Interest rate swap usage for hedging and speculation by Dutch listed non-financial firms

Master Thesis: Business Administration
Track: Financial Management

University of Twente

Faculty of Behavioral, Management and Social sciences (BMS)

Student: Haitang Lei (s1645307)
Supervisor: Prof. Dr. Rezaul Kabir
Second supervisor: Dr. Xiaohong Huang
Date: 23rd Aug 2017

ACKNOWLEDGEMENT

I would like to express immense gratitude to Prof. Dr. Rezaul Kabir, my first supervisor for his valuable guidance, comments and suggestions. His consistent and strong support has been motivating me to confront all the academic challenges and keep this thesis fulfilled. I also extent my sincere thanks to Dr. Xiaohong Huang, who has been always patient, detailed and eager to help, for her willingness to be my second supervisor for this thesis. I am grateful for her constructive comments on ways in which to further develop the research topics and improve the thesis.

I also owe my sincere thankfulness to my friend Frederik Vos. It is his support and presence that give me the confidence and willpower to complete this thesis.

I again express my appreciation to the University of Twente for granting me with the University of Twente Scholarship.

Finally, I offer regards and loves for my parents and friends who have been staying by my side, academically but more generally as well.

ABSTRACT

This study investigates the financial characteristics of firms that influence the usage of interest rate swaps among Dutch non-financial firms to either speculate or hedge against interest rate risks, whether those financial characteristics influence the usage of interest rate swaps differently if the purpose of interest rate swaps usage differs, e.g. to hedge or to speculate, and also whether the purpose of IRS usage (hedging or speculation) influence firm values differently.

The research model provided a novel way to identify hedgers and speculators by creating an index from the information from financial statements such as managements' subjective declarations and auditors' independent judgements on hedge accounting.

Based on sample of around 119 companies non-financial Dutch listed firms in Amsterdam exchange from 2010 to 2014, I find that the study shows a positive significant effect of firm size, leverage and a negative significant effect operating risk on IRS usage either for hedging or speculative reasons. It also shows that given a certain level of growth opportunities, firms with higher cash flow sensitivities to interest rate use more IRS to hedge. Empirical results show that hedgers only have significant lower size then speculators and all other financial characteristics do not influence hedgers or speculators significantly differently. I found a positive influence of usage of IRS used for hedging on firm value. IRS used with higher possibility to hedge increase firm value and used with higher possibility to speculate decrease firm value. Contradictory to most of empirical findings, I find a significant negative impact of IRS usage on firm value.

Table of Contents

1 Introduction

1.1 Background and research questions

In finance, a derivative is a contract that derives its value from the performance of an underlying entity. This underlying entity can be an asset, index, or interest rate, and is often simply called the "underlying". Derivatives can be used for a number of purposes, including insuring against price movements through hedging, increasing exposure to price movements through speculation or getting access to otherwise hard-to-trade assets or markets via e.g. asset backed securities. Hedging is an activity which takes an offsetting position in a related security to reduce the risk of adverse price movements in an asset. Speculation is the purchase of a good with the expectation that it will become more valuable at a future date. Some of the more common derivatives include forwards, futures, swaps, options, and variations of these such as synthetic collateralized debt obligations and credit default swaps. Derivatives either be traded over-the-counter (OTC) or on an exchange. Futures and standardized options are traded in the exchange and forwards, swaps, tailored options and other derivatives are often traded over the counter. Generally speaking, OTC products are more often used by companies because these products can be perfectly tailored to the situations while the exchange traded derivatives cannot (Bodnar, Consolandi, Gabbi, & Jaiswal-Dale, 2013; Bodnar, Hayt, & Marston, 1998; Bodnar, Jong, & Macrae, 2003). Within forwards, futures, swaps, and options, options provide a downside protection and allow future decisions of exercising them, while forwards, futures and swaps give more certainty to the future transactions as people, who long or short those derivatives, are obliged to transact at a predetermined price and future date. Futures are standard versions of forwards, which trade the exchanges and swaps as a bunch of pre-selected forwards contracts, which settle in a certain frequency in a fixed period of time.

Throughout their existence, companies have always had a plentitude of financial risks in their operations, which were particularly intensified by increasingly globalized markets. Major financial risks which companies are facing include credit, liquidity and market risks. Credit risks arise during the normal course of transactions and investing activities where clients or other parties fail to fulfil an obligation. Liquidity risks are the risks stemming from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimize losses. The most common risks companies are facing are market risks, which include foreign exchange risk, interest

rate risk and commodity risk. In another word, companies are facing the movement of the foreign exchange rates, interest rates and commodity prices.

One way to protect the company against such risks is to use derivatives to hedge. According to the survey of derivative usage in the Netherlands (Bodnar et al., 2003), Dutch firm hedge 96% of the currency risk, 81% of the interest rate risk and only 20% of their commodity risk. The currency risk is mainly hedged by OTC forwards (77%) and the interest risk is mainly hedged by both Swaps (52%) and OTC forwards (28%). Although interest rate risk is a major issue among Dutch firms in practice, as indicated by this data, it does not draw the same academic attention to it as the massive analysis of currency risk in the literature.

In dealing with interest rate risks, using interest rate swaps (IRS) is the predominant mechanism for firms firm to mitigate these threats (Bodnar et al., 2003). An IRS is a liquid financial derivative instrument in which two parties agree to exchange interest rate cash flows, based on a specified notional amount transferred from a fixed rate to a floating rate (or vice versa) or from one floating rate to another floating rate. A benefit of IRS as an over-the-counter (OTC) instrument is, that it is tailored to users while other exchange traded interest rate risk derivatives are not. Usage of IRS is thereby prevalent among all interest rate derivatives. As of year 2013, trading volume of interest rate derivatives by non-financial customers is predominated by IRS ($139 billion), followed by forward rate agreements (FRAs) ($16 billion) and interest rate options and other products ($13 billion) (BIS, 2013). Companies use IRS mainly to hedge interest risks while some companies use it to speculate (Géczy, Minton, & Schrand, 2007).

While derivatives usage can be beneficial in that it can lower financial risks, there are risk issues associated with it, which may not be of complete understanding by the users as well as the stake-holders raise concerns. Some Dutch firms are speculative on favorable foreign exchange rate movements. Based on a market views, 50% of them sometimes or frequently alter the timing of hedges, 43% of them altering the size of hedges and 23% of them out rightly actively changing positions (Bodnar et al., 2003). However, there are only 26% and 27% Dutch companies concern about Monitoring and evaluating hedge results and market risk of hedges respectively, which is far below that of US firms at 63% and 64%, respectively (Bodnar et al., 2003). Therefore, a deep look of derivative usage of Dutch companies are necessary.

Therefore, in this thesis, I focus on the analysis of interest rate risk and the most predominant interest rate derivative: interest rate swaps. More specifically, this paper explores how companies' characteristics influence the usage of IRS of Dutch non-financial listed firms and how companies' motivation to use IRS to hedge and to speculate are differently influenced by their firm characteristics. The lack of empirical research on the combination of IRS usage and the speculation behavior related to it, and the great amount of IRS usage and lack of concerns of the risks associated with derivatives by Dutch firms compared to USA motivated this study. The Netherlands is highly suitable for an investigation of this issue due to its large and competitive corporate sectors. Correspondingly, our research questions are:

> *Which characteristics influence the usage of IRS among Dutch non-financial firms to either speculate or hedge against interest rate risks?*
>
> *Do those financial characteristics influence the usage of interest rate swaps differently if the purpose of interest rate swaps usage differs (hedging or speculation)?*
>
> *Does the purpose of IRS usage (hedging or speculation) influence the firm value differently?*

The next two sections will give a short introduction into the concept and previous research as well as outline the contributions of this study to literature.

1.2 Previous research

Interest rate swaps (IRS) was invented in 1981 and developed into a major interest rate derivative. Since then, IRS has been investigated in terms of its pricing, modeling, its impact and interaction with factors on a macroeconomic level (Mitra, Date, Mamon, & Wang, 2013). At the corporate usage level, research has focused on the reasons why, how and to what extent companies use IRS. IRS, as a derivative, was analyzed indirectly at the derivative-general level and IRS specific level. IRS was also analyzed in its use for both hedging and speculation purposes. To sum up, there are four dimensions in the previous research which are derivatives for hedging, IRS for hedging, derivatives for speculation and IRS for speculation. We will illustrate these four dimensions in order below and will provide detailed explanation of theories mentioned in the literature review. Overall, the dimensions relating to speculation are less investigated than the hedging dimensions.

Bodnar, Hayt, Marston, and Smithson (1995) were the first to survey the corporate use of derivatives. Their survey, called Wharton Survey, endeavored to sample all the American non-financial

listed companies. They looked into the prevalence of derivative usages and reasons of using them. Subsequently, many post-Wharton studies focused on European countries in comparison to American firms and their differences in derivative usage were performed. For instance, Bodnar et al. (2003) adapted the Wharton survey for the Netherlands and found that Dutch companies use more derivatives than their counterparts in the USA.

Next to the large research stream using the Wharton Survey, surveys independent of Wharton Survey were conducted as well. One strand of these studies has illustrated the economical drive of hedging for corporate value adding. More specifically, hedging is supposed to be value-neutral activity in a perfect market, according to the classic Modigliani-Miller paradigm (Modigliani & Miller, 1958). However, researchers emphasized that hedging can also increase corporate value if there are market imperfections, such as costs of financial distress (Graham & Smith, 1999; Shapiro & Titman, 1986; Smith & Stulz, 1985), taxes (Graham & Smith, 1999; Myers, 1984), and underinvestment problems (Froot, Scharfstein, & Stein, 1993).

Another strand of studies maintains that hedging is stemming from an incentive of managers to invest the firm's resources in assets, whose value is higher under the command of managers than under the command of shareholders (Mayers & Smith Jr, 1982; Stulz, 1990; Stulz, 1984; Tufano, 1996).

Those theories of derivatives usage as hedging tools such as costs of financial distress (Graham & Smith, 1999; Shapiro & Titman, 1986; Smith & Stulz, 1985), taxes (Graham & Smith, 1999; Myers, 1984), underinvestment problems (Froot et al., 1993) and management risk aversion (Mayers & Smith Jr, 1982; Stulz, 1990; Stulz, 1984; Tufano, 1996) have been investigated intensively in different countries. However, the empirical results provide conflicting findings for support of hedging theories (Berkman & Bradbury, 1996; Géczy, Minton, & Schrand, 1997; Guay, 1999; Judge, 2006; Mian, 1996); Nance, Smith, and Smithson (1993); (Tufano, 1996). For instance, Bartram, Brown, and Fehle (2009) tested theories of derivative usage on an international basis of firms, with about 80% of global market capitalization of nonfinancial firms covered. They found those theories have little power to explain determinants of derivative usage. The reason they found was that derivatives usage is an endogenous variable, which, for instance, influences the level and maturity of debt in the model.

Determinants of interest rate derivative as a hedging tool were tested along with other types of derivatives extensively. However, only a few researchers have examined the determinants of the adoption of the particular derivative: IRS. Five theories, (I) information asymmetry (Titman, 1992), (II) agency cost (Wall, 1989), (III) comparative advantage (Bicksler & Chen, 1986), (IV) expected future downsizing (Smith, Smithson, & Wakeman, 1986) and (V) banks' preferences for floating interest rate debt (Li & Mao, 2003) explain the existence of IRS. Saunders (1999) examined the supporting theories for IRS based on data from US firms. Additionally, Samant (1996) investigated to what extent a US company with different characteristics would enter an IRS contract.

Compared to hedging, the usage of derivatives for speculation in non-financial firms are less explored. Important exceptions are Guay (1999), Brown and Steenbeek (2001), Faulkender (2005); Adam and Fernando (2006), Géczy et al. (2007) and Zhang (2009). They found that different financial characteristics have an impact on the motivation for hedgers and speculators to become active in derivative usage. As for IRS, only two papers analyzed the speculation motive for the specific instrument: Faulkender and Chernenko (2006) tested how companies use IRS to time the yield curve and therefore use IRS to manage their earnings. Chernenko and Faulkender (2012) tested that hedging influences the cross-sectional variation of IRS usage while speculation influences the time-varying variation of it.

Summarized, previous research shows many contradictory results when theories about derivative usage were tested. Though using IRS derivatives to hedge against interest rate risks is a common practice applied by firms, it is under-researched in literature and IRS usage for speculation got few academic attentions.

1.3 Research Contributions

Concerning the contributions of this study, our major contribution to literature is that we address three flaws existing in the previous research, which may have led to the conflicting empirical results in literature. We make a difference between hedgers and speculators, address the Simpson's paradox and take CCIRS into consideration when analyzing IRS usage.

Firstly, we differentiate companies who use IRS to hedge (hedgers) and to speculate (speculators) and therefore obtain correct data to test hedging theories and speculation theories separately. Pre-

vious research commonly presumed that all derivatives are used for hedging. Accordingly, all derivatives users and use volumes were collected to test hedging theory. This is problematic, because hedging theory and speculation theory may indict the opposite direction of impact of firm characteristics' influence on derivative usage and thus might have rendered the result not significant. Also, previous findings that were interpreted as confirmation of hedging theories may instead have been merely the result of the speculative actives. Therefore, distinguishing the IRS usage either due to hedging or speculation is essential. The research model provided a novel way to identify hedgers and speculators. By creating an index from the information gain from financial statements. We combined and weighted the managements' subjective declarations and auditors' independent judgements, thus making the index plausible.

Secondly, the focus of analysis on IRS as a stand-alone, rather than being included in the umbrella term of derivatives might solve the Simpson's paradox (Good & Mittal, 1989), which may have led to the conflicting empirical results for hedging theories as will bed stated in more detail in the following review section. Simpson's paradox is a paradox in probability and statistics, in which a trend appears in different groups of data, but disappears or reverses when these groups are combined. One example here is research with information advantage theory, which is commonly used to explain the speculation behavior in commodity markets as commodity prices are major input costs for companies. Commonly, gold mining companies gain abundant amount of price information of gold through their operations, which provides them information advantage. However, it is not probable that these companies have an information advantage concerning foreign exchange rates. Therefore, information advantage theory may not explain behavior in situations in which companies use only foreign exchange, while it is more suitable in cases in which companies speculate only commodity prices (Géczy et al., 2007). Accordingly, analyzing particular derivatives apart from each other might solve the potential Simpson's paradox in past models. Besides, it helps define the real concern of using such derivatives for managers.

Thirdly, this paper contributes to the literature by defining the scope of IRS and adding fixed/floating CCIRS into the scope of IRS during the analyses. The Dutch economy shows great openness to the rest of the world and reliance on international trading. Correspondingly, fixed/floating CCIRS, as a combination of currency swap and IRS, is often used and, therefore, deserves careful treatment during the data collection and analyses. Prior research on IRS mainly focused on the

difference between floating rate payer and fixed rate payers. Additionally, theories concerning IRS did not take fixed/floating cross-currency interest rate swap (CCIRS) into consideration. In the previous studies on the determinants of divertive usage to mitigate the three previously mentioned main market risks firms are facing (i.e. foreign exchange risk, interest risk and commodity price risk), the role of CCIRS as both a foreign exchange derivative and an interest rate derivative was not clarified in earlier research. Here, this research sheds a clearer light on this issue by distinguishing the role of IRS and CCIRS as tools to both hedge and speculate.

Last but not the least, the findings provide evidence that financial characteristics are not only the indicators for hedging behaviors but may also be the indicators for speculating behaviors. Therefore, using financial characteristics to test hedging theories or calculate hedging amount or ratio may not be sound as the result may come partly from speculation behavior. The findings also provided insights for the inconsistent empirical results for whether usage of derivatives increase firm value. From our results, it is shown that derivatives used for hedging increase firm value and those used for speculation decrease firm value. And the direction of the interaction between usage of derivatives and firm value very much depends on the weight of speculators in the sample.

The reminder of this thesis is organized as follows: Chapter 2 reviews the theories on corporate hedging and speculation of derivatives and especially IRS. It summarizes the prior empirical results of those theories and in the end describes hypothesized relationships between firm characteristics, firm value and usage of IRS. Then, Chapter 3 provides an outline of the methods to test the hypotheses and presents a discussion of the sample construction process. Also, it describes the data collection process. Chapters 4 provides the results of the analysis on conditional relations using logit regression analyses. Chapter 5 will discuss the results in relation to the hypothesis and its implications for theory and practice. Then, the paper concludes with an outline of the limitations of this study and potential future research avenues.

The next chapter continues with the systematic literature review.

2 Literature review

In this chapter, we first gave a broad review of different derivative types and companies preferences on those types. We found that IRS is the mostly common used interest rate derivatives and decided to focus on IRS in this thesis. Section 2.2 provided literature review for the first research question: Does the purpose of IRS usage (hedging or speculation) influence the firm value differently? speculators are clearly defined in this section. Section 2.3 further explored the previous research for the derivative motivations to try to answer the second research question: Which characteristics influence the usage of IRS among Dutch non-financial firms to either speculate or hedge against interest rate risks? Section 2.4 provided insights for the development of the research model, using risk exposure comparison to detect speculators. Section 2.5 provided background information for the research model, using hedging accounting to differentiate hedger from speculators.

We searched for articles using Scopus in a systematic way. Our search key words are "hedg", "derivative", "risk management" or "interest rate swap". We also restrict our search scope to only 14 top finance journals which are *European Financial Management, Financial Management, Financial Analysts Journal, Journal of Banking and Finance, Journal of Business, Finance and Accounting, Journal of Corporate Finance, Journal of Finance, Journal of Financial Economics, Journal of Financial and Quantitative Analysis, Journal of Financial Research, Journal of Multinational Financial Management, Pacific Basin Finance Journal, Review of Finance, and Review of Financial Studies.* By scanning through the titles and the abstracts, I neglect those article is about hedge fund, and other non-related articles. Eventually I classify those articles into three groups, articles about derivative in general, articles about foreign exchange derivatives and articles about interest rate derivatives and obtain 50, 19, and 7 articles respectively. Articles are also categorized by its content. There are 10 articles discussing about the impact of derivatives on firm value or risk, 27 articles about the motivation and reasons that companies use derivatives, only 6 articles talking about speculation through derivative usage and in the end 34 articles about other issues. Due to the scarcity of articles discussing interest rate swap and speculation, I also conducted backward literature review from the reference lists of articles I read.

2.1 Choices of derivative types

There have been several analyses on companies' preferences on derivatives usage. Researches show that firm characteristics, type of risk, and manager/context features influence the usage different derivative types.

The first research focus relates to certain companies' prevalence to use derivatives to tackle a certain risk. Normally, companies who have higher foreign exchange risk exposure or interest rate risk exposure genuinely use currency derivatives or interest rate derivatives to hedge these particular risks. In this context, Bodnar et al. (2013) found that this exposure varies among different industries. In their research on Italian companies, the large retail companies appeared to hedge more interest rate risks than smaller ones, since their interest rate exposure was heavily influenced by the higher cash flow volatility common in the retail industry. And since most of the international trade happens within the manufacturing industry in Italy, companies in this industry have a tendency to use currency derivatives.

The second research focus is about which kind of derivatives (e.g., forwards/swaps/options) that companies prefer to choose in a certain risk area. The preference is influenced both from the institutional environment and the companies' characteristics themselves. For example, Bodnar et al. (2003) found that compared to the Netherlands, American companies use more exchange traded derivatives. They contribute this to the requirements of higher ratings of the counter party in America. In the Netherlands, companies have close connections with commercial banks who are the primary supplier of derivatives, therefore, they are in favor of over-the-counter products, while American companies have a broader source e.g. investment banks and exchange markets (Bodnar et al., 2003). In Italy, Bodnar et al. (2013) showed that within currency derivatives, companies use mostly OTC instruments, namely forward contracts. Forward contracts are followed by OTC options and then currency swaps. Yet they found that size also influenced the choice of options against forwards and swaps. Small firms were found to favor swaps, whereas large firms were found to prefer options, as options require premiums, which small companies hesitate to afford, while forwards and swaps do not require premiums. Within the interest rate risk area, IRS is the most commonly used derivatives. Apart from IRS, interest rate options and forward rate agreements commonly used.

As the last focus area, also manager characteristics and contextual factors play a role in derivative usage. Bodnar et al. (2013) found that CEO/CFO's education is influencing the choice of interest rate derivatives. Lower educated management (high school) tends to choose forward rate agreement, while complicated instruments as options are managed by CEOs/CFOs with university degrees. Secondly, companies' proximity to the large banks also influence their choices. Bigger banks have more expertise to give hedging advice to companies, therefore companies who are closer to bigger banks tend to use more options, while those who are close to small banks tend to use more forward rate agreements. Third, consistent with economics of scale, bigger companies use more options with up-front premiums while small companies use more forward rate agreements.

This thesis will mainly focus on IRS, as within the interest rate risk area, IRS is the most commonly used derivatives.

2.2 The influence of derivatives on firm value

2.2.1 Derivatives used for hedging

A hedge is an investment to reduce the risk of adverse price movements in an asset. Normally, except for operational hedging, such as matching the in and out cash flows, hedging is done by taking an offsetting position to the asset by using derivatives. Hedging is a value-neutral activity according to the classic Modigliani-Miller paradigm (Modigliani & Miller, 1958). This theorem states that in the absence of tax and other market frictions, the capital structure decisions by firms add no value to firm value. This theory was applied initially to firms' debt-equity choices, which can be proved by showing that shareholders can simply undo or replicate any financial decision made by the firms themselves using a home-made leverage. Later, this theory was extended to all aspects of firms' financial strategy, which includes whether to borrow a loan with fixed rate interest or floating rate interest or whether the borrowing should be dominated by US dollars or Euros. It was also stated that under market perfections, the shareholders are indifferent between hedging on their own accounts or letting the company do the hedging for them. For example, if the company does not hedge on the foreign exchange risk, the investors can just hedge it on their own accounts.

However, many markets in reality are not perfect markets. When a general equilibrium for a good or service is not achieved, inefficient allocation of resources and therefore deadweight costs arise.

Scholars have argued that hedging increases company value by reducing deadweight costs due to market imperfections when (1) financial distress is costly (Smith & Stulz, 1985), (2) corporate effective tax schemes are convex (Smith & Stulz, 1985), (3) there are conflicts of interest between debt and equity holders and underinvestment problems occur (Froot et al., 1993; Myers, 1977), (4) managers are risk-adverse and do not diversify their claims (Smith & Stulz, 1985; Stulz, 1984) or (5) other violations of the assumption of market perfection exist.

Concerning empirical findings, Allayannis and Weston (2001) were the first to empirically examine whether hedging increases firm value and to which extent the firm value is increased as referred to the hedging premium. They used Tobin's Q as a proxy for firm value and found that currency derivatives indeed increased firm value. The hedging premium was due to the reduction of expected taxes, financial distress costs and underinvestment. After Allayannis and Weston (2001), various other research on this issue was conducted. For instance, Cater, Rogers, and Simkins (2006) slightly adjusted the model of Allayannis and Weston (2001) and found that hedging increased firm value in airline industries and the hedging premium was mainly achieved by reducing underinvestment problems. Using an entirely different method, Graham and Rogers (2002) found that hedging premium is mainly stemming from the increase of debt capacities and is linked to increased tax reductions. Further research carried out by Bartram, Brown, and Conrad (2011); Bartram et al. (2009); Júnior and Laham (2008); Kapitsinas (2008); MacKay and Moeller (2007); Nelson, Moffitt, and Affleck-Graves (2005) also provided evidence that hedging can increase firms' value, which is opposed to the aforementioned Modigliani-Miller paradigm (Modigliani & Miller, 1958).

However, other studies provide conflicting results. These studies found that there are either no significant effects or even negative effects of hedging on a firm's value. For instance, Guay and Kothari (2003) found that the financial risks that are hedged are too small to impact the firm value in a significant way, even in extreme case when interest rates, foreign exchange rates and commodity prices change simultaneously at three times the annual standard deviation of the historical time series of the assets price movement. Similarly, the studies conducted by Jin and Jorion (2006) and Bashir, Sultan, and Jghef (2013) also provide results that hedging has no significant effects on or has no relation to firm value. Lookman (2004) even found that hedging commodity price risks discounted the firms' value for companies in the oil and gas exploration and production industry.

In support of this, Fauver and Naranjo (2010) studied data ranging from 1991 to 2000 (N=1746) of companies whose headquarters are in America and found a negative relationship between Tobin's Q and hedging. Yet Khediri (2010) concluded the same with the data from French companies.

Reasons for the conflicting results can be explained partly by the differences of industries. As explained earlier, Lookman (2004) and Jin and Jorion (2006)'s research on the oil and gas industry showed that hedging has no effects or even negative effects on firm value. These results can be justified by the fact that, in the oil and gas industry, commodity risk exposure can be hedged by individual investors (Jin & Jorion, 2006). Movements of the oil price and firm value are closely correlated. The existence of an active oil future market provides investors easy access to the market price movements of oil and, in turn, the information asymmetry of the oil price diminishes. This is close to the Modigliani-Miller assumptions that everyone has the same quality of information and therefore hedging does not create any value for firms. On the other hand, even if there are also active markets of foreign exchange rates for individual investors, transaction risk, translation risk and economical risk due from foreign exchange rate fluctuation still influence the firm value in a more complicated way than the commodity price risk. Interest rates are more determined by banks; therefore, the information asymmetry enlarges compared to commodity pricing. Therefore, foreign exchange rates and interest rates are not easy to hedge by investors. This might explain why a positive connection between derivative usage and firm value was found in other industries or when the data was obtained from all non-financial firms.

Another reason for the conflicting results might have been a sample selection bias. For example, the research conducted by Allayannis and Weston (2001) is based on a sample of large U.S. non-financial firms with assets greater $500 million, which showed a positive relation between foreign currency derivatives and firm value, while Jin and Jorion (2006) obtained the data from firms with assets greater than $20 million, which showed no significant relation. The difference between large firms and small firms may provide an alternative explanation that the hedging premiums are correlated to other factors shared by large firms, such as information asymmetry and operational hedging. These factors might have led to the increase of firm value, instead of derivate usage itself.

