.080	0.315	0.213	1.000															
10. Leverage	-0.130	-0.128	-0.143	0.001	0.457	0.032	0.256	-0.048	0.090	1.000														
11. CAPEX/Assets	0.012	0.037	0.068	-0.065	-0.018	0.158	0.043	-0.044	-0.006	0.164	1.000													
12. R&D/Assets	-0.050	-0.062	0.299	0.028	-0.210	-0.090	-0.230	-0.111	-0.055	-0.217	-0.085	1.000												
13. Business Diversification	0.035	0.039	0.008	0.275	0.063	0.064	0.018	0.085	0.021	-0.098	-0.153	0.084	1.000											
14. Geographical Diversification	0.068	0.060	0.185	0.326	-0.163	0.076	-0.040	-0.013	-0.014	-0.131	-0.013	0.072	0.105	1.000										
15. Financial Crisis Hedge	-0.012	-0.042	-0.085	0.198	0.186	0.041	0.118	0.045	0.060	0.135	-0.015	-0.020	0.056	-0.028	1.000									
16. Foreign Sales dummy	0.068	0.060	0.185	0.326	-0.163	0.076	-0.040	-0.013	-0.014	-0.131	-0.013	0.072	0.105	1.000	-0.028	1.000								
17. Foreign Sales Ratio	0.016	0.042	0.169	0.162	-0.227	0.109	0.039	-0.059	-0.045	-0.197	0.036	0.128	0.125	0.653	-0.051	0.653	1.000							
18. Foreign Expenditures	0.040	0.023	0.123	0.538	-0.047	0.144	0.074	-0.008	0.041	-0.124	-0.045	0.096	0.184	0.684	0.039	0.684	0.472	1.000						
19. Multinational Segments	0.117	0.084	0.142	0.249	0.070	0.104	0.311	0.060	0.171	0.023	-0.004	0.000	0.099	0.294	0.033	0.294	0.320	0.223	1.000					
20. Floating Rate Debt	-0.009	-0.012	-0.134	0.209	0.439	0.129	0.340	0.144	0.123	0.339	-0.020	-0.202	-0.020	-0.021	0.126	-0.021	-0.100	0.040	0.064	1.000				
21. Fixed Rate Debt	-0.030	-0.023	-0.160	0.138	0.559	0.135	0.313	0.175	0.060	0.350	0.069	-0.193	0.025	-0.044	0.101	-0.044	-0.027	-0.023	0.073	0.358	1.000			
22. Commodity Purchases	0.009	0.015	-0.052	0.209	0.138	0.562	0.209	0.080	0.060	0.025	0.052	-0.087	0.033	0.104	0.041	0.104	-0.005	0.156	0.103	0.078	0.091	1.000		
23. Commodity Raw Material	-0.019	-0.006	-0.048	0.137	0.130	0.279	0.150	0.068	0.081	0.097	-0.008	-0.049	0.099	0.082	0.019	0.082	0.049	0.114	0.102	0.095	0.136	0.451	1.000	
24. Commodity Oil & Gas, Mining, Energy	-0.004	0.001	0.006	-0.077	-0.080	0.366	0.180	-0.177	-0.051	-0.044	0.243	-0.105	0.020	0.103	-0.046	0.103	0.297	0.140	-0.059	-0.026	-0.006	-0.060	-0.057	1.000

