The University of Hull

The Association between Financial Derivatives and Firms' Value and Performance: Evidence from the UK's Financial Firms

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Abstract

There is a consensus among industry players and academics that the ungoverned use of complex financial derivatives in a high volume of transactions, which very few fully understood, and the lack of transparency underlying the transactions of those complex financial derivatives, played an important role in the occurrence of the 2007 financial crisis. Therefore, it is crucial to investigate how financial firms use financial derivatives that can affect firm value and the performance of the financial industry.

This study attempts to shed more light on how UK financial firms conduct their risk management policies by using financial derivatives for hedging. We use an unbalanced dataset which comprises information on 128 UK financial firms, from the time period between 2005 and 2014. We find that 35.18% of the firms use derivatives and 32.14% use them for hedging purposes only.

We employ the Ordinary Least Squares (OLS) estimator for the Panel Data, which produces consistent and significant results. Our regression results show positive and statistically significant relationships between the use of derivatives for hedging and firm value. Meanwhile, the regression results dealing with Return on Assets (ROA) and Stock Return (SR) suggest that the use of derivatives for foreign exchange rate risk (FX) and interest rate risk (IR) has mixed positive and negative significant impacts on accounting and market performance. Thus, we can conclude that our findings support the notion in the risk management literature that the effect of derivatives usage on firm performance is mixed and ambiguous.

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Introduction

1.1 Introduction

Financial firms play a vital role in economic development. However, they are often accused of being responsible for financial and economic crises, such as that of 2008-09. To a considerable extent the 2008-09 crisis is attributed to part of the financial industry being too devoted to the use of financial derivatives as users or market makers. Like nonfinancial firms, financial firms do have to deal with various types of risks, for which they set their risk management policy. A great part of the financial risk which financial firm face can be hedged through the use of derivatives. Consequently, financial derivatives can be used as an efficient tool for off-balance sheet risk management, since they give a simple means to hedge the residual risk from commercial operations activities. However, financial firms have various other methods available as risk management strategies and these tools can be part of on-balance sheet items or off-balance sheet items as well. For example, firms also can achieve their risk management through different risk mitigation tools such as diversification, insurance, direct sale of liabilities or assets, leverage, loan criteria and underwriting (Hull, 2007).

Financial and nonfinancial firms engage in risk management on a regular basis, as documented in their annual reports and surveys on derivatives usage[1]. According to Modigliani and Miller (1958) financial policy decisions only affect how the value of the firm is divided among its claimholders. More recent risk management theories (Smith & Stulz, 1985; Bessembinder, 1991; Froot et al., 1993 and Leland, 1998), claim; however, that, due to capital market imperfections, the use of financial derivatives for risk management policies purposes adds value to a firm, by mitigating predicted taxes or financial distress costs, by reducing underinvestment problem or by allowing a firm to increase its debt capacity and benefit from debt tax-shields without an increase in risk.

[1] See, for instance, Dai and Lapointe (2010), Sinkey and Carter (2000) and Bodnar, et al. (2003).

With few exceptions, the previous literature focuses on the nonfinancial (private[2]) sector, mostly examining, theoretically or empirically, whether specific risk or derivative-related hedging adds value to the firm (Block & Gallagher, 1986; Bessembinder, 1991; Booth et al., 2004; Bartram & Bodnar, 2007; Bartram et al., 2009 and Allayannis et al., 2012)[3], or whether business geographic diversification affects derivatives usage and, consequently, firm value (Allayannis & Weston, 2001; Bartram et al., 2011 and Allayannis et al., 2012).

Literature reports few empirical studies into the use of derivatives for hedging purposes in the financial sector in regard of the use of financial derivatives. Most of the literature available examines the usage of derivatives in banks and insurance firms, and focuses on a specific type of derivative or risk[4]. For instance, Fung et al. (2012) investigate the impact of credit default swap (CDS) usage on the firm value and risk profile of US insurance firms over the period from 2001 to 2009. Dai and Lapointe (2010) study the impact of derivatives on asset risk in Canadian banks. Sinkey and Carter (2000) explore the characteristics of derivatives users and non-users in US commercial banks; and Schrand and Unal (1998) examine the coordination of risk management activities, by exploring the interaction between credit risk exposures and interest rate risk exposures, in the thrift institutions industry. This study attempts to shed more light on how UK financial firms conduct their risk management policies by using financial derivatives for hedging purposes, as discussed below.

[2] For a study on the public sector see Brailsford et al. (2005) who examine derivatives usage by the Australia Commonwealth public sector organizations.
[3] More specifically, Block and Gallagher (1986) study interest rate futures and options, Bessembinder (1991) concentrates on forward contracts, Booth et al (2004) focus on interest rate futures, and Bartram (2006) focuses on options contracts. Bartram and Bodnar (2007) study commodity price risk hedging, Bartram et al. (2009) and Allayannis et al. (2012) study foreign exchange risk hedging.
[4] The prior studies focus more on credit derivatives usage and their effects on firm risk and value such as Instefjord (2005), Morrison (2005), Acharya and Johnson (2007), Norden (2009), Shao (2009) and Chen (2010).

1.2 The Research Problem

Financial firms are exposed to various types of risk in conducting their business activities, such as market risk, operational risk, liquidity risk and credit risk. Therefore, financial firms tend to use enterprise risk management to manage their exposures. For example, banks focus more on consolidated risk management to manage their risk exposures by implementing a well-designed risk management policy, including the use of different types of derivatives for hedging (Dai & Lapointe, 2010). Also, insurance firms tend to use consolidated risk management to manage their risk exposures by using hedging derivatives and reinsurance policies (Fung et al., 2012).

However, Bartram et al. (2011) argue that the usage of financial derivatives by financial firms was to blame for the last financial global crisis, and was the most harmful factor for the global economic recession. In contrast, Dai and Lapointe (2010) suggest that according to their results, the last financial crisis was not caused by financial derivatives, but by lack of regulations in the financial system to control the original risk exposures, which they consider to be the fundamental issue that needs to be addressed by following a conservative policy.

Despite this controversy, the use of 'Over the Counter' (OTC) derivatives contracts has increased dramatically worldwide. For example, according to the Bank International Settlement (BIS) this number rose from 47.5 trillion dollars in 1995 to nearly 693 trillion dollars in 2013, with a gross market value of 2.2 and 20.158 trillion dollars, respectively. Likewise, derivatives usage in the UK has grown enormously in recent years and the notional amount outstanding and gross market value of the OTC interest rate and foreign exchange rate derivatives represent 49 trillion and nearly 2 trillion pounds sterling, respectively (BIS, May 2013).

However, there is a consensus among industry players and academics that the ungoverned use of complex financial derivatives in a high volume of transactions, which very few understood, and the lack of transparency underlying the transactions of those complex financial derivatives, played an important role in the occurrence of the 2007 financial crisis. Therefore, it is crucial to investigate how financial firms use financial derivatives that can affect the risk and value of financial sectors.

1.3 Motivations for Research

A substantial volume of research has been done in the field of risk management practices in the last two decades, some of those studies focusing on the use of financial derivative instruments for the purpose of hedging. These studies are often conducted using one of two methods. The first one uses data collected from surveys, by means of questionnaires sent to firms' senior financial managers. The second one is through analysis of the annual financial reports, which is usually much more complex due to firms' preferences in financial disclosures. However, the majority of these studies concentrate on non-financial firms and just a few are concerned with financial firms.

This leaves a gap in knowledge regarding this very important type of firms, which have a large impact on the economy and field of finance. This study contributes to fill the gap in the literature, by extending empirical studies to the financial sector. It acquires added significance because using hedging as a risk management policy has the advantage of adding value to firms and helping firms to manage and control their exposures. Hence, the main motivation behind this study is to gain better understanding of how financial firms are using financial derivatives. Also, this work will allow the behaviour of financial firms to be compared with that found in the literature about the behaviour of non-financial firms regarding the use of derivatives for their business activities, especially during the financial crisis.

1.4 Research Questions and Objectives

1.4.1 Questions

This research addresses three main questions: 1) Does risk hedging with financial derivatives affect firms' value and performance? 2) Does the use of derivatives under the three types of hedge have an impact on firm value and performance? 3) Does the use of derivatives for hedging purposes in order to reduce foreign exchange rate risk (FX) or interest rate risk (IR) have an impact on firm value and performance?

1.4.2 Objectives

This research aims to shed light on the ways that UK financial firms implement risk management policies through the use of financial derivatives and to examine whether hedging with financial derivatives affects firm value and performance. Specifically, we would like to find more information on the usage of derivatives for hedging and to what extent the financial firms use derivatives for hedging their financial risks.

Furthermore, this research sheds more light and focus on the usage of derivatives under the three types of hedge: fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), in order to reduce financial market risk. More specifically, we focus on the use of derivatives for hedging FX and IR.

1.5 Research Contributions

This study contributes to the literature by providing new empirical evidence regarding financial firms' behaviour in terms of the use of financial derivatives for risk hedging, through which we gain a better understanding of the popularity of the use of various financial derivatives for risk hedging among the financial firms. Our research also allows us to highlight the differences between financial and non-financial firms in terms of the use of financial derivatives for hedging and the effect of hedging on firms' value and performance. We believe that our results are pertinent to derivatives usage in particular

and to wider risk management activities in general, as we focus on the use of derivatives for hedging foreign exchange rate risk and interest rate risk, which are considered the most important risks of financial risk in most organisations, especially in financial firms. This research's main contributions are as follows:

Firstly, the sample focuses on financial firms in the UK market, which to our best knowledge have not yet been investigated. It provides new empirical evidence regarding financial firms' behaviour in terms of the use of financial derivatives for risk management hedging. We gain a better understanding of the popularity of the use of various financial derivatives for risk hedging among the financial firms. For example, for each firm, data is collected for the types of risk that firms hedge, more specifically for FX and IR. Previous studies have focused on non-financial firms only, and either on a specific risk, without specifying which derivatives are used for hedging, or on a specific derivative usage, without specifying which type of risks it is hedging, or on the study of whether derivatives usage is associated with firms' value and performance. To our best knowledge, this is the first empirical study on the effect of financial derivatives usage on the financial industry. The literature available to date is devoted only to non-financial firms. Yet, risk management and financial derivatives usage are particularly important for the financial industry because the use of an adequate risk management policy may add value to financial firms.

Secondly, we shed more light and focus on the usage of derivatives under the three types of hedge: FV, CF and NI, in order to reduce financial market risk. More specifically, we focus on the use of derivatives for hedging FX and IR. To our best knowledge, this is the first study that explores the effect of derivatives usage from this perspective. We focus in this study on derivatives use for hedging purposes and we classify all variables according to the hedge accounting requirements of IAS 39. Therefore, our data is organized as

follows: firms which use derivatives for hedging purposes (DH), by hedging types -: FV, CF and NI- and by the types of risk: derivatives usage for foreign exchange rate risk (FVFX, CFFX and NIFX) and derivatives for interest rate risk (FVIR and CFIR). To our best knowledge, this structure of the data collection for this part is unique and is a new contribution that can be added to the literature of risk management.

Thirdly, and the most important contribution, the previous literature about the financial industry is scant and focuses on the effect of derivatives usage on risk. Most of these studies focus on the banking industry and a few on insurance and there is no previous study, to the researcher's best knowledge, that studies three sectors- banking, equity investment and financial services- of the financial industry from the use of derivative for risk management hedging perspective. Our research enables us to highlight the differences between financial and non-financial firms in terms of the use of financial derivatives for hedging and the effect of hedging on firms' value and performance. We find in general significant results about the usage of derivatives for hedging purposes and the extent that financial firms use financial derivative to reduce their financial risks. We argue that our results are unique to our best knowledge and can be considered a contribution in the literature, especially for the UK market.

Fourthly, we can argue that our study complements some previous studies in the literature such as Allayannis and Weston (2001), Choi et al. (2013), Fung et al. (2012), and Panaretou (2014). However, these studies concern non-financial firms, except Fung et al. (2012) who study the affect of the use of credit default swaps on firm risk and value, but they use insurance firms as evidence for their data sample. In contrast, this study uses a sample of three different sectors of the financial industry. Also, our research can be considered a substitute for some previous studies in the literature such as Choi and Elyasiani (1997), Brewer et al. (2000), Clark et al. (2008), Ahmed et al. (2011) who study

the use of derivatives in the financial sector from different perspectives. Moreover, we believe that our study substitutes for some prior studies in the UK literature in regard to the use of financial derivatives such as Grant and Marshall (1997) and Adedeji and Baker (2002) who study the use of FX and IR derivatives in non-financial firms from different perspectives.

1.6 Main Results: An Overview

As mentioned earlier, this research focuses on the usage of financial derivatives in the UK financial industry. In order to address the above questions and achieve our objectives, we run eight different static models. We use information from annual reports and DataStream to collect our data. We use an unbalanced panel dataset which comprises information on 128 UK financial firms, from the time period between 2005 and 2014. This dataset includes three sectors of the financial industry: Banking (BS), Equity Investment (EIS) and Financial Services (FSS). The FSS sector has four subsectors: Assets Managers (AMSS), Consumer Finance (CFSS), Investment Services (ISSS) and Specialty Finance (SFSS).

We use the Stata analysis software program to compute the descriptive statistics, run univariate and multivariate tests in order to get more information about these sectors and their behaviour regarding the usage of derivatives for risk hedging and the impact of the FX and IR risks on firms' value and performance. We use four dependent variables: logarithm of Tobin's Q (Ln (TQ)) to measure firm value, return on equity (ROE) and return on assets (ROA) to measure accounting performance, and stock return (SR) to measure market performance. These four dependent variables are used in the eight different static regressions in our empirical chapter (chapter 5). We use the same control variables, but different independent variables in the eight models.

The empirical chapter studies how financial firms conduct their risk management policies,

through the use of financial derivatives. The descriptive statistics introduce the topic and provide some basic results which are helpful to have better understanding about the regression results. We find some results which are consistent with the theories and results from the available risk management literature. The results of the descriptive statistics show that 35.18% of the total observations of firms in the sample use derivatives, 32.14% use them for hedging only, 14.5% use them for trading only, and 11.5% use them for both purposes (in the same year) (Note: percentages do not total 100 because what a firm does changes over time, and because we have an unbalanced dataset). Our findings of the descriptive statistics also show that 22.2% of the firms use derivatives under fair value hedge, about 28% use derivatives under cash flow hedge and 7.2% use derivatives under net investment.

Moreover, surprisingly the results of univariate tests show that the mean values for Ln (TQ) of the non-users are more than those for the users of derivatives. In contrast, the ROE, ROA, SR and control variables' outcomes show that the users of derivatives are significantly differnt from the non-users of derivatives and the t-statistic values are significant at different levels. These results are broadly consistent with prior theories and also support some previous empirical studies in the field of risk management. Our regression results show both expected and unexpected outcomes for the independent variables and the control variables, some of them consistent with the theories and the empirical studies in the field of risk management.

We find statistically positive and significant relationships between the use of derivatives for hedging and firm value and the results are consistent in almost all regression models. Our regression results show some significant relationships between the use of derivatives under the three types of hedge in order to reduce FX and IR risks and both firm value and performance. Also, the regression results of ROA and SR suggest that the use of

derivatives for FX and IR has mixed positive and negative significant impact on accounting and market performance. Thus, we can conclude that our findings in the empirical chapter support the notion in the risk management literature that the effect of derivatives usage on firm value and performance is mixed and ambiguous. Overall, we can argue that our results of both Ln (TQ) and ROA regressions are consistent and significant in most of the regression models. Also, we can conclude that our findings are still mixed and ambiguous, which supports the findings of prior research in the field of risk management.

1.7 Structure of the Research

This research thesis is organized as follows. Chapter two presents a literature review, which gives an overview of the prior literature, the UK financial system background and financial derivatives. Chapter three presents the data collection process and the background of firms. Chapter four presents the research methodology. Chapter five discusses and analyses the results of the empirical study. Chapter six presents the conclusion.

Chapter 2

Literature Review

2.1 Introduction

There is a large volume of literature that explores and tries to explain the motivations for firms to implement hedging policies and the basis and the reasons behind their decisions to use these policies. The literature regarding the usage of derivatives and hedging has grown rapidly over the last three decades. This growth is motivated by ongoing theoretical progress and the availability of data in most public organisations. However, the use of derivatives for hedging purposes is considered just one part of the whole risk management strategy that most firms follow nowadays, especially financial firms, as they operate at a high level of risk with all types of products and services that they offer for their customers.

Financial theories argue that firms can add value in the conditions of imperfect markets by using good risk management. Thus, hedging as a tool of risk management is expected to enhance firm value. Smith and Stulz (1985) highlight that hedging policy will lead to rise in the value of a firm if and only if hedging is costless and it does not exceed the expected growth in firm value. Perez-Gonzalez and Yun (2013) argue that financial derivatives are the most powerful mechanism that can be used to mitigate risk and thus increase firm value. Purnanandam (2007) argues that firms can use derivatives for two purposes, hedging and trading and this is considered one of the challenges that might face empirical studies in the field of derivatives hedging. Clark et al. (2008) suggest that banks, especially the larger ones, use different types of derivative for either hedging, to avoid expected market fluctuations in the future, or speculating purposes. They find a strong relation between derivatives usage and risk sensitivities for both foreign exchange and interest rate derivatives.

Foreign exchange rate risk exposure is considered very important in financial firms, as well as interest rate risk exposure and may have an impact on the performance and value of firms. For example, Ahmed et al. (2011) argue that financial institutions tend to hold

hedging financial derivatives to offset their exposure to FX risk and IR risk; thus hedging by means of derivatives can decrease the market risk of banks by reducing the vulnerability of cash flows to such macroeconomic factors. Schrand and Unal (1998) argue that IR swaps are the most widely used type of derivative contracts in hedging of IR risks. Allayannis and Weston (2001) show that user firms have higher market values than non-users of foreign currency exchange rate derivatives. Smithson and Simkins (2005) argue that firms tend to manage their FX risk exposures and IR risk exposures to mitigate their market risk and thus enhance firm value.

Furthermore, Sinkey and Carter (2000) argue that the higher the debt ratio relative to value, the greater the probability of expected bankruptcy costs, and the more likely banks are to use derivatives to hedge. Purnanandam (2007) argues that the banking sector is more levered than other firms, which means that the expected cost of financial distress is higher. Also, the hedging decision is very important for banks and has an effect on their performance, as this type of firm faces a larger level of IR exposure risks. Geczy et al. (1997) document that hedging reduces the underinvestment problem by mitigating not only the costs of providing external funds, but also a company's reliance on external financing. A company's capability to enter into new investment in the future depends on its ability to meet its funding requirements. Hence, firms have an incentive to reduce unpredicted volatility of cash inflow in order to undertake future investment opportunities to generate more cash flow and thus enhance firm value. Therefore, hedging policy is considered an effective method for firms to protect their investment opportunities and to reduce the potential problem of underinvestment (Gomez-Gonzalez et al., 2012).