2.2.2 Derivatives used for speculation

As explained in the previous section, derivatives are normally regarded as a hedging tool rather than a speculation tool. However, evidence show that many companies use derivatives for speculation. To clarify, speculation is the purchase of a good with the hope that it will become more valuable at a future date. By definition, speculation involves market forecasting and intentionally taking risks to gain profit. In short, there are two types of speculation behaviors. The first type is by building up additional, speculative positions. For example, company A has exposure to floating interest rate risk. Instead of swap floating to fixed, company A entered an IRS as a floating payer. This situation is outright speculation. The second type is subtler which many companies exercise. That is, companies hedge only risk positions which they expect to be a loss and leave open positions which they expect a gain. This is often called selective hedging. Compared to fully hedge their risk positions, they expect selective hedging to increase their cash flow even with the risk of losses due to the open positions. Selective hedging integrated managements' market prediction, and therefore contains certain speculative element. This has been criticized very sharply by Lessard and Nohria (2012): "In fact, to the extent that it includes a speculative element by factoring possible gains into the hedging decision, [selective hedging] differs little from staking the assistant treasurer with a sum of money to be used to speculate on stock options, pork bellies or gold.p.198/199".

Both outright speculation and selective hedgers are non-believers of efficient market hypothesis. Under this hypothesis (in its semi-strong version), financial market price always reflects the public available information. Therefore, unless a company has access to privileged information or analyses public information better than others, it is difficult for individuals to constantly gain abnormal returns from speculation and therefore increase the firm value ((Frankel & Rose, 1995; Lewis, 1995; Stulz, 1996).

Moreover, speculators are non-believers of unbiased expectations hypothesis. The unbiased expectations hypothesis states that forward rates are unbiased predictors of future spot rates. However, the theory has been shown to be inaccurate and a deviation, which is the difference between the forward rates and future spot rates, exists in reality (Lovell, 1986). The deviation is also called expected risk premium in forward prices. The risk premium is evidenced to be highly volatile and time-varying, according to Hsieh and Kulatilaka (1982) and Fama and French (1987). Chen, Kuo,

and Chiang (2014) identified that expectation errors and irrationality can explain the risk premium. Dated back to Hicks (1939) and Keynes (1930), hedging pressure hypothesis suggests that risk premiums can be also earned on the balance of long or short position holders. For example, a commodity producer has a natural long position and would like to have a short position in commodity exchange. To entice a sufficient number of speculators to take the opposite position, hedgers need to offer speculators risk premiums. This induces a normal backwardation situation in which the future price will be lower than the expected spot price in future. The opposite result holds for commodity consumers, which have commonly a short position and would like to gain a long position in the commodity market. Correspondingly, the interplay of short and long positions determines the risk premium, which can motivate firms to use derivatives for speculation.

On the other hand, it is hard to predict expectation errors and irrationality with models in practice. since the risk premium is highly volatile and time-varying, it can be the case that on average that forward rate is unbiased (Glaum, 2002). Therefore, it is very difficult indeed to make systematically successful interest rate forecasts.

Summarized, though economist and academia find difficulty to gain constant profit from predicting market price, speculators tend to be those who have or think they have information advantage to make predictions and beat the market. And although those constant gains are difficult to obtain, speculation can influence the firm value in a volatile way in the short-term. The net present value of derivative trading is not zero but volatile. It can be negative but also positive. Supporting this line of reasoning, Adam and Fernando (2006) found goldmining firms have economically cash flow gains from derivative usage themselves after controlling the firms' rise of systematic risk. This means the usage of derivatives themselves is profitable.

This is contradictory to the mainstream idea in derivative literature that assumes that derivative transactions have zero net present value and are only value-adding to firms through the reduction of deadweight costs due from market imperfections such as costs of financial distress (Graham & Smith, 1999; Shapiro & Titman, 1986; Smith & Stulz, 1985), taxes (Graham & Smith, 1999; Myers, 1984), underinvestment problems (Froot et al., 1993) and undiversified managers (Mayers & Smith Jr, 1982; Stulz, 1990; Stulz, 1984; Tufano, 1996). As criticized by Adam and Fernando (2006) and above discussions, these theories are based on the assumptions that the expectation of a derivative portfolio is zero and thus the derivative trading itself is not value-adding, which is

only true if it is a semi-strong perfect market and if unbiased expectation hypothesis holds. Being in hope of a positive outcome from the risk premium, firms therefore might be motivated to speculate. This might be also a possible explanation of the lack of consistent empirical results on whether derivative usage enhances firm value, as the existence of speculation behavior renders firm value volatile.

Research results also show that companies indeed do use derivatives for speculation. Some Dutch firms are speculative on favorable foreign exchange rate movements. Based on a market views, 50% of them sometimes or frequently alter the timing of hedges, 43% of them altering the size of hedges and 23% of them out rightly actively changing positions (Bodnar et al., 2003). Survey by Dolde (1993) of Fortune 500 companies found that 90% of companies reported usage of derivatives reflected their market view. 399 U.S. nonfinancial firms were investigated by Bodnar et al. (1998) and they found that about 50% of these firms admitted to alter the size and/or timing of derivative usages based on managers' market views. Additionally, the survey of risk management practices conducted by Glaum (2002) found that the majority of the major nonfinancial firms in Germany follow forecast-based and profit-oriented risk management strategies. Faulkender (2005) finds that hedging behavior is associated with the slope of yield curve at the time the debt is issued, thus risk management activities are possibly associated with speculation and myopia. More recently, Chernenko and Faulkender (2012) revealed that though IRS is normally regarded as a hedging tool, its usage for speculation is of equal significance as it is for hedging. Most importantly, merely the time-varying variance of IRS usage is due to speculation. Also, Adam and Fernando (2006) provide further evidence that firms have even an incentive to use derivatives to take advantage of the risk premium and gain profit out of it.

However, using data from the USA market, by comparing the risk exposure firms are facing before and after the initiation of derivatives, (Guay, 1999) found that firm risk (measured in several ways) decreases after the use of derivatives and therefore provide evidence to the idea that companies use derivatives to hedge, not to increase risks through speculation. Although evidence shows that companies use derivatives not to speculate but sometimes also solely to hedge in USA market, (Glaum, 2002) finds that European firms take a more speculative view of managing risk than do USA firms by undertaking active risk management of exposures through a combination of hedged and unhedged risk management instruments (p.14).

2.3 Motivations to use derivatives

The IRS is a general category of financial instruments known as derivative instruments. Derivatives are used to hedge and speculate. Therefore, this section is divided to firms' hedging incentives and speculation incentives. Also, theories and evidence from literature of general derivative usage are incorporated in this section to provide insights into the usage of IRS. Thereby in both hedging section and speculation section, we first illustrate the motivations for derivative instruments usage and then discus the unique reasons why companies use IRS rather than other financial tools. In the end, we develop our hypotheses.

2.3.1 Motivations for hedging in general

2.3.1.1 Costly financial distress

Smith and Stulz (1985) argue that hedging enhances firm value by reducing cash flow volatility, thereby avoiding the likelihood of costly financial distress. Here, the increase in firm value comes from the reduction in deadweight costs – as described before - and an increase in debt capacity, which in turn benefits the firm through valuable tax shields from the interest expenses deductions and reductions in agency costs due to excess free cash flow (Leland, 1998 ; Stulz, 1996).

Leland (1998) further argues that increased debt capacity renders part of debt capacity unused, thus reducing financial distress. Froot et al. (1993) endogenizes financial distress cost by showing that a part of financial distress cost is due from underinvestment problems under which deadweight cost occurs when companies seek external financing.

2.3.1.2 Tax incentives

Smith and Stulz (1985) and Mayers and Smith Jr (1982) argue that hedging smooths the range of pre-tax income and thereby lowers the expected tax liability for a firm under a progressive tax scheme, that is, corporate effective tax rate increases as the taxable amount increases. For example, company A is charged at the tax rate at 20% and 25% when its taxable income is 1million and 2 million respectively. If company A hedges to earn 10million in year 1 and year 2, the total amount of tax liability is 4million. Without hedging, company A may earn 2million in year 1 and 0million in year 2 or the other way around which will result in a tax liability of 5million. In addition to a progressive tax scheme, net operating losses (NOLs) carried forward and backward also provide incentives for firms to hedge. Graham and Smith (1999) document that hedging reduces the chance

of loss, enhances the chance that companies are profitable and able to use its existing NOLs to reduce tax liability. If companies do not hedge and experience operating loss, the utilization of these NOLs are going to be postponed to a later time, which reduces the present value of these tax shields. Shanker (2000) extends this theory by showing that the incentive to hedge depends on both the possibility that companies carry the NOLs forward/backward and the distribution of taxable income. For instance, a company can carry its NOLs backward for 3 years and has a probability of either loss or gain this year. If the tax loss in the current year is smaller than the sum of the taxable income in the last 3 years, there is no incentive for the company to hedge. However, if greater, the tax loss has to be carried forward. The present value of the tax shield when NOLs is carried forward is lower than when fully carried backward. In this situation, the company has an incentive to hedge to lower the range of loss, so that the NOLs can be fully used this year.

Finally, several scholars explain that companies hedge to enjoy the increase of tax shield from the increase of debt capacity (Fenn, Post, & Sharpe, 1996; Smith & Stulz, 1985; Smith Jr, 1995). Reducing cash flow volatility by hedging reduces income tax in a convex tax schedule and also reduces the agency problem between debtholders and shareholders, thereby enhancing the debt capacity and creating higher interest tax shield (Graham & Smith, 1999).

2.3.1.3 Underinvestment problems

Myers (1977) notes that stockholders may forgo a positive net present value (NPV) project when a sufficiently large portion of the NPV goes to debtholders. Debtholders expect this potential conflict of interest at the issuance of debt and, therefore, elevate the interest rate as a compensation for this additional risk. Underinvestment problems also induce higher external financing costs. Bessembinder (1991) shows that hedging reduces the probability of default of project receivables, thereby increasing the expected NPV. Underinvestment problems are therefore attenuated, when stockholders' residual claim to the project increases.

Another perspective is that improved cash flow capacity through hedging also helps firms to avoid rejecting positive NPV projections due to scarcity of internal funds, especially when external financing is costly (Froot et al., 1993; Myers, 1984).

2.3.1.4 Managerial risk aversion

Research found that managers unable to fully diversify their risks inherent in their claim on the firm commonly make hedging decisions. Given that the stock price and option holdings of managements are the main risk for executives, the stock price volatility is the main concern for risk-adverse managements. When managers invested most of their wealth in a firm's equity, they tend to hedge more as it is easier to hedge via the firm than by themselves. The design of management's compensation contracts also likely determines the hedging decisions. As shown by Smith and Stulz (1985), if managers' compensation package is a concave function of company value, managers have a large incentive to hedge. In case of a concave function, managements gain the most in case the stock price is stable as extreme high or low stock price both reduce the managements' compensation. In contrary, in case of a convex function or compensation plan with option-like features, managers may not hedge at all because they tend to increase the firm risk and higher volatility of stock price increase either their compensation plan itself or the value of their options.

2.3.1.5 Empirical results

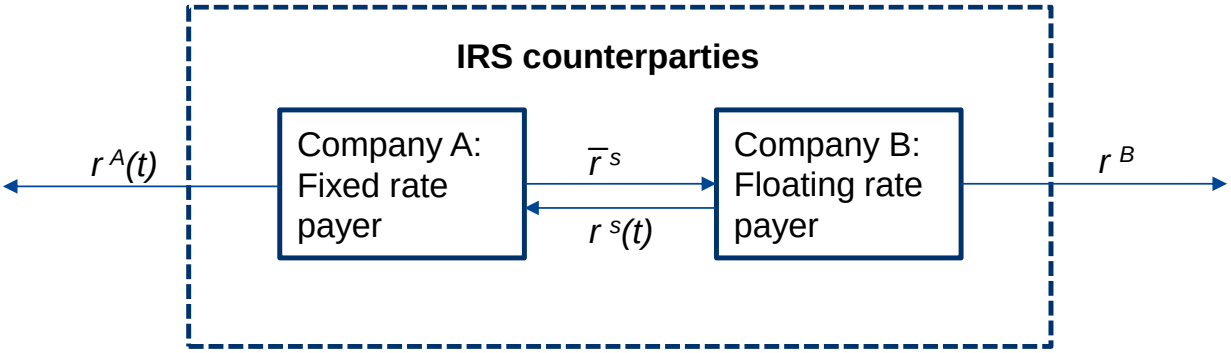
Results of empirical studies on hedging provide varying support for the theories aforementioned (Berkman & Bradbury, 1996; Géczy et al., 1997; Guay, 1999; Judge, 2006; Mian, 1996; Nance et al., 1993; Tufano, 1996). The direct tax influence of hedging appears small, which is probably due to the proliferation of flat tax schemes in many countries; the supportive evidence for management risk-aversion theory is mixed, and one reason might be the possibility of the self-selection of managers. Self-selection means that the more positive outlook that managers has in the firm, the more they invest in the firm and less likely to hedge; the less positive, the less they invest and not necessarily to hedge more. However, the increased debt capacity argument from the financial distress theory is strongly supported by scholars and generally leverage is found to be positively linked to derivative usage (Berkman & Bradbury, 1996; Graham & Rogers, 2002; Guay, 1999); reducing the underinvestment problem is consistently supported and the growth opportunity are positive related to the hedging(Bartram et al., 2009; Bessembinder, 1991; Froot et al., 1993; Géczy et al., 1997); and industry and size effects are consistently positive related to derivative usage in literature.

2.3.2 Motivations for using IRS to hedge

To illustrate better the motivations of usage of IRS, we first have to understand the mechanism of IRS. The quoted price of an interest rate swap consists of two different interest rates. In the case

of a fixed/floating swap, the floating interest rate typically is indexed to a rate determined by the market, e.g. the Treasury bill rate or, more commonly, the three or six-month London Interbank Offered Rate (LIBOR). Such a swap is also known as a generic, or plain-vanilla swap. The mechanics of IRS are also shown in the figure 1 below. Consider that company A and company B are going to exchange their interest payment at the end of each of T periods, denoted by the variable t=1,2,….T. Let $\bar{r^s}$ denote the fixed swap rate for an IRS agreement accepted by the fixed rate payer and $r^s(t)$ denote the floating swap rate accepted by the floating rate payer. Company A is paying a floating rate $r^A(t)$ and company B is paying a fixed rate r^B for their original loans. Based on no-arbitrage theory, $\bar{r^s}$ is priced in a way that the NPV of company A's fixed interest expense equals that of company B's floating interest expense they exchange in the swap, assuming that the notional amount of both loans are 1 Euro. For each term, the net expense borne by company A is $r^A(t) + \bar{r^s} - r^s(t)$. Interest rate is normally priced with LIBOR plus a credit quality risk premium. The difference between firms' risk premium is called credit-quality spread denoted by $\mathrm{q}(t)$. Thereby, $r^A(t) + \bar{r^s} - r^s(t) = \bar{r^s} + r^A(t) - r^s(t) = \bar{r^s} + (libor + risk\ premium^A(t)) - (libor + risk\ premium^s(t)) = \bar{r^s} + \mathrm{q}(t)$. In this way, company A creates a synthetic fixed–rate debt.

Figure 1: The mechanism behind IRS



2.3.2.1 Explanation from comparative advantage theory

Bicksler and Chen (1986) provided the comparative advantage theory to explain IRS usage between two companies with different credit ratings. Both companies have their own advantages to obtain either floating rate or fixed rate. When company A has advantage compared to B to obtain floating rate while prefers fixed rate and company B has advantage to obtain fixed rate debt while

prefers floating rate. They can swap their interest payment to arbitrage the quality spread differences and lower their borrowing cost.

This theory was questioned by Saunders (1999). He argued that arbitrage will reduce the quality spread to an extent that no one can profit from the swap. Under this circumstance, IRS trading volume declines. However, IRS's trading volume shows no severe decline. Turnbull (1987) shows that in the absence of externalities, swaps are a zero sum game when credit risks are taken into consideration. That is, the gain from one party is due to undertaking the default risk of another party and when interest rates change, the gains to one party are offset by losses to the other party.

Companies have concerns about their interest rate exposure due from floating-fixed debt structure. Instead of directly issuing fixed debt or floating debt to target the optimal exposure, firms use IRS as a better alternative to hedge the interest rate exposure. Researchers have proposed that firms benefit from IRS for several reasons: agency cost reduction (Wall, 1989), information asymmetry (Titman, 1992), information signaling (Litzenberger, 1992), banks' natural preference to floating interest rate (Li & Mao, 2003), and expected future downsizing and optimal debt level theory (Smith et al., 1986). We explain these reasons in details below.

2.3.2.2 Explanation from agency cost theory

Wall (1989) initiated the agency cost theory which is built upon the underinvestment theory (Myers, 1977) and asset substitution theory (Jensen & Meckling, 1976). Underinvestment means that managers pass up low risk positive NPV projects because the benefit of this investment would be taken away by creditors. Asset substitution or risk-shifting means that managers who act in the interest of shareholders would substitute high-risk project for low-risk ones to maximize their wealth at the cost of debtholders. Short term debt financing reduces the risk shifting problem for banks as they can adjust risk premium on the basis of the company's investment policy when reviewing debt roll-over. Furthermore, short term debt alleviates banks' concern of underinvestment problems. Underinvestment problems happen typically in insolvency situations. When banks find a firm insolvent, long-term loan borrowers can prevent banks from recovering loans as long as they pay the interest in time, however, short-term loan borrowers have to pay both the interest expenses and the principals. Therefore, banks charge premium for long-term loans due to the possible agency costs: asset substitution and underinvestment. Wall (1989) argues that the existence of agency costs is one reason that quality spread widens with debt maturity. For example, a BBB

credit might pay 50 basis points more than an AAA credit for short-term funds, but 120 basis points more for long-term funds.

Wall (1989) proposes that when firms wish to borrow long-term loans to enjoy fixed long-term rate and avoid the interest rate volatility, but are reluctant to pay the premium for long-term loans, they can first borrow short term debt without the premium and then swap it into long-term fixed rates. By recalling figure 1, company A's net payment is $\overline{r^s} + \mathrm{q}(t)$, which is the fixed swap rate plus the credit quality spread. In this way, interest rate volatility from the market represented by LIBOR is offset to zero. With the combination of short term debt and interest rate swap, the bank is not concerned about the agency problem of company A in the same way as with short term debt alone. Short-term debt with or without interest rate swap is re-evaluated frequently and banks can always revise $r^A(t)$ if necessary. Therefore, a short-term debt with interest rate swap enjoys lower interest rates through reduced agency problems as compared to long-term debt and also lock-in long-term interest rates.

2.3.2.3 Explanation from information asymmetry and information signaling theory

Titman (1992) and Arak, Estrella, Goodman, and Silver (1988) introduced the information asymmetry theory that IRS enables companies to borrow a short-term floating rate loan and enter a fixed rate interest swap to create a synthetic long-term fixed rate loan. To illustrate this better, we suppose that Company A prefers a short-term loan when Company A believes to have a higher credit rating and therefore less interest rate charged in the future. At the same time company B is indifferent towards long-term or short-term loans unless the roll-over costs are excessive. Suppose company A and B are at the same credit rating scale, public lenders are not aware of how their future credit rating will be and therefore lend both companies at the same rate. When the interest rate uncertainty increases, borrowers prefer long-term fixed to short debt. Public lenders will charge a risk premium for long-term fixed debt. When A cannot persuade the public lender of having a higher credit quality than B to get a lower long-term fixed debt rate, A will choose to borrow a short-term loan with a floating rate and swap floating for fixed rates with B. By recalling figure 1, company A's net payment is $\overline{r^s} + \mathrm{q}(t)$, which is the fixed swap rate plus the credit quality spread. Company A's interest rate is reduced when its own risk premium and thus the credit quality spread $(r^A(t) - r^s(t))$ is reduced. Therefore, company A benefits from the changes of

credit rating at roll-over with frequent intervals. In other words, company A leverages its private information and reduced information asymmetry in the credit market.

Litzenberger (1992)'s signalling theory suggests that synthetic fixed rate financing is a hint to the investors that the company is confident about its credit uprating in future. This improves investors' perceptions of the firm's future credit prospects and lowers the other forms financing cost.

2.3.2.4 Explanation from expected future downsizing and optimal debt level theory

Smith et al. (1986) point out that optimal amount of debt of a company will change over time. However, companies normally issue long-term fixed loans to avoid interest rate risk, which is not flexible for the adjustment of debt ratios. Facing this dilemma, an option for companies is issuing long-term fixed rate loans combined with a call option. However, this call option comes with an increase on the interest rate companies need to pay. Also, the value of an embedded call option increases as market interest rates decline. Therefore, it is only profitable for companies to call back the debt when the interest rates declines and the call option is in the money. The better alternative for adjusting the amount of debt suggest by Wall and Pringle (1989) is the synthetic fixed rate financing aforementioned as swap. Debt ratios are easier to be adjusted with short-term loans than long-term loans and swap can be terminated easily by paying the current market value of the swap or by an offsetting or mirror swap.

2.3.2.5 Explanation from the Banks' preferences for floating interest rate debt

Li and Mao (2003) argue that the aforementioned theories focus on the debt maturities, which cannot explain the fact that companies borrow long-term floating rate and swap to fixed rate. Li and Mao (2003) proposed that the reason why a bank is in favor of short term floating rate debt rather than long-term fixed debt cannot be explained by debt maturities, but by banks' natural preference to floating interest rate debt. Due to banks' floating liabilities and a strategy to match assets with liabilities, banks are reluctant to lend fixed-rate loans and, therefore, fixed loans are issued with a higher premium compared to floating loans (Li & Mao, 2003). Li and Mao (2003) also explain that debt maturity is not a concern for banks, because banks, compared to public lenders, have the ability to ascertain the credit quality of borrowers and debt covenants help mitigate agency costs. From the borrower's perspective, borrowing long-term debt results in less transaction cost of short debt roll-over. Under these circumstances, it is possible for a company to first borrow at a long-term floating rate and swap to fixed rate to hedge interest rate risk.

The preceding discussion has illustrated why company enters IRS as a fixed payer. But every swap has a floating payer. The floating side of the IRS is not well developed theoretically and empirically. Titman (1992) and Wall (1989) hypothesize that floating-rate payers share the gains which fixed-rate payers receive from the synthetic long-term loan due to the credit risk of fixed-rate payers. Saunders (1999) found empirically that floating rate payers have a significant higher rating than non-users. A guess for this phenomena is that banks as financial intermediaries try to sell highly rated firms the riskier floating side rather than that the highly rated firms try to use their comparative advantage. Therefore, floating-rate payers virtually act as a manager of a diversified portfolio of risky contractual obligations and hope to profit from it. Another motivation for floating-rated IRS is to change the debt-floating debt structure which we will explain in the speculation section 2.2.2.

2.3.2.6 Empirical findings concerning motivations to use IRS to hedge

Though the mechanisms and benefit of IRS have been illustrated comprehensively in literature, the empirical tests of these theories are comparably rare.

Wall and Pringle (1989) tested the theoretical agency cost, information asymmetry, and downsizing hypotheses. They found support for the agency cost and information asymmetry hypotheses, but not for the downsizing hypothesis. Using descriptive statistical analysis, they found that the majority of the fixed-rate payers are rated A+ or lower while more than half of the floating-rate payers are rated AA- or better, which supported the agency cost theory. As for information asymmetry theory, they found more fixed-payers experience credit upgrade than the remaining firms and the difference of this two groups are statistically significant. Yet they conclude that no single explanation of the motives for using interest-rate swaps is capable of explaining the behavior of all swap users. One limitation of this research is, that all the data were obtained at the time derivative usage was voluntarily disclosed and companies commonly only report derivative usage when they profit from it. Thereby a sampling bias may have biased the analyses.

In another study, Samant (1996) used financial ratios to proxy information asymmetry and agency cost theory and tested IRS users' characteristics, with a separate investigation of fixed-rate payers and floating-rate payers. Samant (1996) found that fixed-rate payers compared to non-swap users have higher leverage, greater profitability, more growth opportunity, lower operating risk, lower ratios of fixed assets to total assets, and more divergent earnings estimates. Additionally, floating-

rate payers showed no significant different characteristics compared to non-swap users. These results supported agency cost theory and information asymmetry theory. Still, in response to these findings Saunders (1999) criticized that Samant's analysis was based on data obtained from the years in which IRS was used rather than the year in which IRS was initiated.

Saunders (1999) believes agency cost theory and information asymmetry theory only explain why companies enter IRS. Accordingly, Saunders (1999) took the year of initiation of swap as a point of reference in comparing changes in relevant variables. Saunders (1999) found that fixed-payers experience a credit upgrade the year after the initiation of IRS and higher sales increase in the year of initiation of IRS more often than floating payers and the non-users, which provides evidence for information asymmetry theory. Agency cost theory implies that fixed payers have higher risk shifting problem which is indicated by high growth opportunities before the initiation of IRS. Saunders (1999) found that fixed payers have higher rate of growth in the year of initiation compared to non-users which supports agency cost theory.

Concerning the theory of the banks' natural preference to floating interest rate debt, Li and Mao (2003) found empirical evidence that firms do prefer long-term floating-rate bank loans and interest rate swaps. They found that there are little differences in debt maturities and percentages of short-term debt between the two groups of swap users (fixed payers and floating payers), which is not consistent with information asymmetry theory and agency cost theory.

Summarized, the empirical findings show that though the results are varying, most of the empirical studies support agency cost theory and information asymmetry theory.

2.3.3 Motivations for speculation

2.3.3.1 Firms speculate to "bet the ranch"

According to Stulz (1996), firms with principal-agency problems in a financial distress situation "bet the ranch" to recover. Speculation brings benefits to the shareholder while hedging only decreases the chance of the good outcomes that actually improve firms' situation. As stated by Froot et al. (1993), firms tend to hedge to maintain a stable cash flow, so that they do not compromise any investment opportunity due to financial constraints. However, Campbell and Kracaw (1999) provide another perspective. They argue that firms under financial constraints are motivated to increase risk exposure to provide more cash inflows to finance growth opportunities. It is therefore

optimal for a firm that faces a convex investment function to speculate (Adam, Dasgupta, & Titman, 2007; Campbell & Kracaw, 1999). Convex investment function means firms' profit to investment ratio increases when investment increases. The convexity theory suggests that firms with (1) good growth opportunities, (2) low short-term liquidity, and (3) high costs of external finance tend to speculate more.