Table 5**Marginal Effects Probit Regressions**

All models are marginal effects at means of pooled probit regressions (ME-means) based on Std. variables, evaluated at their means. Thus, each coefficient indicates that the change in hedging probability if a variable changes from its mean to its mean plus one std. deviation, while all other variables are fixed at their means. In all regressions models, intercepts and year and industry dummy variables are included but not presented. T-statistics (presented in parentheses) are based on observation information matrix standard errors (OIM) in maximum likelihood estimator. ***, **, * and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Hedging decisions		
	FXH	IRH	CMH
	Model 1	Model 2	Model 3
Market-to-book	0.678** (0.340)	0.073 (0.284)	-0.054 (0.498)
Board size	3.408** (1.721)	0.034 (1.173)	1.950 (1.951)
Female%	-3.319** (1.526)	-2.881** (1.145)	-5.101** (2.194)
Independence%	0.789 (1.147)	-1.060 (.772)	1.510 (1.268)
Options ownership	-0.132 (0.249)	0.184 (0.176)	0.547* (0.296)
Analysts	0.025 (0.495)	-0.985*** (0.381)	0.657 (.796)
Governance index	0.055*** (0.018)	-0.005 (0.013)	0.070*** (0.022)
Size	0.886*** (0.212)	1.260*** (0.166)	0.633** (.246)
Age (firm)	0.430 (0.268)	-0.175 (0.198)	0.030 (0.298)
Geographical diversification	3.316*** (0.835)	-0.006 (0.318)	0.411 (0.572)
Dividend yield	0.032 (0.029)	-0.012 (0.032)	0.034 (0.042)
Leverage	-0.741 (0.945)	5.920*** (0.788)	1.070 (1.152)
Profitability (ROA)	0.967 (0.966)	0.655 (1.027)	1.725 (2.064)
Z-Score	-0.218*** (0.059)	-0.088*** (0.031)	0.088** (0.036)
Tax-loss carryforwards	-0.438* (0.234)	-0.179 (0.221)	0.086 (0.322)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Wald Chi-square	126.689	191.798	63.681
(p-value)	(0.000)	(0.000)	(0.000)
Number of obs. used	2120	2120	2064
Pseudo R ²	0.518	0.382	0.534

Table 6**Probit Regressions on hedgers**

The dependent variable in all models are hedging [dummies] financial risks (foreign currency, interest rate and commodity price). These models are pooled probit regressions with values 1 if the firm do hedging of this particular financial risk, zero otherwise. The sample in these regressions is completely restricted to hedgers only. A detailed of description of all variables can be found in Appendix A. In all regressions models, intercepts and year and industry dummy variables are included but not presented. T-statistics (presented in parentheses) are based on observation information matrix standard errors (OIM) in maximum likelihood estimator. ***, **, * and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Hedging decisions		
	FXH	IRH	CMH
	Model 1	Model 2	Model 3
Market-to-book	1.480*** (0.543)	-0.092 (0.385)	0.391 (0.609)
Board size	4.864** (2.143)	1.505 (1.663)	0.946 (2.018)
Female%	-7.358*** (2.083)	-4.373*** (1.575)	-6.229*** (2.379)
Independence%	1.088 (1.318)	-2.733*** (1.042)	1.537 (1.352)
Options ownership	0.162 (0.316)	0.514** (0.241)	0.767** (0.333)
Analysts	-0.023 (0.634)	-1.512*** (0.533)	0.005 (0.788)
Governance index	0.062*** (0.024)	-0.001 (0.019)	0.069*** (0.025)
Size	0.331 (0.250)	1.322*** (0.253)	0.794*** (0.274)
Age (firm)	0.098 (0.296)	-0.220 (0.272)	0.040 (0.305)
Geographical diversification	3.601*** (0.927)	-0.320 (0.478)	0.474 (0.582)
Dividend yield	0.022 (0.056)	-0.065 (0.044)	0.041 (0.055)
Leverage	-3.613*** (1.222)	8.791*** (1.261)	1.079 (1.308)
Profitability (ROA)	0.219 (1.244)	0.003 (1.539)	-0.040 (2.440)
Z-Score	-0.246*** (0.067)	-0.076 (0.063)	0.124* (0.075)
Tax-loss carryforwards	-0.396 (0.298)	-0.251 (0.278)	0.001 (0.341)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Wald Chi-square (p-value)	71.585 (0.000)	100.080 (0.000)	79.310 (0.000)
Number of obs. used	1438	1782	1728
Likelihood ratio (χ^2)	461.280***	500.280***	581.390***

Table 7**The Influence of Corporate Governance Strength on Hedging Financial Risks**