Our main objective in this chapter is to discuss the theoretical background and the literature of the previous studies in the field of risk management. However, we also would

like to give a brief discussion about the financial system background, especially in the UK market and to give a brief summary, with some details, about financial derivatives.

This chapter is organized as follows. Section 2 presents some general background to the financial system and presents and discusses the background to the UK financial system. Section 3 discusses financial derivatives. Section 4 presents an overview of risk management. Section 5 presents the relevant theoretical background. Section 6 discusses hedging and firm value. Section 7 discusses financial firms and the usage of financial derivatives. Section 8 concerns IR exposure and FX rate exposure. Section 9 presents the conclusion.

2.2 Financial System Background

In an early period of economic growth, an economy changes from an agrarian to an industrial system. Banks exist as financial intermediaries to provide external financing funds for investment in the economy. This period is known as the bank-oriented stage in the financial system. Then, as industrialisation grows and the capital markets develop, non-bank financial firms start to work to help the economy and the banking system to provide services for customers. This transforms the financial system to a market-oriented stage. After that, when the de-industrialisation stage of the economy occurs and the economy focuses more on service industries, then the financial system becomes more important for the economy and it transforms to the securitised stage. In the securitised stage, the financial system become more crucial as it plays a vital role to strengthen and restructure the economy and it expands to enhance the credit and capital markets (Kindleberger, 1984; Buckle & Thompson, 2004; Kohn 2004 and Mishkin & Eakins, 2009).

The main roles of the financial system are simple; first, it provides the tools by which money can be transferred from households that have a surplus of funds to firms or

households that seek to borrow these funds, so it works as the intermediary between parties with a surplus and a shortage of funds. A second role is to provide payment tools to make money flow between these parties and a third one is to provide more specialist services such as pensions, fund management, investment management and insurance (Kindleberger, 1984; Buckle & Thompson, 2004; Kohn 2004 and Mishkin & Eakins, 2009).

Buckle and Thompson (2004) argue that asymmetric information and transaction costs are crucial impediments to better functioning financial transactions. Organized financial markets, where tradable debt and equity can be acquired and issued, can be the solution to overcome this problem. Thus, financial intermediaries will exist between the borrower and lender. Buckle and Thompson (2004) highlight that financial intermediaries undertake three essential transformations, including risk, size of claims and maturity.

Buckle and Thompson (2004) state that financial intermediaries exist in response to transactions costs, asymmetric information and adverse selection and moral hazard. Allen and Santomero (1998) argue that the existence of financial intermediaries should be considered from different perspectives such as the functional and institutional perspective. The functional perspective focuses on the types of services that are provided by the financial system, such as distribution, origination and funding. In contrast, the institutional perspective concentrates on the types of businesses and activities that the financial system undertakes, such as banking and insurance. Allen and Santomero (1998) state that financial intermediaries are considered the facilitators of risk transfer and their role has become more crucial as the derivatives market has become larger and grown in scope.

2.2.1 The UK Financial System Background

The UK financial system from the end of World War Two until the end of the 1960s was strictly separated between different forms of financial institutions, as building societies focused on providing housing finance services and banks provided banking services. This led to little competition between these institutions and allowed them to operate cartels (together) in order to affect the financial market and interest rates, for example.

At the end of the 1960s, foreign banks were allowed to enter the banking sector of the UK financial system, which allowed for some competition and reduced the level of cartel activity. Moreover after 1980, some deregulation was undertaken in the financial system in the UK to allow for greater competition, in parallel with a tightening of prudential rules and regulations in order to protect the practitioners of financial services. This deregulation led to new competition between banks and building societies, as banks entered the housing finance area (Buckle & Thompson, 2004; Kohn 2004 and Mishkin & Eakins, 2009).

Additionally, in 1986 the stock market was deregulated, which allowed the financial market in the UK to be more competitive than before; this process was called the Big Bang. In the following year, another banking act was passed to protect the users of financial intermediation services. Buckle and Thompson (2004) argue that since the early 1980s there has been a huge change in the UK financial system as types of lending have changed. The UK financial system follows a market-oriented system similarly to the USA market; it is mainly composed of financial institutions and financial markets (Buckle & Thompson, 2004). National statistics divide financial corporations into three types, which are monetary financial institutions, insurance companies and pension funds and other financial intermediaries and auxiliaries.The main developments in the UK financial system are summarised in the following points:

1. Financial conglomeration (offering different types of products or services at the same time): This means the new regulations and deregulations in the 1980s allowed for the UK financial system to have more competition between organisations. The consequences of these steps allowed banks, for example, to diversify their businesses and activities and to add to their main business of providing payment services, by offering different ranges or types of business such as mortgages or housing finance or insurance.
2. A decline in entry barriers: The effects of the deconstruction process and new technology allow retail financial markets to enter into these markets more easily and bring more competitive advantage for the market.
3. Growth of investment institutions (the growth in assets): Life insurance, pension funds and unit and investment trusts institutions grew very rapidly over the period from 1980 to 2000, compared to the building societies and banks. This reflects two facts: the first one is individuals moving from direct to indirect investment; the second is that the decline or slow growth of the building societies and banks means these types of firms tended to raise larger percentages of external finance from off-balance sheet activities and the capital market and generate other fees in order to diversify their business.
4. Financial Innovation: Financial innovation started in the 1980s and featured development of new forms of financial instrument, in terms of financial markets and techniques, such as financial derivatives and securitisations. Financial derivatives are considered the main element of these innovations and can be traded in a regulated exchange or market or over the counter. Then come securitisations, where a distinction is made between primary and secondary types of securitisation. Primary securitisations means borrowers go directly to the capital market to raise finance, bypassing the lending institutions. In contrast, secondary securitisations are methods

used by lending institutions to raise liquidity off the balance sheet in order to free the capital held normally for or against the loan by packaging their loans and selling them to the capital market institutions.

2.2.1.1 Role of the UK Financial Services Industry

According to the UK international financial services report published in May 2009, the financial services industry is very active and plays an important role in the UK economy as it contributes 8% of gross domestic product and employs more than one million people in the UK. According to the report, this industry has four main sectors that support businesses, individuals, households and Government; these are the banking, insurance, investments and financial infrastructure sectors.

The banking sector supplies finance for households, government, individuals and businesses, whereas the insurance sector helps households and businesses to manage and control their exposure to risks in an effective way. The investments sector enables the whole society to manage risk and accumulate and increase their wealth and the financial infrastructure sector focuses on the payments system and provides various financial services to supply the tools – payment systems, capital markets and exchange- through which households and businesses can carry out their transactions cheaply and quickly in a reliable way. Table 1 in Appendix 2A shows more clearly how the financial services industry plays a vital role in the economy of the UK (HM Treasury May 2009, hm-treasury.gov.uk).

2.2.1.2 UK Financial Services Regulation

Two new authorised regulators officially came into force from 1 April 2013 in order to replace the Financial Services Authority (FSA) as a result of the Financial Services Act which was issued in December 2012 (Chartered Insurance Institute, April 2013). The Financial Services Authority's responsibility passed to the Bank of England in order to

ensure financial stability during the handover to the new authorities, as the FSA was disbanded according to the same Act and replaced by the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA). Also, the Financial Policy Committee (FPC) was formed from the Bank of England and is responsible for horizon-scanning for systemic risk issues, whereas the responsibility of the PRA covers the solvency and resolution of systemically vital institutions. The market regulation, prudential supervision of smaller firms and ensuring consumer protection are the responsibility of the FCA. Figure 1 in Appendix 2A shows the new regulatory structure (Policy Briefing, April 2013, the Chartered Insurance Institute).

The FCA regulates about 26000 companies, which are divided into three types of firms depending on the responsibilities of the FCA towards these firms. More than 2000 companies such as banks, credit unions, life insurance companies, general insurance companies, building societies and Lloyd's and Lloyd's Agents are regulated purely for conduct of business activities problems and issues. Twenty-three thousand companies are only regulated for the purpose of conduct and prudential issues and these companies are considered as having limited systemic importance. These companies are investment management companies, personal investment companies, non-bank mortgage lenders, insurance or mortgage intermediaries, providers of market trading infrastructure, authorised professional Lloyd's brokers and Lloyd's members' agents. A thousand companies such as payments institutions and electronic money institutions are regulated under other legislation. The PRA, as mentioned above, has responsibility for the solvency and resolution of systemically vital institutions such as banks, credit unions, insurers, major investment firms and building societies (Policy Briefing, April 2013, the Chartered Insurance Institute).

2.3 Financial Derivatives

According to the International Monetary Fund (IMF, June 2002), financial derivatives are defined as financial instruments that are related to another particular financial instrument or commodity or indicator and through which particular financial risks can be traded in financial markets. The valuation of a financial derivative is derived from the value of the underlying assets such as stocks, bonds, commodities and indexes. Financial derivatives are commonly settled by net payments of the difference of positive and negative values as they do not require an advance principal amount to be paid and they do not have accrual investment income. Financial derivatives are used by firms for three different purposes: as a hedging tool for risk management, for speculation to gain money and to gain arbitrage opportunities from market price differences. The advantage of these instruments is that they allow entities to trade and transfer particular financial risks from one entity to another that is better suited and more willing to manage and take that risk (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

Financial derivatives can be traded in two different types of market; the first one is in the regulated and standardized exchange markets and the second one is known as the over the counter market (OTC). The standardized exchange market is open for individual, institutional and corporation investors; it works according to the bid and ask price and future price and the clearing houses are responsible for all transactions in the market. However, in the OTC market the transaction will be done directly between the buyer and seller and the price of the deal is negotiable between these parties. These derivatives can have different values and size depending on the counterparties engaged in the trade or deal. Some of these financial derivatives are considered very complicated and complex and are called exotic, while others are less complicated and are considered standard and easier to use; these are called vanillas (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

Regardless of their complexity or simplicity, financial derivative instruments are generally a combination and/or variant of four main types of contracts: Forward contracts, Future contracts, Option contracts and Swap contracts. The following discussion gives more details about these four contracts.

2.3.1 Forwards

The forward contract is traded only on the OTC market and it is defined as an agreement between two parties to buy and sell an underlying asset at specified price on a future specified date. The buyer of the contract is known as entering a long position and the seller is known as entering a short position. This type of contract creates an obligation for both parties of the contract. The buyer (long position) of the underlying assets is committed to pay the agreed amount and buy that asset on the specified future date and at the same time, the seller (short position) must sell it at the same agreed price on that agreed future date. The forward contract is used to reduce and manage market price fluctuations and the volatility of future market prices. It is very common to use this type of contract to reduce foreign exchange rate risk; these are known as currency forwards. Also, forward contracts are very commonly used in the commodity markets, which give assurance for seller companies by guaranteeing their goods' price in advance (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

2.3.2 Futures

The future contract is traded only on the standardized and regulated markets and it has the same features as forward contracts as it is an agreement between two parties to buy and sell an underlying asset at a specified price on a future specified date. The buyer of the contract is known as entering into a long position and the seller known as entering into a short position. This type of contract creates an obligation for both long and short parties. Future contracts are used to reduce and manage market price fluctuations and the

volatility of future market prices. However, it is most common to use this type of contract to reduce foreign exchange rate risk; these contracts are known as currency futures. Also, future contracts are frequently used in the commodity markets, to give assurance for seller companies by guaranteeing their goods' price in advance (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

Therefore, the main difference between forward and future contracts is the market where they trade. Future contracts have the additional feature of market liquidity, so they are considered better than forward contracts, as the terms and conditions of each contract are defined in advance. Also, the default risk of future contracts is considered low as the parities to the agreement are required to perform daily settlement according to the rules and regulations of the standardized markets. In contrast, in the OTC market, contracts depend on the counterparty not to default and on the dealer in terms of liquidity quality (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

2.3.3 Options

The third type of derivative instrument is option contracts, which can be traded in both the standardized market and the OTC market. An option contract is an agreement that grants its holder or owner the right to sell or buy the underlying asset on a future date at a specified price, without an obligation to exercise that option on the due date. The buyer of the option is called the holder of the option, the seller is called the writer of the option and the agreed specified price is known as the strike price (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

Option contracts are considered as a depreciating asset, with a limited useful life as they have an expiry date and should be exercised on or before that date; the contract loses its value as time passes and becomes close to its expiry date. There are two main types of option contracts: American options and European options. The difference is that

American options can be exercised at any time during the contract period, whereas European options cannot be exercised at any time, but only on the expiry date. This difference gives more flexibility to American options over the European option, but at the same time the premium is higher. These types of contract can be used with different forms of underlying assets to manage and control various financial risks, such as relating to commodities, currencies, stocks, bonds, interest rates and indexes (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

Moreover, the holder of the contract in option contracts (call option or put option) will pay a premium in order to enter into the option contract and this premium is the only cost to be incurred if the option is not exercised by the holder of the option contract. This feature is considered the key difference between option contracts and the other types of derivative instrument contracts (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

2.3.4 Swaps

The swap contract is traded only on the OTC market and it is considered a customized contract as it is an agreement between two counterparties to exchange a series or sequence of cash flows generated from interest payments without swapping the underlying assets such as debt or bonds. In swaps contracts, the default risk between the contract counterparties is very high and it is dominated by the financial institutions and firms rather than individual investors. This is because swap contracts are considered risker than other derivative instrument contracts and their regulation is easier compared to other derivative contracts (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

The most common and simple swap contracts are the plain vanilla interest rate swap and plain vanilla foreign currency swap. In the interest rate swap, the swap contract parties

agree to swap and exchange a fixed rate with a floating rate. The first swap contract's party pledges to pay to the second swap contract's party at particular periods of time an agreed amount of interest that is calculated at a fixed interest rate, depending on the principal notional amount. At the same time the second swap contract's party pledges to pay the first swap contract's party at the same agreed periods a floating interest rate depending on the principal notional amount. It is usual in the OTC market to use the London Interbank Offer Rate (LIBOR) as the base for calculating the floating rate used in interest rate swap contracts. The plain vanilla foreign currency swap involves swapping fixed interest payments and principal amount on a loan in one currency for fixed interest payments and principal amount on an identical loan in another currency. The plain vanilla foreign currency swap differs from the plain vanilla interest rate swap as both counterparties in the foreign currency swap the principal amounts at the beginning of the swap contract and at the end of the contract as well (Gitman, 1994; Dixit & Pindyck, 1994; Wang, 2010 and Keown et al., 2011).

2.4 Risk Management Overview

According to the Risk Management Standard (2002), the term risk management can be defined as an important part of any type of firms' future strategic management. In the risk management section of the company's report or as part of a firm's strategy, the firm's risks and exposures will be defined and the plans for reducing or avoiding those risks will be explained and considered for the short and long term. For instance, firms can achieve their risk management through various risk mitigation tools such as diversification, insurance, direct sale of liabilities or assets, leverage and loan criteria (Hull, 2007 and Watson & Head, 2007).

Firms face various forms of risk; some of these risks can be managed and controlled, whereas others cannot. However, financial risks are considered some of the most

important risks that companies face, especially in the last three decades. These financial risks include interest rate risk, foreign exchange rate risk or currency risk and commodity price risk. Therefore, firms tend to use financial derivatives as a tool to manage and control financial risks, which is considered an off-balance sheet form of hedging that can help firms to transfer their negative risks and reduce their overall exposures. This may grant firms that use derivatives a competitive advantage over their peers. Also, at the same time, the use of derivatives for hedging purposes is considered one part of the whole risk management strategy that most firms follow.

However, risk management plans and views vary among firms, sectors and industries depending on the types of business, products and services they offer to their customers. For example, financial firms are often highly leveraged and offer highly risky products and services. They also deal with different types and levels of customers and with different geographic regions, both domestically and internationally. These are some of the reasons why they focus more on risk management and use different tools and methods to overcome their industry challenges and risks. They generally take into account both upside and downside risks and the ways that they can increase their benefits and decrease their losses. They consider their historical outcomes and forecasts for their business future over the long and short term. Accordingly, these types of firms implement risk management plans that can add value to their business. However, the challenges increase as the business increases, which calls for a high standard and quality of risk management strategy (Hull, 2007).

Moreover, financial firms have a variety of tools available for risk management strategies and these tools can be on-balance sheet items or off-balance sheet items. We focus in this research on financial derivatives, which can be used as an efficient tool for off-balance sheet risk management, since they give a simple means to hedge the residual risk from

commercial operations. As we mentioned, there is a consensus among industry players and academics that the excessive use of financial derivatives, and the lack of transparency underlying the transactions of those financial derivatives, played an important role in the occurrence of the 2007 financial crisis. Therefore, it is vital to investigate how financial firms use financial derivatives and how that can affect the risk and value of financial firms in the different financial industry sectors. We focus on the use of derivatives for hedging FX risk and IR risk, which are considered the most important types of financial risk in each organisation, especially financial firms.

It is important to consider whether the results are attributable to derivatives usage and not to wider risk management activities. For any given company, its wider risk management activities will be very important and any derivatives usage will only be an element of this. However, investigating this fairly fully would require quite a detailed case study type approach. Much of the relevant information will not be readily available in accessible public documents. Even given some successful investigations of this nature, it is not necessarily easy to generalise the results, although the findings would undoubtedly be interesting.

We take a different approach which is aligned with the empirical finance literature. We use a quantitative research method with secondary data which requires a large amount of data to conduct our empirical work. In this type of research it is normal to group somewhat heterogeneous firms together, even though they have differing business models and activities. This is especially true when the firms are from the same industry (the UK Financial Industry Services in this case). Much of the underlying heterogeneity can be accounted for by the use of various control variables (e.g. firm size, profitability, leverage, liquidity, investment opportunities, dividends, industry diversification and geographic diversification). Also, in this research we collect a complete sample of the relevant data,

which is required and acceptable in the empirical finance literature. If our sample was self-selected, this would lead to a selection problem which would be an issue in biasing the results. Finally, our use of a relatively large sample of firms means that it is possible to derive results that are statistically significant, even though many individual firms may deviate from them.

2.5 Theoretical Background to Corporate Risk Management

Modigliani and Miller (1958) assume that given the existence of a perfect market in the absence of taxes, agency cost, bankruptcy costs and asymmetric information, a firm's financial decisions have no impact on the firm value. This is called the irrelevance theory. Thus, under this theory, the choice of risk management and hedging policies employed by a firm will not add value to the firm and its shareholders. However, in the world of market imperfection where taxes, agency costs, bankruptcy costs and asymmetric information exist, then risk management and hedging policies become more important as financial risks need to be controlled and managed. There is a large volume of literature that explores and tries to explain the motivations for firms to implement hedging policies and the basis and the reasons behind their decisions to use these policies. The literature regarding the usage of derivatives and hedging has grown rapidly over the last three decades. This growth is motivated by ongoing theoretical developments in the literature and the availability of new risk management data.