2.3.3.2 Firms speculate to "Shoot for the moon"

A supplementary theory is that derivatives are used to "shoot for the moon". Firms speculate because they believe it is profitable rather than simply taking a risky move that provides upside payoff potential. Management can lift up the company's earnings to enhance the stock price and, therefore, the value of their own holdings. Stulz (1996) argues that companies have incentives to gather information of the price movement of their major input, so they have an estimation and control of their cost. As evidenced by Brown, Crabb, and Haushalter (2006), gold markets believe large gold mining firms possess an information advantage about future gold prices and can better estimate future price movements. Accordingly, Stulz (1996) maintains that speculation occurs in particular when companies believe they have information advantages over the rest of the market and they are in a position to profit from it.

2.3.3.3 Motivation for using IRS to speculate: Timing the yield curve

Faulkender and Chernenko (2006) explain why companies use IRS to time the yield curve. Taking a plain vanilla IRS for example: the NPV of company A's fixed interest expense should be the same with that of company B's floating interest expense they exchange in the IRS contract, based on no-arbitrage theory. Therefore, the value of IRS should be always 0 if the unbiased expectation hypothesis holds. If not, for example when the floating interest rate is lower than implied by the term structure, the value of IRS held by the floating payer increases while the value of the IRS, held by the fixed payer, decreases with the same amount, as IRS is supposed to be a zero-sum game between the two counterparties. Because hedging accounting requires IRS to be marked-to-market, the profit or loss of using IRS is then the change of the value of this IRS. If a company sees that the floating rate is going to increase less than implied by the term structure, while this company has excessive fixed rate debt, this company can enter a fixed-to-floating IRS to profit from it. In this case, companies speculate and make a profit by timing the market and take a view

of the yield curve. This implies that companies' usage of IRS can be contingent on the current floating/fixed debt ratio.

2.3.3.4 Empirical results

Using a 10-year sample of North American gold mining firms, Adam, Fernando, and Salas (2015) found that speculation is more prevalent among firms who are believed to have information advantages and are financially constrained. In contrast, Géczy et al. (2007) found that features of speculators indicate that perceived information advantage and cost advantage, as opposed to financial constraints, lead them to speculate. Correspondingly, they conclude betting the ranch is unlikely, as the speculating firms they surveyed tend to have access to low-cost outside financing, which made betting the ranch unnecessary.

Furthermore, Chernenko and Faulkender (2012) analyzed both the hedge and speculation incentives to use IRS and decomposed IRS into cross-sectional and time-series components. The mean of both dependent and independent variables were based on cross-sectional data and the standard deviation of both dependent and independent variables were time-varying. Considering that optimal hedge ratio is stable over time, by regressing the cross-sectional component, they identified which firm characteristics are associated with hedging and by regressing the time-series variation component, they identified which originated from speculation. This paper demonstrated that some characteristics supported by hedging theories are more consistent with speculation and the cross-sectional and time-series variation in the IRS usage are in the same magnitude. The time-series component showed that the higher performance-sensitive the executive compensation package of managers is, the more a firm uses IRS to speculate and mange earnings.

2.4 The influence of derivatives on firm risk

Empirical research has also studied whether and how derivatives affect firm risks. The evidence is mixed. As stated in the previous value section, companies can hedge to reduce risk and speculate to increase risk and thus make profits. The conflicting results might be due to the fact, that in the samples of these studies, some companies actually use derivatives to speculate rather than hedge.

There are several indications from literature which support such an assumption. For example, by comparing the difference of companies' risk after the initiation of derivatives usage of a sample of

234 U.S. nonfinancial firms, Guay (1999) found that measures of total and idiosyncratic risk declined in the years following the initialization. However, he found no significant evidence for changes in systematic risk.

Similarly, in a study of the North American gold mining industry, Tufano (1996) showed that mangers who own more options hedge more to reduce risks, while managers who own more firm stocks (rather than options) do not care about reducing risks, which is consistent with the use of derivatives for hedging to reduce risks in response to risk aversion by managers and owners. Additionally, Allayannis and Ofek (2001) found that the use of derivatives significantly reduced the exposure to exchange rate risks of the sample of 378 U.S. nonfinancial firms and Hentschel and Kothari (2001) found no significant relationship between derivative users and the risk (stock return volatility) even for large derivative position holders, by examining the risk characteristics of a panel of 425 large U.S. nonfinancial firms from 1991 to 1993.

Finally, using data from non-financial companies from 47 countries, Brown and Conrad (2011) examined the effect of derivative use on firm risks and value. They found strong evidence that financial derivative usage can reduce both total risks and systematic risks. They also show that the effect of derivative use on firm value is significantly positive, which is in line with the findings of Allayannis and Weston (2001).

2.5 Derivative accounting treatment and its influence on firms' profit and loss

2.5.1 Pricing/Valuation of derivatives

The accounting standards for derivatives had changed from historical value measurement to fair value measurement. To understand the influence of different derivatives accounting treatments on the firms' profit and loss, we shall understand how derivatives are priced and valued.

2.5.1.1 Development of derivative pricing and valuation in literature

Derivative pricing borrows most of theories and models from the asset pricing research stream. Asset pricing historically originated from the general equilibrium theory developed by Walras (2013). General equilibrium theory states that the interaction of demand and supply result in an overall equilibrium in the whole economy with several or many interacting markets. Here, asset pricing is the method to price the asset as similar as possible to the equilibrium price. A modern development of general equilibrium theory is called the Arrow–Debreu model, which is illustrated

in several papers, notably by Arrow (1951), Arrow and Debreu (1954), and Debreu (1951). The Arrow–Debreu model extended the traditional equilibrium to an intertemporal equilibrium, which contains forward markets for all goods at all dates. This is done by specifying goods with their physical features and when, where and under which state they will be delivered. In the Arrow–Debreu model, they used the Arrow-Debreu security to prove the intertemporal equilibrium as explained below. Arrow-Debreu security is defined as a contract, which entails the agreement to pay one unit of a numeraire (a currency or a commodity) if a particular state occurs, at a particular time, at a particular place in the future and pays zero numeraire in all the other states. The price of this security is called state price. As such, any financial assets can be decomposed as a linear function of different Arrow-Debreu securities and the asset price is therefore the weighted sum of state prices. In short, the price of an assets is the price of replicating this asset by its underlying Arrow-Debreu securities (Dupire, 1997). Only in this way, the law of one price exists; otherwise, the arbitrageur will gain risk-free profit from the mismatch of the price of the asset and the total price of the underlying Arrow-Debreu securities. This is also similar to how derivatives are priced in most other sorts of pricing models, e.g. the binomial options pricing model (Cox & Ross, 1976). After explaining the underlying theory of pricing models, we will now describe the different models in more detail.

The main asset pricing models in literature are the capital asset pricing model (CAPM) initialed by Sharpe (1964) and the arbitrary pricing theory (APT) raised by Ross (1976). The main difference of these two models are that CAPM is built upon the precondition of a market equilibrium while APT is not and that the market equilibrium can be achieved through risk free arbitrage, if an asset is not priced correctly according to the APT rate. Arbitrage is the practice of taking advantage of a mismatch of prices of the same product in two markets. Arbitrageurs gain a profit by buying undervalued product in market A and selling it in market B. Arbitrage therefore changes the supply and demand of a certain asset and facilitates the market equilibrium.

The derivatives pricing analysis is mainly built upon on the APT, where the market is not in an equilibrium and the probability used in calculation is a risk-neutral probability (or arbitrage-pricing probability). Under APT, the goal of derivatives pricing is to determine the fair price of a given security in terms of (more) liquid securities, whose price is determined by the law of supply and demand. Therefore, the price of correctly priced derivatives are the prices which make arbitrage

impossible. The most notable derivative model developed under the APT framework is Black-Scholes formula (BSF) (Black & Scholes, 1973). Also as a key equation for the theoretical valuation of options the BSF is based on the assumption that the cash flows from a European stock option can be replicated by a continuous buying and selling strategy using only (a) the stock and (b) a riskless bond. The power of the BSF is that it holds for every agent, regardless of its risk preferences. A simplified version of this valuation technique is the binomial options model. After the publication of this formula, Merton (1973) discussed the generic properties of options based on various no-arbitrage theories and helped to extend our understanding from European stock options to other options. Since Black-Scholes formula holds for any agent, it must also hold for risk-neutral agents. Soon after Merton (1973), Cox and Ross (1976) were the first to define that the option price is the expected value of discounted future payoffs from the options under risk-neutral measures. Here, the probability distribution of the future payoffs is not the real probability of risk involved but a risk neutral distribution, meaning that those payoffs are for risk-neutral investors. How to calculate the expectation of future payoffs has therefore been a challenge and research field for researchers till today? The understanding of the stochastic process of future payoffs is often crucial. Stochastic interest rate models have developed such as Merton's Model (Merton, 1973), Vasicek model (Vasicek, 1977) and Cox–Ingersoll–Ross model (Cox, Ingersoll Jr, & Ross, 1985). Models of stochastic process of price determination of the underlying asset started from invention of the geometric Brownian motion (GBM), which models stock prices in the Black–Scholes model, and then developed to several jump diffusion models (Merton, 1976). Summarized, research into the correct pricing of derivatives has been a challenge until today.

After describing the general derivative pricing and valuation literature in this section, the next section will dive deeper into the precise pricing and valuation of different derivatives, namely of forwards and swaps.

2.5.1.2 Pricing and valuation of forwards and swaps

The arbitrary pricing theory maintains that in a market without frictions, with a general equilibrium, and where the borrowing and lending can be done in unlimited amounts at risk-free rates of interest, the price of an asset is the expectation of future payoffs discounted at risk-free rates (Ross, 1976). In this way, a derivative price is the price that prevents profitable riskless arbitrage in frictionless markets. Pricing of future, forwards, swaps and options all follow the no-arbitrary principal.

The price of a forward contract is not the price to purchase the contract, as no upfront payment is made upon entering a forward contract. Here, the price is referred to as the price of the underlying assets under the terms of the contract. For the implicit loan in a forward rate agreement (FRA), it will be expressed as annualized London Interbank Offered Rate (LIBOR); and for a currency forward, it is expressed as an exchange rate between the two currencies involved. Under the no-arbitrary principal, the calculation of the future/forward price is stated as follows:

$$\mathbf{FP} = \boldsymbol{S_0} \times (\mathbf{1} + \boldsymbol{R_f})^{\boldsymbol{T}}$$

Where:

FP = forward price

S_0 = spot price at inception of the contract (t = 0)

R_f = annual risk-free rate

T = forward contract term in years

At initiation, the value of a forward contract is zero as the forward price is priced in way that the discounted future payoffs equal the spot price. During the life of the contract, due to the change of the spot price, the contract will likely have a value leaning to either the long or the short. The value of a forward contract changes and equals the discounted remaining future payoffs, minus the spot price that moment. At the expiration, the value of the forward price equals the terminal spot price, minus the forward price. One can normally regard a swap as a series of forwards contracts. The difference is that unless the yield curve is flat, there will be a variety of fixed rates in the series of forwards contracts expiring on the swap's payment dates, while the swap has only one fixed rate in the whole period. The pricing of a swap is calculated by a fixed rate, which makes the swap's value zero at initiation. Although some differences make the equivalence not fully exact, it is possible to view currency swaps as a series of currency forwards and an interest rate swap as a series of forward rate agreements.

Therefore, under historic value measurement, symmetric derivatives such as forward, futures and swaps are always recorded at its initial value, zero, until the open positions are settled. Gains or loss from the derivatives are only recorded at its settlement day. Fair value measurement, however, recorded also the change of the derivative value from its initial date to the settlement date. As said,

during the life of a derivative contract, the derivative will likely have a value. Derivatives are measured at its fair value and the change of its fair value is constantly recorded at profit and loss statement.

2.5.2 Development of hedge accounting

Before the issuance of SFAS 133 in 1998, companies in USA were able to recognize derivatives in their historic value, which is basically zero for symmetric derivatives such as forward, futures and swaps. In this accounting treatment, the potential gains or losses due to derivative usage can be hidden before the derivatives mature, which leads to possible abundant speculation. SFAS 133 regulated that all derivatives should be recognized at fair value and all unrealized gains or losses from the derivatives should be reported in the income statement. IAS 39 later on also adopted the same accounting policy. The change in accounting standards from historical value measurement to fair value recognition of derivatives also reduced speculation behavior among firms.

Nonetheless, IAS 39 creates common issue for organizations that hedge risks using derivatives. Specifically, such organizations may face an accounting mismatch in profit or loss between derivatives measured as fair value through profit and loss, and the underlying exposure being hedged, as most of them are recognized assets or liabilities that are accounted for on a cost or an amortized cost basis, or future transactions that have yet to be recognized. This results in volatility in reported results as there is no offset to the change in the fair value of the derivative instrument.

An exception is made by hedging accounting for derivatives used effectively for hedging. Under the condition that the derivatives are used effectively as a hedging tool, those unrealized gains (loss) are reported with the offsetting unrealized losses (gains) resulting from the change in fair value of the hedged items. Here, a hedge is determined as effective if the ratio of the gain (loss) on the derivative itself to the loss (gain) from the hedged items is between 80% to 125%. Any ineffective hedging or speculation activities do not earn any offset for their unrealized gains or losses. In this way, companies are cautious of derivative usage for speculation, as any increased gains or losses from derivative usage are immediately recorded in the income statements without any offsetting items. This could generate higher short-term earnings volatility, which is generally not favorable for shareholders and managers. These amendments, for the first time, discriminated corporate speculation from hedging and provided preferential accounting treatment to hedging be-

haviors. Accordingly, empirical evidence shows that the implementation of the fair valuation treatment did indeed decrease the usage of speculation among companies. For example, Zhang (2009) computed the increase or decrease of risk exposure before and after the usage of new derivatives, compared the change before and after the implementation of SFAS 133, and found that the interest rate risk exposure, foreign exchange rate risk exposure, and commodity price risk exposure decreased significantly for the group of effective hedging firms following the adoption of SFAS 133, after controlling for potential changes in the underlying business risk. Hence, the results show that companies were engaged more in prudent risk management behaviors after the implementation of SFAS 133.

3 Hypotheses

3.1 Influences of financial characteristics on the usage of IRS

By combining the reasoning of IRS usage from both the hedging and speculation perspectives, borrowing theories from general derivative usage, and scrutinizing the empirical results stated in the previous sections, we propose that certain financial characteristics influences the usage of IRS. These characteristics and their impact will be discussed in this section.

Firm size. Firstly, when transaction costs are important and there are economic scale effects, the swap users need to be big enough to enter swaps with huge notional amounts and therefore can profit on the bid-ask spread in a swap contract when hedging or speculating (Luiz Rossi, 2013). In other words, bigger companies may find a swap contract cost-effective while smaller companies may not see the necessity to enter a swap contract. Therefore, bigger companies use more derivatives, more precisely, IRS. Secondly, based on information advantage theory raised by Stulz (1996), companies who have or believe they have information advantages over the rest of the market to profit speculate more. And most of the time, those companies are bigger companies, as they have bigger exposures to a particular risk and are able to conduct more sophisticated analyses, thus gaining an information advantage over small companies. Therefore, bigger companies tend to use derivatives to speculate more. Hence we hypothesize that:

Hypothesis 1a: higher firm size induces the usage of IRS for hedgers.

Hypothesis 1b: higher firm size induces the usage of IRS for speculators.

Firm leverage. Companies with higher leverage are easier to encounter financial distress and underinvestment problems. From a hedging perspective, IRS can be used to reduce cash volatilities according to the theory of financial distress cost (Smith & Stulz, 1985) and underinvestment theory (Myers, 1977). From the speculation perspective, as suggested by Stulz (1996), companies, with lower chances of bankruptcy, as indicated by its leverage, speculate more, since only those firms can undertake the negative outcomes stemming from speculations. However, Stulz (1996) also suggests that firms with principal-agency problems use derivatives to speculate to recover in financial distress situations, as the negative outcomes will be borne by the creditors after all. Therefore, in case of speculation, firm leverage can induce or deduce the usage of IRS. In this case, we refer leverage to the last year's leverage of the company. Because companies may decide on the

risk management policy and the capital structure at the same time (Zhang, 2009) and thus leverage of the current year maybe the result of the IRS usage.

To summarize, it is expected that:

> *Hypothesis 2a: higher last year's firm leverage induces the current year's usage of IRS for hedgers.*
>
> *Hypothesis 2b: higher last year's firm leverage induces or deduces the current year's usage of IRS for speculators.*

Growth opportunities. From the hedging perspective, according to Wall (1989), the combination of a short-term debt with interest rate swap helps companies lock in long-term interest rates and enjoy lower interest rates through reduced agency problems as compared to long-term debt (see section 2.3.2.2). According to agency cost theory (Wall, 1989), underinvestment and risk-shifting problems are more likely to happen in growing industries. Companies having high growth perspectives are therefore motived to use IRS to mitigate potential interest rises due to agency costs. From the speculation perspective, Campbell and Kracaw (1999) and Adam et al. (2007) suggest that speculation may be linked to the existence of convex investment functions, where firms' profit-to-investment ratio is higher when investment increases. Thus, companies with good opportunities for growth, but low short-term liquidity and high external financing costs are more likely to speculate with derivatives. Corresponding to these arguments it is expected that:

> *Hypothesis 3a: higher growth opportunities induce the usage of IRS for hedgers.*
>
> *Hypothesis 3b: higher growth opportunities induce the usage of IRS for speculators.*

Operating Risk. Furthermore, agency cost theory (Wall, 1989) suggests that the use of interest-rate swaps may be more beneficial to firms with low operating risks. For fixed-rate payers, borrowing short-term and then swap to fixed rate, rather than borrowing a real long-term fixed rate loan, requires companies to undertake quicker principal payments from short-term loans. Also, according to information asymmetric theory by Titman (1992), fixed-rate payers might be borrowing short-term loans and then swap to fixed rates, due to their expectations of future credit upgrades. Here, lower operating risks lead to higher chances of good profit outcomes, which brings credit upgrades. This theory also suggests that both fixed-rate and floating-rate payers may have lower

operating risks than those who do not use swaps. As for the motivation for floating-rate payers, firms with low operational risk have a higher ability to undertake the floating risk unhedged. Normally, when interest rates increase, the labor and other material costs increase as well, due to inflation. Firms with lower operational risks guarantee that they achieve enough revenue to compensate the increased costs compared to firms with higher operational risks. From the speculation perspective, Stulz (1996) argue that firms with low operational risk can undertake the negative outcome generated from speculation. Thus firms with low operational risk speculate more and have higher possibility to enter an IRS.

Hypothesis 4a: higher operating risk deduces the usage of IRS for hedgers.

Hypothesis 4b: higher operating risk deduces the usage of IRS for speculators.

Cash flow sensitivity. At last, companies also hedge to maintain enough funding for investments and, according to pecking order theory, companies generally like to finance their investment from internal funds, which are the free cash flow towards the firm. If the free cash flow to the firm before the interest expenses is positively correlated to the interest rate, one can expect that companies have less incentive to hedge, since the residual amount that is the free cash flow to the firm after the interest expense is stable; however, in case of a negative correlation, one can expect that companies hedge to reduce interest expenses (Chernenko & Faulkender, 2012).

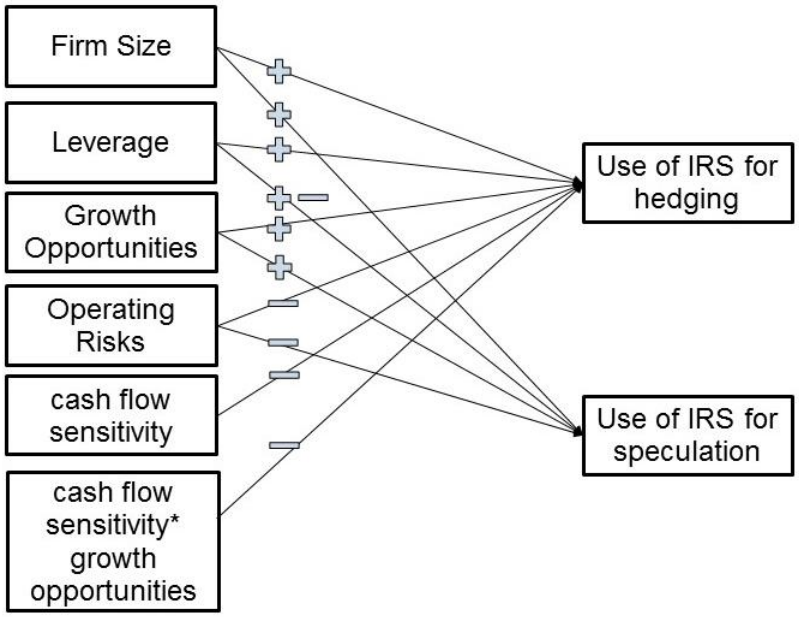
Hypothesis 5: higher cash flow sensitivity to interest rate deduces the usage of IRS for hedgers.

Interaction between Cash flow sensitivity and growth opportunities. Froot et al. (1993) maintained that the funding investment internally is the drive of the risk management activities of investment intensive firms. Chernenko and Faulkender (2011); Chernenko and Faulkender (2012) also found evidence that, if a firm is hedging to reduce costly finance expenses to fund investment opportunities, this firm is more motivated to ensure that the free cash flow towards the firm is stable. Thereby, we also propose that the interaction between cash flow interest rate beta and the growth opportunity have an impact on the usage of IRS.

Hypothesis 6: given a certain level of growth opportunities, firms with higher cash flow sensitivities to interest rate use less IRS to hedge.

To sum up, Figure 2 shows the research model and hypotheses as explained in this section. The next section will describe the research methodology.

Figure 2: Research model



3.2 Difference of the influences of financial characteristics on the usage of IRS for hedging or speculating purpose

By observing Figure 2, we see that some financial characteristics influence the usage of IRS for hedging or speculation in the same direction, while others only influence the usage of IRS for hedging purpose. Therefore, we can propose our hypothesis as:

> *Hypothesis 7a: Firm size, leverage, growth opportunities, operating risks influence the use of IRS for either hedging or speculation purpose without significant difference.*
>
> *Hypothesis 7b: cash flow sensitivity and the interaction between cash flow sensitivity and growth opportunities influence the use of IRS for hedging purpose, but not for the usage for speculation purpose.*

3.3 Influence of usage of IRS on firm value

In line with the discussion about the influence usage of derivatives on firm value, we argue that usage of derivatives for different purpose can have different influence on the firm value. Hedging help reduce the deadweight cost from market imperfection and thereby increase firm value. Speculations render firm value volatile in the short-term. Although Adam and Fernando (2006) found goldmining firms have economically cash flow gains from foreign derivative usage themselves after controlling the firms' rise of systematic risk. It is highly unlikely that companies have information knowledge on interest rate market as multinationals may trade daily on foreign exchange market, but trade in debt market normally happens every several months. Therefore, speculation with IRS increase firm risk but cannot gain constant gains from it. Therefore, we can propose our hypothesis as:

Hypothesis 8a: Use of IRS for hedging purpose increase firm value.

Hypothesis 8b: Use of IRS for speculating purpose decrease firm value.

4 Research Methods

4.1 Classification of hedgers and speculators

Researchers used different techniques to distinguish companies who use IRS to hedge (hedger) from those use IRS to speculate (speculator). Adam and Fernando (2006) used financial characteristics which influence hedging to estimate the hedge ratio. They used the residual between the derivative usage ratio and the hedge ratio predicted by financial characteristics as the speculation ratio. The speculation ratio was tested on several speculation theories. The notional amount of derivatives was used to calculate the derivative usage ratio. Given the fact few companies in our sample reported the notional amount of their derivative usage, we do not use this method in this article. Géczy et al. (2007) use survey data to divide hedger and speculator. They asked companies derivative usage behavior and managements' attitude towards speculation implicitly and then infer whether a company is a hedger or speculator based on the questionnaires. Given the massive time and resources required, we forgo this method in this article. In this research, we use other two models below to differentiate them.

4.1.1 Risk exposure comparison

Whether a company is a hedger or a speculator is not possible to distinguish ex-ante. However, as described in the literature review, hedgers use derivatives to decrease the risk exposure of companies while speculators increase the risk exposure. Thereby, speculators can be differentiated by observing their ex-post results of the change of risk exposure. In the previous research by Wong (2000), Guay (1999) and Zhang (2009), a firm's interest rate exposure is defined as the absolute value of the estimated coefficient from a regression of the firm's monthly stock returns on the monthly percentage change in LIBOR.

Borrowing their research methods, we classify hedgers and speculators depending on whether a company's interest rate exposure decreased or increased after the initiation of IRS over a five-year window from 2010 to 2014. However, companies do not necessarily enter an IRS every year. Hence, for a better classification and in line with previous studies, we used the latest year that a company entered a new IRS as the comparison year within the five year.

We used model (1) to calculate the interest rate exposure for each firm-period (Zhang, 2009). A minimum of 12 months of return data were required for the estimation.

$$R_{i,t} = a_{0i} + a_{1i}R_{mt} + a_{2i}IR_t + \varepsilon_{i,t} \qquad \textit{Model (1)}$$

Where $R_{i,t}$ is the Holding period return for firm *i* in month *t*; R_{mt} the value-weighted market portfolio return for month *t*; IR_t is the monthly percentage change in the interest rate. The value-weighted market portfolio return hereby is AEX-INDEX and the interest rate is represented by the 3 month Libor. In this way we calculated the interest rate exposure.

Since the time period of the study was relatively short and the result might be due to the sample-selection procedure and/or period-specific general economic conditions, we used a matched-pair control-sample approach for firm classification. For example, we matched new user at the year of initiation with different nonusers of that year based on industry and firm size characteristics. The industry was divided by the first 3-digit code of SIC. Using the change of the risk exposure of non-users as a benchmark, I defined a new user as a hedger (speculator) if its change of risk exposure was higher (lower) relative to the matched firm. Even though this methods relied on the availability of benchmark companies and neglected firms' business risk differentials, Guay (1999) and Zhang (2009) showed that this method generates similar empirical results compared to other more complex regression models. Due to the relatively small sample size and the higher parsimoniousness of the method, the matched-pair control-sample approach was chosen over complex regression models.