The dependent variable in all models are hedging [dummies] financial risks (foreign currency, interest rate and commodity price). These models are pooled probit regressions with values 1 if the firm do hedging of this particular financial risk, zero otherwise. The sample in these regressions is completely restricted to corporate governance index (GOV) denotes strong corporate governance if GOV>50, and weak otherwise. A detailed of description of all variables can be found in Appendix A. In all regressions models, intercepts and year and industry dummy variables are included but not presented. T-statistics (presented in parentheses) are based on observation information matrix standard errors (OIM) in maximum likelihood estimator. ***, **, * and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Strong Governance			Weak Governance		
	FXH	IRH	CMH	FXH	IRH	CMH
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Market-to-book	0.613 (0.578)	0.087 (0.463)	1.365* (0.738)	0.850* (0.494)	-0.485 (0.507)	-0.679 (1.289)
Board size	2.465 (2.366)	-1.122 (1.590)	1.829 (2.316)	4.883 (6.948)	0.497 (2.651)	11.024 (7.853)
Female%	-2.753 (1.941)	-4.730*** (1.512)	-4.889* (2.542)	-6.493** (3.211)	3.343 (3.206)	-19.764* (10.908)
Independence%	1.483 (1.597)	-1.162 (1.083)	-2.081 (1.696)	0.874 (2.420)	-0.848 (1.867)	7.223 (5.780)
Options ownership	-0.529 (0.355)	0.083 (0.243)	0.817** (0.358)	0.341 (0.455)	0.602* (0.341)	-0.116 (1.375)
Analysts	-0.165 (0.881)	-0.674 (0.615)	-0.902 (0.983)	-0.655 (0.730)	-0.901 (0.624)	4.208* (2.431)
Governance index	0.035 (0.041)	0.058** (0.028)	0.047 (0.029)	0.057 (0.038)	-0.085*** (0.032)	0.184 (0.167)
Size	0.658* (0.341)	1.175*** (0.226)	1.177*** (0.310)	0.977*** (0.352)	1.586*** (0.360)	0.685 (0.703)
Age (firm)	0.543 (0.333)	-0.123 (0.245)	0.247 (0.380)	0.365 (0.415)	0.095 (0.379)	-2.373*** (0.903)
Geographical diversification	2.750*** (0.717)	0.295 (0.476)	0.579 (0.665)	7.336*** (0.853)	-1.519** (0.684)	1.395 (1.985)
Dividend yield	0.072 (0.091)	-0.058 (0.049)	0.085 (0.073)	0.019 (0.046)	0.044 (0.035)	-0.121 (0.200)
Leverage	-1.546 (1.610)	6.105*** (1.140)	-0.327 (1.623)	-0.677 (1.157)	6.340*** (1.469)	-0.824 (3.507)
Profitability (ROA)	0.395 (1.619)	0.297 (1.773)	0.047 (3.110)	1.205 (1.577)	3.308* (1.790)	5.197 (5.250)
Z-Score	-0.270** (0.130)	-0.173** (0.077)	-0.076 (0.118)	-0.141* (0.077)	-0.078** (0.039)	0.246*** (0.069)
Tax-loss carryforwards	-0.645* -0.366	0.119 -0.332	-0.576 -0.444	-0.302 (0.353)	-0.083 (0.412)	3.909*** (1.340)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi-square	48.94	106.35	91.32	131.209	85.593	55.149
(p-value)	0.000	0.000	0.000	0.000	0.000	0.000
No. of obs. used	1,153	1,216	1,198	841	841	750
Likelihood ratio (χ^2)	351.630***	315.910***	470.170***	374.480***	216.090***	68.150***