Smith and Stulz (1985), Froot et al. (1993) and Tufano (1998) highlight that corporate risk management can increase firm value by reducing financial distress costs, minimizing the corporate tax burden and improving the decisions of corporate financing and investments policies. Also, Smith and Stulz (1985) and Froot et al. (1993) argue that the role of risk management is important to reduce the expected costs associated with variability of cash flow as a result of imperfect capital markets and thus maximize

shareholders' value and so firm value. Mayers and Smith (1982) argue that firms tend to purchase insurance contracts to avoid the transaction costs of bankruptcy and when their managers have higher discretion over the choice of projects; thus their risk will decrease as they shift it to the insurance firms.

Moreover, the previous studies stress various rationales for risk management policies. For example, Smith and Stulz (1985), Leland (1998), and Graham and Rogers (2002) emphasize that firms gain tax advantages from using a hedging policy. Smith and Stulz (1985) contend that firms' risk management could mitigate the fluctuations in the income before tax and thus can reduce a firm's burden of tax, depending on a convex tax schedule of a firm's return. Froot et al. (1993) argue that as external financing is costly for firms, implementing an effective and active risk management policy can mitigate investment distortions in external financing decisions. They show, for example, that investment expenditures and firms' internal cash flows can be aligned by mitigating cash flow excess through implementing an effective risk management policy. This occurs when cash flows overtake investment expenditures and when cash flows are less than investment expenditures. Leland (1998) finds that hedging allows firms to have more debt and firms that have lower agency costs can get more advantages of hedging. Schrand and Unal (1998) argue that companies could use risk management to allocate a company's total exposure risk among several different sources of risk rather than to mitigate total risk.

The risk management literature regarding the usage of derivatives and hedging has grown rapidly over the last three decades. This growth is motivated by ongoing theoretical progress and the availability of data in most public organisations. In general, there are two main lines of research thought that focus on conducting these types of studies. The first one focuses on the usage of derivatives, and is conducted in various countries. For example, Berkman and Bradbury (1996), Bodnar et al. (1998), Grant and Marshall (1997)

and Marshall (2000), etc. concentrate on the use of derivatives by non-financial firms. The second research stream focuses on the determinants of corporate hedging policies, for example, Geczy et al. (1997), Jalilvand (1999), Adedeji and Baker (2002), Berkman et al. (2002) etc. All these studies contribute significantly to the general understanding of derivatives usage in firms for the purpose of hedging. Prevost et al. (2000) find that the reduction in the cash flow fluctuation risk is the most important motivation for using derivatives for hedging. Rivas et al. (2006) argue that under imperfect capital markets, firms have more incentives to use more derivatives for hedging. Perez-Gonzalez and Yun (2013) argue that 'over the counter' transactions give firms more flexibility to organize their derivatives contracts according to their firms' requirements; however, these types of markets are considered less liquid than the traded exchange markets.

2.6 Hedging and Firm Value

Financial theories argue that firms can add value in the conditions of imperfect markets by using good risk management. Thus, hedging as a tool of risk management is expected to reduce risk exposures and thus enhance firm value. Mayers and Smith (1982) argue that the form of firms offers an effective hedging policy; their stockholders could reduce insurable risk by diversification. The high cost of insurance contracts can reduce the wealth of stockholders as it provides a negative net present value. They add that risk can be shifted to claimholders at the lowest cost and this will increase firm value; however, the ability of those claimholders to bear risk is limited by firms' stock capital. Therefore, firms will tend to use insurance contracts offered by insurance firms to shift their risk.

Firms hedge the risks underlying their daily activities because this reduces risks and may enhance value. Thus, financial firms use derivatives for hedging. Smith and Stulz (1985) argue that the optimal hedging policy depends on the type of managers and their tolerance of risk and it is optimal for companies to use financial derivatives for hedging purposes,

when their earnings have a convex tax rate function. They argue, for example, that management compensation is very important for a firm's hedging policy decisions and firms that give more compensation options for their managers, are likely to have lower hedging costs. Froot et al. (1993) pointed out that in firms that have less variability of cash flow, their income streams can have lower expected taxes as a result of the convexity logic.

Hentschel and Smith (1997) structure a model to show a significant correlation between derivatives obligations and firm value regarding default risk, which depends on the firms' financial derivatives position. They argue that a firm can have an optimal hedging position of its financial derivatives contracts by optimizing its value and these derivatives contracts need to be highly correlated with firm value, in order to have an optimal and effective hedge. Schrand and Unal (1998) argue that managers tend to use risk management policies and tools, when their compensation is tied effectively to firm value and firms can have an optimal allocation in both cases, to maintain their existing level of total risk or try to reduce or increase their total risk.

Smith and Stulz (1985) highlight that hedging policy will lead to a rise in the value of a firm if and only if hedging is costless and it does not exceed the expected growth in firm value. Hence, financial derivatives as a tool of hedging seem to be a crucial determinant of a firm's value. Hentschel and Smith (1997) argue that hedging can be beneficial for firms when it adds value to them; for example, a financial firm could be able to mitigate its risk of bankruptcy or insolvency due to one particular product such as loans or insurance policies by hedging its FX or IR exposures. Such mitigation of risk will allow those firms to add value by increasing or charging high premiums; in this case the hedging policy is beneficial. Theoretically, derivatives usage for hedging can increase firm value, as documented by previous empirical studies (Gay & Nam, 1998; Allayannis & Weston,

2001; Nocco & Stulz, 2006; Mackay & Moeller, 2007; Bartram et al., 2011; and Perez-Gonzalez & Yun, 2013).

For example, Gay and Nam (1998) argue that there is a positive relationship between a firm's derivatives usage and its growth opportunities, as they found that in firms which have enhanced investment opportunities, the use of derivatives is greater, even if they have low cash stocks. Allayannis and Weston (2001) show that user firms have higher market values than non-users of foreign currency exchange rate derivatives. Nocco and Stulz (2006) argue that firms that succeed in implementing and creating effective enterprise risk management can have a competitive advantage over those that take a decision to manage their risks under an individual approach. Mackay and Moeller (2007) find a positive relationship between hedging and firm value in the context of airliners and oil refining firms. Bartram et al. (2011) find a positive relation between financial derivatives usage and firm value, with high sensitivity to both omitted variable bias and endogeneity concerns. Gomez-Gonzalez et al. (2012) examine the impact of hedging decisions and risk management on firms' market value and find a positive relationship between hedging and firm value. Perez-Gonzalez and Yun (2013) argue that financial derivatives are considered the most powerful mechanism that can be used to mitigate risk and thus increase firm value.

In contrast, some studies find no evidence for a positive relationship between hedging policy and firm value. For example, Tufano (1996) finds little evidence to support the theory that risk management is a means to maximize firm value, by using empirical evidence from the gold and mining industry. Fok et al. (1997) argue that their results show support for hedging incentives' reduction of the probability of financial distress and agency cost problems, but they find no evidence to support the theory that hedging can increase firm value. Hentschel and Smith (1997) argue that insurance firms' customers

are concerned about their insurer's ability to meet financial obligations or commitments, so when these firms face a problem of insolvency, for example, then their customers are expected to be unlikely to be willing to pay a premium or to have a contract with them, which will reduce their firm value. Kim et al. (2013) investigate the impact of both financial and operational hedging policy on the firm value of family ownership in the US and find that neither financial nor operational hedging affects family firms' value, which is consistent with the concept of portfolio hedging for the undiversified private wealth of family firm owners.

2.7 Financial Firms and the Usage of Financial Derivatives

Financial firms use financial derivative contracts for two purposes, hedging and trading. In the case of trading, financial firms (especially banks) are considered market makers by selling and offering those contracts as a product to their customers, who seek to hedge their risk exposures. This enables financial firms to gain or generate profit, by taking the positioning and market arbitrage as well as the advantage of the bid and ask spread. However, the risk of so doing is obscure, as the traded derivative contracts are undertaken without taking another position to offset gain or loss, which might increase the risk exposure (Dai & Lapointe, 2010).

For example, Sinkey and Carter (2000) argue that financial institutions engage in the financial derivatives markets as market makers or as end-users or for both purposes. In the case of end-users, they use financial derivatives to gain profit by using derivatives for trading, as they speculate on future price fluctuations of various underlying assets or instruments contracts, such as stocks, options, bonds, swaps, currency, commodity and loans. etc. However, in the case of hedging, the risk is assumed to be reduced as the hedging position is taken to offset the underlying assets' gain and loss. For instance, banks can use financial derivatives for the purpose of hedging to mitigate their exposure risks,

such as foreign currency exchange rate risk, interest rate risk, credit risk, commodity prices risk and equity risk (Sinkey & Carter, 2000). Therefore, theoretically, using financial derivatives contracts for these two alternative purposes (hedging and trading) has different impacts on financial firms' risk and thus their value (Dai & Lapointe, 2010; Sinkey & Carter, 2000 and Fung et al., 2012).

Furthermore, Hentschel and Smith (1997) argue that insurance firms tend to use financial derivatives in their strategy of risk management activities and at the same time they are considered market makers in derivatives markets. Thus, the risk and value of insurance firms' assets in their investments portfolios depend on the activities of risk management represented in their portfolios. They add that financial derivatives markets act to mitigate market risk by spreading the effect of underlying economic shocks among different big groups of investors in order to absorb them in the best way. Purnanandam (2007) argues that firms use of derivatives for two purposes, hedging and trading, is one of the challenges that might face empirical studies in the field of derivatives hedging.

Clark et al. (2008) suggest that banks, especially the larger ones, use different types of derivatives for either hedging or speculating purposes to avoid expected market fluctuations in the future. They find a strong relation between derivatives usage and risk sensitivities for both FX and IR derivatives. Ahmed et al. (2011) argue that financial institutions tend to hold hedging financial derivatives to offset their exposure to FX and IR risk. Thus, derivatives hedging can decrease the market risk of banks by reducing the reliance of cash flows on such macroeconomic factors. Also, it mitigates financial institutions' default risk by shielding their capital from losses caused by unexpected fluctuation in market prices.

2.8 Interest Rate and Foreign Exchange Rate Exposures

Financial firms, especially banking businesses, face various vital risk exposures such as credit or default risks, foreign exchange rate risk, interest rate risk, liquidity risk, operational risk, market risk and counterparties risks. Bartram et al. (2011) report evidence that firms use derivatives to reduce their risk, especially market risk, as domestic and international market price fluctuations are unexpected and firms that do not use a financial derivatives hedge as an effective means of risk management are more likely to be exposed to interest rate risk and to currency exchange rate risk. Therefore, financial derivatives usage for hedging purposes is considered an important tool to manage some of these risks, especially market risks. According to Choi and Elyasiani (1997), previous literature examines the impact of traditional items of off-balance sheet activities on banking risk and operations, and it does not concentrate specifically on financial derivatives and their effect on both exchange rate and interest rate.

Hentschel and Smith (1997) argue that insurance firms can be exposed to unpredicted change or fluctuations of interest rate when the effective maturity of loans or a life insurer's assets differs from that of their liabilities. Bodnar et al. (1998) find that their responding firms use derivatives to mitigate their interest rate exposure risks and foreign exchange exposure risks, which they consider the most common risks that need to be reduced. Aretz et al. (2007) argue that hedging policy could mitigate the effect of IR risk and FX risk on a firm's value and thus strengthen the relationship between management performance and share price, making it easier to differentiate between efficient and inefficient managements.

For example, Schrand and Unal (1998) argue that IR swaps are considered the most widely used type of derivative contracts in the hedging of interest rate exposure risks. Also, Flannery and James (1984) argue that IR risk arises due to the exposure of duration

mismatches as a result of giving loans for the long term and taking deposits for the short term; the longer the duration mismatch, the larger the impact of unpredicted changes in interest rates, which can affect a bank's market value. Sinkey and Carter (2000) argue that banks tend to use derivatives hedging as they have a higher level of IR risk exposure, which suggests a positive relationship between financial derivatives usage and banks' duration mismatch.

Purnanandam (2007) use the off-balance sheet IR derivatives and on-balance sheet non-derivatives interest rate (by comparing the Gap mismatch maturity and assets and liabilities re-pricing) as measurement techniques to investigate hedging motives and to test whether hedging improves banks' role and ability in the intermediation services. Clark et al. (2008) argue that there is a positive relationship between derivatives usage and IR risk. Hankins (2011) argues that the IR hedging level can be affected by the IR exposure risk. He measures the IR sensitivity by using the one-year maturity gap, and argues that the IR exposure is considered the most important risk for bank holding companies and has the priority in their risk management policy.

On the other hand, FX risk exposure is considered very important in financial firms, as well as the IR, and may have an impact on the performance and value of firms. For example, Allayannis and Weston (2001) show that user firms have higher market values than non-users of foreign currency exchange rate derivatives. Smithson and Simkins (2005) argue that firms tend to manage their FX risk exposures and IR risk exposures to mitigate their market risk and thus enhance firm value. Dolde and Mishra (2007) argue that there is a positive relationship between higher usage of FX derivatives and geographically diversified firms. Also, Clark et al. (2008) contrast the performance of traders with that of hedgers and find that FX exposure risk is better managed by hedgers

and IR exposure risk is better managed by traders. Choi et al. (2013) construe firms' FX exposure risk as either foreign sales or geographical diversification.

2.9 Conclusion

Financial firms play a vital and active part in the economy of any country. However, because of the nature of their business activities, financial firms have a high level of risk. Therefore, financial firms need to have effective and efficient risk management policies. Partly as a consequence they tend to use financial derivative contracts much more than non-financial firms do.

However, the above discussion shows that the empirical evidence to support the theory that risk management by using derivatives for hedging can increase firm value and performance is mixed and still not clear, especially for financial firms. Also, according to the theory of risk management, under an imperfect market, firms can use more derivatives for hedging purposes, and according to the above discussion there are inconsistent and unclear results, especially in financial firms. Moreover, the above discussion shows that the empirical evidence to support the theory of risk management regarding the use of derivatives for hedging is mixed, regarding its effect on IR risk and FX risk. Therefore, the empirical chapter in this research examines a number of hypotheses related to derivatives usage for hedging purposes.

Chapter 3

Data Sample Collection Process and the Background of Firms

3.1 Introduction

This research focuses on the UK financial firms listed on the London Stock Exchange (LSE). Our data sample comprises information on three sectors, within the Financial Services industry: banking, equity investment and financial services. This classification conforms to that defined by the LSE and the DataStream database. The above three sectors of the Financial Services industry constitute a very important part of the UK financial industry. Our data sample includes a mix of large, medium and small firms, which we rank according to the total asset value (see Table 1 in Appendix 3A). In the following sections we describe our data sample sectors in some detail.

This research focuses mainly on the usage of financial derivatives for risk hedging and the effect of the various (financial derivative related) hedging strategies available on firms' value and financial performance. We collect information on 128 firms over a period of 10 years (2005-2014) which leads to a total of 1,114 observations (see Table 1 in Appendix 3A).

More specifically, there are 55 firms that use derivatives in general (regardless of purposes), of which 34 use derivatives for hedging purposes, 5 use derivatives for trading purposes and 16 use derivatives for both purposes (see Table 2 in Appendix 3A). Also, Tables 3 and 4 in Appendix 3A provide details about the notional amount associated with the use of derivatives, where we can see that only 24 firms (out of the 55 firms) disclose the notional amount. The statistics for the overall sample show that about 35.2% of the total observations in the whole sample use derivatives, 32.14% use them for hedging purposes and just 14.54% use them for trading purposes (see Table 9 in Appendix 3C).

This chapter is organized as follows. Section 2 presents the background of the sectors and subsectors. Section 3 discusses financial derivatives accounting. Section 4 introduces the dataset and describes how the sample is constructed. Section 5 presents the conclusion.

3.2 Sectors and Subsectors Background

As mentioned above, this research uses data from three sectors of the UK financial services industry, which are banking (BS), equity investment (EIS) and financial services (FSS). The financial services sector includes four subsectors which are: Assets Managers (AMSS), Investment Services (ISSS), Consumer Finance (CFSS) and Specialty Finance (SFSS). These sectors and subsectors are classified according to information available in both the London Stock Exchange market and DataStream database. The following discussion gives more information about these sectors and subsectors in some details.

The nature and business activities of firms differ according to the sector in which they operate, although they are all belong to the UK financial industry. This industry has four main sectors, namely, the banking, insurance, investments and financial infrastructure sectors. The Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA) are responsible for the regulation of all firms in the financial industry.

3.2.1 Banking Sector

In the UK few banks are listed on the LSE compared with other developed countries such as the USA and those listed do not represent the whole commercial banking sector of the UK market. This is a limitation of our research. Some of the banks that are listed are the biggest and more famous banks in the UK and some of the largest in the world. These banks are holding companies and global and international financial services providers, which engage in different types of business activities such as retail banking, wholesale banking and investment banking, commercial banking, credit cards, wealth management, investment management services and insurance services. However, some of these banks focus on retail and commercial banking along with provision of other financial services such as assets and liabilities management and corporate finance (Davies et al., 2010).

Buckle and Thompson (2004) argue that it is hard to differentiate between wholesale and retail banks in the UK as most banks work in wholesale markets as well as in the retail market. In order to operate as a bank in the UK market it is required to get a licence and authorization from the Bank of England and since 1998 the Financial Services Authority (FSA); since April 2013 the Prudential Regulation Authority or Financial Conduct Authority gave this authorization for banks accepted to work in the UK Banking industry (The Chartered Insurance Institute, Policy briefing, April 2013).

In this data sample there are only nine banks that are listed on the LSE, which leads to a total of 73 observations. This is the largest sector in terms of total assets, with total mean assets of about 6 trillion pounds (see Table 5 in Appendix 3A). Of those nine banks, seven use derivatives. Five of these use derivatives for both trading and risk hedging, one bank uses derivatives for trading only and one bank uses derivatives for hedging only. The disclosure of information on the use of derivatives in the banking sector is quite good, at least compared to other sectors. Also, according to our statistics, about 75.34% of banks' total observations show use of derivatives, with 72.60% showing use for hedging purposes and 71.23% for trading purposes (see Table 10 in Appendix 3C).

3.2.2 Equity Investment Instruments Sector

These firms are considered as part of the investment sector in the financial services industry. They have a variety of business activities and are mainly medium and small sized firms. The main business activity of these firms is investment in quoted and unquoted firms to obtain capital growth and they have property development projects as well. Also, they are engaged in making and managing investment in new firms at the establishment stage in different sectors, such as financial services, telecommunications and media, technology, manufacturing, and support services, which include healthcare, social housing, education and debt and equity (Corder, 2004).

Investment trusts are considered a type of investment firm. These investment institutions enable companies and individuals to buy a stake in a greater and more diversified portfolio than they would normally be capable to hold directly and at the same time to acquire the advantages of a sophisticated portfolio management service (Buckle & Thompson, 2004). An investment trust is a company in which companies or individuals might participate to enable them to acquire a share in the returns produced by the fund.