4.1.2 Index construction by text-mining

Our index is constructed by two dimensions. The first dimension is by checking whether hedging accounting is applied to IRS. The second dimension is by checking whether the managements regard their usage of derivatives as speculative or hedging. The first dimension is the evidence provided by auditors. The second dimension is managements' subjective opinion or their words to the public. Therefore, I give the first dimension weight of 2/3 and the second dimension weight of 1/3 when constructing the index. Company_year combination is defined as hedger if the hedging score is above 0, and as speculator if otherwise. The higher the score is, the higher possibility that the company_year case is a hedger. Summary and illustration is as follows, see table 1 and model 1.

$$HedgingScore_{i,t} = \frac{1}{3} * Managements' Description\ score_{i,t} + \frac{2}{3} * Hedging\ Accounting\ Score_{i,t} \qquad \textit{Model (2)}$$

Table 1: Index Construction

Managements' description	Score	Hedging accounting	Score
Weight	1/3	Weight	2/3
Derivatives used only for hedging	1	IRS all designated as hedging accounting	1
Not mentioned	0	The company applied hedging accounting, but unknown about whether IRS is designated as non-hedging or not qualified for hedging accounting	0.5
Derivatives used for speculation or trading	1	Existence of IRS not designated as hedging or this company does not apply hedging accounting	-1

As stated before, hedging accounting provide preferential treatment for derivatives used for hedging to mitigate the possible volatility of profit due to the fair value accounting of derivatives. Also, requirements for derivative positions to qualify for hedging accounting is demanding. Based on these two reasons, one can be expecting that hedging accounting captures the true economic hedge and IRS designated as hedge are truly used for hedging purpose and IRS not designated as hedge are suspicious of being used for speculative purposes.

Under IFRS, derivatives not designated as hedging are sometimes not fully disclosed. It can be the case that the company applied hedging accounting, but unknown about whether IRS is designated as non-hedging or not qualified for hedging accounting. When a company applied hedging accounting in general, it shows a bit creditability that this company maybe a true hedger. To be prudent, this situation is scored with 0.5 so that it is not categorized as speculating.

however, the real questions lie on whether derivatives are deemed to be speculative if they are designated as non-hedgers if (i) firms choose not to apply hedge accounting, or (ii) they do not qualify for hedge accounting treatment.

Firms choose not to apply hedging accounting often argue that hedging accounting requires costly documentation. However, as stated by Manchiraju, Pierce, and Sridharan (2014), in reality, making complex hedging decisions involves the clarification of the assumptions, objectives of such exercise, and the on-going testing and documentation help companies monitor whether such hedging positions are still constantly effective. Therefore, if a company would like to be true hedger, documentation for hedging accounting is by all means necessary. Therefore, costly documentation

does not justify their decision not applying hedging accounting and I score company_year case not applying hedging accounting as -1.

Derivatives not qualifying for hedging accounting treatment mainly when the hedging relations are tested as ineffective, meaning that the ratio of the gain (loss) on the derivative itself to the loss (gain) from the hedged items is below 80% or above 125%. Those derivatives are therefore held suspicious of being used for speculation. This is intuitive as speculating increase the risk or the volatility of the gains and loss from the derivative. Thus the gains or loss will not be largely covered by its hedged item.

Further, Liu, Seow, and Xie (2011) found that accounting hedge ineffectiveness measures captures the economical ineffectiveness of firms' hedging activities, which provided empirical evidence to this suggestion. Therefore, I score company_year case not qualifying for applying hedging accounting as -1.

However, macro-hedging strategy is an alternative explanation for derivatives not assigned as hedging. For reliability, when testing effectiveness of a hedge, usually one individual hedging instrument is tested against its hedged individual item (IAS 39.78 and 39.83–84). And IAS 39.84 prohibits designating a net position as a hedged item. For instance, companies with well-established treasury departments who are good at centralizing and netting risk exposures may use the net balance from its floating interest rate assets and liabilities as a hedged item. Such hedging may be effective if tested against the net balance, but highly unlikely if tested separately against the hedged asset and the hedged liability.

Summarized, hedging accounting captures whether a company use derivative for hedging or speculative purposes largely but fully due to the possible macro-hedging strategy. Therefore, I gave 2/3 weight to this dimension.

Taking a step back, as ends do not justify the means, hedging accounting may capture the effectiveness of hedging, the ex-post result of derivative usage, but does not necessarily captures the companies' ex-ante motives. One way to have a peek of managements' motive to use derivatives is by looking into the managements' description about their usage of derivatives and risk management policy. Firstly, one can check whether risk management objectives written in the financial statements to see whether they apply a profit-seeking risk management objective or exercise their

market views on certain economic variables or other descriptions resembling the definition of selective-hedgers. These descriptions highly reflect companies' real motive to use derivatives. For instance, case HEIJM_2014 wrote: "*The objective of managing market risk is to keep the market risk position within acceptable limits while achieving optimum returns.*" This is another way of saying that they hedge only risk positions for which they expect a loss and leaving open positions for which they expect a gain, which meets the definition of selective hedging.

Listed companies are cautious about investors' interpretation about their usage of derivatives and are very cautious about their wording of their purpose of using derivatives in the financial statements. Interestingly, most companies declared that they do not use derivatives for trading purpose, but not many asserted that they do not use derivatives for either speculative or trading purpose. Therefore, a company who are able to make assertions that they don't use derivatives for speculative purpose or they only use derivatives for hedging purposes shows high creditability as a true hedger.

However, one cannot fully trust what management claims in the financial statement. According to Glaum (2002)'s sample, although, 88% of companies claimed that they only use derivatives for hedging purpose, figure shows that firms including selective hedgers (54%) actively adjust their hedges in response to perceived market opportunities.

Given the discussion above, I give 1/3 weight to this dimension.

4.2 Model construction

We used model 3 to test the firm determinants of derivative usage of Dutch non-financial firms. Firstly, companies were divided into IRS users (1) and IRS non-users (0). Then, a logistic regression was conducted, which was also conducted by Chernenko and Faulkender (2012), Samant (1996) and Saunders (1999).

$$\boldsymbol{IRS_{i,t} = b_{0i} + b_{1i}SIZE_{i,t} + b_{2i}LEV_{i,t-1} + b_{3i}GP_{i,t} + b_{4i}OR_{i,t} + b_{5i}BETA_{i,t} + b_{6i}BETA_{i,t} * GP_{i,t} + b_{7i}IND_{i,t} + b_{8i}YR_{i,t} + \varepsilon_{i,t}} \qquad \textit{Model (3)}$$

Secondly, we used model 4 and 5 to test hypotheses 1-7 about the firm determinants of derivative usage on either hedgers or speculators. Companies were divided as IRS hedgers, speculators and IRS non-users. Two logistic regressions were conducted, which was similar to the model by

Samant (1996) and Saunders (1999), with one for hedgers (1) versus non users (0) and one for speculators (1) versus non-users (0):

$$\boldsymbol{H_{i,t} = c_{0i} + c_{1i}SIZE_{i,t} + c_{2i}LEV_{i,t-1} + c_{3i}GP_{i,t} + d_{4i}OR_{i,t} + c_{5i}BETA_{i,t} + c_{6i}BETA_{i,t} * GP_{i,t} + c_{7i}IND_{i,t} + c_{8i}YR_{i,t} + \varepsilon_{i,t}} \quad \textit{Model (4)}$$

$$\boldsymbol{S_{i,t} = d_{0i} + d_{1i}SIZE_{i,t} + d_{2i}LEV_{i,t-1} + d_{3i}GP_{i,t} + d_{4i}OR_{i,t} + d_{5i}IND_{i,t} + d_{6i}YR_{i,t} + \varepsilon_{i,t}} \quad \textit{Model (5)}$$

Thirdly, we used model 6 to test hypotheses 8 about the difference of the firm determinants of derivative usage between hedgers and speculators. Companies were divided as IRS hedgers and speculators. One logistic regressions were conducted, which was similar to the model by Samant (1996) and Saunders (1999), with one for hedgers (1) versus speculators (0):

$$\boldsymbol{H_{i,t} = c_{0i} + c_{1i}SIZE_{i,t} + c_{2i}LEV_{i,t-1} + c_{3i}GP_{i,t} + d_{4i}OR_{i,t} + c_{5i}BETA_{i,t} + c_{6i}BETA_{i,t} * GP_{i,t} + c_{7i}IND_{i,t} + c_{8i}YR_{i,t} + \varepsilon_{i,t}} \quad \textit{Model (6)}$$

Fourthly, we use model 7 to test hypothesis 9 about the influence of usage of IRS for either hedging purpose or speculating purpose on firm value. interaction and subgroup analysis can be both used to test this hypothesis. The estimates will be the same and the conclusion will be the same if the inference is done properly. The only difference is that there is only one residual variance using interaction analysis while two separate residual variances across groups using subgroup analysis. And the interaction analysis is more advantageous as there are multiple explanatory variables in the model. By estimating separate regressions an interaction between whether hedger or speculator and all other explanatory variables is forced, while with interaction effects I can choose that only the effect of IRS user can change over whether hedger or speculator and the rest of variables remain constant. This is often very desirable as interaction effects tend to eat large amounts of statistical power. Therefore, we only use interaction analysis for this model. Step-wise linear regressions which was similar to the model by Allayannis, Lel, and Miller (2011);Lang and Stulz (1994);Servaes (1996) were conducted with control variable Size, lev, OR, ID, ROA, GP, IND,YR. Step-wise linear regression is advantageous as we can see the change of R squares after introducing the independent variables to see their explanatory power to the model.

$$Tobin's\ Q_{i,t} = c_{0i} + c_{1i}User_{i,t} + c_{2i}User_{i,t} * Hedging\_score_{i,t} + c_{3i}Size_{i,t} + c_{4i}Lev_{i,t-1} + c_{5i}OR_{i,t} + c_{6i}ID_{i,t} + c_{7i}ROA_{i,t} + c_{8i}GP_{i,t} + c_{9i}IND_{i,t} + c_{10i}YR_{i,t} + \varepsilon_{i,t}$$

Model (7)

The proxy and calculation methods of each variable are listed below in Table 1. Leverage was lagged behind a year to avoid the possible endogeneity bias that companies may decide on the risk management policy and the capital structure at the same time (Zhang, 2009). Also, to deal with the time-period-specific and industry effect, year and industry dummy variables are included in the regression. If not indicated otherwise, all hypotheses were tested with a significance level of 0.05.

Table 2: Measurements and calculation methods of all variables included in models

Variable	Proxy	Abbreviation	Calculation method	Referenced articles
IRS user		IRS	If a company is an IRS user, then 1; if not, then 0	(Samant, 1996);(Saunders, 1999)
IRS hedger		S	If a company is an IRS hedger, whose hedging score is greater than 0, then 1; if a company is not a IRS user, then 0	(Samant, 1996);(Saunders, 1999)
IRS specu-lator		H	If a company is an IRS speculator, whose hedging score is less or equal 0, then 1; if a company is not a IRS user, then 0	(Samant, 1996);(Saunders, 1999)
Firm Value	Tobin's Q	Tobin's Q	The result of Book value of Total assets plus market value of equity minus book value of equity and then divided by book value of total assets	(Lookman, 2004);(Lins, 2003);(Hagelin & Pramborg, 2004);(Jin & Jorion, 2006); (Júnior & Laham, 2008);(Fauver & Naranjo, 2010);(Bashir et al., 2013)
Size	Total assets	SIZE	Normalize total assets: Ln(total assets)	(Saunders, 1999);(Adam & Fernando, 2006);(Géczy et al., 2007)

Leverage	Non-current debt to asset ratio	LEV	Scale non-current debt by total asset	(Saunders, 1999);(Chernenko & Faulkender, 2012); (Adam & Fernando, 2006);(Géczy et al., 2007)
Growth prospects	Market to book ratio	GP	Divide market capitalization by book value of common stocks	(Saunders, 1999);Adam, 2006 #684 };Géczy, 2007 #659 }
Growth prospects/ Investment opportunities	R&D expense to operational income ratio	GP1	Divide R&D expense by operational income	(Allayannis et al., 2011);(Allayannis & Weston, 2001);(Lookman, 2004);(Jin & Jorion, 2006);(Fauver & Naranjo, 2010);(Alayannis, Lel, & Miller, 2003)
Growth prospects/ Investment opportunities	Investing cash flow to sales ratio	GP2	Divide investing cash flow by sales. (the ratio of capital expenditure to total sales would be the ideal proxy, use investing cash flow instead as capex is hard to extract from Orbis)	
Operating risk	Fluctuation in operating income relative to firm size.	OR	Standard deviation of ratios of operating income to firm size for the previous four years	(Samant, 1996)
cash flow sensitivity to interest rate	Cash flow interest rate beta	Beta	Correlation of the yearly operating cash flow on contemporaneous values of 3-month LIBOR for the previous four years	(Chernenko & Faulkender, 2012)
Interaction of cash flow sensitivity to interest rate and growth prospects	Interaction of Cash flow interest rate beta and growth prospects	Beta*GP	Multiple the Beta with the GP	(Chernenko & Faulkender, 2012)
Profitability	ROA	ROA	Divide net income by total assets	(Allayannis et al., 2011);

Industry Diversification	Industry Diversification dummy	ID	equals one if the firm has more than one business segments at the four-digit SIC level, and zero otherwise	(Allayannis et al., 2011);(Lang & Stulz, 1994);(Servaes, 1996)
Industry	Industry dummy	IND	First take 1-digit SIC code, then categorize as three sectors: raw materials, manufacturing and service based on three-sector theory	(Géczy et al., 2007); (Fisher, 1939)
Year sensitivity	YEAR	YR	year	

4.3 Robustness test

4.3.1 Robustness test with different proxies of variables

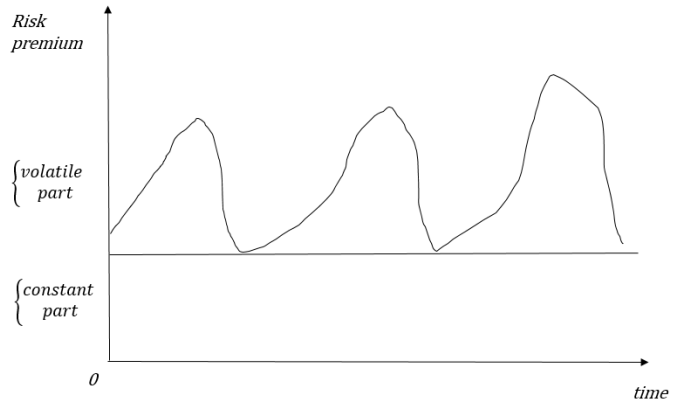
The results of the tests are necessarily to be tested to further its robustness in a certain manner. Additional tests will be conducted with alternative definitions of variables in the primary model. We used three different proxies for Growth prospects/ Investment opportunities variable and the result of three models using different proxies will be reported all together.

4.3.2 Robustness test for Model 3

We aim to investigate the influence of financial characteristics on firm's usage of IRS. Based on our hypothesis, we propose that certain financial characteristics lead to usage of IRS for speculation or hedging. In relation to the distinction between speculation and hedging, Adam and Fernando (2006) proposed a novel way to detect to which extent the derivative usage is influenced by the existence of risk premium that is the origin of speculation. For this, Adam and Fernando (2006) divided the risk premium to a constant part and time-varying part as shown in figure 3. If the risk premium is always constant, then the usage of derivatives can be explained entirely by financial characteristics. When the risk premium is volatile, financial characteristics cannot explain the hedge ratio alone. Accordingly, the time varying part of risk premium is due to changes of firm's market views. For example, if a firm believes that an interest rate is going to rise always more than implied by the term structure by 5 basis points every year, this firm is going to use

derivatives every year to profit from this. And the constant risk premium lead to constant speculation of the firm. This speculation behavior is influenced by the firms' ability to gain information advantage over the rest of the market, which is characterized by its size. However, if the risk premium is not constant, for example, and a firm believes that an interest rate is going to rise 5 basis points more than implied by the term structure in year 1 but there is no rise in year 2, this firm is going to use derivatives only in year 1. In this case, financial characteristics cannot explain the difference of the derivative usage as they are influenced by the change of firms' market views. As evidenced by Luiz Rossi (2013), market timing behavior cannot be explained by financial characteristics but only by firms' risk exposure, corporate governance and the macroeconomic environment. Therefore, we must mitigate the influence of the market timing behavior in our model.

Figure 3: graph of risk premium volatility



Our research is conducted in a similar vein with Chernenko and Faulkender (2012), in a sense that we regress the mean of the dependent variable on the means of the independent variables to find the influence of the financial characteristics on the IRS usage. The difference between my model and theirs is that Chernenko and Faulkender (2012) used the mean of ten years IRS usage ratio to regress on the mean of ten years financial characteristics to find which financial characteristics influence the hedge ratio rather than the derivative usage. This means they regard financial characteristics as only the proxies of the hedging motivations and the averaged IRS usage is not influenced by speculation at all. However, we argue that averaged IRS usage is also influenced by speculation as discussed above. And the usage of IRS for both speculation and hedging are influenced by firms' financial characteristics. We mitigate the only bias from companies' the time-varying market views by averaging the dependent variables and independent variables and then

conducting the regression. Using this technique, the coefficient estimates from this regression model can be interpreted to explain the cross-sectional variations of financial characteristics on IRS usage.

In this article, a multivariate regression will be conducted, which is similar to the model by Chernenko and Faulkender (2012). The dependent variable for every year is binary. The dependent variable indicates whether a firm uses interest-rate swaps or not (IRS= 1 for IRS users; = 0 for nonusers). When the five year IRS usage are averaged, the dependent variable can be 0, 0.2, 0.4, 0.6, 0.8, or 1. 0 means a company continuously use IRS for five years and 0 for zero years. 0.4 means company use IRS for 2 years among these five years.

The multivariate regression model used in this study is as follows:

$$\overline{IRS_i} = \beta_0 + \beta_1\overline{(SIZE)_i} + \beta_2\overline{(LEV)_i} + \beta_3\overline{(GP)_i} + \beta_4\overline{(OR)_i} + \beta_5\overline{(BETA)_i} + \beta_6\overline{(Beta * GP)_i} + \beta_7\overline{(IND)_i} + \varepsilon_i \qquad \textit{Model (8)}$$

4.3.3 Robustness test for Model 7

We will also conduct robustness test for model 7 by comparing the result of the sub-samples of large and small firms, high and low levered firms. Subsamples were split with the median of the sample. Cases with Ln(size) below the median 13.09 is categorized as the smaller size group and the otherwise for the bigger size group. Cases with their leverages below the median 0.39 is categorized as the low leveraged group and the otherwise for the high leveraged group.

4.4 Data Collection

For the analyses, we only sampled those Dutch listed non-financial companies using IRS. Concerning the availability of information, in 2002, the European Union adopted IFRS Standards as the required financial reporting standards for the consolidated financial statements of all European companies whose debt or equity securities are traded in a regulated market in Europe (effective in 2005). At 18 August 2005, IFRS-7 disclosures were issued and used for annual periods beginning on or after 1 January 2007. IFRS-7.22 required disclosures on information about hedge accounting, including descriptions of each hedge, hedging instrument, fair values of those instruments, and nature of risks being hedged.

To gather the data, we manually searched annual reports. The annual reports were available on the company websites and Morningstar database. To classify companies as IRS users, the interest rate swap usage was analyzed by mainly checking the annual reports' risk management, derivative usage and hedging accounting sections. Though the data were available since 2007, it was important to take into consideration that the financial crisis busted out in 2008 and lasted up to summer 2009. It led to declines in credit availability and huge cutting offs of interest rates by European central banks to save the market. Since it is beneficial to exclude the turbulences due to the financial crisis, we constructed our sample by the annual reports of Dutch companies for the financial years ranging from 2010 to 2014 (5 years). We collect the financial data mainly from the Orbis database. We used the search criteria from Table 2 for Orbis. However, for certain reasons. There are 15 non-financial Dutch companies which are listed in Euronext Amsterdam but cannot be found through this search criterion. I later manually added those 15 companies to our sample. Further, certain data for independent variables for 2007 to 2010 cannot be found in Orbis; therefore, we manually searched the Morningstar database to locate the missing variables. The sample of this research consists of the listed firms having the criteria as shown in table 1. We excluded the financial companies with the US SIC code starting with 6. We also collect the yearly data separately so that there is no survivorship bias. We obtained a sample size of 119 companies on average per year and 594 cases in total. We have missing values considering that we actually collected financial data dating back to 2007 (see Table 2) and that some companies were not listed back then. Valid cases amounts vary in different models, please refer to Table 9-14.

Table 3: search criteria and search results of data collection

Search criteria	**Search results**
(1) World region/ Country/ Region in country: Netherlands;	33,240
(2) Listed/Unlisted companies: Publicly listed companies;	186
(3) Code search: NOT USSIC(60,61,62,63,64,65,67)	116
(4) Years with available accounts: 2014	113
(4) Years with available accounts: 2013	110
(4) Years with available accounts: 2012	108
(4) Years with available accounts: 2011	97
(4) Years with available accounts: 2010	91

Concerning the scope of IRS, researchers in past studies neglected the overlap between IRS and CCIRS. CCIRS is a foreign exchange derivative between two institutions to exchange the principal

and interest payments of a loan in one currency to another for equivalent amounts. CCIRS consists of fixed-for-floating rate cross currency swap, floating-for-fixed rate cross currency swap, fixed-to-fixed rate cross currency swap and floating-to-floating rate cross currency swap. The definition of IRS is being a liquid financial derivative instrument in which two parties agree to exchange interest rate cash flows, based on a specified notional amount from a fixed rate to a floating rate (or vice versa). One of the main reason why companies enter fixed/floating CCIRS (fixed-for-floating rate swap and floating-for-fixed rate swap) is to hedge or speculate on the bid-ask spread of interest rate. However, reasons to enter fixed-to-fixed rate and floating-to-floating rate cross currency swap are to hedge or speculate the foreign exchange exposure of interest expenses. Therefore, we included as control variable in our analyses the fixed/floating CCIRS (fixed-for-floating rate swap and floating-for-fixed rate swap), whose interest rate on one leg is floating, and the interest rate on the other leg is fixed, in our sample scope.

Despite our broad five-year focus on Dutch listed non-financial firms, we were unable to find the data necessary for dividing speculators and hedgers by comparing the risk exposure (see 4.1.1). Though all were disclosing IRS usage, most of companies did not disclose detailed information about the initiation year of each IRS. We divide speculators and hedgers by comparing the risk exposure before and after the initiation of IRS. However, this is only valid if 12months before and after the initiation, no other IRS is implemented by the firm so that we can obtain the change of risk exposure only due to the IRS at initiation. If other IRS is implemented, the change of companies' risk exposure might be influenced by the other IRS. Only 6 out of averagely 104 companies (ranging from 2010-2014) provided the clear initiation year of each IRS. The rest of company dataset do not allow us to test on whether companies hedge or speculate.

Facing this obstacles, we switched our focus to model 2 to differentiate hedgers and speculators by using text mining (see 4.1.2). key words such as "derivatives" "financial instrument" "hedge accounting" "hedge" "speculate" "risk management" "swap" "interest rate swap" were used to locate the relevant chapter and I read through those chapters to search for information required.

Certain judgement was made based on my accounting knowledge which are listed below, Firstly, if a company did not mention hedging accounting but does have hedge reserve in their statement for the change of equity, I conclude this company used hedge accounting as hedge reserve only exists if the company applied cash flow hedge. Secondly, if a company did not disclose derivatives

not designated for hedging accounting, but provide the notional amount and value of both financial instruments categorized as “fair value through profit and loss” and financial instruments designated as hedging accounting, I use the difference of this two to infer whether there are financial instruments not designated for hedging. The reason is that all derivatives are in the “fair value through profit and loss” financial instrument categorization. If two numbers matched, then all derivatives are designated for hedging accounting, score 1 were given. If not, then we are unknown about whether IRS were designated as non-hedging accounting.

4.5 Outliers Elimination

In prior studies, there are several ways to eliminate outliers such as using cook’s distance, outlier labeling rule or winsorization. However, after applying those rules, sample size was reduced abundantly. Given our small sample size, outliers are identified by screening variables with large distant from mean value or with negative figures. I removed 1 case with LEV of 225 which is distant from other observations. I also deleted 19 cases from GP. It happened that some cases have negative book value of equity. This is not uncommon but will create distortion to the model fit and create difficulty to the interpretation of model coefficient. As if GP is great than 0, the bigger the number, the higher growth potential it has; however, if GP is less than 0, the smaller the number, the higher growth potential it has. I also delete one negative case from GP1 as one would not expect that the R&D to operational sales ratio to be negative. You may find in descriptive analysis that the maximum of firm size deviate quite from the mean. This is due to the fact that one company in our sample scope: Royal Dutch Shell stands out in company size, which is understandable. After normalize company size, the LN(SIZE) of Royal Dutch Shell does not deviate from mean too much therefore it is not eliminated as an outlier.

5 Empirical results

This chapter initially reports the descriptive statistics of all variables. Then, empirical results of the logistic regressions on the effects of firm characteristics on IRS usage are reported.

5.1 Descriptive statistics

Table 4 provides a distribution of hedgers, speculators and non-users of IRS, the average sizes and different industry groups of sample companies. As seen from the table, 45% of cases use IRS, which is in line with the finding that 60% of Dutch firm use derivatives and 52% of the Dutch firms consider swaps as being the most important derivatives. 38% of IRS users are speculators, this is supported also by the survey data from Bodnar et al. (2003) that based on a market views, 50% of Dutch companies sometimes or frequently alter the timing of hedges, 43% of them altering the size of hedges and 23% of them out rightly actively changing positions. Companies appeared evenly distributed in different size levels. Also, we found that among the eight different groups of industries in the sample, most of Dutch listed non-financial companies are centered in Service (70%), including transportation, Communications, Electric, Gas and Sanitary service (26%) and Services industries (18%).