Table 8**The Impact of Corporate Governance on Why Do Firms (not) Hedge.**

The dependent variable in all models are hedging [dummies] decisions to hedge any of financial risks exposures. These models are pooled probit regressions with values 1 if the firm do hedging decision, zero otherwise. The sample in these regressions is completely restricted to the full sample denotes why do firms (not) hedge. A detailed of description of all variables can be found in Appendix A. In all regressions models, intercepts and year and industry dummy variables are included but not presented. T-statistics (presented in parentheses) are based on observation information matrix standard errors (OIM) in maximum likelihood estimator. ***, **, * and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	Governance Variable						
	Baseline Underinvestment	Board Size	Female%	Independence%	Options Ownership	Analysts	GOV-Index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Market-to-Book	0.175 (0.260)	0.193 (0.263)	0.185 (0.261)	0.169 (0.268)	0.211 (0.269)	0.175 -0.271	0.224 (0.273)
Governance	- -	-0.593 (1.371)	0.513 (1.382)	0.891 (1.032)	-0.369 (0.230)	0.001 (0.412)	-0.013 (0.015)
Size	0.827*** (0.138)	0.851*** (0.149)	0.826*** (0.138)	0.833*** (0.149)	0.883*** (0.151)	0.827*** -0.163	0.899*** (0.158)
Age (firm)	0.122 (0.205)	0.126 (0.205)	0.126 (0.206)	0.108 (0.231)	0.131 (0.233)	0.122 -0.206	0.101 (0.233)
Geographical diversification	0.515 (0.372)	0.514 (0.372)	0.523 (0.373)	0.544 (0.414)	0.552 (0.416)	0.515 -0.372	0.579 (0.416)
Dividend yield	0.029 (0.022)	0.029 (0.022)	0.029 (0.022)	0.029 (0.022)	0.03 (0.023)	0.029 -0.022	0.03 (0.022)
Leverage	2.169*** (0.812)	2.173*** (0.814)	2.186*** (0.815)	2.270*** (0.865)	2.201** (0.868)	2.170*** -0.812	2.230** (0.874)
Profitability (ROA)	0.668 (0.731)	0.681 (0.727)	0.674 (0.736)	0.669 (0.754)	0.633 (0.717)	0.668 -0.731	0.665 (0.754)
Z-Score	-0.036* (0.020)	-0.036* (0.020)	-0.037* (0.020)	-0.037* (0.020)	-0.034* (0.020)	-0.036* -0.02	-0.034* (0.020)
Tax-loss carryforwards	-0.267 (0.256)	-0.265 (0.256)	-0.266 (0.256)	-0.278 (0.260)	-0.304 (0.261)	-0.267 (0.256)	-0.272 (0.262)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi-square	99.324	98.942	99.045	89.612	90.134	99.409	89.427
(p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No. of obs. Used	2120	2120	2120	2120	2120	2120	2120
Likelihood ratio (χ^2)	586.790***	586.890***	586.940***	584.24***	587.99***	584.94***	581.94***

Table 9

Times-Series Probit Regression Estimates of the Likelihood of Hedging Decisions

This table presents estimations results for the hedging decisions (FXH, IRH and CMH) in time series probit regressions analysis. Margins effects at means are reported for each model. The dependent variable in the model (1), (2) or (3) is a dummy variable that is set to 1 if the firm decides to choose hedging financial risks: foreign exchange risk; interest rate risk; commodity price risk- and 0 otherwise. In each model, coefficients are shown in column 1, followed the marginal effects. The standard errors are reported in parenthesis below the coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Variable	Hedging decisions					
	FXH		IRH		CMH	
	Coef.	Marg. Eff.	Coef.	Marg. Eff.	Coef.	Marg. Eff.
Market-to-book	0.213** (0.107)	0.066	0.020 (0.110)	0.007	-0.030 (0.150)	-0.004
Board size	0.278 (0.365)	0.086	0.294 (0.383)	0.102	-0.737 (0.499)	-0.1061
Female%	-1.159*** (0.379)	-0.357	-0.495 (0.399)	-0.1708	-1.926*** (0.559)	-0.2771
Independence%	-0.304 (0.271)	-0.094	0.060 (0.277)	0.021	1.044*** (0.372)	0.150
Options ownership	0.026 (0.078)	0.008	0.137* (0.079)	0.047	0.171* (0.102)	0.025
Analysts	0.194 (0.146)	0.060	-0.563*** (0.158)	-0.1942	-0.383* (0.196)	-0.0552
Governance index	0.024*** (0.005)	0.007	0.004 (0.005)	0.00153	0.035*** (0.007)	0.005
Size	0.302*** (0.045)	0.093	0.428*** (0.046)	0.148	0.396*** (0.056)	0.057
Age (firm)	0.291*** (0.045)	0.090	0.048 (0.046)	0.016	-0.180*** (0.054)	-0.0259
Geographical diversification	1.370*** (0.086)	0.422	-0.490*** (0.101)	-0.169	0.267** (0.122)	0.038
Dividend yield	0.032*** (0.010)	0.010	0.007 (0.012)	0.002	0.013 (0.015)	0.002
Leverage	-0.250 (0.218)	-0.077	3.885*** (0.266)	1.341	0.000 (0.292)	0.000
Profitability (ROA)	0.047 (0.304)	0.015	0.052 (0.438)	0.01793	-0.198 (0.478)	-0.029
Z-Score	-0.033*** (0.013)	-0.010	-0.053*** (0.015)	(0.018)	0.001 (0.015)	0.00015
Tax-loss carryforwards	-0.215** (0.097)	-0.066	-0.279** (0.112)	-0.096	-0.156 (0.132)	-0.022
Year fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	
Wald Chi-square	851.919		1056.56		547.684	
(p-value)	0.000		0.000		0.000	
No. of obs. Used	2120		2120		2064	
Pseudo R2	0.322		0.380		0.321	