This sector is the smallest in the whole sample according to the number of firms and in terms of their average total assets, which is about 40 million pounds. There are seven firms of this sector included in the data sample of this research, with 67 observations. Only two of those firms use derivatives for hedging purposes and one for trading purposes (see Table 6 in Appendix 3A). In general, according to the statistics of the subsample of this sector, about 26.86% of equity investment firms' total observations show derivatives use, 11.94% for hedging purposes and 14.93% for trading purposes (see Table 11 in Appendix 3C).

3.2.3 Financial Services Firms Sector

This sector has the largest number of listed firms. It is divided into four subsectors, which are Asset Managers, Investment Services, Consumer Finance, and Specialty Finance, according to both the LSE and the DataStream classification. These four sub-sectors have different business activities and are part of the investment and financial infrastructure sectors (Corder, 2004). Some types of these firms might be considered as investment institutions, which are considered another type of financial intermediary that manages funds, allowing small investors to participate in collective investment funds.

These investment institutions pool together a substantial number of small-value subscriptions into a fund which is used to fund the acquisition of a varied portfolio of assets (Buckle & Thompson, 2004). Most of these firms in this sector diversify their

business activities, work in different sectors and industries, financial and non-financial, and tend to diversify their business locally in the UK market and internationally in other markets outside the UK.

For example, some of them offer services in the banking sector such as deposit taking and lending, while others provide securities trading and wealth investment by providing trading services and financial advices, respectively. Also, some of them provide credit products and home loans and some offer motor finance services. Moreover, some of these firms work as private banks and are involved in asset management and holding of investment. The following sections will discuss in detail each subsector and the nature of its business.

There are 112 firms of this sector included in this data sample, which has 974 observations in total for the ten-year period. The total number of firms that use derivatives for any purpose in this sector is 45 firms, of which 31 use derivatives for hedging purposes, three for trading only and 11 for both purposes (see Table 7 in Appendix 3A). Of the 45 firms that use derivatives, only 18 of those firms disclose quantitative data, making this sector less open than the banking sector in general in terms of disclosure and transparency. The firms in this sector are also smaller in terms of the average size of total assets, which is about 2.3 billion pounds. According to the statistics for the subsample of this sector, about 32.75% of its total observations show use of derivatives, 30.49% for hedging purposes and 10.27% for trading purposes (see Table 12 in Appendix 3C).

3.2.4 Assets Managers

These types of firms have different business activities and do not focus on one particular business or segment. For example, these firms could offer such services as private banking, asset management, wealth management services for corporations, institutions, trustees, charities and private customers as well. Also, these firms offer services such as

unit trusts and investment management. Asset management activity could encompass diverse divisions such as investment, infrastructure and distribution as main functions and these functions and divisions have different activities as well. For instance, investment might consist of portfolio management of equities, multi-assets, real estate and fixed income. However, these firms mainly manage wealth and money on behalf of their customers -retail investors, high net worth clients, institutional and financial institutions- by investing this wealth in a wide range of business using a variety of strategies across fixed income, equities, real estate and multi-assets. Moreover, these types of firms diversify their business lines and also tend to work in different markets worldwide.

There are 20 firms in the Asset Managers subsector, with 169 observations and average total assets of about 1.3 billion pounds. Eleven firms in this subsector use derivatives: eight for hedging purposes, one for trading purposes and two for both purposes. The data sample shows that nine of the firms that use derivatives disclose quantitative data and the other three do not (see Table 7 in Appendix 3A). According to the statistics for this subsector and its subsample, about 51.47% of its total observations show derivatives use, 43.78% for hedging purposes and 15.38% for trading purposes (see Table 13 in Appendix 3C).

3.2.5 Investment Services

These firms, like the Asset Managers, have various business segments and most of the firms in this subsector diversify their business activities and run their businesses in different markets worldwide. Some of them operate as holding companies as well, as do many firms in other sectors. For instance, these firms can offer and provide investment banking services by taking deposits and supplying lending, wealth management services and securities trading. They may provide capital to firms in the form of ownership of shares instead of giving loans, and provide consultancy on corporate finance issues.

Also, they could provide fund management and investment management services for firms, individuals, charities and trusts and they offer and provide financial planning, corporate finance and broking services for medium and small size firms as well. Moreover, some of these firms provide administration of personal saving accounts, research, institutional sales, market making, corporate broking and corporate finance, and they offer a variety of investment banking services related to merger and acquisitions, initial public offerings (IPO), private equity, public bids, convertible securities and secondary fund raising.

Firms in this subsector are the largest among the financial services firms in terms of total assets, which average about 11.5 billion pounds. The number of firms is 18 firms with 170 observations in total for ten years. Of these, 12 firms use derivatives: five for hedging purposes, two for trading purposes and five for both purposes. This subsector generally does not disclose quantitative data as is the case with EIS; only one firm out of the 12 discloses this type of data (see Table 7 in Appendix 3A). Moreover, the statistics for this subsector and its subsample show use of derivatives in 47.06% of total observations, 41.76% for hedging purposes and 26.47% for trading purposes (see Table 14 in Appendix 3C).

3.2.6 Consumer Finance

These firms, like the AMSS and ISSS, have a variety of business lines and most of the firms under this subsector diversify their business products and activities. They run their businesses mainly in the UK market, although some engage in different markets worldwide and some of these firms operate as holding companies. They are considered as non-bank credit firms and consist of a rather heterogeneous set of financial institutions which include subsidiary firms of UK banks, many independent institutions and overseas financial institutions.

These firms provide specialised activities, and account for a very small percentage of overall lending by financial institutions. Most of their funding depends on loans received from banks and other financial institutions, and their essential business is to provide instalment credit, mostly in the personal sector. Also, they are called finance companies which tend to provide and finance firms in the form of leasing and factoring as well as instalment loans. For example, these firms are engaged in provision of motor finance services, consumer credit, rentals, retail trading, banking (credit products for non-standard borrowers), prepaid gift card business, multi-redemption vouchers, consumer finance and mortgages.

This subsector is small in terms of the number of firms, with only seven companies and 58 observations, and the firms have average total assets of about 2 billion pounds. Five firms use derivatives for hedging purposes and none of the firms use derivatives for trading or for both purposes. Out of the five firms only one firm does not disclose quantitative data, which is better in terms of disclosure and transparency than the other subsectors of the financial services sector (see Table 7 in Appendix 3A). The statistics for this subsector and its subsample show derivative use in 72.41% of its total observations, all for hedging purposes (see Table 15 in Appendix 3C).

3.2.7 Specialty Finance

This subsector has the largest number of listed firms and it is also the smallest in terms of firms' size compared to other subsectors of the financial services sector. These firms, like the AMSS, ISSS, and CFSS, have various business lines and most of the firms under this subsector diversify their business activities. They run their businesses mainly in the UK market, but some operate in different markets worldwide and some of these firms operate as holding companies as well.

These firms are engaged in provision of a variety of financial and non-financial services and products. The financial products include private banking, financial services, retail banking, wealth management, investment, corporate finance, consumer finance, fund management, operating investment and sale of assets. The non-financial products provided by some of these firms include food storage, distribution, building materials, property development, pub operations, textile processing and legal funds.

The number of firms in this subsector that are included in the data sample is 67 firms, with 577 observations and average total assets of about 200 million pounds. Out of the 67 firms only 17 companies use derivatives. Of these, 13 use derivatives for hedging purposes and four for both hedging and trading purposes. No firm uses derivatives for trading purposes only in this subsector (see Table 7 in Appendix 3A). Only four firms disclose their quantitative data about derivatives use, which is a very low number compared to the other sectors and subsectors. The statistics for this subsector and its subsample show derivatives use in 19.06% of its total observations, 19.06% for hedging purposes and 5.03% for trading purposes (see Table 16 in Appendix 3C).

3.3 Financial Derivatives Accounting

In the last three decades the use of derivatives as a tool of hedging policy in the field of risk management has shown a significant increase. This substantial rise of interest in sophisticated financial risk management is because of the reality that financial institutions and firms are nowadays facing an unpredictable and volatile business environment, which is more complicated than before. Meanwhile, innovations in technology and developments and exploration in academic research facilitate for new and improved methods of measuring different type of risks, leading to an increased level of understanding of each risk and its requirements and the ways it can be managed and controlled.

However, despite these significant developments in the field of risk management, external stakeholders and investors outside the firms' management lack a clear picture regarding the risks that these firms face and how these firms measure and deal with these types of risks (Risk Management Standard, 2002). The annual reports are considered the most important source of information, alongside capital market information, on which stakeholders and investors can base their decisions regarding firms. However, most of those annual reports use very complicated methods and approaches when they present their data and their measurements regarding risk management. Some of those annual reports do not have sufficient data to give clear and accurate information regarding methods of risk measurement and management, and firms' future positions (Linsley & Shrives, 2000).

Measuring the different financial risks is not always easy and usually demands some specific techniques; moreover, the process or technique should be as transparent as possible. Therefore, Financial Reporting Standard No. 13 (FRS 13) was issued by the UK Accounting Standard Board (ASB September, 1998) in order to ensure the transparency and disclosure of all types of financial instruments for corporations working in the UK markets. This standard focuses on improving different requirements regarding types of risks and derivative contracts disclosures, and firms are required to disclose their derivatives activities and transactions in their annual reports, which will be discussed in later sections in more detail.

According to the Bank of International Settlements (BIS, May 2013) and as documented by Grant and Marshall (1997) and Mallin (2001) UK firms have increased their usage of financial derivatives as a risk management strategy, as is the case worldwide. However, this increase is also associated with increased misuse of derivatives, leading to some scandals or crises such as happened in 2008. Most economists and governments consider

that the crisis was due to the bad use of derivatives and lack of transparency of derivatives discourse. As a result, developed countries such as the USA and the UK have issued new rules to improve the financial reporting of corporate derivatives usage.

Moreover, the International Accounting Standard No. 39 (IAS 39) regarding the recognition and measurement of the financial instruments was issued in December 2003 by the International Accounting Standards Board (IASB), and introduced in the annual reports of firms using International Financial Reporting Standards (IFRS), from 1st January 2005[5]. The IAS 39 focuses on two main aspects that should be clarified by firms when they prepare their annual statement of financial position: the recognition and measurement of financial instruments.

Financial instruments are classified into two categories, financial assets and financial liabilities, which are initially measured based on the fair value model depending on each category. Also, firms that apply this standard must consider how to measure financial guarantee contracts, how to deal with impairment assets and how to use the reclassification and deracination of financial instruments (IFRS- IAS 39, 2014). It is worth mentioning that firms that apply IAS 39 have to classify their derivatives usage into two main categories: derivatives held for trading purposes and derivatives held for hedging purposes.

Regarding hedge accounting, the standard sets special criteria to be met in order to follow and apply the rules of hedge accounting, which will be discussed later in more detail (IFRS- IAS 39, 2014). Application of the IAS 39 was introduced in the annual reports of firms using IFRS from 1st January 2005, but it was not compulsory for firms to use it until January 2015. However, it is considered very complicated in terms of its rules and

[5]www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015

methods. Thus, several changes and amendments have been made and it was replaced gradually by IFRS No.9, issued in November 2013, which became mandatory on 1st January 2018[6]. Also, in 2003 the International Accounting Standards Board (IASB) issued IAS 32 in order to organize the disclosure and presentation of financial instruments. This was changed in 2005 and applied from 1st January 2007, by issuing a new standard IFRS 7.

3.3.1 Financial Reporting Standard 13 (FRS 13)

As mentioned in the above section FRS 13 was issued by the UK Accounting Standards Board (ASB) in September 1998 in order to improve the level of disclosure and transparency for firms that use financial instruments in their operations, and was to be applied by firms from the accounting period ending 23 March 1999. These financial instruments are defined as any type of agreement that grants rise or change in the side of financial assets of an entity and the same change in the side of financial liability or equity of another entity (ASB FRS 13, 1998).

The main aim of FRS 13 is to set clear rules that ensure that publicly traded firms report their financial statements according to disclosure requirements that enable all stakeholders to have a clear picture of those firms' business activities objectives, strategies and policies regarding their financial instrument use (ASB FRS 13, 1998). The objective of these requirements is to enable users of the information in the financial statements to evaluate and analyse a firm's risk profile with details of each risk in order to assess the health of its position in using such financial instruments, and any significant risk to their interests (ASB FRS 13, 1998).

[6]www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015

The FRS 13 terms and conditions are applied to all publicly traded financial and non-financial firms that use financial instruments, except insurance firms. Firms using FRS 13 need to provide numerical and narrative disclosure information regarding their use of financial instruments such as financial derivatives and other off-balance sheet products (Helliar et al., 2004). The narrative disclosures concentrate mainly on the type of risks that arise in relation to the usage of financial derivatives instrument contracts and how firms deal with, control, manage and measure such risks as an overall strategy in the firm's risk management policy. The numerical disclosures focus primarily on the implementation of risk management policy and provision of supplementary data in order to assess a firm's risk exposure in terms of magnitude and significance (ASB FRS 13, 1998).

However, the standards of FRS 13 face criticism from a number of authors in this field such as Adedeji and Baker (1999) and McIlwraith and Dealy (2000). Adedeji and Baker (1999) argue that there is no significant difference between the FRS 13 requirements and the previous standards, based on their review of disclosure of financial derivatives before the FRS 13 was implemented.

McIlwraith and Dealy (2000) use data from 60 firms from FTSE 500 listed on the London Stock Exchange market to study and review the implementation of FRS 13 and their results show that only ten firms in their sample had adopted the standards, whereas the other fifty were forced to comply with these standards. They argue that the FRS 13 explanations seem unclear and incomplete regarding the use of derivatives. Consequently, financial regulatory authorities and the Accounting Standards Board in the UK face pressure to develop new rules and standards regarding the disclosure and transparency of financial derivatives and other financial instruments.

3.3.2 Hedge Accounting

As discussed in the section above, the IAS 39 regarding the recognition and measurement of the financial instruments focuses on hedge accounting, and has special criteria that should be fulfilled by firms that employ financial derivatives for the purpose of hedging. The criteria are as follows:

1. The hedge is designated in relationship to an existing underlying asset or an asset that has great transaction probability.
2. The hedge is expected to be effective in the range of 80% to 125% of effectiveness.
3. The hedge has to be measurable.
4. Hedges are classified into three types: fair value hedge, cash flow hedge and hedge of a net investment in a foreign operation. These types will be discussed separately in more detail in the following sections.
5. The hedge must be evaluated on an ongoing basis.

Also, it is necessary to have an offsetting change in the fair value of both the hedging instruments and the hedged items of underlying assets. This means that any change that occurs in one side must be offset by a change in the other side. The IAS 39 defines a hedging instrument as a derivative instrument whose cash flow or fair value is predicted to balance changes in the cash flow or fair value of a specified hedged item of an underlying asset. Hedged items are defined as underlying assets that expose a firm to risk of variation in future cash flows or fair value and are specified as being hedged. Hedged items could be of different types such as assets or financial assets, commitments, liabilities or financial liabilities, net investment of a firm's foreign operations, any transaction that has a high level of probability and all types of risks[7].

[7] www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015

3.3.2.1 Fair Value Hedge

The fair value hedge is classified and defined in the IAS 39 as a type of hedge against any risk exposure of fluctuation in the fair value of a recognised liability or asset or identified part of such liability, assets or entity commitment or unrecognised entity commitment that is attributable to a specific risk and can have an impact on the profit and loss account of an entity's income statement. The positive or negative fluctuation in the fair value of the hedging instrument contract is recognised directly in the income statement of the profit and loss account. Meanwhile, the carrying value of the hedge underlying item is modified for the identical loss or gain with regard to the specified hedged risk that is recognised directly in the income statement of the profit and loss account[8].

3.3.2.2 Cash Flow Hedge

The cash flow hedge is classified and defined in the IAS 39 as another type of hedge against any risk exposure of variability that occurs in the cash flow that is attributable to a specific risk linked with a recognised liability or asset which could have an impact on the income statement of the profit and loss account, such as the expected future interest payments on floating debt rate and forecast transaction of high probability. The effective part of the hedge is recognised initially in the other comprehensive income and the ineffective part will be recognised in the income statement of the profit and loss account. Then the effective part will be recycled to the profit and loss account in the periods when the hedge underlying item will have an impact on the income statement of the profit and loss account. Also, when the hedge instrument contract no longer meets the standard of hedge accounting or if it is sold or expires, then the accumulative loss or gain in the other comprehensive income will be directly transferred to the income statement[9].

[8] www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015
[9] www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015.

3.2.2.3 Hedge of a Net Investment in a Foreign Operation

The hedge of a net investment in a foreign operation is classified and defined in the IAS 39 as the third type of hedge. It includes a hedge of monetary underlying items that are considered as a portion of the net investment. The hedge of a net investment in a foreign operation is considered similar to the cash flow hedge in terms of accounting requirements. The effective part of gain and loss on the hedging instrument contract of the net investment hedge will be recognised immediately in the other comprehensive income, while the ineffective part will be recognised directly in the profit and loss account (IFRS- IAS 39, 2014). Likewise, the accumulative gain or loss that is recognised in the equity of other comprehensive income will be transferred to the profit and loss account in case of partial or full disposal of the foreign operation[10]. The forward contract is considered the best known hedge instrument used against currency risk exposures, to manage foreign currency borrowing and lending.

3.4 Data and Sample Construction

This research focuses on UK financial firms listed on the LSE, which is one of the biggest and most developed markets in the world. Our data sample is hand collected and this is a unique contribution of this study. Purnanandam (2007) argues that the quality of data is assumed to be much better in financial firms than in non-financial firms. Bartram et al. (2011) argue that as derivatives usage has increased worldwide, the requirements and regulations regarding the data disclosure of derivatives have been improved by regulatory authorities in order to monitor and control companies in various countries by requiring them to disclose and include all financial derivative contracts' positions information in their annual report.

[10]www.iasplus.com/en-gb/standards/ias/ias39, 26/10/2015.

As mentioned in the above sections, our data sample comprises information on three sectors of the Financial Services industry: banking, equity investment firms and financial services firms. These three sectors constitute the most important three sectors of the UK financial services industry and they include a mix of large, medium and small firms, as explained in the previous section on Data Sample Firms' Background. The financial services sector has four subsectors: asset managers, investment services, consumer finance and specialty finance, according to the data and classification of both the LSE and the DataStream database.

The data collection process includes different steps depending on the type of data to be collected and the sources of data that are available. The data needed for this study comes from different sources: off-balance sheet derivatives usage data and accounting data (see Figure 1 in Appendix 3B). These data are available as secondary data from a variety of sources: we use annual reports for derivatives usage and risk management data, and Thomson Reuters which includes DataStream and Thomson One Banker for the accounting data.