Table 5 and Table 6 presents summary statistics for the dependent variable (IRS usage), the independent variables, and control variables. Generally, table 5 shows no abnormal means, medians and standard deviations within the data. Table 7 provides a comparison between the means of users and non-users of IRS and the T-test of the difference of the means. The means of the variables of non-users are significantly different from users except for variable Beta, GP*Beta and GP2. As indicated by table 7, usage rate of derivatives drops significantly when firm size decreases as the median and means of users is significantly greater than those of non-users. This was found also by that Bodnar et al. (2003) 88% large Dutch firms use derivatives which 57% for the medium size groups and 42% for small firms. This may be explained by decreasing economies of scale regarding the investment in employees, training, computers, facilities, etc. It also supports the study of Nance et al. (1993) that larger firms are more likely to hedge than small firms.

The negative mean value difference (-0.17) of leverage at the 1% significant level shows that IRS users are higher leveraged than none users, which is supports the study of Graham and Smith (1999) and Leland (1998) that hedging can increase debt capacity to take tax shield advantages.

The positive mean value difference (1.73) of leverage at the 1% significant level shows that none users are is with higher investment or growth opportunities than IRS users, which is on the contrary to the idea by Wall (1989) that IRS usage helps solve the problem of underinvestment.

The operating risk, on average, of IRS Users (0.04) is lower than that of non-users (0.26) and this difference (0.22) is significant at the level of 1% (p=0.01). It supports the study of Samant (1996) that IRS users has lower operating risk than comparable non-swap users.

The mean value of Tobin's Q for IRS users and non-users is 1.21 and 0.80, respectively. The difference between mean values of Tobin's Q is negative (-0.40) and statistically significant at the level of 10% (p=0.00). Thus, it be concluded that the firms using IRS are valued higher than firms not using it, which is contrast to the earlier literature like Allayannis and Weston (2001) and Bashir, Sultan and Jghef (2013) that the difference mean value of Tobin's Q between derivative users and non-users is positive and significant.

However, only the means of the variables SIZE, LEV, OR and ID (Table 8) of hedgers are significantly different from speculators. The Ln of size, on average, of hedgers (14.19) is lower than that of speculator (15.17) and this difference (-0.98) is significant at the level of 1% (p=0.00). The Leverage, on average, of hedgers (0.47) is lower than that of speculator (0.53) and this difference (-0.06) is significant at the level of 5% (p=0.04). The OR, on average, of hedgers (0.04) is higher than that of speculator (0.03) and this difference (0.01) is significant at the level of 10% (p=0.07). The ID, on average, of hedgers (0.44) is lower than that of speculator (0.54) and this difference (0.10) is significant at the level of 10% (p=0.09).

The mean value of Tobin's Q for hedging firms and speculators is 0.75 and 0.89, respectively. The difference between mean values of Tobin's Q is negative (-0.14) and but not statistically significant at the level of 10% (p=0.24>0.1). However, by checking the median, we found that difference between median values of Tobin's Q is positive (0.16). Thus, it cannot be concluded whether the hedgers are valued higher than speculators or not.

Table 4 – Frequencies table

Category	N	%	% within IRS users
Hedger	169	28	63
Speculator	101	17	38
Non-user	324	55	N/A
Total	594	100	100

Size (x1000)	N	%
< 4,0000	114	20
40,000 - 300,000	141	25
300,000 - 2,200,000	146	25
> 2,200,000	174	30
Total	575	100

Industry sector	N	%
1:Raw Material	50	8%
2:Manufacturing	129	22%
3:Service	415	70%
Total	594	100%

Table 5 - Descriptive Statistics of all variables

	Construct	Observations	Mean	SD	Min	Max	Median
1	User	540	0.49	0.50	0.00	1.00	0.50
2	SIZE	575	8234127.83	28874623.64	81.00	290845750.51	486274.00
3	LEV	524	0.41	0.31	-0.13	2.89	0.39
4	GP	428	2.82	6.80	0.00	122.76	1.64
5	OR	502	0.14	0.91	0.00	12.05	0.04
6	Beta	530	-0.12	0.65	-1.00	1.00	-0.19
7	GP*Beta	438	-0.15	4.34	-33.83	49.65	-0.16
8	Hedging score	270	0.25	0.66	-1.00	1.00	0.50
9	Hedger/speculator	594	0.11	0.64	-1.00	1.00	0.00
10	Tobin Q	436	1.01	1.36	0.00	19.94	0.70
11	ROA	532	1.91	15.33	-90.15	65.44	3.94
12	GP 1	489	2.80	7.85	0.00	84.74	0.00
13	GP 2	594	0.12	1.06	-17.86	13.04	0.04
14	ID	594	0.33	0.47	0.00	1.00	0.00
15	Industry	594	2.61	0.64	1.00	3.00	3.00

Table 6 - Pearson Correlation Matrix

	Construct	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	User	540	-														
2	SIZE	575	.251**	-													
3	LEV	524	.288**	.106*	-												
4	GP	428	-.126**	-0.05	0.03	-											
5	OR	502	-.119**	-0.04	-0.08	.221**	-										
6	Beta	530	0.02	0.01	0.00	-0.02	0.05	-									
7	GP*Beta	438	0.01	0.01	0.01	-0.02	.180**	.318**	-								
8	Hedging score	270	.b	-0.08	-0.07	0.07	.142*	-0.05	-0.07	-							
9	Hedger/specu-lator	594	.181**	-0.05	-0.02	-0.03	-0.02	-0.05	-0.02	.924**	-						
10	Tobin Q	436	-.148**	-.106*	-.221**	.241**	.407**	-0.08	-.173**	-0.03	-0.07	-					
11	ROA	532	.194**	0.07	-.214**	0.06	-.249**	-.116**	-.155**	-0.02	0.02	.161**	-				
12	GP 1	489	-.188**	-0.04	-.153**	0.07	-0.01	-0.03	-.126*	0.08	-0.03	.384**	-0.04	-			
13	GP 2	594	-0.04	-0.01	.093*	0.06	0.01	-0.01	-0.03	-0.07	-0.01	0.05	-.163**	0.01	-		
14	ID	594	.272**	.232**	0.08	-0.03	-0.08	0.03	-0.01	0.00	-0.02	-0.01	.147**	-0.06	0.05	-	
15	Industry	594	-.174**	-.163**	-.178**	0.06	0.05	-0.02	-0.01	-0.07	-.083*	0.00	0.03	.132**	0.00	-.276**	-

Notes: N= Observations; *b. Cannot be computed because at least one of the variables is constant.*

Table 7 - Comparison of Users versus Non Users in Variables

Variables	Observa-tions	M(non-users)	M(users)	Median(non-users)	Median(users)	t	df	Sig	M diff	SE Diff	CI(95%)
SIZE	575	1,404,329.08	16,466,107.47	111,121.00	2,184,600.00	(5.96)	527.00	0.00	(15,061,778.39)	2,528,500.88	-20028956.75;-10094600.03
LEV	524	0.32	0.49	0.27	0.47	-6.75	502	0.00	-0.17	0.03	-0.22;-0.12
GP	428	3.73	2.00	1.68	1.61	2.60	418	0.01	1.73	0.67	0.42;3.04
OR	502	0.26	0.04	0.06	0.02	2.63	480	0.01	0.22	0.08	0.06;0.39
Beta	530	(0.13)	(0.10)	(0.17)	(0.18)	-0.56	501	0.58	-0.03	0.06	-0.15;0.08
GP*Beta	438	(0.17)	(0.12)	(0.06)	(0.21)	-0.11	426	0.91	-0.05	0.42	-0.88;0.79
Ln(SIZE)	575	11.97	14.57	11.62	14.60	-13.16	527	0.00	-2.59	0.20	-2.98;-2.21
Tobin's Q	436	1.21	0.80	0.77	0.63	3.07	422	0.00	0.40	0.13	0.15;0.66
ROA	532	(1.45)	4.35	2.67	4.69	-4.40	494	0.00	-5.80	1.32	-8.39;-3.21
GP1	489	4.26	1.34	-	-	4.12	462	0.00	2.91	0.71	1.52;4.3
GP2	594	0.17	0.07	0.04	0.04	1.00	538	0.32	0.10	0.10	-0.09;0.28
ID	594	0.22	0.48	-	-	-6.56	538	0.00	-0.26	0.04	-0.34;-0.18
Industry	594	2.73	2.51	3.00	3.00	4.09	538	0.00	0.22	0.05	0.11;0.32

Notes: M=Mean; t= t test statistic; DF= Degrees of freedom; Sig= Significance level; M Diff= Mean difference between groups; SE Diff= Standard error of group differences; CI 95%= 95% Confidence interval of group differences.

Table 8 – Comparison of Hedgers versus Speculators in Variables

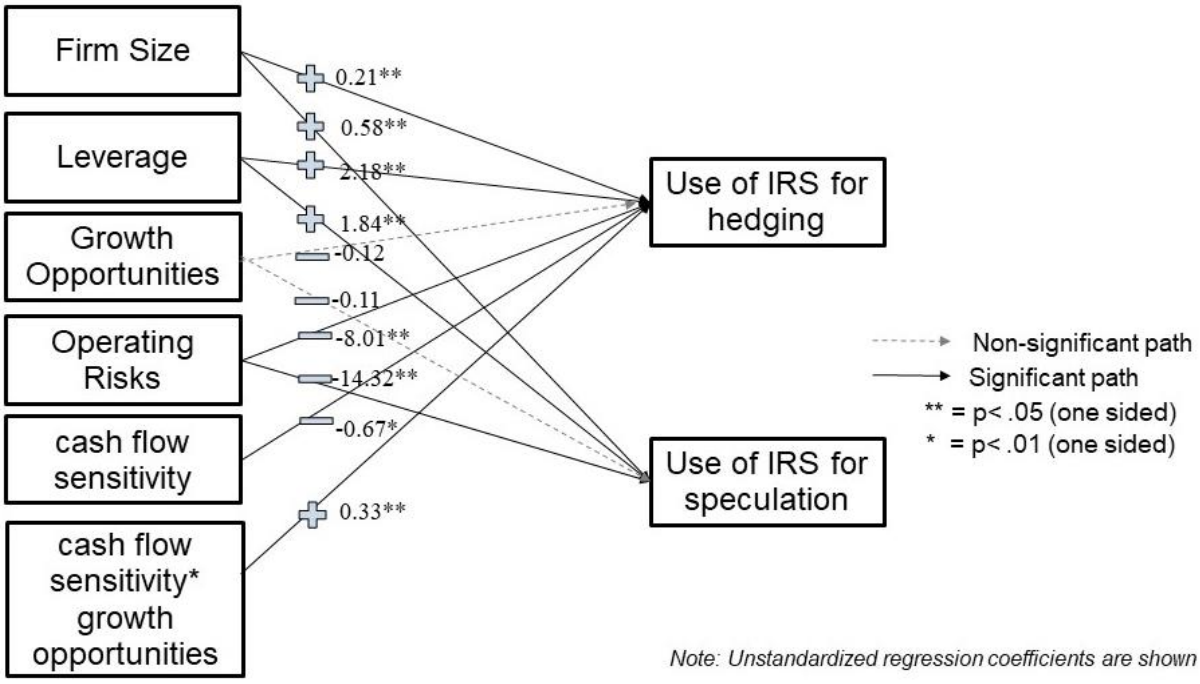
Variables	Observa-tions	M(Hedger)	M(Speculator)	Me-dian(Hedger)	Median(Specu-lator)	t	df	Sig	M diff	SE Diff	CI(95%)
SIZE	263	13,212,526.29	21,684,722.82	1,771,417.50	3,831,000.00	(1.63)	261	0.10	(8,472,196.53)	5,190,342.37	-18692472.32; 1748079.25
LEV	260	0.47	0.53	0.45	0.50	-2.05	258	0.04	-0.06	0.03	-0.12;0
GP	220	1.97	2.05	1.64	1.39	-0.36	218	0.72	-0.08	0.22	-0.51;0.35
OR	246	0.04	0.03	0.03	0.02	1.84	244	0.07	0.01	0.01	0;0.02
Beta	258	(0.14)	(0.04)	(0.30)	(0.09)	-1.18	256	0.24	-0.10	0.08	-0.26;0.07
GP*Beta	220	(0.24)	0.09	(0.35)	0.02	-1.36	218	0.17	-0.33	0.24	-0.81;0.15
Ln(SIZE)	263	14.19	15.17	14.39	15.16	-3.42	261	0.00	-0.98	0.29	-1.54;-0.41
Tobin' Q	215	0.75	0.89	0.69	0.53	-1.17	213	0.24	-0.14	0.12	-0.39;0.1
ROA	255	4.27	4.48	6.07	2.65	-0.18	253	0.86	-0.21	1.17	-2.5;2.09
GP1	244	1.43	1.20	-	-	0.62	242	0.54	0.23	0.37	-0.5;0.96
GP2	270	0.07	0.08	0.04	0.03	-0.39	268	0.70	-0.01	0.02	-0.06;0.04
ID	270	0.44	0.54	-	1.00	-1.70	268	0.09	-0.11	0.06	-0.23;0.02
Industry	270	2.47	2.57	3.00	3.00	-1.22	268	0.23	-0.11	0.09	-0.28;0.07

Notes: M=Mean; t= t test statistic; DF= Degrees of freedom; Sig= Significance level; M Diff= Mean difference between groups; SE Diff= Standard error of group differences; CI 95%= 95% Confidence interval of group differences.

5.2 Logistic regression

Figure 4 and Table 9-11 present the results of logistic regression concerning the effects all financial variables have on IRS usage.

Figure 4:



We used two-steps hierarchical logistic regression by first entering the control variables and then entering the predictors in the model to see how the R squares changes. In the first step (see Table 10, Model 1), the control variables revealed that the companies in raw material (Industry 1) and manufacturing (Industry sector 2) industries used significantly more IRS than companies in the service industry (contrast group)，which is intuitive as raw materials and manufacturing firms require high tangible assets investments and debt financing is often necessary.

As next step we tested the hypotheses (see Table 10, Model 2). We use market to book ratio as the main proxy for growth potential and GP1 and GP2 as secondary proxies to test the robustness. Analysis is based on models using GP (market to book ratio) only. We first start with hypothesis regarding hedgers vs non-users by looking into Table 9. Concerning hypothesis 1(a), firm size (SIZE) has a positive impact on IRS usage (β=0.21, $p<0.01$), therefore this hypothesis 1a: higher firm size induces the usage of IRS for hedgers is supported. Regarding to second hypothesis, firm

leverage (LEV) has a significantly positive impact on the usage of IRS (β=2.18, p<0.01). Hypothesis 2(a): higher last year's firm leverage induces the current year's usage of IRS for hedgers is also supported by the findings. Furthermore, a firm's growth opportunities (GP) have and insignificant negative impact on the usage of IRS, since the effect is not statistically significant (β=-0.12, p=n.s.), hypothesis 3(a): higher growth opportunities induce the usage of IRS for hedgers is not supported. Operational risk (OR) was found to be significantly negatively associated with usage of IRS (β=-8.01, p<0.01). Hypothesis 4(a): higher operating risk deduces the usage of IRS for hedgers is supported. Additionally, Hypothesis 5: higher cash flow sensitivity to interest rate deduces the usage of IRS for hedgers is significantly supported as the cash flow sensitivity to interest rate (Beta) is negatively related to IRS usage (β=-0.67, p<0.10), as suggested in the hypothesis. The significance of the variable cash flow sensitivity to interest rate is also in line with the descriptive results from the survey data of Bodnar et al. (2003) that 60% of Dutch companies indicate that managing the volatility of their cash flows is the most important reason for their risk management practices. Finally, the interaction between growth opportunities and the cash flow sensitivity to interest rate (Beta*GP) is significantly positively associated with IRS usage (β=0.33, p<0.05). This results are opposite to the hypothesis 6: given a certain level of growth opportunities, firms with higher cash flow sensitivities to interest rate use less IRS to hedge, which is therefore rejected.

We then check hypothesis regarding Speculators vs non-users by looking into Table 11. Concerning hypothesis 1(b): higher firm size induces the usage of IRS for speculators, firm size (SIZE) has a positive impact on IRS usage (β=0.58, p<0.01), therefore this hypothesis is supported. Regarding to second hypothesis, firm leverage (LEV) has a significantly positive impact on the usage of IRS (β=1.84, p<0.05). Hypothesis 2(b): higher last year's firm leverage induces or deduces the current year's usage of IRS for speculators is also supported by the findings. Furthermore, a firm's growth opportunities (GP) have insignificant negative impact on the usage of IRS, since the effect is not statistically significant (β=-0.11, p=n.s.), hypothesis 3(b): higher growth opportunities induce the usage of IRS for speculators is not supported. Operational risk (OR) was found to be significantly negatively associated with usage of IRS (β=-14.32, p<0.01). Hypothesis 4(b): higher operating risk deduces the usage of IRS for speculators is supported.

We at last check Hedgers versus Speculators by looking into Table 12. We see that hedgers only have significant lower size then speculators (β=-0.27, p<0.01). Therefore, hypothesis 7a: Firm size,

leverage, growth opportunities, operating risks influence the use of IRS for either hedging or speculation purpose without significant difference is rejected. However, we noted that other financial characteristics indeed do not influence hedgers or speculators significantly differently seen from Table 12. And we do not see hedgers is significant different from speculators in terms of Beta and GP*Beta. Therefore, hypothesis 7b: cash flow sensitivity and the interaction between cash flow sensitivity and growth opportunities influence the use of IRS for hedging purpose, but not for the usage for speculation purpose is rejected.

Table 9 - Logistic Regression Table: Non-Users vs. Users

Variables	Dependent: Non-Users vs. Users							
	Model 1		Model 2					
Step 1	B	SE	B	SE	B	SE	B	SE
IND_1	2.63**	.74	1.73**	.78	.43	.52	0.84*	.50
IND_2	0.67**	.25	0.77**	.30	.45	.29	0.6**	.27
Year_2010	-.04	.33	.11	.39	.41	.38	.45	.35
Year_2011	.11	.33	.23	.39	.42	.38	.42	.35
Year_2012	.16	.33	.25	.39	.58	.38	.45	.35
Year_2013	.02	.32	-.02	.38	.32	.37	.17	.34
Step 2								
Ln(SIZE)			0.25**	.06	0.43**	.07	0.33**	.06
LEV			2.24**	.60	0.85**	.48	0.92**	.43
OR			-9.27**	2.89	-5.86**	2.61	-9.31**	2.70
Beta			-0.68*	.35	0.06	.22	0.24	.19
Constant			-3.67**	.91	-5.77**	.93	-4.57**	.83
GP			-0.09	.08				
GP*Beta			0.37**	.13				
GP1					-0.14**	.03		
GP1*Beta					0.1*	.05		
GP2							-.42	.45
GP2*Beta							-.74	.76
Nagelkerke R^2			0.42		0.42		0.37	
Observations			396		418		459	

*Notes: *= p<0.05 (one-sided); **=p<0.01 (one-sided); B=unstandardized regression coefficient; SE= Standard error; Year=Contrast Group is First, Industry=Contrast Group is First.*

Table 10 - Logistic Regression Table: Hedgers1 vs. Non-Users0

Variables	Dependent: Hedgrs1 vs. Non-Users0							
	Model 1		Model 2					
Step 1	B	SE	B	SE	B	SE	B	SE
IND_1	2.46**	.63	1.54**	.69	.49	.54	1**	.50
IND_2	0.36	.29	0.18	.33	.21	.32	0.23	.30
Year_2010	-.07	.37	-.01	.42	.43	.40	.39	.37
Year_2011	.17	.36	.27	.41	.46	.41	.37	.37
Year_2012	.19	.37	.20	.42	.62	.41	.37	.37
Year_2013	.07	.36	.00	.40	.31	.40	.10	.37
Step 2								
Ln(SIZE)			0.21**	.07	0.44**	.07	0.29**	.06
LEV			2.18**	.66	0.77	.48	0.75*	.44
OR			-8.01**	2.94	-3.99*	2.39	-7.08**	2.67
Beta			-0.67*	.38	-0.08	.24	0.1	.20
GP			-0.12	.10				
GP*Beta			0.33**	.15				
GP1					-0.14**	.04		
GP1*Beta					0.13**	.06		
GP2							-.17	.51
GP2*Beta							-.32	.82
Nagelkerke R^2			0.35		0.38		0.29	
Observa-tions			324		343		377	

*Notes: *= p<0.05 (one-sided); **=p<0.01 (one-sided); B=unstandardized regression coefficient; SE= Standard error; Year=Contrast Group is First, Industry=Contrast Group is First.*

Table 11 - Logistic Regression Table: Speculators1 vs. Non-Users0

Variables	Dependent: Speculators1 vs. Non-Users0							
	Model 1		Model 2					
Step 1	B	SE	B	SE	B	SE	B	SE
IND_1	1.82**	.76	2.16**	.92	.83	.76	1.43*	.75
IND_2	1.06**	.30	1.87**	.44	0.73*	.40	1.23**	.37
Year_2010	-.26	.44	.34	.59	.76	.57	.72	.52
Year_2011	-.09	.43	.08	.57	.51	.55	.42	.51
Year_2012	.14	.43	.20	.56	.60	.55	.50	.50
Year_2013	.05	.42	.05	.54	.46	.53	.35	.49
Step 2								
Ln(SIZE)			0.58**	.11	0.54**	.09	0.58**	.09
LEV			1.84**	.86	0.7	.59	0.6	.55
OR			-14.32**	5.33	-14.73**	5.72	-14.54*	4.98
GP			-0.11	.09				
GP1					-0.16**	.05		
GP2							-0.18	.25
Nagelkerke R^2			0.56		0.53		0.50	
Observa-tions			273		281		326	

*Notes: *= p<0.05 (one-sided); **=p<0.01 (one-sided); B=unstandardized regression coefficient; SE= Standard error; Year=Contrast Group is First, Industry=Contrast Group is First.*

Table 12 - Logistic Regression Table: Hedger 1 vs Speculator0

Variables	Dependent: Hedger 1 vs Speculator0							
	Model 1		Model 2					
Step 1	B	SE	B	SE	B	SE	B	SE
IND_1	0.73	.53	1.25**	.58	1.5**	.56	1.53**	.55
IND_2	-0.65**	.32	-0.92**	.36	-.44	.35	-0.63*	.34
Year_2010	.15	.46	.21	.49	.16	.48	.07	.46
Year_2011	.22	.45	.14	.48	.02	.48	-.11	.46
Year_2012	.08	.45	-.07	.48	-.09	.48	-.26	.45
Year_2013	.03	.44	-.04	.47	-.21	.46	-.22	.45
Step 2								
Ln(SIZE)			-0.27**	.08	-0.24**	.08	-0.29**	.08
LEV			-0.75	.83	-0.05	.77	-0.14	.70
OR			2.26	4.98	6.56	5.76	4.78	5.20
Beta			-0.2	.44	-0.46*	.28	-0.56**	.27
GP			0.12	.11				
GP*Beta			-0.07	.17				
GP1					0.07	.06		
GP1*Beta					0.03	.09		
GP2							1.41	1.05
GP2*Beta							3.61**	1.74
Nagelkerke R^2			0.18		0.18		0.20	
Observations			215		227		246	

*Notes: *= p<0.05 (one-sided); **=p<0.01 (one-sided); B=unstandardized regression coefficient; SE= Standard error; Year=Contrast Group is First, Industry=Contrast Group is First.*

5.3 Linear regression

Table 13 present the results of linear regression concerning the effects IRS usage and IRS hedging usage have on IRS usage. Considering the high correlation between Tobin's Q and market to book ratio, we didn't use this as proxy for growth potential. GP1 and GP2 remain. We used three-steps hierarchical linear regression by first entering the control variables and then entering the predictors in the model to see how the R squares changes. As next step we tested the influence of IRS usage on the firm value and the third step test the hypotheses 8 about the influence of using IRS for hedging or speculation on firm value.

The first step shows generally the control variables have significant impact on firm value. R-square changed significantly after introducing Variable(USERS) for both model. The second steps revealed a negative significant relation between IRS usage and firm value from both models using GP1 (β=-0.22, $p<0.01$) and GP2 (β=-0.28, $p<0.01$). This is contradictory to positive relation revealed by the most of the empirical results (Allayannis & Ofek, 2001; Bartram et al., 2011; Cater et al., 2006; Graham & Rogers, 2002; Júnior & Laham, 2008; Kapitsinas, 2008; MacKay & Moeller, 2007; Nelson et al., 2005). However, there are also studies which revealed no relation or negative relations. Fauver and Naranjo (2010) used derivative usage data on over 1746 firms headquartered in the U.S. during the 1991 through 2000 time period, they find a negative association between Tobin's Q and derivative usage. And Khediri (2010) used a sample of 250 non-financial firms from the French market over the period of 2000-2002 to examine the relation between hedging and firm value. They find that the decision to use derivatives has a negative effect on firm valuation.

The third model shows still a negative significant relation between IRS usage and firm value from both models using GP1 (β=-0.26, $p<0.01$) and GP2 (β=-0.29, $p<0.01$). Hedging scores is positively related to Tobin's Q under both model. This is in line with the massive prior studies which assumed derivative usage is purely for hedging and found empirically derivatives usages is positively related to firm value. Therefore, hypothesis 8a: Use of IRS for hedging purpose increase firm value and hypothesis 8b: Use of IRS for speculating purpose decrease firm value are supported. However, only model using GP1 shows significance of the relation and the change of R-square after introducing variable (User_x_HedgingScore). The insignificance of model 2 might be explained by the fact that GP2 is in nature not a good proxy for investment potentials as investing cash flow only

revealed the paid part of investment but not the planned or accrued investment. However, the latter part can be of equal amount in investment.

In summary, hypothesis 8 is supported that IRS used with higher possibility to hedge increase firm value and used with higher possibility to speculate decrease firm value.

Table 13 - Linear Regression Table:

Varia-bles	Dependent: Tobin's Q					
	GP 1 (N378)			GP 2(N395)		
Step 1	B	B	B	B	B	B
IND_1	-0.24**	-0.23**	-0.25**	-0.7***	-0.71***	-0.72***
IND_2	0.12*	0.15**	0.16**			
IND_3				-0.32***	-0.35***	-0.36***
Year_2010	-.07	-.07	-.07	-.14	-.14	-.14
Year_2011	-0.15*	-.15	-0.15*	-.18	-.17	-.17
Year_2012	-.12	-.10	-.11	-.15	-.13	-.13
Year_2013	.03	.03	.03	.06	.07	.07
Ln(SIZE)	-0.03**	-0.02	-.01	.00	.01	.01
LEV	-0.33***	-0.27**	-0.28**	-0.4***	-0.33**	-0.33**
OR	-0.89**	-1.01***	-1.01***	0.65*	.49	.49
ID	0.09	0.11*	0.12*	0.16*	0.19**	0.19**
ROA	0.02***	0.02***	0.02***	0.02***	0.03***	0.02***
GP	0.05***	0.04***	0.04***	0.07*	0.07*	0.07*
Step 2						
User		-0.22***	-0.26***		-0.28***	-0.29***
Step 3						
User_x_HedgingScore			0.13**			.04
Adjusted R Square	.33	.35	.35	.24	.26	.26
Sig. F Change	.00	.00	.04	.00	.00	.63

*Notes: *= p<0.10;**= p<0.05; ***=p<0.01; B=unstandardized regression coefficient; Year=Contrast Group is First, Industry=Contrast Group is First.*

5.4 Robustness test

5.4.1 Robustness test for model 3

We conducted the robustness test by regressing the yearly averaged variables. No significance was revealed among all predictors, which is not surprising, as the number of valid data cases declined sharply after taking the yearly average, since there was already abundant of missing data in certain years of each company.

5.4.1 Robustness test for model 7

We conducted the robustness test by comparing the results for subgroups with cases split by larger sizes and smaller sizes. By looking into table 14, we found that variable User is always negatively significantly associated with Tobin's Q for both subgroups and for models using GP1 and GP2 as proxies for investment opportunities. Therefore, the results are qualitatively the same to the main findings from model 7. However, the influence of User_x_HedgingScore on Tobin's Q is different across the subgroups, especially when using different investment opportunity proxies. User_x_HedgingScore shows a significant positive impact on Tobin's Q across the models for smaller firms. However, for larger companies, User_x_HedgingScore shows an insignificant positive impact on Tobin's Q using GP1 as the proxy for investment opportunities and a significantly negative impact using GP2 as the proxy for investment opportunities.

We also conducted the robustness test by comparing the results for subgroups with cases split by higher leverage and lower leverage. By looking into table 14, we found that variable User is insignificantly negative associated with Tobin's Q for lower leveraged firms using GP2 as proxy for investment opportunities. In other three cases, User is always negatively significantly associated with Tobin's Q. We can conclude that the results are almost the same to the main findings from model 7. However, the influence of User_x_HedgingScore on Tobin's Q is different across the subgroups, especially when using different investment opportunity proxies. User_x_HedgingScore only shows a significant positive impact on Tobin's Q for lower leveraged firms when using GP1 as the investment opportunity proxy but insignificance on Tobin's Q in other cases.

Table 14 - Robustness test result for model 7:

Variables	Dependent: Tobin's Q							
	GP1				GP2			
	Larger firms	Smaller firms	High lev-ered firms	Low lev-ered firms	Larger firms	Smaller firms	High levered firms	Low levered firms
Step 1	B	B	B	B	B	B	B	B
IND_1	-0.26**	0.03	-0.21**	-0.35	-0.43**	-0.32	-0.4**	-0.78**
IND_2	-0.05	0.22*	0.02	0.44**	0.1**	0.38**	0.12	0.48**
Year_2010	-0.19*		-0.12	-0.07	-0.28**	-0.14	-0.13	0.02
Year_2011	-0.28**	-0.09	-0.28**	-0.05	-0.31**	-0.17	-0.27**	0
Year_2012	-0.17*	-0.11	-0.22**	0.05	-0.15**	-0.21	-0.22**	0.01
Year_2013	0.07	-0.06		0.02	0.16**	-0.11		0.14
Year_2014		-0.01	-0.02				-0.02	
Ln(SIZE)	-0.02	-0.05	-0.02*	0.05	-0.03**	0.05	-0.02	0.12**
LEV	-0.5**	-0.31*	-0.1	-1.54**	-0.94**	-0.12	-0.1	-2.89**
OR	0.05	-1.34**	-0.47	-1.29**	3.4**	0.04	0.51	-0.92
ID	-0.15**	0.79**	0.02	0.18	0.06**	0.65**	0.09	0.25*
ROA	0.04**	0.01**	0.03**	0.02**	0.06**	0.01**	0.01**	0.03**
GP	0.03**	0.05**	0.04**	0.03**	0.48**	0.04	0.28**	0.05
Step 2								
User	-0.18**	-0.56**	-0.13*	-0.5**	-0.11**	-0.57**	-0.15*	-0.22
Step 3								
User_x_Hedg-ingScore	0.09	0.54**	0.05	0.4**	-0.01**	0.38**	0.05	0.03
Adjusted R Square	.46	.46	.45	.32	.56	.27	.21	.38
Observations	214	164	196	182	220	175	200	195

*Notes: *= p<0.10;**= p<0.05; ***=p<0.01; B=unstandardized regression coefficient; Year=Contrast Group is First, Industry=Contrast Group is First.*

5.5 Additional test

We also tested the influence of financial figures on the notional amount of IRS usage, there was no significant relationship detected which presumably relates to the limited datasets available and their vague disclosure about the calculation principle of the notional amount in the annual reports. More detailed, firstly, only 30 companies per year (on average) provided notional amounts of their IRS. Secondly, companies sometimes used both floating-to-fixed IRS and fixed-to-floating IRS. Therefore, whether the notional amount is a net amount or a total amount was not possible to verify from the limited information given in the financial statements.

6 Conclusion and discussions

6.1 Findings and implications

6.1.1 Influences of financial characteristics on the usage of IRS

This study investigated which firm characteristics influence the usage of IRS among Dutch non-financial firms to either speculate or hedge against interest rate risks. Based on the sample of 374 cases ranging from 2010 to 2014, the study shows a significant effect of firm size, leverage and operating risk on IRS usage either for hedging or speculative reasons. It also shows that cash flow sensitivity to interest rate and the interaction between it and growth opportunity on IRS usage for hedging purpose are significant. However, the effects of growth opportunity, and the interaction between it and growth opportunity are found to be significantly negative, which is surprising. In the following paragraphs we will discuss these findings in more detail.

As explained above, the findings show that firm size and leverage are positively related to IRS usage, which is consistent with results from the derivative usage literature(Bartram et al., 2009; Samant, 1996; Saunders, 1999). In particular the positive influence of Leverage on IRS usage supports the assumptions of financial distress cost theory (Smith & Stulz, 1985) and underinvestment theory (Myers, 1977), meaning that companies with higher leverage have the tendency to have higher financial distress costs and underinvestment problems. Therefore, the chance to use derivatives to hedge is higher than for companies with lower leverage. Also, if the company has a low amount of debt or no debt at all, the company might not encounter material interest rate risks and IRS will not be used.

Furthermore, the operating risk is found to negatively relate to IRS usage, which is consistent with results from the derivative usage literature (Samant, 1996). This supports agency costs theory (Wall, 1989) and information asymmetric theory (Titman, 1992). More specifically, agency costs theory (Wall, 1989) suggests that fixed-rate payers will most probably borrow short-term and then swap to fixed rate rather than borrow a real long-term fixed rate loan, but this requires companies to undertake quicker principal payment from a short-term loan and therefore these companies usually have a characteristic of lower operating risks. In relation to information asymmetric theory, Titman (1992) suggested that lower operating risks provide companies higher ability to undertake IRS for both fixed-rate payers and floating-rate payers. For fixed-rate payers, lower operating risks

guarantee higher chances of good profit outcomes and, therefore, possible credit upgrading. For floating-rate payer, it helps to ease worries of having floating risk exposure positions open. The positive impact of operating risks on IRS usage as found in this research supports these theories.

The interaction between it and growth opportunity are found to be significantly negative is mainly because the growth opportunity shows a negative impact. A possible explanation for having negative influence of growth opportunity on IRS usage are suggested as followed. According to agency costs (Wall, 1989), underinvestment and risk-shifting problems are more likely to happen in growing industries and companies therefore use floating-to-fixed IRS to construct a synthetic long-term debt to avoid the premium charged to companies with these problems. However, every swap has a floating payer and floating payers exist also in our dataset. The floating side analysis of the IRS is not well developed theoretically and empirically. The main reasons for the usage of fixed-to-floating IRS is either that highly rated firms use floating IRS as a riskier contractual obligations to diversified companies' asset managing portfolio (e.g. when the companies' cash and cash equivalents are invested in products with fixed-rate payoffs) and profit from it or companies use it to reach the fixed-floating debt ratio, which is normally set as an interest rate risk managing goal by companies (Titman, 1992; Wall, 1989). Based on these arguments, it is possible that those highly rated companies, who are able to manage their current asset in a diversified way, are mature companies rather than growing companies. Growing companies probably do not have as much residual cash to manage as most of the cash goes to capital investments. Therefore, higher growth opportunity might have negative influenced floating-rate IRS usage and therefore the test results is negative when most of cases are floating rate IRS user. Unfortunately, due to data availability, we were unable to the find how much floating-rate users accounted for the whole sample.

6.1.2 Difference of the influences of financial characteristics on the usage of IRS for hedging or speculating purpose

As seen from figure 4, we see that most financial characteristics influence the usage of IRS for hedging or speculation in the same direction. Firm size, leverage, growth opportunities, operating risks influence the use of IRS for either hedging or speculation purpose in the same direction. Through model 5 we check whether these financial characteristics influence hedger or speculator in a significant different way. Empirical results show that hedgers only have significant lower size

then speculators. Other financial characteristics do not influence hedgers or speculators significantly differently. And we do not see hedgers is significant different from speculators in terms of Beta and GP*Beta. This sheds doubts on the validity of Adam and Fernando (2006)'s model to differentiate hedgers and speculators. As they used financial characteristics which influence hedging to estimate the hedge ratio. And then they used the residual between the derivative usage ratio and predicted hedge ratio as the speculation ratio. The speculation ratio was tested on several speculation theories. Since those financial characteristics can influence companies' hedging or speculating behavior in a similar way, financial characteristics cannot be used to estimate the hedge ratio.

Surprisingly, size has a negative significant impact. This is in line with the finding from Glaum (2002). This result might be explained by the possibility that bigger companies have centralized treasury department and more specialists on financial market, which in the end provide them or make the management believe they have information advantage to speculate. According to Bodnar et al. (2003), 81% of Dutch companies use centralized approach for interest rate risk management activities. It can also be the case that bigger companies' employee managers who believe they can beat the currency markets, or who have incentive packages that reward upside returns more than downside losses relative to some benchmark. (Fabling & Grimes, 2010)

6.1.3 Influence of usage of IRS on firm value

We found positive influence of usage of IRS used for hedging on firm value. IRS used with higher possibility to hedge increase firm value and used with higher possibility to speculate decrease firm value. Contradictory to most of empirical findings, we find a significant negative impact of IRS usage on firm value. This might be due to the fact that companies using IRS for speculation carry more weight in the whole model than hedgers.

However, the robustness tests shed doubt to the finding that IRS used with higher possibility to hedge increase firm value and used with higher possibility to speculate decrease firm value. The influence of User_x_HedgingScore on Tobin's Q is different across the subgroups, especially when using different investment opportunity proxies. User_x_HedgingScore shows a significant positive impact on Tobin's Q across the models for smaller firms. However, for larger companies, User_x_HedgingScore shows an insignificant positive impact on Tobin's Q using GP1 as the proxy for investment opportunities and a significantly negative impact using GP2 as the proxy for

investment opportunities. This might be explained by the possibility that larger firms have information advantage and monitored their risk more effectively than smaller firms. Though speculation increases the firm risk and higher firm risk renders firm value volatile, if monitored effectively, higher risk may induce higher value. As stated by sample company Airbus by its annual report, "*The Group undertakes to match the risk profile of its assets with a corresponding liability structure. The remaining net interest rate exposure is managed through several types of interest rate derivatives in order to minimise risks and financial impacts. The Group holds on a regular basis an Asset Management Committee which aims at limiting the interest rate risk on a fair value basis through a value-at-risk approach. The VaR model used is mainly based on the so called "Monte-Carlo-Simulation" method. The Group uses VaR amongst other key figures in order to determine the riskiness of its financial instrument portfolio and in order to optimise the risk-return ratio of its financial asset portfolio.*" This company virtually regards itself as an asset management fund with the assets from the company itself. For such a big company with knowledgably treasury staff who can conduct VaR model, I would say it has information advantage and monitored their risk more effectively than smaller firms. Speaking from asset allocation perspective, it is most value adding if the asset with the highest sharp ratio is invested. Hedging, though lower firm risk, also limits the upward expected returns, thus may even lower the sharp ratio of the company assets. In other words, for companies who do not have information advantage and cannot monitor the risk effectively, hedging increases firm value while speculation decreases firm value. However, for companies who do have information advantage and can monitor the risk effectively, speculation my increases firm value while hedging may not increase or even possibly decrease firm value.

6.2 Contributions

The research model provided a novel way to identify hedgers and speculators. By creating an index from the information gain from financial statements. We combined and weighted the managements' subjective declarations and auditors' independent judgements, thus making the index plausible.

The findings of this study firstly provide practical implications for banks as to identify their target customers. As shown by the findings, banks do not need to assess cash flow sensitivity to the interest rate ratios or growth opportunities of firms in order to identify potential customers for their IRS products, since these variables had no significant influence on IRS usage. Also, firms with

lower operating risks tend to use more IRS. In combination, this could help banks to identify opportunities for IRS usage among their potential customers.

The findings secondly provide evidence that financial characteristics are not only the indicators for hedging behaviors but may also be the indicators for speculating behaviors. Therefore, using financial characteristics to test hedging theories or calculate hedging amount or ratio may not be sound as the result may come partly from speculation behavior.

The findings thirdly provided insights for the inconsistent empirical results for whether usage of derivatives increase firm value. From our results, it is shown that derivatives used for hedging increase firm value and those used for speculation decrease firm value. And the direction of the interaction between usage of derivatives and firm value very much depends on the weight of speculators in the sample.

6.3 Limitations

This study has also some limitations.

Firstly, unlike USA companies, European companies are not required to disclose the detailed information of derivatives not designated for hedging. This created difficulty to tell whether all ORS is designated for hedging or partly for speculation for some companies. In case of uncertainty, cases were given score of 0.5 which were categorized as a weak hedger. This may not correctly capture companies' hedging or speculation behaviors and therefore distort the result. I hereby call for regulators' attention to enhance companies' disclosure on information of derivatives not designated for hedging under IFRS.

Secondly, a comparison tests of derivative usage on firm value using different data from different countries are suggested for future research. Though there are two empirical tests supported our findings, the reason why our data from Dutch companies show negative relation between derivative usage and firm value, which are the mainstream findings are not fully understood and explained.

Thirdly, due to the lack of well-developed theories for fixed-to-floating IRS users and the lack of the disclosure of the exact types of IRS users in annual reports, we did not consider the influence of fixed-to-floating IRS users in our model. Furthermore, in our analysis, due to the unavailability of the data of the floating-fixed debt ratios, we did not introduce this control variable. This variable

might be crucial as control variable as companies actually use IRS merely to change the floating-fixed debt structure. Finally, usage of IRS should be considered within the framework of the whole risk management policy of a company, including the replacement of IRS through other methods such as operating hedging behaviors and other interest rate derivatives.

7 References

Adam, T., Dasgupta, S., & Titman, S. (2007). Financial constraints, competition, and hedging in industry equilibrium. *The Journal of Finance, 62*(5), 2445-2473.

Adam, T. R., & Fernando, C. S. (2006). Hedging, speculation, and shareholder value. *Journal of Financial Economics, 81*(2), 283-309.

Adam, T. R., Fernando, C. S., & Salas, J. M. (2015). Why do firms engage in selective hedging? Evidence from the gold mining industry. *Journal of Banking and Finance, 77*, 269–282.

Alayannis, G., Lel, U., & Miller, D. (2003). Corporate Governance and the Hedging Premium. *Darden Business School, University of Virginia, Charlottesville*.

Allayannis, G., Lel, U., & Miller, P. (2011). The use of foreign currency derivatives, corporate governance, and firm value around the world. *Journal of International Economics, 87*(1), 65-79.

Allayannis, G., & Ofek, E. (2001). Exchange rate exposure, hedging, and the use of foreign currency derivatives. *Journal of International Money and Finance, 20*(2), 273-296.

Allayannis, G., & Weston, J. P. (2001). The use of foreign currency derivatives and firm market value. *Review of Financial Studies, 14*(1), 243-276.

Arak, M., Estrella, A., Goodman, L., & Silver, A. (1988). Interest rate swaps: An alternative explanation. *Financial management, 17*(2), 12-18.

Arrow, K. J. (1951). Alternative approaches to the theory of choice in risk-taking situations. *Econometrica: Journal of the Econometric Society*, 404-437.

Arrow, K. J., & Debreu, G. (1954). Existence of an equilibrium for a competitive economy. *Econometrica: Journal of the Econometric Society*, 265-290.

Bartram, S. M., Brown, G. W., & Conrad, J. (2011). The effects of derivatives on firm risk and value. *Journal of Financial and Quantitative Analysis, 46*(4), 967-999.

Bartram, S. M., Brown, G. W., & Fehle, F. R. (2009). International evidence on financial derivatives usage. *Financial management, 38*(1), 185-206.

Bashir, H., Sultan, K., & Jghef, O. K. (2013). Impact of Derivatives Usage on Firm Value: Evidence from Non Financial Firms of Pakistan. *Journal of Management Research, 5*(4), 108.

Berkman, H., & Bradbury, M. E. (1996). Empirical evidence on the corporate use of derivatives. *Financial management, 25*(2), 5-13.

Bessembinder, H. (1991). Forward contracts and firm value: Investment incentive and contracting effects. *Journal of Financial and Quantitative Analysis, 26*(04), 519-532.

Bicksler, J., & Chen, A. H. (1986). An economic analysis of interest rate swaps. *The Journal of Finance, 41*(3), 645-655.

BIS. (2013). Triennial Central Bank Survey of foreign exchange and derivatives market activity in 2013. Retrieved from http://www.bis.org/publ/rpfx13.htm

Black, F., & Scholes, M. (1973). The pricing of options and corporate liabilities. *The journal of political economy, 81*(3), 637-654.

Bodnar, G. M., Consolandi, C., Gabbi, G., & Jaiswal-Dale, A. (2013). Risk Management for Italian non-financial firms: Currency and interest rate exposure. *European Financial Management, 19*(5), 887-910.

Bodnar, G. M., Hayt, G. S., & Marston, R. C. (1998). 1998 Wharton survey of financial risk management by US non-financial firms. *Financial management, 27*(4), 70-91.

Bodnar, G. M., Hayt, G. S., Marston, R. C., & Smithson, C. W. (1995). Wharton survey of derivatives usage by US non-financial firms. *Financial management, 24*(2), 104-114.

Bodnar, G. M., Jong, A. d., & Macrae, V. (2003). The impact of institutional differences on derivatives usage: A comparative study of US and Dutch firms. *European Financial Management, 9*(3), 271-297.

Brown, G. W., Crabb, P. R., & Haushalter, D. (2006). Are firms successful at selective hedging? *The Journal of Business, 79*(6), 2925-2949.

Brown, S. J., & Steenbeek, O. W. (2001). Doubling: Nick Leeson's trading strategy. *Pacific Basin Finance Journal, 9*(2), 83-99.

Campbell, T., & Kracaw, W. A. (1999). *Optimal speculation in the presence of costly external financing*. London: Risk Publications.

Cater, D., Rogers, D., & Simkins, B. (2006). Does hedging affect firm value? Evidence from US airline industry. *Financial management, 35*(1), 53-86.

Chen, C. Y.-H., Kuo, I.-D., & Chiang, T. C. (2014). What explains deviations in the unbiased expectations hypothesis? Market irrationality vs. the peso problem. *Journal of International Financial Markets, Institutions and Money, 30*, 172-190.

Chernenko, S., & Faulkender, M. (2011). The two sides of derivatives usage: Hedging and speculating with interest rate swaps. *Journal of Financial and Quantitative Analysis, 46*(6), 1727-1754.

Chernenko, S., & Faulkender, M. (2012). The two sides of derivatives usage: Hedging and speculating with interest rate swaps. *Journal of Financial and Quantitative Analysis, 46*(06), 1727-1754.

Cox, J. C., Ingersoll Jr, J. E., & Ross, S. A. (1985). A theory of the term structure of interest rates. *Econometrica: Journal of the Econometric Society, 53*(2), 385-407.

Cox, J. C., & Ross, S. A. (1976). The valuation of options for alternative stochastic processes. *Journal of Financial Economics, 3*(1-2), 145-166.

Debreu, G. (1951). The coefficient of resource utilization. *Econometrica: Journal of the Econometric Society, 19*(3), 273-292.

Dolde, W. (1993). The trajectory of corporate financial risk management. *Journal of Applied Corporate Finance, 6*(3), 33-41.

Dupire, B. (1997). *Pricing and hedging with smiles*: Mathematics of derivative securities. Dempster and Pliska eds., Cambridge Uni. Press.

Fabling, R., & Grimes, A. (2010). Cutting the hedge: Exporters' dynamic currency hedging behaviour. *Pacific-Basin Finance Journal, 18*(3), 241-253.

Fama, E. F., & French, K. R. (1987). Commodity futures prices: Some evidence on forecast power, premiums, and the theory of storage. *Journal of Business, 60*(1), 55-73.

Faulkender, M. (2005). Hedging or market timing? Selecting the interest rate exposure of corporate debt. *The Journal of Finance, 60*(2), 931-962.

Faulkender, M. W., & Chernenko, S. (2006). Why are firms using interest rate swaps to time the yield curve? *Available at SSRN 759744*.

Fauver, L., & Naranjo, A. (2010). Derivative usage and firm value: The influence of agency costs and monitoring problems. *Journal of Corporate Finance, 16*(5), 719-735.

Fenn, G. W., Post, M., & Sharpe, S. A. (1996). *Debt maturity and the use of interest rate derivatives by nonfinancial firms*. Washington, D.C.: Division of Research and Statistics, Division of Monetary Affairs, Federal Reserve Board.

Fisher, A. G. (1939). Production, primary, secondary and tertiary. *Economic Record, 15*(1), 24-38.

Frankel, J. A., & Rose, A. K. (1995). Empirical research on nominal exchange rates. *Handbook of international economics, 3*, 1689-1729.

Froot, K. A., Scharfstein, D. S., & Stein, J. C. (1993). Risk management: Coordinating corporate investment and financing policies. *The Journal of Finance, 48*(5), 1629-1658.

Géczy, C., Minton, B. A., & Schrand, C. (1997). Why firms use currency derivatives. *Journal of Finance, 52*(4), 1323-1354.

Géczy, C. C., Minton, B. A., & Schrand, C. M. (2007). Taking a view: Corporate speculation, governance, and compensation. *Journal of Finance, 62*(5), 2405-2443.

Glaum, M. (2002). The determinants of selective exchange risk management – evidence from German non‐financial corporations. *Journal of Applied Corporate Finance, 14*(4), 108-121.

Good, I., & Mittal, Y. (1989). Addendum: The Amalgamation and Geometry of Two-by-Two Contingency Tables. *The Annals of Statistics, 17*(2), 947-947.

Graham, J. R., & Rogers, D. A. (2002). Do firms hedge in response to tax incentives? *Journal of Finance, 57*(2), 815-839.

Graham, J. R., & Smith, C. W. (1999). Tax incentives to hedge. *The Journal of Finance, 54*(6), 2241-2262.

Guay, W., & Kothari, S. P. (2003). How much do firms hedge with derivatives? *Journal of Financial Economics, 70*(3), 423-461.

Guay, W. R. (1999). The impact of derivatives on firm risk: An empirical examination of new derivative users. *Journal of Accounting and Economics, 26*(1), 319-351.

Hagelin, N., & Pramborg, B. (2004). Hedging foreign exchange exposure: risk reduction from transaction and translation hedging. *Journal of International Financial Management & Accounting, 15*(1), 1-20.

Hentschel, L., & Kothari, S. P. (2001). Are corporations reducing or taking risks with derivatives? *Journal of Financial and Quantitative Analysis, 36*(1), 93-118.

Hicks, J. R. (1939). *Value and Capital*. New York: Oxford University Press.

Hsieh, D. A., & Kulatilaka, N. (1982). Rational expectations and risk premia in forward markets: primary metals at the London Metals Exchange. *The Journal of Finance, 37*(5), 1199-1207.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360.

Jin, Y., & Jorion, P. (2006). Firm value and hedging: Evidence from US oil and gas producers. *The Journal of Finance, 61*(2), 893-919.

Judge, A. (2006). Why and how UK firms hedge. *European Financial Management, 12*(3), 407-441.

Júnior, J. L. R., & Laham, J. (2008). The impact of hedging on firm value: evidence from Brazil. *Journal of International Finance & Economics, 8*(1).

Kapitsinas, S. (2008). The impact of derivatives usage on firm value: evidence from Greece.

Keynes, J. M. (1930). *A treatise on money*. London: Macmillan.

Khediri, K. B. (2010). Do investors really value derivatives use? Empirical evidence from France. *The Journal of Risk Finance, 11*(1), 62-74.

Lang, L. H., & Stulz, R. M. (1994). Tobin's q, corporate diversification, and firm performance. *Journal of political economy, 102*(6), 1248-1280.

Leland, H. E. (1998). Agency costs, risk management, and capital structure. *The Journal of Finance, 53*(4), 1213-1243.

Lessard, D. R., & Nohria, N. (2012). Rediscovering Functions in the MNC: The Role of Expertise in the Firm's Responses to Shifting Exchange Rates. *Managing the Global Firm*, 186-212.

Lewis, K. K. (1995). Puzzles in international financial markets. *Handbook of international economics, 3*, 1913-1971.

Li, H., & Mao, C. X. (2003). Corporate use of interest rate swaps: Theory and evidence. *Journal of Banking and Finance, 27*(8), 1511-1538.