We collect qualitative data and quantitative data regarding financial derivative contracts by hand from the annual reports for each individual firm. Dummy variables are used to represent the presence of qualitative data and continuous variables are used to represent quantitative data (Saunders et al., 2009). The accounting data for dependent variables and control variables are collected from the DataStream database and all data are collected for a 10-year period from 2005 to 2014, depending on the listed history of a firm.

These data are collected in order to answer the research questions and test the hypotheses of the empirical chapter. The expected sample was 209 firms and the total number of observations was expected to be 2090 according to the total number of firms listed on the LSE throughout the research period and according to the DataStream record. However,

the data sample is reduced for various reasons such as (i) reports for some firms exist for one year or less; these are excluded from the sample. (ii) The annual reports of some companies are not available through any of the different sources consulted, which included Thomson One Banker, the firms' website, Google finance, Yahoo Finance, Financial Times and the Northcote Internet. (iii) Some firms have problems with their accounting data, which are not available on DataStream, the main source for the accounting data of this research. (iv) For some firms, accounting data were not available for one or two full years.

Although ideally are would have a balanced dataset for the ten-year period, for the above reasons, we use an unbalanced dataset in order to increase the total number of observations. Therefore, the final number of firms used in the sample of this research is 128 and the total number of observations is 1114, representing an unbalanced dataset with an inconsistent number of years per company. See Table 8 in Appendix 3A for more details.

3.4.1 Data Collection Process

The data for derivatives usage is collected manually from the off-balance sheet annual reports for the ten-year period subject to the listing history of the firms in the sample and the availability of the annual reports. As mentioned earlier, financial derivatives are used by firms for three purposes: as a hedging tool for risk management, for speculation to gain money and to get the arbitrage opportunities from market pricing differences. The advantage of these instruments is that they make it possible to transfer financial risks from one entity to another which is better placed to accommodate or manage them. The most popular financial derivative instruments used are considered a combination and variation of four main types of contracts, regardless of their complexity or simplicity: forward, futures, options and swap contracts.

Whilst the main aim of this research is to collect data about off-balance derivatives usage for hedging purposes, financial firms use derivatives for both hedging and trading. Hence, we collect qualitative and quantitative data on use for both purposes, with more focus on hedging, as the subject of this study. In the process of collecting these data, we employ various steps as follows (see Figures 1-15 in Appendix 3B, which show each step, for more details).

First, we collect annual reports for all financial firms in the three sectors that are listed on the LSE, depending on both history and availability. Then, the risk management and derivatives usage parts of the off-balance sheet annual reports of firms are read carefully. Reading through the annual reports is one of the most challenging processes in terms of collecting data manually, as each individual company has its own style and principles of presenting its annual financial reports, especially as the sample includes different sectors and sub-sectors. For this reason, we use various key words in order to search correctly without missing any important information, including derivatives, financial derivatives, financial instruments, hedging, off-balance sheet items, forward contracts, future contracts, swaps contracts, options contracts, interest rate swap, risk, risk management, market risk, interest rate risk, foreign exchange rate risk, equity risk or derivatives and commodity risk or derivatives.

Second, we check the annual reports in order to get targeted data regarding the usage of financial derivatives by posing various questions in this regard, such as: (i) does a particular firm use financial derivatives? If the answer is yes, then: (ii) does it use them for hedging or trading purpose or both? If a firm uses derivatives for hedging, then: (iii) For which type of hedge does it use these financial derivatives? In order to classify the usage of derivatives according to the hedge accounting requirements of IAS 39, the following question is asked: (iv) which type of risk or hedge item does the firm seek to

mitigate through the use of derivatives? This is followed by question: (v) Which type of hedging instrument contracts does it use: Forward contracts, Future contracts, Option contacts and Swap contracts or other derivatives contracts?

Third, if a particular firm uses derivatives for both hedging and trading, only the total amount of notional contracts of derivatives, the fair value of assets and liabilities is collected for trading, when the data are available (see Figure 2 in step one in Appendix 3B). In the case of hedging, we collect more details when available, to make it possible to conduct this research and achieve its targets. These include the type of hedge, the type of hedge items of underlying assets and the type of derivative contracts used (see Figure 3 in step two in Appendix 3B).

Fourth, in the case that a firm uses derivatives for hedging, the question is, what type of risk exposures does it use them to reduce? The main focus is on two types of exposure: foreign exchange rate exposure risk and interest rate exposure risk. Data for these two exposures are collected in more detail from the derivatives usage perspective and depending on data availability. Firms' use of derivatives for other exposures such as credit, equity, commodity, liquidity... etc., is categorized as other derivatives usage. However, for those other exposures, data are collected only for the total amount of notional contracts of derivatives, the fair value of assets and liabilities and the types of contracts used, when available (see Figures 4, 5 and 6 in step three in Appendix 3B).

Finally, when firms uses derivatives to hedge one or both of foreign exchange rate exposure risk and interest rate exposure risk, the question is which derivative contracts do firms use to hedge? Details of the total amount of notional contracts of derivatives, the fair value of assets and liabilities, in addition to the details of the derivatives contracts, forward, future, option, swaps and other contracts, are collected when available (see Figures 7-15 in steps four, five and six in Appendix 3B).

3.4.2 Disclosure and Transparency of Data

Firms' disclosure of derivatives data in the sample differs from one firm to another and from one sector to another; however, it can be classified into four types in general. The first type consist of firms that follow the full requirements of FRS 13 and IAS 39 regarding their use of financial derivatives, as they disclose both qualitative and quantitative data. The second type of firms follow FRS 13 and IAS 39 regarding their use of financial derivatives, but they disclose only qualitative data. The third type of firms do not use derivatives and disclose this clearly in their annual reports. The last type of firms do not use derivatives, but do not mention clearly that they do not use derivatives.

Also, the disclosure of quantitative data varies from one firm to another and from one sector to another. Some firms disclose only the total notional amount of all derivatives contracts without disclosing the fair value of assets or liabilities. Some firms disclose only the total notional amount for a particular risk, say, interest rate risk, without disclosing the notional amount of the contracts used. Other firms disclose only the fair value of the contracts and so on. These disparities in disclosure reduce the number of observations of the continuous variables, compared to the dummy variables. For example, the total number of observations of the usage of derivatives for hedging purposes in the whole sample is 358 observations, while the total number of observations of the total notional amount for firms that use derivatives for hedging purpose is only 169 (see Table 9 in Appendix 3C).

In general it can be seen that the firms in the sample tend to disclose more qualitative data rather than numerical and quantitative data and this might be because the full implementation of the disclosure standard was not yet compulsory during the sample period. It only became compulsory for all firms both financial and non-financial to

disclose and implement hedging accounting from 1st January 2015 according to the requirements and rules of IAS 39.

3.4.3 Derivatives Usage Data Variables

We collect data for many different items regarding the usage of derivatives in order to conduct this study, including qualitative data and quantitative data. These data are organized in an unbalanced dataset in order to answer all the questions in this research. The qualitative data are classified into 60 dummy variables and the quantitative data are classified into 20 continuous variables, as the quantitative data seems to be more limited than the qualitative data (see Table 9 in Appendix 3C for more details).

Tables 9-16 in Appendix 3C present and summarize the names of the variables, the types of the variables, the total number of the observations, the mean for the users of the derivatives of that item and the number of observations comparing with non-users of the derivatives. Also, they report information for the overall sample and for each sector and sub-sector separately. The results provided in those tables show a number of important points. For example, in general the non-users of derivatives in the sample are more numerous than the users of derivatives, the disclosure of qualitative data is greater than that of quantitative data, the banking sector is the best in term of disclosure of both types of data, while the equity investment sector is the worst in terms of disclosing quantitative data.

3.4.4 Data Collection Challenges

We acknowledge many challenges faced during the time-consuming and arduous process of collecting and gathering the dataset for this study. As mentioned earlier, we use two sources from which to collect and gather the dataset: annual reports for derivatives usage and the Datastream database for accounting data. Each method has its challenges and

requirements. These are the main challenges encountered during the data collection process:

Firstly, it is hard to collect the annual reports for ten years and to read them, given the different presentation formats used by different firms. The presentation differs from sector to sector and from firm to firm in the same sector and individual firms can change their presentation from one year to another. The need to collect both qualitative data and quantitative data lengthens the time needed to read each report carefully, to be sure not to miss any information that is useful for the research. Some firms have large reports in terms of the number of pages, whereas others have medium or small reports. For these reasons we use a variety of key words during our reading and our search of each report to ensure collection of the correct data and all the data that is available (for more details please see chapter 3 section 3.4 and subsection 3.4.1).

Secondly, the sample is 209 firms, which should yield a total of 2090 observations, according to the total number of firms listed on the LSE throughout the research period and the DataStream record. However, the data sample is reduced for various reasons such as: (i) exclusion of firms that reported for one year or less; (ii) unavailability of the annual reports of some companies, in any of the various consulted sources; (iii) absence of some firms data from DataStream, the main source for the accounting data of this research; (iv) instances of accounting data being unavailable for one or two full years.

Thirdly, we classify the usage of derivatives according to the hedge accounting requirements of IAS 39, taking a long time in reading the annual reports and so collecting the data. Fourthly, firms' disclosure of derivatives data in the sample differs from one firm to another and from one sector to another, therefore we classify firms in our dataset into four types as shown in subsection 3.4.2. Finally, the disclosure of quantitative data varies from one firm to another.

3.4.5 Financial Firms' Classification

We believe that our data does not need to be reclassified into different categories for several reasons. Initially, we believe that although the nature of these firms may be different, even though they are under the same industry classification, they are similar in that they are subject to the same regulation and rules, especially relating to the use of derivatives and capital market requirements, as all of them are listed on the London Stock Exchange. For example, the FRS 13 terms and conditions are applied to all publicly traded financial and non-financial firms that use financial instruments, except insurance firms. Firms using FRS 13 need to provide numerical and narrative disclosure information regarding their use of financial instruments such as financial derivatives and other off-balance sheet products (Helliar et al., 2004). Moreover, the IAS 39 standard regarding the recognition and measurement of the financial instruments focuses on hedge accounting, and has special criteria that should be fulfilled by firms that employ financial derivatives for the purpose of hedging. As a result we assume that these firms have the same motivations to use financial derivatives for hedging, especially to hedge interest rate risk and foreign exchange rate risk.

In addition, the official firm classifications are objective and widely recognized. It would be potentially possible to reclassify firms but this would not only be extremely laborious but also might introduce an element of subjectivity which would not be desirable. In particular it might not be very credible to present our results to a wider audience if they were based on a classification system that is not widely recognized. Nonetheless, it might be considered one of our research limitations that we do not reclassify our data sample into different categories and this might open a path for new researchers to overcome this limitation in the future.

3.5 Conclusion

As all firms in the sample are listed on the LSE, they are subject to the terms and conditions of FRS 13, whereby all publicly traded financial and non-financial firms that use financial instruments, except insurance firms, must show transparency and disclosure improvement in their annual reports. Therefore, the transparency and disclosures of financial derivatives for corporations working in the UK markets are expected to be well developed with a high level of disclosure and transparency in their operations. However, the firms in our data sample do not present all information about derivatives usage in a consistent way in their annual reports, and the level of disclosure depends on the sector to which those firms belong.

Finally, this study uses a unique dataset, collected by laborious and time consuming methods. To our best knowledge, no previous study has been done in such a way. Therefore, this dataset is considered one of the main contributions of this study and is expected to add new empirical evidence to the literature on risk management.

Chapter 4

Research Methodology

4.1 Introduction

This research uses secondary data of UK financial firms and applies quantitative research methods in order to investigate the relationship between the use of derivatives and firm value and performance. It uses univariate tests to compare the users and non-users of financial derivatives. Also, we use multivariate tests to examine the impact of financial derivatives usage for hedging purposes on the firm value and performance. As mentioned in chapter three, this research employs an unbalanced panel dataset and implements OLS estimator of panel data analysis method. Gardiner et al. (2009) argue that it is crucial to understand the conceptual difference between techniques and methods, even though they may not vary substantively when applied empirically.

As advised by Baum (2006), it is important to prepare our dataset for the statistical analysis. Moreover, it is worthwhile to mention that it is better to have a balanced dataset, but the data sample sometimes forces researchers to use an unbalanced dataset. The difference between an unbalanced dataset and a balanced dataset is only that the number of time periods in an unbalanced dataset varies from one firm to another. If a firm is denoted as (i) and time as (t), the total number of firms as (N) and the total time-span as (T), the normal total number of observations is (NT), but in the case of an unbalanced dataset it will be $\sum^{N}_{i=1}T_i$ as the number of time periods will not be the same in all individual i observations. This might lead to exclusion of firms that have a low number of time periods compared to the total time-span in the sample

Baltagi (1985) uses a General Least Square (GLS) estimator model and an unbalanced dataset of pooled cross sectional data over unequal time period lengths and his results show that there are no differences in the results between a balanced and an unbalanced panel dataset. He also argues that researchers who use panel data at micro level or firm level can use an unbalanced dataset because firms need to be followed over time and it is

problematic to obtain balanced datasets. This is because some firms may not be in the market at the beginning of the time period, or they may exist at the beginning of the sample time period but disappear in some point of time because of a bankruptcy, a merger or an acquisition.

This chapter is organized as follows. Section 2 presents methods and techniques. Section 3 presents and discusses the panel data method. Section 4 discusses sources of endogeneity. Section 5 presents and discusses dynamic panel data and GMM technique estimators. Section 6 presents the conclusion.

4.2 Methods and Techniques

It would be possible, in this research, to use several multivariate tests and econometric analysis methods in order to address our research questions. More specifically, we could use Ordinary Least Squares (OLS), Fixed-effect (FE) and Random-effect (RE) estimators of the Panel Data method to estimate the coefficients and errors of our regression models. We use a panel dataset which is the most advisable methodology to address our research questions. Baltagi (2005) suggests that the use of panel data has several advantages, and although it also has a few disadvantages, the advantages outweigh the disadvantages. of using it. In addition, in order to control for the endogeneity effect and omitted variables bias, we can use the so-called Generalised Method of Moments (GMM). Perez-Gonzalez and Yun (2013) among others, use the GMM to reduce their concern about endogeneity problems and to control for autocorrelation and potential of heteroscedasticity at the firm level. However, we find that the results of the Ordinary Least Squares (OLS) estimator of the panel data method are more consistent and more suitable to run our regressions models. Below, we discuss in further detail the features of the above mentioned techniques and their advantages and disadvantages.

4.3 Panel Data Methods

The use of panel data in empirical finance research is quite popular because it takes into account simultaneously the time (temporal) dimension and the cross-section (spatial) dimension in the regression analysis. Baltagi (2005: 15) defines panel data as "*the pooling of observations on a cross-section of households, countries, firms, etc. over several time periods. This can be achieved by surveying a number of households or individuals and following them over time*". The panel data technique is used when the data sample comprises cross-sectional data over time. The temporal dimension relates to periods and time observations of a set of variables characterizing the individuals of cross sectional dimension over a specific time period, whereas the spatial dimension relates to a set of cross-sectional individuals of observation (Arellano 2003, Mundlak 1978, Wooldridge 2002 and Yaffee 2003). The models of this technique can be written as follows:

$Y_{it} = \alpha + \beta X_{it} + U_{it}$ (i = individuals (1, 2, 3… N); t = time (1, 2, 3… T) (Main equation)

Where (i) indicates units or individuals and (t) indicates the time dimension, (N) is the total number of individuals and (T) is the length of time-span in the time dimension. (Y) represents the dependent variable, (X) represents the independent variables, (α) is a constant, (β) denotes the coefficients of the independent variables and (U) represents the component of the error term in the model. It is known that the performance of any analysis estimation procedure for the parameters of the regression models relies on the statistical characteristics of the components of error term in those models.

4.3.1 Advantages and Disadvantages of Panel Data

There are a variety of advantages of using this method, as discussed by various specialists and authors. Baltagi (2005) highlights five main benefits of using panel data, which are (i) it controls for individual heterogeneity as it proposes that countries, states, individual and firms are heterogeneous; by contrast, cross-sectional and time-series studies do not

control heterogeneity which leads to biased outcomes. He argues that some variables might be hard to collect and difficult to measure, so the omission of these variables can cause a bias in the estimated outcome. In the case of panel data it is possible to control for these variables, whereas cross-section and time-series studies do not have this feature. (ii) It gives more variability, with less collinearity issues among the variables, better efficiency, more informative data and greater degrees of freedom. In contrast, time-series studies have a high probability of having multicollinearity problems (Baltagi, 2005). For instance, the variability of data can be decomposed into variation within individuals and variation between individuals of different characteristics and sizes. (iii) It is more suitable for studying the dynamics of changes, whereas cross-section, while seeming relatively steady, hides a large number of adjustments. (iv) It is more suitable for measuring and identifying impacts that are simply not detectable using both time series or cross-section studies. (v) It helps researchers to examine and construct more complex behavioural models than either time series or cross-section studies.

The author adds that panel data that are gathered at the micro level of firms or individuals might be more accurately measured than the same variables measured at the macro level, as the expected bias in outcomes from aggregation over individuals or firms might be eliminated or reduced. Yaffee (2003) states that the panel data method can produce high quality results by combining cross-sectional and time series data at the same time.

On the other hand, Baltagi (2005) argues that this technique has very few limitations compared to other statistical analysis methods. These limitations are (i) it has data collection and design issues such as missing and incomplete variables' data. (ii) Measurement errors might arise due to mistaken responses for various reasons, such as deliberate distortion of responses, questions sometimes not being clear and memory errors. (iii) It has selectivity issues due to non-response, self-selection and attrition, which

will cause bias in the data. (iv) It has at the micro level a short time-series dimension for each individual, whereas the macro level has a longer time-series dimension, as it does not take into account the cross-section dependence of regions and countries, which might result in misleading outcomes. Also, Yaffee (2003) criticises the panel data method as he argues that it has many different estimators, which necessitates use of more dummy variables. This is likely to decrease the R square level and the power of statistical tests, as it will increase the coefficients of standard errors.

4.3.2 Ordinary Least Squares

Ordinary Least Squares (OLS) is one of the most commonly used methods in linear regression models. This method is based on the Gauss-Markov assumptions. These assumptions are the following: (i) the dependent variable Y is considered to be a linear function of the independent variable X and the error term. (ii) The predicted value of the random error term for all observations is zero. (iii) The variance of the error term is fixed in all independent variables over time as result of homoscedasticity. (iv) The error term is not correlated with the dependent variable Y and is independently distributed. (v) It considers the independent variables as deterministic as it is not correlated with the error term. (vi) It assumes there is no multicollinearity problem. Under these assumptions the OLS is efficient and does not have bias problems and in this case it called the best linear unbiased estimator, (Blue) (Wooldridge, 2002).

Baltagi and Chang (1994) argue that OLS is the best linear unbiased estimator when the ratio of the variance component is equal to zero and it is still consistent and unbiased when this ratio is positive, but it will have bias in its standard errors. Wooldridge (2009) argues that in the population model, the OLS is employed to estimate the intercept and the slope parameters. Tibshirani (1996) argue that the OLS is known to reduce the residual

squared error, but it has problems of insufficient accuracy and shrinking the predicted coefficients.

However, the above Gauss-Markov assumptions do not usually all hold, which makes the OLS method produce biased and inefficient results. The OLS can have various problems such as intercept bias, heteroscedasticity, autocorrelation, endogeneity, omitted variable bias and multicollinearity. Moulton (1986: 386) argues that "*the use of OLS when disturbances are correlated results in inefficient coefficient estimation and biased standard errors. The magnitudes of these effects have been studied in the survey methods literature for regression analysis of data from cluster samples*". Therefore, it is a good practice to start the regression analysis by using this method, but it is important to use the panel data estimators in order to overcome the mentioned problems that might occur in the OLS. Baltagi (2005) argues that the use of OLS can lead to inconsistent estimates and omission variables bias of the regression parameters, because the OLS wipes out the unit dummies, which are relevant in reality. Leng et al. (2007) argue that the OLS assume that the explanatory predictors are measured without error, which is in reality not true, especially when the predictors' randomness exists.

4.3.3 Fixed-Effect Estimator

The Fixed Effect Estimator (FE) assumes that the individual or unit specific effect is correlated with the independent variables and thus the time-invariant component will be dropped from the model by taking the variation between each observation with the within-units' average values in order to remove the individual specific term (Wooldridge, 2002 and Baltagi, 2005). Baltagi (2005) highlights that under the models of panel data techniques the error term components might be estimated in different error structures. Therefore, there are two types of FE, the one-way FE model and the two-way FE model. The following is a brief discussion about both types.

4.3.3.1 One-Way Fixed-Effects Model

A model is considered a one-way model if its specifications rely on the spatial dimension only or the temporal dimension only and it is considered a FE model as the unobservable unit-specific impact (μ_i) is proposed to have fixed parameters and the remainder disturbances of v_{it} to be randomly determined. The remainder disturbances of v_{it} are assumed to be independent and identically distributed (IID) (0, σ^2_v) and at the same time the independent variables of (X_{it}) are proposed to be independent of the remaining disturbance (v_{it}) for all units of (i) and time (t) (Baltagi, 2005 and Hsiao, 2014).

In this case the OLS method is performed on the main equation of panel data in order to estimate the constant (α), the coefficient (β) and the unobservable error term (μ) and when the total number of individuals or firms (N) is large, this will require the inclusion of large numbers of individual or firm dummies in the regression, as well as large numbers of the independent variable matrix that is inverted by the OLS. The constant (α) and the coefficient (β) are considered the parameters of interest. Thus, the FE or least squares dummy variables (LSDV) estimator could be obtained from the main equation by pre-multiplying the model equation by (Q), where (Q) is a matrix that acquire the deviations from unit means and it has a feature to wipe out the units or individual impacts. Then the OLS, is performed on the resulting transformed model as this equation model $QY = QX\beta + QV$ in order to get the coefficients.

Baltagi (2005) and Wooldridge (2002) argue that this estimator suffers from a great loss of degrees of freedom and several dummy variables might exacerbate the issue of multicollinearity among the independent variables. Also, they add that it cannot estimate the impact of any time-invariant variable. However, the FE is considered the best linear unbiased estimator model as long as the remainder disturbances of v_{it} is the standard classical disturbance with variance and covariance matrix and zero mean. Also, the FE

estimator is considered consistent as the length of time-span (T) goes to (∞) (infinity), but as (T) is fixed and the total number of individuals of (N) is going to (∞) (infinity), then the coefficient of (β) is consistent. However, in this case the unit or individual impacts are inconsistent due to the increase in the number of parameters as a result of increase in (N).

4.3.3.2 Two-Way Fixed-Effects Model

A model is considered a two-way fixed-effects model if its specifications rely on both the spatial and temporal dimensions. In this case of a two-way model, the components of the error term will be written or structured as $U_{it} = \mu_i + \lambda_i + v_{it}$, where ($\lambda_i$) indicates the unobservable time-specific impact and it is considered unit-invariant and accounts for any time-specific impact that is excluded from the regression. Thus, the two-way FE model assumes that the unobservable unit-specific impact (μ_i) and the unobservable time-specific impact (λ_i) are fixed parameters and the remainder disturbances of (v_{it}) assumed to be randomly related with independent and identically distributed (IID) ($0, \sigma^2_v$) (Baltagi, 1981). The independent variables of the (X_{it}) matrix are proposed to be independent of the remainder disturbance (v_{it}) for all units of (i) and time (t).

Baltagi (2005) and Wooldridge (2002) argue that a two-way FE model is conditional on the specific (N) units and over the particular periods of time observed and it can be assumed that the time dummies are NT * T. When (T) or (N) is large this leads to a substantial loss in the degrees of freedom, which will reduce the issue of multicollinearity among the regressors' variables. They add that the two-way FE model considers time dummies, which are ignored by both the OLS and the one-way fixed-effects model.

4.3.4 Random-Effect Estimator

This estimator assumes that individual or unit specific effects are uncorrelated with the independent variables, and thus this model will estimate the coefficients of all variables,

time–invariant and time–variant. This means that in this model there is no fixed individual or unit specific effect, so the remainder disturbance will be combined with the individual or unit specific effects in order to form a new error term. In this case we do not have to drop the differences and all variables can be included regardless of time variability (Wooldridge, 2002 and Baltagi, 2005). In this estimator there are two types of model, as in the case of the FE estimator, as the error term components might be estimated in different error structures, one-way RE model and two-way RE model (Baltagi, 2005). The following is a brief discussion about both types.

4.3.4.1 One-Way Random-Effects Model

As mentioned, a model is considered a one-way model if its specifications rely on the spatial dimension only or the temporal dimension only and it is considered a RE model as the unobservable unit-specific impact (μ_i) close to or equal to the independent and identically distributed (IID) (0, σ^2_μ) and the remainder disturbances of (v_{it}) also close to or equal to the independent and identically distributed (IID) (0, σ^2_v) and both are independent of each other. The independent variables of (X_{it}) are proposed to be independent of both the unobservable unit-specific impact (μ_i) and the remainder disturbance (v_{it}) for all units of (i) and time (t) (Baltagi, 2005 and Hsiao, 2014).

Baltagi (2005) and Wooldridge (2002) argue that in the FE model there are too many parameters and this causes this estimator to lose its level of freedom in the regression. This could be avoided by assuming the unobservable unit-specific impact (μ_i) randomly, only in this case the selection of the RE estimator will be the best. Also, it is considered the best choice to use the RE model when the total number of individuals (N) in a large population are selected randomly and this is considered as the normal situation, as most samples are chosen randomly. However, the RE model could imply homoscedastic variance, which might cause the issue of sequent correlation over time between the

disturbance only of the same unit or individual. Baltagi (2005) and Wooldridge (2002) add that under this model the OLS estimation could have consistent and unbiased results but it is still considered as inefficient and no longer fulfils the condition of BLUE assumptions.

4.3.4.2 Two-Way Random-Effects Model

A model is considered a two-way effect model if its specifications rely on both spatial and temporal dimensions. In the case of a two-way model, the components of the error term will be written or structured as $U_{it} = \mu_i + \lambda_i + v_{it}$, where (λ_i) indicates the unobservable time-specific impact. It is considered unit-invariant and it accounts for any time-specific impact excluded from the regression.

Thus, the unobservable unit-specific impact (μ_i) is close to or equal to the independent and identically distributed (IID) ($0, \sigma^2_\mu$), the unobservable time-specific impact (λ_i) is close to or equal to the independent and identically distributed (IID) ($0, \sigma^2_\lambda$) and the remainder disturbances of (v_{it}) are also close to or equal to the independent and identically distributed (IID) ($0, \sigma^2_v$) and all of these three components are independent of each other (Baltagi, 1981). The independent variables of the (X_{it}) are proposed to be independent of all three components, the unobservable unit-specific impact (μ_i), the unobservable time-specific impact (λ_i) and the remainder disturbance (v_{it}) for all units of (i) and time (t) (Baltagi, 2005 and Hsiao, 2014).

4.3.5 Fixed-Effect Estimator Vs Random-Effect Estimator

In addition to the various impacts of different error structures, one-way or two-way, and to the nature of the temporal and spatial dimensions and their potential specifications, there are different tests that can be used to differentiate between FE and RE models. The most famous test is the Hausman test. It is considered a classical test in the panel data technique for the purpose of choosing the best model for the regression.

Baltagi (2005) and Wooldridge (2002) argue that the choice between these two estimators (FE and RE) is considered one of the hottest topics in the field of statistics literature and it generates huge debate, which has spilled over into the literature of the use of the panel data technique. Chamberlain (1984) indicates that the FE model forces testable limitations on parameters of the reduced form model and the validity of these limitations should be checked in advance before using this model. Mundlak (1978) states that the RE model proposes exogeneity of all the explanatory or regressor variables with the random unit impact, whereas the FE model enables endogeneity of all regressor variables with these units' impact.

However, there are two tests a researcher using these two estimators should use in order to choose the best model for his or her regression. The first test is to know if there is any random impact between units or individuals, and the appropriate test in this regard is the Breusch and Pagan Lagrange Multiplier (LM), which was suggested in 1980 by Breusch and Pagan. This test compares between the OLS estimator and the RE estimator. The assumptions of this test are that under the null hypothesis H_0 = there is no random impact ($\sigma^2_\mu = \sigma^2_\lambda = 0$) and the alternative hypothesis assumes H_1 = random impact is there ($\sigma^2_\mu > 0$ and $\sigma^2_\lambda > 0$). The rejection rules depend on the critical value; if it is less than Breusch and Pagan's LM value then the null hypothesis will be rejected and this means that there is existence of random impact between the regressor variables and the unobservable individual-specific impact and thus the RE is more suitable to be used (Breusch & Pagan, 1980).

The second test is the Hausman specification test, suggested by Hausman (1978) and this test, as mentioned, is suggested to select the best model between the FE and RE estimators that can fit the regression of panel data technique. This test depends on whether there is a significant correlation between the regressor variables and the unobserved individual-

specific random impact. When the answer shows no correlation exists, then the RE model is considered the best and more powerful to be used in the regression; when such correlation exists, then the RE model will be inconsistently estimated, and in this case the FE estimator will be the best to be used. The assumptions of this test are that under the null hypothesis H_0 = there is no correlation and the random impact is efficient and consistent $E(X_{it}\ \mu_i) = 0$ and the alternative hypothesis assumes that H_1 = a correlation exists and fixed impact is consistent $E(X_{it}\ \mu_i) \neq 0$. The rejection rules depend on the critical value; if it is less than the test statistic (m) (m is represented as X^2_k, where k indicates the number of regrssor variables) then the null hypothesis will be rejected and this means that the FE model is more suitable to be selected (Hausman, 1978).

4.4 Sources of Endogeneity

The existence of endogeneity problems is a characteristic of most empirical studies in corporate finance (Wintoki et al., 2012). For instance, the decision to use derivatives for hedging purposes can have a positive or negative impact on firm value and performance and at the same time firms could decide to use derivatives in order to prevent their value and performance or guard against negative impacts on their investment or business activities. This means it can be assumed there may be a dynamic relation between the decision to use derivatives and firm value and performance.

This also means that estimators and techniques such as the FE and OLS might show a biased relationship between the dependent variable and the explanatory variables, especially the decisions to use derivatives for hedging purposes, by ignoring this dynamic nature and not taking account of endogeneity issues. Wintoki et al. (2012) argue that the FE model could possibly improve the bias that emerges from unobserved heterogeneity when there is a strong exogeneity assumption, which is very difficult to make explicit and to be recognized by finance researchers.

Wintoki et al. (2012) study the determinants of corporate governance and its impact on firm performance and they employ dynamic panel of GMM estimators (difference GMM and system GMM) in order to reduce the endogeneity issue. They argue that corporate governance decisions and their dynamic nature could be investigated by using the estimators of the GMM technique, which offers strong and valid instruments to overcome the main sources of the endogeneity problem, which are simultaneity and unobserved heterogeneity. Therefore, it can be assumed that derivatives usage is a choice variable and its dynamic nature might be influenced by past firm value and performance and other factors that affect the decision to use derivatives.

It is known that in econometrics, unobservable heterogeneity is considered one of the main sources of endogeneity issues, especially when researchers have different unobservable variables or factors that influence firm value and performance and the explanatory variables. This can be the case when studying the effect of derivatives on firm value and performance. For example, the risk management team's ability and plan (or the nature and differences between the financial sectors and subsectors) are considered unobservable factors, but they might affect the firm value and performance.

Therefore, the regression results of the OLS method can be biased as it ignores this unobservable heterogeneity between firms and this issue can be solved by using the FE estimator. However, it also can be biased if it does not consider the assumption that past firm value and performance can have impact on the current value of derivatives usage and other explanatory variables. In this case the dynamic panel of GMM estimator can be used to solve this issue (Wintoki et al., 2012).

Moreover, from the economic view, simultaneity can arise in derivatives usage and its impact on firm value and performance. Theory suggests that firms deicide to use derivatives in any period with a plan targeted to achieve a specific level of firm value and

performance in that period; if this is the case, then whilst firm value and performance might be affected by derivatives usage, the usage of derivatives can also be affected by firm value and performance. So, in this case firm value or performance and derivatives usage are simultaneously determined and both the FE and OLS estimators may produce biased results.

Thus, the best possible solution to overcome this particular issue is to use the system GMM technique in order to estimate the impact of derivatives usage on firm value and performance. Wintoki et al. (2012) argue that researchers should consider that the potential of current values of dependent variables could be a function of previous firm performance (the lag of the dependent variable), which might be another source of the endogeneity issue, which could have a great impact on the regression results.

4.5 Dynamic Panel Data and GMM Technique Estimator

Finance researchers, through the use of the dynamic panel GMM technique, can achieve unbiased and consistent regression results. This technique was developed and designed by Arellano-Bond (1991) and Arellano-Bover and Blundell-Bond (1998) to overcome various problems that might face researchers who use panel data. These cases include: (i) short panel and linear relation function; (ii) a dynamic dependent variable that relies on its own pervious realization; (iii) explanatory variables which might not be fully exogenous and may be correlated with current and past errors; (iv) fixed individual impacts, autocorrelation and heteroscedasticity within individuals. Also, Cameron and Trivedi (2010) state that the GMM is considered a quite general technique that can be used when the error terms are heteroskedastic and independent and it must satisfy the assumption of E (u|z) =0 as a condition to be consistent.

Roodman (2006) argues that the GMM technique has become very popular in short panels that have more individuals (N) and fewer time periods (T), which might have a problem

of shortage of endogeneity. It has two estimators: Difference GMM and System GMM. The System GMM was developed by Arellano and Bover (1995) and Blundell and Bond (1998) and it is considered superior to the Difference GMM estimator. Roodman (2009B) argues that the Difference GMM and System GMM can fit the linear GMM. The Difference GMM processes data after first-differencing in order to remove fixed effects, while System GMM augments it by estimating the two equations of first-differences and levels simultaneously and the two are clearly instrumented.

Wintoki et al. (2012) state that the system GMM estimator is better to be employed than the first difference GMM estimator as it can reduce potential bias and meet the criteria validity of the instruments. Also, the use of the system GMM estimator can achieve efficient estimations whilst controlling for simultaneity, unobserved heterogeneity (time-invariant) and the dynamic link between the past value of the dependent variable and current values of the explanatory variables.

Roodman (2009A) argues that in order to reduce or limit the instrument number in System GMM, researchers can use either option, to add the collapse option in the regression or to restrict the lag range used in generating those instrument sets. Roodman (2009B) highlights that when System GMM is valid, the collapsed instrument leads to less bias. The vital aspect of the GMM is its use of the firm's historical values as instruments – by using the set of lag- for the explanatory variables.

Roodman (2006) argues that time–invariant variables can be included in System GMM but cannot be included in Difference GMM. Roodman (2009A) highlights that the crucial assumption for the validity of the GMM is that the instruments are exogenous. These instruments should meet two conditions in order to be valid: they have to offer a source of variation for current values of explanatory variables and the lagged or historical values have to offer an exogenous source of variation for current explanatory variables.

Consequently, the lagged variables have to be uncorrelated with the error on the firm value and performance (Wintoki et al., 2012).

4.5.1 Advantages and Disadvantages of GMM

There are various advantages in implementing the GMM technique compared to other regression analysis methods. For example, the GMM estimators of the dynamic panel technique outperform the FE and OLS estimators in three main vital aspects. (i) Researchers could include in the GMM estimator firm-specific impacts to consider or account for the unobservable heterogeneity issue, which cannot be included in the OLS estimation. (ii) The GMM estimator enables the current value of independent or explanatory variables (the usage of derivatives) to be influenced by shocks to or prior realizations of, previous performance or a dependent variable, which is not considered or taken into account in the FE estimator. (iii) Neither the FE nor the OLS estimators take into account the dynamic interaction between the dependent and explanatory variables, which is considered a key insight of the GMM estimator, in that it considers the dynamics of the underlying economic process itself.

In this case it might possible to employ a combination of explanatory variables from the company's history as valid internal instruments to account for and overcome the issue of simultaneity and at the same time eliminate the necessity for using external instruments (Wintoki et al., 2012). Roodman (2009A) argues that the advantage of System GMM is that the time-invariant explanatory variables can be included, which disappear in Difference GMM.

On the other hand, the GMM estimator of the dynamic panel technique has some limitations such as: (i) GMM depends on employing the lags of explanatory and dependent variables (firms' history values) for identification, which might generate weak instruments if the number of lags of instrumental variables increases and at the same time

could be considered as a trade-off. This means that as the number or length of lags increases, it could make more exogenous variables, but might at the same time make the instruments weaker. (ii) It assumes the error terms are serially uncorrelated, which may not hold for all variables because of persistence. This means that the GMM estimators of dynamic panel data might not remove measurement error bias except if the researchers build strong and hard assumptions to verify hypothesises about serial correlation in the measurement error. (iii) The GMM estimator of dynamic panel technique does not solve all endogeneity issues (Wintoki et al., 2012). Roodman (2009B) argues that GMM estimator has an issue of instrument proliferation, which is also common in other estimators as well; however this problem can be limited by using forward techniques.

4.5.2 Application of GMM

The most important concern for researchers who use the System GMM estimator is whether they have included sufficient lags to manage the dynamic aspects of their empirical study. When the number of lags is enough, then any previous values of dependent variables (firm value and performance) beyond those lags are possibly correct instruments since they will be exogenous to present dependent variable (firm value and performance) shocks (Roodman, 2009A). Wintoki et al. (2012) highlight that in empirical corporate finance research it is considered crucial to understand how many lags of the dependent variable should be used to capture all information from the historical values of the past. There are at least two main reasons why it is important to capture past information. The first one is to avoid omitted variable bias and the second one is that past values might produce an exogenous instrumental variable with respect to the residual of the current values. Some empirical studies in finance propose that two lags are enough to capture the persistence of performance (Roodman, 2009B).