Lins, K. V. (2003). Equity ownership and firm value in emerging markets. *Journal of Financial and Quantitative Analysis, 38*(1), 159-184.

Litzenberger, R. H. (1992). Swaps: Plain and fanciful. *The Journal of Finance, 47*(3), 831-851.

Liu, Z., Seow, G. S., & Xie, H. (2011). *Does the Accounting Hedge Ineffectiveness Measure under SFAS 133 Capture the Economic Ineffectiveness of a Firm's Hedging Activities?* Retrieved from

Lookman, A. (2004). *Does hedging increase firm value? Evidence from oil and gas producing firms.* Paper presented at the EFA 2004 Maastricht Meetings, Paper.

Lovell, M. C. (1986). Tests of the rational expectations hypothesis. *The American economic review, 76*(1), 110-124.
Luiz Rossi, J. (2013). Hedging, selective hedging, or speculation? Evidence of the use of derivatives by Brazilian firms during the financial crisis. *Journal of Multinational Financial Management, 23*(5), 415-433.
MacKay, P., & Moeller, S. B. (2007). The value of corporate risk management. *The Journal of Finance, 62*(3), 1379-1419.
Manchiraju, H., Pierce, S., & Sridharan, S. (2014). Do firms use derivatives for hedging or non-hedging purposes? Evidence based on SFAS 161 disclosures. Retrieved from https://ssrn.com/abstract=2417194
Mayers, D., & Smith Jr, C. W. (1982). On the corporate demand for insurance *Foundations of Insurance Economics* (pp. 190-205): Springer.
Merton, R. C. (1973). Theory of rational option pricing. *The Bell Journal of economics and management science*, 141-183.
Merton, R. C. (1976). Option pricing when underlying stock returns are discontinuous. *Journal of Financial Economics, 3*(1-2), 125-144.
Mian, S. L. (1996). Evidence on corporate hedging policy. *Journal of Financial and Quantitative Analysis, 31*(03), 419-439.
Mitra, S., Date, P., Mamon, R., & Wang, I.-C. (2013). Pricing and risk management of interest rate swaps. *European Journal of Operational Research, 228*(1), 102-111.
Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review, 48*(3), 261-297.
Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 147-175.
Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance, 39*(3), 574-592.
Nance, D. R., Smith, C. W., & Smithson, C. W. (1993). On the determinants of corporate hedging. *The Journal of Finance, 48*(1), 267-284.
Nelson, J. M., Moffitt, J. S., & Affleck-Graves, J. (2005). The impact of hedging on the market value of equity. *Journal of Corporate Finance, 11*(5), 851-881.
Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of economic theory, 13*(3), 341-360.
Samant, A. (1996). An empirical study of interest rate swap usage by nonfinancial corporate business. *Journal of Financial Services Research, 10*(1), 43-57.
Saunders, K. T. (1999). The interest rate swap: Theory and evidence. *Journal of Corporate Finance, 5*(1), 55-78.
Servaes, H. (1996). The value of diversification during the conglomerate merger wave. *The Journal of Finance, 51*(4), 1201-1225.
Shanker, L. (2000). An innovative analysis of taxes and corporate hedging. *Journal of Multinational Financial Management, 10*(3-4), 237-255.
Shapiro, A. C., & Titman, S. (1986). An integrated approach to corporate risk management. *The revolution in corporate finance, 3*, 251-265.
Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance, 19*(3), 425-442.
Smith, C. W., Smithson, C. W., & Wakeman, L. M. (1986). *The evolving market for swaps*: Managerial Economics Research Center, Graduate School of Management, University of Rochester.
Smith, C. W., & Stulz, R. M. (1985). The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis, 20*(04), 391-405.
Smith Jr, C. W. (1995). Corporate risk management: Theory and practice. *The Journal of Derivatives, 2*(4), 21-30.

Stulz, R. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics, 26*(1), 3-27.
Stulz, R. M. (1984). Optimal hedging policies. *Journal of Financial and Quantitative Analysis, 19*(02), 127-140.
Stulz, R. M. (1996). Rethinking risk management. *Journal of Applied Corporate Finance, 9*(3), 8-25.
Titman, S. (1992). Interest rate swaps and corporate financing choices. *Journal of Finance, 47*(4), 1503-1516.
Tufano, P. (1996). Who manages risk? An empirical examination of risk management practices in the gold mining industry. *Journal of Finance, 51*(4), 1097-1137.
Turnbull, S. M. (1987). Swaps: a zero sum game? *Financial management*, 15-21.
Vasicek, O. (1977). An equilibrium characterization of the term structure. *Journal of Financial Economics, 5*(2), 177-188.
Wall, L. D. (1989). Interest rate swaps in an agency theoretic model with uncertain interest rates. *Journal of Banking & Finance, 13*(2), 261-270.
Wall, L. D., & Pringle, J. J. (1989). Alternative explanations of interest rate swaps: A theoretical and empirical analysis. *Financial management, 18*(2), 59-73.
Walras, L. (2013). *Elements of pure economics*: Routledge.
Wong, M. F. (2000). The association between SFAS No. 119 derivatives disclosures and the foreign exchange risk exposure of manufacturing firms. *Journal of Accounting Research*, 387-417.
Zhang, H. (2009). Effect of derivative accounting rules on corporate risk-management behavior. *Journal of Accounting and Economics, 47*(3), 244-264.

8 Appendix

Appendix 1: List of companies identified as hedgers, speculators and non-users

Company name	Ticker symbol	TICKER symbol_Year	Hedger/speculator
AALBERTS INDUSTRIES NV	AALB	AALB_2010	Hedger
AALBERTS INDUSTRIES NV	AALB	AALB_2011	Hedger
AALBERTS INDUSTRIES NV	AALB	AALB_2012	Hedger
AALBERTS INDUSTRIES NV	AALB	AALB_2013	Hedger
AALBERTS INDUSTRIES NV	AALB	AALB_2014	Hedger
ACCELL GROUP NV	ACCEL	ACCEL_2010	Hedger
ACCELL GROUP NV	ACCEL	ACCEL_2011	Hedger
ACCELL GROUP NV	ACCEL	ACCEL_2012	Hedger
ACCELL GROUP NV	ACCEL	ACCEL_2013	Hedger
ACCELL GROUP NV	ACCEL	ACCEL_2014	Hedger
ACCSYS TECHNOLOGIES PLC	AXS	AXS_2010	Non-user
ACCSYS TECHNOLOGIES PLC	AXS	AXS_2011	Non-user
ACCSYS TECHNOLOGIES PLC	AXS	AXS_2012	Non-user
ACCSYS TECHNOLOGIES PLC	AXS	AXS_2013	Non-user
ACCSYS TECHNOLOGIES PLC	AXS	AXS_2014	Non-user
AD PEPPER MEDIA INTERNATIONAL NV	APM	APM_2010	Non-user
AD PEPPER MEDIA INTERNATIONAL NV	APM	APM_2011	Non-user
AD PEPPER MEDIA INTERNATIONAL NV	APM	APM_2012	Non-user
AD PEPPER MEDIA INTERNATIONAL NV	APM	APM_2013	Non-user
AD PEPPER MEDIA INTERNATIONAL NV	APM	APM_2014	Non-user
ADVANCED METALLURGICAL GROUP N.V.	AMG	AMG_2010	Hedger
ADVANCED METALLURGICAL GROUP N.V.	AMG	AMG_2011	Hedger
ADVANCED METALLURGICAL GROUP N.V.	AMG	AMG_2012	Hedger
ADVANCED METALLURGICAL GROUP N.V.	AMG	AMG_2013	Hedger
ADVANCED METALLURGICAL GROUP N.V.	AMG	AMG_2014	Hedger
AERCAP HOLDINGS N.V.	AER	AER_2010	Speculator
AERCAP HOLDINGS N.V.	AER	AER_2011	Speculator
AERCAP HOLDINGS N.V.	AER	AER_2012	Speculator
AERCAP HOLDINGS N.V.	AER	AER_2013	Speculator
AERCAP HOLDINGS N.V.	AER	AER_2014	Speculator
AFC AJAX N.V.	AJAX	AJAX_2010	Non-user
AFC AJAX N.V.	AJAX	AJAX_2011	Non-user
AFC AJAX N.V.	AJAX	AJAX_2012	Non-user
AFC AJAX N.V.	AJAX	AJAX_2013	Non-user
AFC AJAX N.V.	AJAX	AJAX_2014	Non-user
AFFIMED N.V.	AFMD	AFMD_2012	Non-user
AFFIMED N.V.	AFMD	AFMD_2013	Non-user
AFFIMED N.V.	AFMD	AFMD_2014	Non-user
AIRBUS GROUP SE	AIR	AIR_2010	Speculator

AIRBUS GROUP SE	AIR	AIR_2011	Speculator
AIRBUS GROUP SE	AIR	AIR_2012	Speculator
AIRBUS GROUP SE	AIR	AIR_2013	Speculator
AIRBUS GROUP SE	AIR	AIR_2014	Speculator
AKZO NOBEL NV	AKZA	AKZA_2010	Hedger
AKZO NOBEL NV	AKZA	AKZA_2011	Non-user
AKZO NOBEL NV	AKZA	AKZA_2012	Non-user
AKZO NOBEL NV	AKZA	AKZA_2013	Non-user
AKZO NOBEL NV	AKZA	AKZA_2014	Non-user
ALTICE N.V.	ATC	ATC_2010	Non-user
ALTICE N.V.	ATC	ATC_2011	Speculator
ALTICE N.V.	ATC	ATC_2012	Speculator
ALTICE N.V.	ATC	ATC_2013	Speculator
ALTICE N.V.	ATC	ATC_2014	Non-user
AMATHEON AGRI HOLDING N.V.	MLAAH	MLAAH_2014	Non-user
AMSTERDAM COMMODITIES N.V.	ACOMO	ACOMO_2010	Non-user
AMSTERDAM COMMODITIES N.V.	ACOMO	ACOMO_2011	Hedger
AMSTERDAM COMMODITIES N.V.	ACOMO	ACOMO_2012	Hedger
AMSTERDAM COMMODITIES N.V.	ACOMO	ACOMO_2013	Non-user
AMSTERDAM COMMODITIES N.V.	ACOMO	ACOMO_2014	Non-user
AND INTERNATIONAL PUBLISHERS N.V.	AND	AND_2010	Non-user
AND INTERNATIONAL PUBLISHERS N.V.	AND	AND_2011	Non-user
AND INTERNATIONAL PUBLISHERS N.V.	AND	AND_2012	Non-user
AND INTERNATIONAL PUBLISHERS N.V.	AND	AND_2014	Non-user
APERAM SA	APAM	APAM_2010	Hedger
APERAM SA	APAM	APAM_2011	Hedger
APERAM SA	APAM	APAM_2012	Hedger
APERAM SA	APAM	APAM_2013	Hedger
APERAM SA	APAM	APAM_2014	Hedger
ARCADIS NV	ARCAD	ARCAD_2010	Hedger
ARCADIS NV	ARCAD	ARCAD_2011	Hedger
ARCADIS NV	ARCAD	ARCAD_2012	Hedger
ARCADIS NV	ARCAD	ARCAD_2013	Hedger
ARCADIS NV	ARCAD	ARCAD_2014	Hedger
ARCELORMITTAL S.A.	MT	MT_2010	Speculator
ARCELORMITTAL S.A.	MT	MT_2011	Speculator
ARCELORMITTAL S.A.	MT	MT_2012	Speculator
ARCELORMITTAL S.A.	MT	MT_2013	Speculator
ARCELORMITTAL S.A.	MT	MT_2014	Speculator
ARGEN-X N.V.	ARGX	ARGX_2012	Non-user
ARGEN-X N.V.	ARGX	ARGX_2013	Non-user
ARGEN-X N.V.	ARGX	ARGX_2014	Non-user
ASM INTERNATIONAL NV	ASM	ASM_2010	Non-user
ASM INTERNATIONAL NV	ASM	ASM_2011	Non-user
ASM INTERNATIONAL NV	ASM	ASM_2012	Non-user

ASM INTERNATIONAL NV	ASM	ASM_2013	Non-user
ASM INTERNATIONAL NV	ASM	ASM_2014	Non-user
ASML HOLDING N.V.	ASML	ASML_2010	Hedger
ASML HOLDING N.V.	ASML	ASML_2011	Hedger
ASML HOLDING N.V.	ASML	ASML_2012	Hedger
ASML HOLDING N.V.	ASML	ASML_2013	Hedger
ASML HOLDING N.V.	ASML	ASML_2014	Hedger
ASTARTA HOLDING N.V.	AST	AST_2010	Non-user
ASTARTA HOLDING N.V.	AST	AST_2011	Non-user
ASTARTA HOLDING N.V.	AST	AST_2012	Non-user
ASTARTA HOLDING N.V.	AST	AST_2013	Non-user
ASTARTA HOLDING N.V.	AST	AST_2014	Non-user
BE SEMICONDUCTOR INDUSTRIES NV	BESI	BESI_2010	Non-user
BE SEMICONDUCTOR INDUSTRIES NV	BESI	BESI_2011	Non-user
BE SEMICONDUCTOR INDUSTRIES NV	BESI	BESI_2012	Non-user
BE SEMICONDUCTOR INDUSTRIES NV	BESI	BESI_2013	Non-user
BE SEMICONDUCTOR INDUSTRIES NV	BESI	BESI_2014	Non-user
BETER BED HOLDING NV	BBED	BBED_2010	Non-user
BETER BED HOLDING NV	BBED	BBED_2011	Non-user
BETER BED HOLDING NV	BBED	BBED_2012	Non-user
BETER BED HOLDING NV	BBED	BBED_2013	Non-user
BETER BED HOLDING NV	BBED	BBED_2014	Non-user
BRUNEL INTERNATIONAL NV	BRNL	BRNL_2010	Non-user
BRUNEL INTERNATIONAL NV	BRNL	BRNL_2011	Non-user
BRUNEL INTERNATIONAL NV	BRNL	BRNL_2012	Non-user
BRUNEL INTERNATIONAL NV	BRNL	BRNL_2013	Non-user
BRUNEL INTERNATIONAL NV	BRNL	BRNL_2014	Non-user
C/TAC NV	CTAC	CTAC_2010	Non-user
C/TAC NV	CTAC	CTAC_2011	Non-user
C/TAC NV	CTAC	CTAC_2012	Non-user
C/TAC NV	CTAC	CTAC_2013	Non-user
C/TAC NV	CTAC	CTAC_2014	Non-user
CATALIS S.E.	XAE2	XAE2_2010	Non-user
CATALIS S.E.	XAE2	XAE2_2011	Non-user
CATALIS S.E.	XAE2	XAE2_2012	Non-user
CATALIS S.E.	XAE2	XAE2_2013	Non-user
CATALIS S.E.	XAE2	XAE2_2014	Non-user
CIMPRESS N.V.	CMPR	CMPR_2010	Non-user
CIMPRESS N.V.	CMPR	CMPR_2011	Non-user
CIMPRESS N.V.	CMPR	CMPR_2012	Hedger
CIMPRESS N.V.	CMPR	CMPR_2013	Hedger
CIMPRESS N.V.	CMPR	CMPR_2014	Hedger
CNH INDUSTRIAL N.V.	CNHI	CNHI_2010	Speculator
CNH INDUSTRIAL N.V.	CNHI	CNHI_2011	Speculator
CNH INDUSTRIAL N.V.	CNHI	CNHI_2012	Speculator

CNH INDUSTRIAL N.V.	CNHI	CNHI_2013	Speculator
CNH INDUSTRIAL N.V.	CNHI	CNHI_2014	Speculator
CNOVA N.V.	CNV	CNV_2011	Non-user
CNOVA N.V.	CNV	CNV_2012	Non-user
CNOVA N.V.	CNV	CNV_2013	Non-user
CNOVA N.V.	CNV	CNV_2014	Non-user
COCA-COLA EUROPEAN PARTNERS PLC	CCE	CCE_2010	Non-user
COCA-COLA EUROPEAN PARTNERS PLC	CCE	CCE_2011	Non-user
COCA-COLA EUROPEAN PARTNERS PLC	CCE	CCE_2012	Non-user
COCA-COLA EUROPEAN PARTNERS PLC	CCE	CCE_2013	Hedger
COCA-COLA EUROPEAN PARTNERS PLC	CCE	CCE_2014	Hedger
COMPAGNIE DE SAINT GOBAIN SA	SGO	SGO_2010	Speculator
COMPAGNIE DE SAINT GOBAIN SA	SGO	SGO_2011	Speculator
COMPAGNIE DE SAINT GOBAIN SA	SGO	SGO_2012	Speculator
COMPAGNIE DE SAINT GOBAIN SA	SGO	SGO_2013	Hedger
COMPAGNIE DE SAINT GOBAIN SA	SGO	SGO_2014	Hedger
CONSTELLIUM N.V.	CSTM	CSTM_2011	Non-user
CONSTELLIUM N.V.	CSTM	CSTM_2012	Non-user
CONSTELLIUM N.V.	CSTM	CSTM_2013	Non-user
CONSTELLIUM N.V.	CSTM	CSTM_2014	Non-user
CORBION N.V.	CRBN	CRBN_2010	Speculator
CORBION N.V.	CRBN	CRBN_2011	Speculator
CORBION N.V.	CRBN	CRBN_2012	Speculator
CORBION N.V.	CRBN	CRBN_2013	Speculator
CORBION N.V.	CRBN	CRBN_2014	Non-user
CURETIS N.V.	CURE	CURE_2012	Non-user
CURETIS N.V.	CURE	CURE_2013	Non-user
CURETIS N.V.	CURE	CURE_2014	Non-user
DOCDATA N.V.	DOCD	DOCD_2010	Non-user
DOCDATA N.V.	DOCD	DOCD_2011	Non-user
DOCDATA N.V.	DOCD	DOCD_2012	Non-user
DOCDATA N.V.	DOCD	DOCD_2013	Non-user
DOCDATA N.V.	DOCD	DOCD_2014	Non-user
DPA GROUP N.V.	DPA	DPA_2010	Non-user
DPA GROUP N.V.	DPA	DPA_2011	Non-user
DPA GROUP N.V.	DPA	DPA_2012	Non-user
DPA GROUP N.V.	DPA	DPA_2013	Non-user
DPA GROUP N.V.	DPA	DPA_2014	Non-user
ENVIPCO HOLDING N.V.	ENVI	ENVI_2010	Hedger
ENVIPCO HOLDING N.V.	ENVI	ENVI_2011	Hedger
ENVIPCO HOLDING N.V.	ENVI	ENVI_2012	Hedger
ENVIPCO HOLDING N.V.	ENVI	ENVI_2013	Hedger
ENVIPCO HOLDING N.V.	ENVI	ENVI_2014	Hedger
ESPERITE N.V.	ESP	ESP_2010	Non-user
ESPERITE N.V.	ESP	ESP_2011	Non-user

ESPERITE N.V.	ESP	ESP_2012	Non-user
ESPERITE N.V.	ESP	ESP_2013	Non-user
ESPERITE N.V.	ESP	ESP_2014	Non-user
FAGRON NV	FAGR	FAGR_2010	Non-user
FAGRON NV	FAGR	FAGR_2011	Non-user
FAGRON NV	FAGR	FAGR_2012	Non-user
FAGRON NV	FAGR	FAGR_2013	Non-user
FAGRON NV	FAGR	FAGR_2014	Non-user
FERRARI N.V.	RACE	RACE_2012	Non-user
FERRARI N.V.	RACE	RACE_2013	Non-user
FERRARI N.V.	RACE	RACE_2014	Non-user
FIAT CHRYSLER AUTOMOBILES N.V.	FCAU	FCAU_2010	Speculator
FIAT CHRYSLER AUTOMOBILES N.V.	FCAU	FCAU_2011	Speculator
FIAT CHRYSLER AUTOMOBILES N.V.	FCAU	FCAU_2012	Speculator
FIAT CHRYSLER AUTOMOBILES N.V.	FCAU	FCAU_2013	Speculator
FIAT CHRYSLER AUTOMOBILES N.V.	FCAU	FCAU_2014	Speculator
FORFARMERS N.V.	FFARM	FFARM_2013	Hedger
FORFARMERS N.V.	FFARM	FFARM_2014	Hedger
FORTUNA ENTERTAINMENT GROUP N.V.	FOREG	FOREG_2010	Speculator
FORTUNA ENTERTAINMENT GROUP N.V.	FOREG	FOREG_2011	Speculator
FORTUNA ENTERTAINMENT GROUP N.V.	FOREG	FOREG_2012	Speculator
FORTUNA ENTERTAINMENT GROUP N.V.	FOREG	FOREG_2013	Speculator
FORTUNA ENTERTAINMENT GROUP N.V.	FOREG	FOREG_2014	Hedger
FRANK'S INTERNATIONAL N.V.	FI	FI_2010	Non-user
FRANK'S INTERNATIONAL N.V.	FI	FI_2011	Non-user
FRANK'S INTERNATIONAL N.V.	FI	FI_2012	Non-user
FRANK'S INTERNATIONAL N.V.	FI	FI_2013	Non-user
FRANK'S INTERNATIONAL N.V.	FI	FI_2014	Non-user
FUGRO NV	FUR	FUR_2010	Hedger
FUGRO NV	FUR	FUR_2011	Hedger
FUGRO NV	FUR	FUR_2012	Hedger
FUGRO NV	FUR	FUR_2013	Hedger
FUGRO NV	FUR	FUR_2014	Hedger
FUNCOM N.V.	FUNCOM	FUN-COM_2010	Non-user
FUNCOM N.V.	FUNCOM	FUN-COM_2011	Non-user
FUNCOM N.V.	FUNCOM	FUN-COM_2012	Non-user
FUNCOM N.V.	FUNCOM	FUN-COM_2013	Non-user
FUNCOM N.V.	FUNCOM	FUN-COM_2014	Non-user
GALAPAGOS N.V.	GLPG	GLPG_2010	Non-user
GALAPAGOS N.V.	GLPG	GLPG_2011	Non-user
GALAPAGOS N.V.	GLPG	GLPG_2012	Non-user
GALAPAGOS N.V.	GLPG	GLPG_2013	Non-user
GALAPAGOS N.V.	GLPG	GLPG_2014	Non-user

GEMALTO N.V.	GTO	GTO_2010	Non-user
GEMALTO N.V.	GTO	GTO_2011	Non-user
GEMALTO N.V.	GTO	GTO_2012	Non-user
GEMALTO N.V.	GTO	GTO_2013	Non-user
GEMALTO N.V.	GTO	GTO_2014	Non-user
GRANDVISION N.V	GVNV	GVNV_2012	Hedger
GRANDVISION N.V	GVNV	GVNV_2013	Hedger
GRANDVISION N.V	GVNV	GVNV_2014	Hedger
HEADFIRST SOURCE GROUP	HFS	HFS_2010	Non-user
HEADFIRST SOURCE GROUP	HFS	HFS_2011	Non-user
HEADFIRST SOURCE GROUP	HFS	HFS_2012	Non-user
HEADFIRST SOURCE GROUP	HFS	HFS_2013	Non-user
HEADFIRST SOURCE GROUP	HFS	HFS_2014	Non-user
HEIJMANS NV	HEIJM	HEIJM_2010	Speculator
HEIJMANS NV	HEIJM	HEIJM_2011	Speculator
HEIJMANS NV	HEIJM	HEIJM_2012	Speculator
HEIJMANS NV	HEIJM	HEIJM_2013	Speculator
HEIJMANS NV	HEIJM	HEIJM_2014	Speculator
HEINEKEN NV	HEIA	HEIA_2010	Hedger
HEINEKEN NV	HEIA	HEIA_2011	Hedger
HEINEKEN NV	HEIA	HEIA_2012	Hedger
HEINEKEN NV	HEIA	HEIA_2013	Hedger
HEINEKEN NV	HEIA	HEIA_2014	Hedger
HOLLAND COLOURS NV	HOLCO	HOLCO_2010	Hedger
HOLLAND COLOURS NV	HOLCO	HOLCO_2011	Hedger
HOLLAND COLOURS NV	HOLCO	HOLCO_2012	Hedger
HOLLAND COLOURS NV	HOLCO	HOLCO_2013	Hedger
HOLLAND COLOURS NV	HOLCO	HOLCO_2014	Hedger
HUNTER DOUGLAS N.V.	HDG	HDG_2010	Speculator
HUNTER DOUGLAS N.V.	HDG	HDG_2011	Speculator
HUNTER DOUGLAS N.V.	HDG	HDG_2012	Speculator
HUNTER DOUGLAS N.V.	HDG	HDG_2013	Speculator
HUNTER DOUGLAS N.V.	HDG	HDG_2014	Speculator
HYDRATEC INDUSTRIES N.V.	HYDRA	HYDRA_2010	Hedger
HYDRATEC INDUSTRIES N.V.	HYDRA	HYDRA_2011	Hedger
HYDRATEC INDUSTRIES N.V.	HYDRA	HYDRA_2012	Hedger
HYDRATEC INDUSTRIES N.V.	HYDRA	HYDRA_2013	Hedger
HYDRATEC INDUSTRIES N.V.	HYDRA	HYDRA_2014	Hedger
ICHORCOAL N.V.	IO0	IO0_2012	Non-user
ICHORCOAL N.V.	IO0	IO0_2013	Non-user
ICHORCOAL N.V.	IO0	IO0_2014	Non-user
ICT GROUP N.V.	ICT	ICT_2010	Non-user
ICT GROUP N.V.	ICT	ICT_2011	Non-user
ICT GROUP N.V.	ICT	ICT_2012	Non-user
ICT GROUP N.V.	ICT	ICT_2013	Non-user