However, Roodman (2009A) argues that the estimation issue is to select coefficients on the explanatory variables, so that the moments of the errors with the instruments are zero. He states that the two step GMM can estimate the coefficients better than the one step GMM, with lower bias and standard errors. Roodman (2009A) suggests that the number of instruments should not exceed the number of individual units in the datasets of the panel, as a large number of instruments can over fit the endogenous variables. He adds that the lagged dependent variable is considered the natural candidate instrument and the coefficient of the lagged dependent variable should be in the range between the dynamic OLS and FE values in order to consider the consistency of the System GMM estimator.

Wintoki et al. (2012) and Roodman (2009a) point out that Arellano and Bond (1991) propose two key tests for the exogeneity assumption; the first one is called second-order serial correlation (second difference (AR 2) and the second is the Hansen test of Over-identification. The second-order serial correlation test is to ensure that there is no serial correlation for the residuals, unlike the first difference (AR 1) which may be correlated. As this GMM estimator employs multiple lags as instruments, the Hansen test of Over-identification is used to test the validity of these instruments.

Roodman (2009B) highlights that there are two main techniques to cap or restrict the number of instruments count that is generated in GMM estimators. The first one is to employ only specific lags instead of all available lags for instruments (limiting depth or range). Each period still will have or generate its separate instrument, but each period will have a limited number; thus the instrument number is linear in (T). In the second option, which is less common, the instrument will be added into smaller sets in order to combine them, which has the possible benefit of retaining more information, as all lags will not be dropped. In this case, the instrument will be collapsing and it will result in the number of instruments being linear in (T). The concept of a collapsed instrument is considered as a

straightforward technique as 1 is made for each lag distance with zero substituted for any missing values. However, these two techniques can be combined together in one regression, which leads the number of instruments to be invariant in (T) (Roodman, 2009B).

4.6 Conclusion

This research can use various regression analysis methods in order to investigate the relationship between derivatives usage and firm value and performance. Univariate tests are employed to compare the users and non-users of financial derivatives in general, and also those of interest rate derivatives and foreign exchange rate derivatives. Then, multivariate tests are used to examine the impacts of financial derivatives use on firm value and performance. The OLS estimator of the Panel Data method is used in order to answer all the research questions and test all the hypotheses of this study, in the empirical chapter.

Chapter 5

Empirical Results

5.1 Introduction

Financial and non-financial firms engage in risk management practices on a regular basis, as is documented in annual reports and industry surveys on the use of financial derivatives.[11] According to Modigliani and Miller (1958) financial policy decisions only affect how the value of the firm is divided among its claimholders. More recent risk management theories (Smith & Stulz, 1985; Bessembinder, 1991; Froot et al., 1993 and Leland, 1998), claim, however, that, due to capital market imperfections, the use of financial derivatives for risk management purposes adds firm value, by mitigating predicted taxes or financial distress costs, reducing the underinvestment problem or increasing debt capacity (benefiting from higher debt tax-shields) without an increase in risk. The literature available to date is devoted only to non-financial firms.[12] Yet, risk management and financial derivatives usage are also important for the financial industry because the use of an adequate risk management policy may add value to both financial and non-financial firms .

Financial firms play a vital role in the economy of any country and are considered an important part in its development. However, they are considered a riskier part of the financial system of any country partly because they tend to use financial derivative contracts much more than non-financial firms. Therefore, financial firms need to have effective and efficient risk management policies, as their business is exposed to a higher level of risk. Shiu et al. (2010) argue that financial firms work as intermediaries with highly-levered balance sheets, therefore being more exposed to interest rate, currency, and commodity risks need effective methods to monitor and manage these exposures.

[11] See, for instance, Dai and Lapointe (2010), Sinkey and Carter (2000) and Bodnar, et al (2003).

[12] See, for example, Bartram et al. (2011), Allayannis and Miller (2012), Perez-Gonzalez and Yun (2013), Kim et al. (2013), Choi et al. (2013) and Panaretou (2014).

Furthermore, financial firms are exposed to various types of risk in conducting their business activities, including market risk, operational risk, liquidity risk and credit risk. Therefore, financial firms tend to use enterprise risk management to manage their exposures. For example, banks focus more on consolidated risk management to manage their risk exposures by implementing a well-designed risk management policy, using different types of derivatives for hedging (Dai & Lapointe, 2010). Also, insurance firms tend to use consolidated risk management to manage their risk exposures by using hedging derivatives and reinsurance policies (Fung et al., 2012). Therefore, financial derivatives can be used as an efficient tool for off-balance sheet risk management[13] since they give a simple means to hedge the residual risk from commercial operations activities. The valuation of financial derivatives is derived from the value of the underlying assets such as stocks, bonds, commodities and indexes. However, financial derivatives are addressed as a discrete transaction rather than as an integrated portion of the value of the underlying assets transaction they are related to.

Hence, the main motivation behind this study is to shed light on the risk management procedures used by financial firms, namely, which financial derivatives they use and whether the use of derivatives affects firms' value and performance. The finance theories expect that the use of derivatives can have a positive impact on both firms' value and performance (Smith & Stulz, 1985; Froot et al., 1993 and Tufano, 1998). This research allows us to compare the behaviour of financial firms to that found in the literature about the behaviour of non-financial firms regarding the popularity of the use of derivatives for hedging. We focus mainly on the usage of financial derivatives for risk hedging and the effect of the various (financial derivative related) hedging strategies on firms' value and performance. Specifically, we want to find more information on the usage of derivatives

[13] Please see chapter 2 section 2.3 for more details about why financial derivatives could be used for off-balance sheet risk management.

for hedging and to what extent financial firms use derivatives for hedging their financial risks. There are different types of financial risks that firms must consider while designing their risk management policy, such as foreign exchange rate risk, interest rate risk, commodity price risk, credit risk, liquidity risk and equity risk. However, the focus of this study will be only on the usage of derivatives for foreign exchange rate risk (FX) and interest rate risk (IR).

Thus, this research aims to shed light on the ways that UK financial firms implement risk management policies through the use of financial derivatives and to examine whether hedging with financial derivatives affects firm value and performance. Also, this empirical study chapter aims to extend the previous empirical works regarding the use of derivatives for risk management by shedding more light on the usage of derivatives under the three types of hedge- fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI) in order to reduce financial market risk. More specifically, we focus on the use of derivatives for hedging foreign exchange rate risk (FX) and interest rate risk (IR). Therefore, we investigate the relationship between FX derivatives usage and IR derivatives usage under the three hedge types and their impact on firm value and performance of UK financial firms.

As a result, our three main questions in this empirical chapter are: 1) does risk hedging with financial derivatives affect firms' value and performance? 2) Does the use of derivatives under the three types of hedge have an impact on firm value and performance? 3) Does the use of derivatives for hedging purpose in order to reduce FX or IR have an impact on firm value and performance? For more details and discussion please see chapter 2 section 2.6-8, and the literature review section 5.2 subsections 5.2.1-2. in this chapter.

We use an unbalanced panel dataset which comprises information on 128 UK financial firms, from the time period between 2005 and 2014. This dataset includes three sectors

of the financial industry: Banking, Equity Investment and Financial Services and four subsectors: Assets Managers, Finance Consumer, Investment Services and Specialty Finance. We employ the OLS method in order to test our research hypotheses. We find the regressions of the Ln (TQ) of the firm value shows consistent results in almost all the regression models, which show a positive and significant relationships. In contrast, the regressions of the ROA of the accounting performance show consistent results in almost all the regression models, which show a negative and significant relationships. Also, the regression results show some significant relationships with derivatives use under the three types of hedge in order to reduce FX and IR risks. For example, the regression of Ln (TQ) suggests positive and significant relationships with the use of derivatives in order to reduce the FX and IR risks and firm value.

Furthermore, our empirical findings are significant and consistent with the theory and the outcomes of empirical studies such as Allayannis and Weston (2001), Choi et al. (2013), Fung et al. (2012), and Panaretou (2014), although they vary among the four dependent variables. Also, we can conclude that our findings support the notion in the risk management literature that the effect of derivatives usage on the firm value and performance is mixed and ambiguous.

This study contributes to the literature of the use of derivatives for risk management purpose in different ways:

Firstly, by providing new empirical evidence regarding financial firms' behaviour in terms of both the use of financial derivatives and risk management policies. We gain a better understanding of the popularity of the various financial derivatives and risk management strategies and polices among the financial firms. To our best knowledge, this is the first empirical study on the effect of financial derivatives usage on the financial industry. The literature available to date is devoted only to non-financial firms. Yet, risk

management and financial derivatives usage are also important for the financial industry because the use of an adequate risk management policy may add value to financial firms.

Secondly, our research also allows us to highlight the differences between financial and non-financial firms in terms of the use of financial derivatives for hedging and the effect of hedging on firms' value and performance. We find in general significant results about the usage of derivatives for hedging purposes and the extent that financial firms use financial derivative to reduce their financial risks. We argue that our results are unique to our best knowledge and can be considered a contribution in the literature, especially for the UK market.

Thirdly, we shed more light and focus on the usage of derivatives under the three types of hedge: fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), in order to reduce financial market risk. More specifically, we focus on the use of derivatives for hedging foreign exchange rate risk (FX) and interest rate risk (IR), making this, is to our best knowledge, the first study that explores the effect of derivatives usage from this perspective. We focus in this study on derivatives use for hedging purposes and we classify all variables according to the hedge accounting requirements of IAS 39. Therefore, our data is organized as follows: firms which use derivatives for hedging purposes (DH), by hedging types -fair value hedge: FV, cash flow hedge: CF and net investment hedge: NI- and by the types of risk: derivatives usage for foreign exchange rate risk (FVFX, CFFX and NIFX) and derivatives usage for interest rate risk (FVIR and CFIR). To our best knowledge, this structure of the data collection for this part is unique and is a new contribution that can be added to the literature of risk management.

Fourthly, we believe that our study complements some previous studies in the literature such as Allayannis and Weston (2001), Choi et al. (2013), Fung et al. (2012), and Panaretou (2014). The latter studies have been done in non-financial firms except Fung

et al. (2012) who study the effect of the use of credit default swaps on firm risk and value, but they use insurance firms as evidence for their data sample. In contrast, this study uses a sample of three different sector of the financial industry. Also, our research can be considered substitute for some previous studies in the literature such as Choi and Elyasiani (1997), Brewer et al. (2000), Clark et al. (2008), Ahmed et al. (2011) who study the use of derivatives in the financial sector from different prespective. Moreover, we believe that our study substitutes for some prior studies in the UK literature in regard to the use of financial derivatives, such as Grant and Marshall (1997) and Adedeji and Baker (2002) who study the use of FX and IR derivatives in non-financial firms from different prespective.

This chapter is organized as follows. Section 2 presents the literature review, which includes the literature and hypotheses. Section 3 presents and discusses the data and methodology, which includes the data sample construction, descriptive statistics, discusses and analyses the results of univariate tests for derivatives usage and explains the methodology. Section 4-6 presents the variables specifications. Section 7 presents and discusses the empirical results and analysis of the regression models. Section 8 present the discussion. Section 9 presents the conclusion.

5.2 Literature Review

Financial theories argue that in imperfect markets firms can add value through the use of sensible risk management policies. Thus, hedging reduces risk exposure and, therefore, enhances firm value. Mayers and Smith (1982) argue that when firms use effective hedging policies, stockholders can reduce insurable risk through diversification. They also advocate that the high cost of insurance contracts can reduce the stockholders' wealth as it provides a negative net present value, and that risk can be shifted to claimholders at the lowest cost, which will increase firm value. However, the ability of those claimholders

to bear risk is limited by firms' stock capital. Therefore, firms will tend to use insurance contracts that are offered by insurance firms to shift their risk. Smith and Stulz (1985) highlight that hedging policies lead to increase in firm value if and only if hedging is costless and does not exceed the expected firm value growth. Consequently, the use of some financial derivatives as tools of hedging, appears to be a crucial determinant of firms' value.

Hentschel and Smith (1997) argue that hedging is beneficial if it adds firm value. For example, often firms are able to eliminate or mitigate bankruptcy risk by hedging foreign exchange rate or interest rate risk exposures, through which they add value. Egly and Sun (2014) argue that in the banking industry, managers are in charge of a dual objective of managing the different sources of risk inherent in their firms while maximizing shareholder value. Bank managers must find an equilibrium between these objectives since a rise in shareholder returns usually come at a cost of rise in risk. Over the last few decades, there has been rising publicity of banks' use of derivatives to manage different types of risk they are exposed to, including foreign exchange rate, interest rate and credit risk.

5.2.1 The Use of Derivatives and its impact on Firm Value and Performance

Theoretically, the use of derivatives for hedging can increase firm value, as documented by previous empirical studies (Gay & Nam, 1998; Allayannis & Weston, 2001; Nocco & Stulz, 2006; Mackay & Moeller, 2007; Bartram et al., 2011; and Perez-Gonzalez & Yun, 2013). Adkins et al. (2007) argue that the theoretical literature on financial risk hedging in terms of value maximization concentrates on four rational incentives for a firm to hedge: (1) reduction of the probability of financial distress (Smith & Stulz 1985), (2) reduction of expected taxes (Nance et al., 1993), (3) optimization of the capital budget due to the reduction of cash flow uncertainty (Froot et al., 1993), and (4) expansion of

debt capacity (Leland 1998; Graham & Rogers 2002). The motive for a value maximizing firm to hedge assumes that owner and management interests are identical. However, Rogers (2002) highlights that the firm's management take the actual decision to hedge. If owners and managers are dissociated, agency issues could affect the hedging decisions of the firm. One possible outcome is that managers might hedge in a manner that does not maximize the firm value.

Gay and Nam (1998) indicate that there is a positive relationship between a firm's derivatives usage and its growth opportunities, as they found that in firms which have enhanced investment opportunities, the use of derivatives is greater, even if they have low cash stocks. Allayannis and Weston (2001) show that user firms have higher market values than non-users of foreign currency exchange rate derivatives. Nocco and Stulz (2006) argue that firms that succeed in implementing and creating effective enterprise risk management can have a competitive advantage over those that take a decision to manage their risks under an individual approach.

Mackay and Moeller (2007) find a positive relationship between hedging and firm value in the context of airliners and oil refining firms, respectively. Bartram et al. (2011) find a positive relation between financial derivatives usage and firm value, with high sensitivity to both omitted variable bias and endogeneity concerns. Gomez-Gonzalez et al. (2012) examine the impact of hedging decisions and risk management on firms' market value and find a positive relationship between hedging and firm value. Perez-Gonzalez and Yun (2013) argue that financial derivatives are the most powerful mechanism that can be used to mitigate risk and thus increase firm value.

Egly and Sun (2014) argue that derivatives trading, in addition, generates important fee income to the banks, it provides chances for bankers to add value through cross-selling and enhanced clients' relationships. Depending on the implicit negative relationship

between charter value and risk, derivatives use for hedging purposes should favourably affect bank charter value. Brunnermeier et al (2012) show that banks have progressively gained a higher portion of their profits from non-interest income, including income from derivatives trading, compared to profits that are generated from interest income. Li and Yu (2010) investigate the impact of derivatives usage on bank performance, proxied by return on assets and on BHCs' risk, captured through the asset volatility. They find that derivatives usage increases BHCs overall risk, since BHCs are capable of taking on more speculative positions in derivative contracts. Also, they find that speculative derivative positions were eventually reduced after the subprime mortgage loans of the last financial crisis.

On the other hand, some studies find no evidence for a positive relationship between hedging policy and firm value. For example, Tufano (1996) finds little evidence to support the theory that risk management is a means to maximize firm value by using empirical evidence from the gold and mining industry. Fok et al. (1997) argue that their results show support for hedging reducing the probability of financial distress and agency cost problems, but they find no evidence to support the theory that hedging can increase firm value.

Hentschel and Smith (1997) show that insurance firms' customers are concerned about their insurer's ability to meet financial obligations or commitments, so when these firms face a problem of insolvency, then their customers are expected to be unlikely to be willing to pay a premium or to have a contract with them, which will reduce their firm value. Ashraf et al. (2007) find that the involvement in credit derivative markets is closely associated with bank size, however, they find limited evidence that past experience in derivative markets or entry barriers related to franchise value are important. Kim et al. (2013) investigate the impact of both financial and operational hedging policy on the

value of family firms in the USA and find that neither financial nor operational hedging affect family firms' value, which is consistent with the concept of portfolio hedging for undiversified private wealth of family firm owners.

The above discussion shows that the empirical evidence regarding the question of whether the use of financial derivatives for risk hedging increase firm value is mixed and perhaps not conclusive. Some authors find positive relationship which is consistent with the theory and some find negative relationship which is not in line with the theory and the third group find mix and unclear relationship. Therefore, our conjecture is that the use of derivatives for hedging can have positive impact on the firm value and performance, and thus we aim to test the following hypotheses:

$H1_A$: The effect of the use of derivatives for hedging positively affects firm value.

$H1_B$: The effect of the use of derivatives for hedging positively affects firm performance.

5.2.2 The Use of Derivatives for Interest Rate and Foreign Exchange Rate Risks

Financial firms, especially banking businesses, face various vital risk exposures such as credit or default risks, foreign exchange rate risk, interest rate risk, liquidity risk, operational risk, market risk and counterparties risks. Bartram et al. (2011) argue that their results show that firms use derivatives to reduce their risk, especially market risk, as domestic and international market price fluctuations are unexpected and firms that do not use a financial derivatives hedge as an effective means of risk management are more likely to be exposed to IR risk and to FX risk. Therefore, financial derivatives usage for hedging purposes is considered an important tool to manage some of these risks, especially market risks.

Choi and Elyasiani (1997) argue that the previous literature has examined the impact of traditional items of off-balance sheet activities on banking risk and operations, and it does not concentrate specifically on financial derivatives and their effect on both exchange rate and interest rate. Hentschel and Smith (1997) highlight that insurance firms can be exposed to unpredicted change or fluctuations of IR when the effective maturity of loans or a life insurer's assets differs from that of their liabilities. Bodnard et al. (1998) find that their responding firms use derivatives to mitigate their IR and FX risks, which are considered the most common risks that need to be reduced. Aretz et al. (2010) argue that hedging policy could mitigate the effect of IR risk and FX risk on a firm's value and thus strengthen the relationship between management performance and share price, making it easier to differentiate between efficient and inefficient managements.