ICT GROUP N.V.	ICT	ICT_2014	Non-user
ICTS INTERNATIONAL N.V.	ICTSF	ICTSF_2010	Non-user
ICTS INTERNATIONAL N.V.	ICTSF	ICTSF_2011	Non-user
ICTS INTERNATIONAL N.V.	ICTSF	ICTSF_2012	Non-user
ICTS INTERNATIONAL N.V.	ICTSF	ICTSF_2013	Non-user
ICTS INTERNATIONAL N.V.	ICTSF	ICTSF_2014	Non-user
IMCD N.V.	IMCD	IMCD_2012	Hedger
IMCD N.V.	IMCD	IMCD_2013	Hedger
IMCD N.V.	IMCD	IMCD_2014	Hedger
INTERXION HOLDING N.V.	INXN	INXN_2010	Hedger
INTERXION HOLDING N.V.	INXN	INXN_2011	Hedger
INTERXION HOLDING N.V.	INXN	INXN_2012	Hedger
INTERXION HOLDING N.V.	INXN	INXN_2013	Hedger
INTERXION HOLDING N.V.	INXN	INXN_2014	Hedger
INVERKO N.V.	INVER	INVER_2010	Non-user
INVERKO N.V.	INVER	INVER_2011	Non-user
INVERKO N.V.	INVER	INVER_2012	Non-user
INVERKO N.V.	INVER	INVER_2013	Non-user
INVERKO N.V.	INVER	INVER_2014	Non-user
JUBII EUROPE N.V.	LCY	LCY_2010	Non-user
JUBII EUROPE N.V.	LCY	LCY_2011	Non-user
JUBII EUROPE N.V.	LCY	LCY_2012	Non-user
JUBII EUROPE N.V.	LCY	LCY_2013	Non-user
JUBII EUROPE N.V.	LCY	LCY_2014	Non-user
KENDRION N.V.	KENDR	KENDR_2010	Non-user
KENDRION N.V.	KENDR	KENDR_2011	Hedger
KENDRION N.V.	KENDR	KENDR_2012	Hedger
KENDRION N.V.	KENDR	KENDR_2013	Hedger
KENDRION N.V.	KENDR	KENDR_2014	Hedger
KIMBERLY ENTERPRISES N.V.	KBE	KBE_2010	Non-user
KIMBERLY ENTERPRISES N.V.	KBE	KBE_2011	Non-user
KIMBERLY ENTERPRISES N.V.	KBE	KBE_2012	Non-user
KIMBERLY ENTERPRISES N.V.	KBE	KBE_2013	Non-user
KIMBERLY ENTERPRISES N.V.	KBE	KBE_2014	Non-user
KONINKLIJKE AHOLD DELHAIZE N.V.	AD	AD_2010	Speculator
KONINKLIJKE AHOLD DELHAIZE N.V.	AD	AD_2011	Speculator
KONINKLIJKE AHOLD DELHAIZE N.V.	AD	AD_2012	Speculator
KONINKLIJKE AHOLD DELHAIZE N.V.	AD	AD_2013	Speculator
KONINKLIJKE AHOLD DELHAIZE N.V.	AD	AD_2014	Speculator
KONINKLIJKE BAM GROEP NV	BAMNB	BAMNB_2010	Hedger
KONINKLIJKE BAM GROEP NV	BAMNB	BAMNB_2011	Hedger
KONINKLIJKE BAM GROEP NV	BAMNB	BAMNB_2012	Hedger
KONINKLIJKE BAM GROEP NV	BAMNB	BAMNB_2013	Hedger
KONINKLIJKE BAM GROEP NV	BAMNB	BAMNB_2014	Hedger
KONINKLIJKE BOSKALIS WESTMINSTER NV	BOKA	BOKA_2010	Hedger

KONINKLIJKE BOSKALIS WESTMINSTER NV	BOKA	BOKA_2011	Hedger
KONINKLIJKE BOSKALIS WESTMINSTER NV	BOKA	BOKA_2012	Hedger
KONINKLIJKE BOSKALIS WESTMINSTER NV	BOKA	BOKA_2013	Hedger
KONINKLIJKE BOSKALIS WESTMINSTER NV	BOKA	BOKA_2014	Hedger
KONINKLIJKE BRILL NV	BRILL	BRILL_2010	Non-user
KONINKLIJKE BRILL NV	BRILL	BRILL_2011	Non-user
KONINKLIJKE BRILL NV	BRILL	BRILL_2012	Non-user
KONINKLIJKE BRILL NV	BRILL	BRILL_2013	Non-user
KONINKLIJKE BRILL NV	BRILL	BRILL_2014	Non-user
KONINKLIJKE DSM N.V.	DSM	DSM_2010	Hedger
KONINKLIJKE DSM N.V.	DSM	DSM_2011	Hedger
KONINKLIJKE DSM N.V.	DSM	DSM_2012	Hedger
KONINKLIJKE DSM N.V.	DSM	DSM_2013	Hedger
KONINKLIJKE DSM N.V.	DSM	DSM_2014	Hedger
KONINKLIJKE KPN NV	KPN	KPN_2010	Hedger
KONINKLIJKE KPN NV	KPN	KPN_2011	Speculator
KONINKLIJKE KPN NV	KPN	KPN_2012	Speculator
KONINKLIJKE KPN NV	KPN	KPN_2013	Speculator
KONINKLIJKE KPN NV	KPN	KPN_2014	Speculator
KONINKLIJKE PHILIPS N.V.	PHIA	PHIA_2010	Hedger
KONINKLIJKE PHILIPS N.V.	PHIA	PHIA_2011	Hedger
KONINKLIJKE PHILIPS N.V.	PHIA	PHIA_2012	Hedger
KONINKLIJKE PHILIPS N.V.	PHIA	PHIA_2013	Hedger
KONINKLIJKE PHILIPS N.V.	PHIA	PHIA_2014	Hedger
KONINKLIJKE VOPAK N.V.	VPK	VPK_2010	Speculator
KONINKLIJKE VOPAK N.V.	VPK	VPK_2011	Speculator
KONINKLIJKE VOPAK N.V.	VPK	VPK_2012	Speculator
KONINKLIJKE VOPAK N.V.	VPK	VPK_2013	Speculator
KONINKLIJKE VOPAK N.V.	VPK	VPK_2014	Speculator
LASTMINUTE.COM N.V.	LMN	LMN_2012	Non-user
LASTMINUTE.COM N.V.	LMN	LMN_2013	Non-user
LASTMINUTE.COM N.V.	LMN	LMN_2014	Non-user
LAVIDE HOLDING N.V.	LVIDE	LVIDE_2010	Non-user
LAVIDE HOLDING N.V.	LVIDE	LVIDE_2011	Non-user
LAVIDE HOLDING N.V.	LVIDE	LVIDE_2012	Non-user
LAVIDE HOLDING N.V.	LVIDE	LVIDE_2013	Non-user
LAVIDE HOLDING N.V.	LVIDE	LVIDE_2014	Non-user
LUCAS BOLS N.V	BOLS	BOLS_2012	Speculator
LUCAS BOLS N.V	BOLS	BOLS_2013	Speculator
LUCAS BOLS N.V	BOLS	BOLS_2014	Speculator
MACINTOSH RETAIL GROUP NV	MACIN	MACIN_2010	Hedger
MACINTOSH RETAIL GROUP NV	MACIN	MACIN_2011	Hedger
MACINTOSH RETAIL GROUP NV	MACIN	MACIN_2012	Hedger
MACINTOSH RETAIL GROUP NV	MACIN	MACIN_2013	Hedger
MACINTOSH RETAIL GROUP NV	MACIN	MACIN_2014	Hedger

MERUS N.V.	MRUS	MRUS_2010	Non-user
MERUS N.V.	MRUS	MRUS_2011	Non-user
MERUS N.V.	MRUS	MRUS_2012	Non-user
MERUS N.V.	MRUS	MRUS_2013	Non-user
MERUS N.V.	MRUS	MRUS_2014	Non-user
MILKILAND N.V.	MLK	MLK_2010	Non-user
MILKILAND N.V.	MLK	MLK_2011	Non-user
MILKILAND N.V.	MLK	MLK_2012	Non-user
MILKILAND N.V.	MLK	MLK_2013	Non-user
MILKILAND N.V.	MLK	MLK_2014	Non-user
MOBILEYE N.V.	MBLY	MBLY_2012	Non-user
MOBILEYE N.V.	MBLY	MBLY_2013	Non-user
MOBILEYE N.V.	MBLY	MBLY_2014	Non-user
MYLAN N.V.	MYL	MYL_2010	Hedger
MYLAN N.V.	MYL	MYL_2011	Hedger
MYLAN N.V.	MYL	MYL_2012	Hedger
MYLAN N.V.	MYL	MYL_2013	Non-user
MYLAN N.V.	MYL	MYL_2014	Non-user
N.V. KONINKLIJKE PORCELEYNE FLES	PORF	PORF_2010	Non-user
N.V. KONINKLIJKE PORCELEYNE FLES	PORF	PORF_2011	Non-user
N.V. KONINKLIJKE PORCELEYNE FLES	PORF	PORF_2012	Non-user
N.V. KONINKLIJKE PORCELEYNE FLES	PORF	PORF_2013	Non-user
N.V. KONINKLIJKE PORCELEYNE FLES	PORF	PORF_2014	Non-user
NAVIGATOR EQUITY SOLUTIONS SE	NUQA	NUQA_2010	Non-user
NAVIGATOR EQUITY SOLUTIONS SE	NUQA	NUQA_2011	Non-user
NAVIGATOR EQUITY SOLUTIONS SE	NUQA	NUQA_2012	Non-user
NAVIGATOR EQUITY SOLUTIONS SE	NUQA	NUQA_2013	Non-user
NAVIGATOR EQUITY SOLUTIONS SE	NUQA	NUQA_2014	Non-user
NEDERLANDSCHE APPARATENFABRIEK 'NEDAP' N.V.	NEDAP	NEDAP_2010	Speculator
NEDERLANDSCHE APPARATENFABRIEK 'NEDAP' N.V.	NEDAP	NEDAP_2011	Speculator
NEDERLANDSCHE APPARATENFABRIEK 'NEDAP' N.V.	NEDAP	NEDAP_2012	Speculator
NEDERLANDSCHE APPARATENFABRIEK 'NEDAP' N.V.	NEDAP	NEDAP_2013	Speculator
NEDERLANDSCHE APPARATENFABRIEK 'NEDAP' N.V.	NEDAP	NEDAP_2014	Speculator
NEDSENSE ENTERPRISES N.V.	NEDSE	NEDSE_2010	Non-user
NEDSENSE ENTERPRISES N.V.	NEDSE	NEDSE_2011	Non-user
NEDSENSE ENTERPRISES N.V.	NEDSE	NEDSE_2012	Non-user
NEDSENSE ENTERPRISES N.V.	NEDSE	NEDSE_2013	Non-user
NEDSENSE ENTERPRISES N.V.	NEDSE	NEDSE_2014	Non-user
NEWAYS ELECTRONICS INTERNATIONAL NV	NEWAY	NEWAY_2010	Non-user
NEWAYS ELECTRONICS INTERNATIONAL NV	NEWAY	NEWAY_2011	Non-user
NEWAYS ELECTRONICS INTERNATIONAL NV	NEWAY	NEWAY_2012	Non-user
NEWAYS ELECTRONICS INTERNATIONAL NV	NEWAY	NEWAY_2013	Non-user
NEWAYS ELECTRONICS INTERNATIONAL NV	NEWAY	NEWAY_2014	Non-user

NXP SEMICONDUCTORS N.V.	NXPI	NXPI_2010	Non-user
NXP SEMICONDUCTORS N.V.	NXPI	NXPI_2011	Non-user
NXP SEMICONDUCTORS N.V.	NXPI	NXPI_2012	Non-user
NXP SEMICONDUCTORS N.V.	NXPI	NXPI_2013	Non-user
NXP SEMICONDUCTORS N.V.	NXPI	NXPI_2014	Non-user
OCI N.V	OCI	OCI_2010	Non-user
OCI N.V	OCI	OCI_2011	Non-user
OCI N.V	OCI	OCI_2012	Speculator
OCI N.V	OCI	OCI_2013	Speculator
OCI N.V	OCI	OCI_2014	Speculator
ORANJEWOUD N.V.	ORANW	ORANW_2010	Speculator
ORANJEWOUD N.V.	ORANW	ORANW_2011	Speculator
ORANJEWOUD N.V.	ORANW	ORANW_2012	Speculator
ORANJEWOUD N.V.	ORANW	ORANW_2013	Speculator
ORANJEWOUD N.V.	ORANW	ORANW_2014	Speculator
ORDINA NV	ORDI	ORDI_2010	Hedger
ORDINA NV	ORDI	ORDI_2011	Hedger
ORDINA NV	ORDI	ORDI_2012	Hedger
ORDINA NV	ORDI	ORDI_2013	Hedger
ORDINA NV	ORDI	ORDI_2014	Hedger
PEIXIN INTERNATIONAL GROUP N.V.	PEX	PEX_2010	Non-user
PEIXIN INTERNATIONAL GROUP N.V.	PEX	PEX_2011	Non-user
PEIXIN INTERNATIONAL GROUP N.V.	PEX	PEX_2012	Non-user
PEIXIN INTERNATIONAL GROUP N.V.	PEX	PEX_2013	Non-user
PEIXIN INTERNATIONAL GROUP N.V.	PEX	PEX_2014	Non-user
PHARMING GROUP NV	PHARM	PHARM_2010	Non-user
PHARMING GROUP NV	PHARM	PHARM_2011	Non-user
PHARMING GROUP NV	PHARM	PHARM_2012	Non-user
PHARMING GROUP NV	PHARM	PHARM_2013	Non-user
PHARMING GROUP NV	PHARM	PHARM_2014	Non-user
PHOTON ENERGY N.V.	PEN	PEN_2011	Speculator
PHOTON ENERGY N.V.	PEN	PEN_2012	Speculator
PHOTON ENERGY N.V.	PEN	PEN_2013	Speculator
PHOTON ENERGY N.V.	PEN	PEN_2014	Speculator
POSTNL N.V.	PNL	PNL_2010	Hedger
POSTNL N.V.	PNL	PNL_2011	Hedger
POSTNL N.V.	PNL	PNL_2012	Hedger
POSTNL N.V.	PNL	PNL_2013	Hedger
POSTNL N.V.	PNL	PNL_2014	Hedger
PROBIODRUG AG	PBD	PBD_2010	Non-user
PROBIODRUG AG	PBD	PBD_2011	Non-user
PROBIODRUG AG	PBD	PBD_2012	Non-user
PROBIODRUG AG	PBD	PBD_2013	Non-user
PROBIODRUG AG	PBD	PBD_2014	Non-user
PROQR THERAPEUTICS N.V.	PRQR	PRQR_2012	Non-user

PROQR THERAPEUTICS N.V.	PRQR	PRQR_2013	Non-user
PROQR THERAPEUTICS N.V.	PRQR	PRQR_2014	Non-user
QIAGEN NV	QIA	QIA_2010	Hedger
QIAGEN NV	QIA	QIA_2011	Hedger
QIAGEN NV	QIA	QIA_2012	Non-user
QIAGEN NV	QIA	QIA_2013	Non-user
QIAGEN NV	QIA	QIA_2014	Hedger
RANDSTAD HOLDING NV	RAND	RAND_2010	Non-user
RANDSTAD HOLDING NV	RAND	RAND_2011	Non-user
RANDSTAD HOLDING NV	RAND	RAND_2012	Non-user
RANDSTAD HOLDING NV	RAND	RAND_2013	Non-user
RANDSTAD HOLDING NV	RAND	RAND_2014	Non-user
RELX NV	REN	REN_2010	Speculator
RELX NV	REN	REN_2011	Speculator
RELX NV	REN	REN_2012	Speculator
RELX NV	REN	REN_2013	Speculator
RELX NV	REN	REN_2014	Speculator
ROODMICROTEC N.V.	ROOD	ROOD_2010	Hedger
ROODMICROTEC N.V.	ROOD	ROOD_2011	Hedger
ROODMICROTEC N.V.	ROOD	ROOD_2012	Hedger
ROODMICROTEC N.V.	ROOD	ROOD_2013	Hedger
ROODMICROTEC N.V.	ROOD	ROOD_2014	Non-user
ROYAL DUTCH SHELL PLC	RDSB	RDSB_2010	Hedger
ROYAL DUTCH SHELL PLC	RDSB	RDSB_2011	Hedger
ROYAL DUTCH SHELL PLC	RDSB	RDSB_2012	Hedger
ROYAL DUTCH SHELL PLC	RDSB	RDSB_2013	Hedger
ROYAL DUTCH SHELL PLC	RDSB	RDSB_2014	Hedger
ROYAL IMTECH N.V.	IM	IM_2010	Hedger
ROYAL IMTECH N.V.	IM	IM_2011	Hedger
ROYAL IMTECH N.V.	IM	IM_2012	Hedger
ROYAL IMTECH N.V.	IM	IM_2013	Hedger
ROYAL IMTECH N.V.	IM	IM_2014	Hedger
SBM OFFSHORE N.V.	SBMO	SBMO_2010	Hedger
SBM OFFSHORE N.V.	SBMO	SBMO_2011	Hedger
SBM OFFSHORE N.V.	SBMO	SBMO_2012	Hedger
SBM OFFSHORE N.V.	SBMO	SBMO_2013	Hedger
SBM OFFSHORE N.V.	SBMO	SBMO_2014	Hedger
SENSATA TECHNOLOGIES HOLDING N.V.	ST	ST_2010	Hedger
SENSATA TECHNOLOGIES HOLDING N.V.	ST	ST_2011	Non-user
SENSATA TECHNOLOGIES HOLDING N.V.	ST	ST_2012	Non-user
SENSATA TECHNOLOGIES HOLDING N.V.	ST	ST_2013	Non-user
SENSATA TECHNOLOGIES HOLDING N.V.	ST	ST_2014	Non-user
SEQUA PETROLEUM NV	MLSEQ	MLSEQ_2013	Non-user
SEQUA PETROLEUM NV	MLSEQ	MLSEQ_2014	Non-user
SIF HOLDING N.V.	SIFG	SIFG_2011	Non-user

SIF HOLDING N.V.	SIFG	SIFG_2012	Non-user
SIF HOLDING N.V.	SIFG	SIFG_2014	Non-user
SLIGRO FOOD GROUP N.V.	SLIGR	SLIGR_2010	Hedger
SLIGRO FOOD GROUP N.V.	SLIGR	SLIGR_2011	Hedger
SLIGRO FOOD GROUP N.V.	SLIGR	SLIGR_2012	Hedger
SLIGRO FOOD GROUP N.V.	SLIGR	SLIGR_2013	Hedger
SLIGRO FOOD GROUP N.V.	SLIGR	SLIGR_2014	Non-user
SNOWWORLD N.V.	SNOW	SNOW_2010	Non-user
SNOWWORLD N.V.	SNOW	SNOW_2011	Hedger
SNOWWORLD N.V.	SNOW	SNOW_2012	Hedger
SNOWWORLD N.V.	SNOW	SNOW_2013	Hedger
SNOWWORLD N.V.	SNOW	SNOW_2014	Hedger
SPYKER N.V.	SPYKR	SPYKR_2013	Non-user
SPYKER N.V.	SPYKR	SPYKR_2014	Non-user
STERN GROEP N.V.	STRN	STRN_2010	Hedger
STERN GROEP N.V.	STRN	STRN_2011	Hedger
STERN GROEP N.V.	STRN	STRN_2012	Hedger
STERN GROEP N.V.	STRN	STRN_2013	Hedger
STERN GROEP N.V.	STRN	STRN_2014	Hedger
STMICROELECTRONICS N.V.	STM	STM_2010	Non-user
STMICROELECTRONICS N.V.	STM	STM_2011	Non-user
STMICROELECTRONICS N.V.	STM	STM_2012	Non-user
STMICROELECTRONICS N.V.	STM	STM_2013	Non-user
STMICROELECTRONICS N.V.	STM	STM_2014	Non-user
SUMMUS SOLUTIONS N.V.	SS	SS_2010	Non-user
SUMMUS SOLUTIONS N.V.	SS	SS_2011	Non-user
SUMMUS SOLUTIONS N.V.	SS	SS_2012	Non-user
SUMMUS SOLUTIONS N.V.	SS	SS_2013	Non-user
SUMMUS SOLUTIONS N.V.	SS	SS_2014	Non-user
TELEGRAAF MEDIA GROEP N.V.	TMG	TMG_2010	Non-user
TELEGRAAF MEDIA GROEP N.V.	TMG	TMG_2011	Non-user
TELEGRAAF MEDIA GROEP N.V.	TMG	TMG_2012	Speculator
TELEGRAAF MEDIA GROEP N.V.	TMG	TMG_2013	Speculator
TELEGRAAF MEDIA GROEP N.V.	TMG	TMG_2014	Speculator
TELEPLAN INTERNATIONAL N.V.	TPL	TPL_2010	Non-user
TELEPLAN INTERNATIONAL N.V.	TPL	TPL_2011	Non-user
TELEPLAN INTERNATIONAL N.V.	TPL	TPL_2012	Non-user
TELEPLAN INTERNATIONAL N.V.	TPL	TPL_2013	Non-user
TELEPLAN INTERNATIONAL N.V.	TPL	TPL_2014	Non-user
THUNDERBIRD RESORTS, INC.	TBIRD	TBIRD_2010	Non-user
THUNDERBIRD RESORTS, INC.	TBIRD	TBIRD_2011	Non-user
THUNDERBIRD RESORTS, INC.	TBIRD	TBIRD_2012	Non-user
THUNDERBIRD RESORTS, INC.	TBIRD	TBIRD_2013	Non-user
THUNDERBIRD RESORTS, INC.	TBIRD	TBIRD_2014	Non-user
TIE KINETIX N.V.	TIE	TIE_2010	Non-user

TIE KINETIX N.V.	TIE	TIE_2011	Non-user
TIE KINETIX N.V.	TIE	TIE_2012	Non-user
TIE KINETIX N.V.	TIE	TIE_2013	Non-user
TIE KINETIX N.V.	TIE	TIE_2014	Non-user
TIMBER AND BUILDING SUPPLIES HOLLAND N.V.	NONE	NONE_2010	Non-user
TIMBER AND BUILDING SUPPLIES HOLLAND N.V.	NONE	NONE_2011	Non-user
TIMBER AND BUILDING SUPPLIES HOLLAND N.V.	NONE	NONE_2012	Non-user
TIMBER AND BUILDING SUPPLIES HOLLAND N.V.	NONE	NONE_2013	Non-user
TIMBER AND BUILDING SUPPLIES HOLLAND N.V.	NONE	NONE_2014	Non-user
TKH GROUP N.V.	TWEKA	TWEKA_2010	Hedger
TKH GROUP N.V.	TWEKA	TWEKA_2011	Hedger
TKH GROUP N.V.	TWEKA	TWEKA_2012	Hedger
TKH GROUP N.V.	TWEKA	TWEKA_2013	Hedger
TKH GROUP N.V.	TWEKA	TWEKA_2014	Hedger
TOMTOM NV	TOM2	TOM2_2010	Hedger
TOMTOM NV	TOM2	TOM2_2011	Non-user
TOMTOM NV	TOM2	TOM2_2012	Non-user
TOMTOM NV	TOM2	TOM2_2013	Non-user
TOMTOM NV	TOM2	TOM2_2014	Non-user
TRIPLE P N.V.	TPPPF	TPPPF_2010	Non-user
TRIPLE P N.V.	TPPPF	TPPPF_2011	Non-user
TRIPLE P N.V.	TPPPF	TPPPF_2012	Non-user
TRIPLE P N.V.	TPPPF	TPPPF_2013	Non-user
TRIPLE P N.V.	TPPPF	TPPPF_2014	Non-user
UNILEVER NV	UNA	UNA_2010	Speculator
UNILEVER NV	UNA	UNA_2011	Speculator
UNILEVER NV	UNA	UNA_2012	Speculator
UNILEVER NV	UNA	UNA_2013	Speculator
UNILEVER NV	UNA	UNA_2014	Speculator
UNIQURE N.V.	QURE	QURE_2011	Non-user
UNIQURE N.V.	QURE	QURE_2012	Non-user
UNIQURE N.V.	QURE	QURE_2013	Non-user
UNIQURE N.V.	QURE	QURE_2014	Non-user
USG PEOPLE N.V.	USG	USG_2010	Non-user
USG PEOPLE N.V.	USG	USG_2011	Non-user
USG PEOPLE N.V.	USG	USG_2012	Non-user
USG PEOPLE N.V.	USG	USG_2013	Non-user
USG PEOPLE N.V.	USG	USG_2014	Non-user
VERENIGDE NEDERLANDSE COMPAGNIE N.V.	VNC	VNC_2010	Speculator
VERENIGDE NEDERLANDSE COMPAGNIE N.V.	VNC	VNC_2011	Speculator
VERENIGDE NEDERLANDSE COMPAGNIE N.V.	VNC	VNC_2012	Speculator
VERENIGDE NEDERLANDSE COMPAGNIE N.V.	VNC	VNC_2013	Speculator
VERENIGDE NEDERLANDSE COMPAGNIE N.V.	VNC	VNC_2014	Speculator
WESSANEN NV	WES	WES_2010	Non-user
WESSANEN NV	WES	WES_2011	Non-user

WESSANEN NV	WES	WES_2012	Non-user
WESSANEN NV	WES	WES_2013	Non-user
WESSANEN NV	WES	WES_2014	Non-user
WOLTERS KLUWER NV	WKL	WKL_2010	Hedger
WOLTERS KLUWER NV	WKL	WKL_2011	Hedger
WOLTERS KLUWER NV	WKL	WKL_2012	Hedger
WOLTERS KLUWER NV	WKL	WKL_2013	Hedger
WOLTERS KLUWER NV	WKL	WKL_2014	Hedger
WRIGHT MEDICAL GROUP N.V.	WMGI	WMGI_2013	Non-user
WRIGHT MEDICAL GROUP N.V.	WMGI	WMGI_2014	Non-user
X5 RETAIL GROUP N.V.	FIVE	FIVE_2010	Non-user
X5 RETAIL GROUP N.V.	FIVE	FIVE_2011	Non-user
X5 RETAIL GROUP N.V.	FIVE	FIVE_2012	Non-user
X5 RETAIL GROUP N.V.	FIVE	FIVE_2013	Non-user
X5 RETAIL GROUP N.V.	FIVE	FIVE_2014	Non-user
YANDEX N.V.	YNDX	YNDX_2011	Non-user
YANDEX N.V.	YNDX	YNDX_2012	Non-user
YANDEX N.V.	YNDX	YNDX_2013	Non-user
YANDEX N.V.	YNDX	YNDX_2014	Non-user