Booth et al. (1984) argue that the financial sector has been faced with large interest rate volatility in the last few decades and as a result, financial companies tend to transfer this risk to the borrowers. For example, some institutions tend to use short term floating rate loans in order to reduce long term fixed rate loans and thus reduce the interest rate volatility risk. However, many studies argue that derivatives can offer benefits over the traditional techniques to overcome the interest rate volatility. They argue that the mechanism of transferring the risk of interest rate volatility by using floating rate loans can be applied for borrowers who commonly are ready to pay to avoid this particular risk. Booth et al. (1984) argue that lenders could change their matching period strategies by using hedging derivatives, which permit them use fixed rate loans without spread differences risk.

Flannery and James (1984a) show that both savings and loans and commercial equities are sensitive to unpredicted fluctuations in interest rate and the impact of interest rate on commercial banks is significantly less than on the stocks of saving and loans associations.

Brewer et al. (2000) argue that interest rate derivatives provide banks with the chance to manage their IR exposure risk and to generate income in addition to income from traditional bank operations, and this was especially true during the 1980s and 1990s.

Consequently, financial institutions have developed a strong interest in these derivatives assets. Whilst institutions have become involved more as active participants in the derivative markets, their role as credit services providers has declined. Brewer et al. (2000) highlight that as the role of banks in providing short and medium-term business credit has become less important, their activities in IR derivatives as end-users, or intermediaries, or as both, have become increasingly greater. Scott and Peterson (1986) argue that life insurance firms are ordinarily considered to be fully hedged against interest rate exposure risk as they balance between long term policies liabilities with long term assets, while commercial banks tend to balance short term liabilities with short term assets.

Sinkey and Carter (2000) argue that banks tend to use derivatives hedging as they have a higher level of interest rate risk exposures, which suggests a positive relationship between financial derivatives usage and banks' duration mismatch. Schrand and Unal (1998) find that interest rate swaps are considered the most widely used type of derivative contracts in the hedging of interest rate exposure risks. Also, Flannery and James (1984) argue that interest rate risk arises due to the exposure to duration mismatches as a result of giving loans for the long term and taking deposits for the short term; the longer the duration mismatch, the larger the impact of unpredicted changes in interest rates, which can affect a bank's market value.

Purnanandam (2007) uses the off-balance sheet interest rate derivatives and on-balance sheet non-derivatives interest rate (by comparing the Gap mismatch maturity and assets and liabilities re-pricing) as measurement techniques to investigate hedging motives and

to test whether hedging improves banks' role and ability in the intermediation services. Clark et al. (2008) find that there is a positive relationship between derivatives usage and interest rate risk. Hankins (2011) argues that the interest rate hedging level can be affected by the interest rate exposure risk. He measures the interest rate sensitivity by using the one-year maturity gap, and states that the IR exposure is considered the most important risk for bank holding companies and has the priority in their risk management policy.

On the other hand, foreign exchange rate risk exposure is also considered very important in financial firms. Grammatikos et al. (1986) argue that the risks stemming from the foreign currency businesses of commercial banks can be classified into two forms, exchange rate risks, and foreign interest rate risks. The FX risk arises whenever a bank has a negative or positive net asset position in a specific foreign currency and there is an unpredicted fluctuation in exchange rates. They add that whether foreign currency assets are lower (higher) than liabilities, a depreciation (an appreciation) in the foreign currency vis-a-vis the dollar produce capital losses (gains) either on realized or paper. However, even when a bank's net assets position is zero, so its assets and liabilities in a foreign currency are equal in size, it might yet be exposed to foreign interest rate risk. This has been called apparently hedged speculation (Grammatikos et al., 1986).

Allayannis and Weston (2001) show that user firms have higher market values than non-users of foreign currency exchange rate derivatives. Smithson and Simkins (2005) argue that firms tend to manage their foreign exchange rate risk exposures and interest rate risk exposures to mitigate their market risk and thus enhance firm value. Dolde and Mishra (2007) find that there is a positive relationship between higher usage of foreign exchange rate derivatives and geographically diversified firms. Also, Clark et al. (2008) contrast the performance of traders to that of hedgers and find that foreign exchange rate exposure risk is better managed by hedgers and interest rate exposure risk is better managed by

traders. Choi et al. (2013) construe firms' foreign exposure risk as either foreign sales or geographical diversification. Bredin and Hyde (2011) search in the provenance of foreign exchange exposure of industry level portfolios and find that this type of exposure rises with the level of competiveness and trade openness.

The above discussion shows that the empirical evidence to support the theory of risk management regarding the use of derivatives for hedging is mixed regarding its effect on interest rate risk and foreign exchange rate risk. However, our conjecture is that the fluctuations in foreign exchange rate and interest rate can have a positive impact on the use of derivatives. We focus in this study on derivatives use for hedging purposes and we classify all variables according to the hedge accounting requirements of IAS 39. It is diffcult to find previous empirical studies in the literature that follow our classification, which follows the hedging accounting requirements of IAS 39. To our best knowledge, this structure of the data collection for this part is unique and is a new contribution that can be added to the literature on risk management. Therefore, in order to answer these two questions: Does the use of derivatives under the three types of hedge have an impact on firm value and performance? And does the use of derivatives for hedging purpose in order to reduce FX or IR have an impact on firm value and performance? We propose the following hypotheses.

$H2_{A-}$ The effect of the three types of hedge (FV, CF, NI) has a positive impact on the firm value of UK financial firms.

$H2_{B-}$ The effect of the three types of hedge (FV, CF, NI) has a positive impact on the performance of UK financial firms.

$H3_{A-}$ The effect of FX derivatives usage for hedging has a positive impact on the firm value of UK financial firms.

$H3_{B-}$ The effect of FX derivatives usage for hedging has a positive impact on the performance of UK financial firms.

$H4_{A-}$ The effect of IR derivatives usage for hedging has a positive impact on the firm value of UK financial firms.

$H4_{B-}$ The effect of IR derivatives usage for hedging has a positive impact on the performance of UK financial firms.

5.3 Data and Methodology

This research focuses on UK financial firms listed on the London Stock Exchange Market. This data sample is considered one of the main contributions in this study, which is expected to add new knowledge, based on empirical evidence, to the literature of risk management. We use an unbalanced panel dataset which comprises information on 128 UK financial firms, from the time period between 2005 and 2014. We apply quantitative methods to answer the research questions; we use the OLS method in order to test our research hypotheses. We believe that the OLS method is suitable for our data in order to apply our static model. The following discussion will give more details about the data sample and methodology and regression models.

5.3.1 Data Sample Construction

The data sample consists of three financial sectors: Banking (BS), Equity Investment (EIS) and Financial Services (FSS), the FSS subdivided into four subsectors: Asset Managers (AMSS), Investment Services (ISSS), Consumer Finance (CFSS) and Specialty Finance (SFSS). Also, as mentioned above, two types of data are collected in this research from different sources: off-balance derivatives usage data and accounting data. These data are available as secondary data from a variety of sources such as annual reports for a 10-year period from 2005 to 2014 depending on the listed history of a firm.

Based on an expected sample size was 209 firms and the total number of observations was expected to be 2,090 observations, according to the total number of firms are listed on the London Stock Exchange Market (LSE) based on the DataStream record. However, the data sample is reduced for various reasons, such as one year or less of financial reports, missing financial reports or missing accounting data (for more details see chapter 3 section 3.4). Although working with a balanced dataset over the ten-year period would be preferable, due to data limitations we work with an unbalanced dataset so as to increase the number of sample observations. Our sample comprises information on 128 firms over inconsistent periods of up to 10 years leading to a total number of observations of 1,114. See Table 1 in Appendix 5A for more details.

The data regarding the financial derivatives used in the risk hedging is collected manually from annual reports over the ten-year period. The main aim of this research is to collect data about the off-balance sheet derivatives usage for hedging purposes, however, financial firms use derivatives for both hedging and trading. Hence, qualitative and quantitative data are collected for both purposes with more focus on the hedging purpose. The following are the steps involved in collecting these data:

We collect the annual reports for all financial firms in the three financial sectors that are listed on the LSE depending on both history and availability. After careful reading of those annual reports, looking at both the risk management and derivatives usage parts on the off-balance sheet annual reports of firms, we check those annual reports in order to get targeted data regarding the usage of financial derivatives by setting and asking various relevant questions: (i) Does a particular firm use financial derivatives? If the answer is yes, then the next question is (ii) are they used for risk hedging or trading purpose, or both? If a firm uses derivatives for both hedging and trading, the total amount of national

contracts of derivatives, and the fair value of assets and liabilities are collected, if available.

The next step involves checking, those annual reports in order to get targeted data regarding the usage of financial derivatives for IR and FX for hedging purposes by posing various questions in this regard. If a firm uses derivatives for hedging, the following question is asked: (i) for which type of hedge does it use these financial derivatives? In order to classify the usage of derivatives according to the hedge accounting requirements of IAS 39, the following question is asked: (ii) which type of risk or hedge item does it seek to mitigate through the use of derivatives?

Finally, the aim is to focus on two exposures, foreign exchange rate exposure risk and interest rate exposure risk; the data of these two exposures are collected in more detail from a derivatives usage perspective and depending on data availability. The following two sub-sections give an overview about our data sample descriptive statistics and univariate t-tests.

5.3.1.1 Descriptive Statistics

As mentioned, the main objective of this section is to provide descriptive statistics on the data. Tables 2 in Appendix 5A reports the descriptive statistics for the whole sample (WS). The statistics show important results. Specifically, we find that the mean of Ln(TQ) is 0.27, while we find that ROE and ROA are both negative, -5% and -17%, respectively, and the SR is 5%. Also, the results show that 35.18% of the firms use derivatives, 32.14% employ them only for hedging purposes, about 14.5% use derivatives only for trading purposes and 11.5% use derivatives for both trading and hedging in the same year. Hentschel and Kothari (2001) who use data for large financial and non-financial US firms document that 62% of their data sample disclosed derivatives usage activities, while Nelson et al. (2005) who also use US non-financial firms find 21.6% of their sample use

derivatives only for hedging purpose. Panaretou (2014) use data of UK non-financial firms and find about 87% of their data sample use derivatives for hedging purposes.

We focus in this study on derivatives use for hedging purposes and we classify all variables according to the hedge accounting requirements of IAS 39. Therefore, our data is organized as follows: firms which use derivatives for hedging purposes (DH) are initially divided by the type of hedging: fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI) and then by the type of risks: derivatives usage for foreign exchange rate risk (FVFX, CFFX and NIFX) and derivatives usage for interest rate risk (FVIR and CFIR).

The data show that 22.2% of the firms use derivatives for FV, about 28% use derivatives for CF and 7.2% use derivatives for NI. Also, firms in the sample that use derivatives to reduce their risks of FX and IR under fair value hedge account for about 15.62% and 19%, respectively. Likewise, the proportion of firms that employ derivatives to mitigate their risks of FX and IR under cash flow hedge is about 22% and 20.5%, respectively. In contrast, the proportion of firms in our sample that use derivatives under the net investment hedge to reduce only the foreign exchange rate risk is about 7.2%. It is diffcult to compare our findings here to previous emiprical studies in the liteature, because of our classification, which follows the hedging accounting requirements of IAS 39. However, Panaretou (2014) finds that in total 71.79%, 68.22% of the firms in her sample use derivatives for FX and IR risks, respectively, whereas, Nelson (2005) finds 33.7% and 26% use derivatives for FX and IR, respectively.

Further, the data indicate that the sample varies in size between large, medium and small firms, depending on the sector. On average the mean value of firm size for the whole sample is about 42724.5 million pounds. Guay and Kothari (2003) find evidence that the larger firms in their sample tend to use more derivatives. The descriptive statistics shows

positive mean values for Leverage, Liquidity and InvestOpportunties of about 15%, 31% and 1.5, respectively. In contrast, the Profitability mean value is negative, at about -17.4%. Our results for Profitability and Investment Opportunties are in line with some previous findings in the literature. For instance, Adam and Fernando (2006) find that firms that tend to use more derivatives will incur less losses. Guay and Kothari (2003) argue that firms that use more derivatives will have greater investment opportunities.

Finally, the results indicate that the three sectors tend to pay dividends, diversify their business activities and have foreign branches and activities in countries other than the UK. For example, the whole sample results indicate that about 47% of the firms pay dividends, 78% of the firms diversify their business and their activities and 60% of the firms have branches and business activities in countries other than the UK. Our results regarding Geographical Diversification are consistent with Guay and Kothari (2003) who find that the use of derivatives is higher among Geographically Diversified firms.

5.3.1.2 Univariate Tests for Derivatives Usage

These tests are reported in Tables 3 and 4 in Appendix 5A, in which the mean values of the dependent variables and the firm characteristic variables (control variables) are reported for the users and non-users of derivatives. The main objective of these t-tests is to compare the two groups of users and non-users of derivatives by assuming that the mean of each variable is the same between the tested groups, as the null hypothesis of each test. However, as mentioned earlier, in this study, there are two purposes for derivatives usage in financial firms and the focus of the study is on hedging. Therefore, to conduct this type of univariate test, the study differentiated between three groups, the users and non-users of derivatives regardless of the purpose (Table 3- Panel A), the users and non-users of derivatives for hedging (Table 3- Panel B) and the users and non-users of derivatives for trading (Table 3- Panel C).

The results of Table 3- Panel A show surprisingly that the non-users of derivatives have a higher mean value of Ln (TQ) than the users of derivatives but the t-statistic is insignificant. However, the results for the other variables show that the users of derivatives perform better than the non-users of derivatives and the t-statistic values are significant at the 1% level, except for the SR, which is significant at the 5% level.

The results of Table 3- Panel B show that the non-users of derivatives for hedging purposes have a higher mean value of Ln (TQ) than the users of derivatives for hedging but the t-statistic is insignificant. However, the other variables' results indicate that the users of derivatives for hedging have higher performance than the non-users of derivatives and the t-statistic values are significant at the 1% level, except for SR, which is significant at the 5% level.

The results of Table 3- Panel C indicate that the users of derivatives for trading have lower mean value for Ln (TQ), SR and liquidity than the non-users of derivatives for trading and the t-statistic values are significant at the 10% level for Ln (TQ) and the 1% level for liquidity and insignificant for SR. However, the users of derivatives for trading have a higher percentage of industry diversification and geographical diversification and pay more dividends than the non-users of derivatives; and the t-statistic values are significant at the 1% level. Also, the users of derivatives for trading purposes have higher leverage and generate more profit than non-users of derivatives for trading purpose and the t-statistic values are significant at the 1% level for profitability and insignificant for leverage.

Furthermore, as mentioned earlier, we classify the types of hedging according to the hedge accounting requirements of IAS 39. Therefore, to conduct univariate tests, we differentiate between different groups among the users and non-users of derivatives for hedging purposes. Our tests are organized according to the type of hedge. First, the users

and non-users of derivatives for fair value hedge (FV) (see Table 4- Panel A in Appendix 5A), second, the users and non-users of derivatives for cash flow hedge (CF) (see Table 4- Panel B in Appendix 5A), finally, the users and non-users of derivatives for net investment hedge (NI) (see Table 4- Panel C in Appendix 5A).

The results in Table 4- Panel A in Appendix 5A show that the non-users of derivatives under the FV to reduce FX and IR risks have higher mean values of Ln (TQ) than the users of derivatives and the t-statistic is significant at the 1% level of significance. However, the other variables' results show that the users of derivatives under the FV to reduce the FX and IR risks have higher performance than the non-users and the t-statistic values are significant at the 1% level, except for the SR, which is significant at the 5% level.

The outcomes in Table 4- Panel B in Appendix 5A indicate that the non-users of derivatives under the CF to reduce the FX and IR risks have higher values of Ln (TQ) than the users of derivatives although the t-statistic is not significant. Other variables' results show that the users of derivatives for the CF to reduce the FX and IR risks have higher performance than the non-users and the t-statistic values are significant at the 1% level, except for the SR, which shows insignificant values. Further, the results in Table 4- Panel C in Appendix 5A show that the non-users of derivatives under the NI to reduce NIFX risk have higher mean value of Ln (TQ) than the users of derivatives and the t-statistic is significant at the 1% level. Also, the results for the ROE and SR show higher values for the users than non-users, but the t-statistics are insignificant. However, the other variables' results show that the users of derivatives under the NI to reduce NIFX perform better than the non-users and the t-statistic values are significant at the 1% level.

Overall, the results of univariate tests surprisingly show that the mean values for Ln (TQ) of non-users are higher than those of users of derivatives in the six tests but their t-

statistics are insignificant except for the trading purpose, FV and NI. These results are consistent with the results of Panaretou (2014) who studies the usage of derivatives in the UK market for non-financial firms and finds that the Tobin's Q mean values of the non-hedgers are higher than those of the hedgers.

However, the control variables' results show that the users of derivatives have significant differences compared with the non-users of derivatives and the t-statistic values are significant at various levels. These results are consistent with most prior theoretical work and support some empirical studies in the field of risk management, such as Choi et al. (2013) who find that the users of derivatives have higher mean values than the non-users of derivatives for ROA, firm size, profitability, leverage, investment opportunities, geographical diversification and industry diversification. Moreover, these tests can be considered as indicators to proceed with multivariate tests and evidence of unclear support for firm value creation, as shown in the existing studies in the literature.

5.3.2 Research Methodology

In order to investigate the relationship between the use of derivatives and performance and firm value, we use multivariate tests to examine the effect of the use of financial derivatives on both firm value and performance. We also examine the impact of FX and IR derivatives usage on the firm value and performance under the three types of hedge.

5.3.2.1 Methods and Techniques

We use the Ordinary Least Squares (OLS) estimator of the Panel data method to test our research hypotheses. The OLS method is one of the most commonly used linear regression models. This method is based on the Gauss-Markov assumptions, which assumes that the dependent variable Y is a linear function of the independent variable X and the error term. (ii) The predicted value of the random error term for all observations is zero. (iii) It assumes that the variance of the error term is fixed in all independent

variables over time as result of homoscedasticity. (iv) Also, it assumes that the error term is not correlated with the dependent variable Y and is considered independently distributed. (v) It considers the independent variables as deterministic as it is not correlated with the error term. (vi) It assumes there is no multicollinearity problem. Under these assumptions the OLS is more efficient and does not have bias problems and in this case it is called the best linear unbiased estimator (Blue) (Wooldridge, 2002).

Baltagi and Chang (1994) argue that OLS is the best linear unbiased estimator when the ratio of the variance component is equal to zero and it is still consistent and unbiased when this ratio is positive, but it will have bias in its standard errors. Wooldridge (2009) argues that in the population model, the OLS is employed to estimate the intercept and the slope parameters. Tibshirani (1996) argues that the OLS is known to reduce the residual squared error, but it has problems of insufficient accuracy and shrinking the predicted coefficients.

5.3.2.2 Regression Models

We use several linear regression models to test our research hypotheses, by implementing the OLS estimator of the Panel Data method. As we discuss in the data and sample construction section, various questions were asked during the data collection process in order to answer our research questions and to test the hypotheses. Also, this research uses four dependent variables, the Ln (TQ) to measure firm value, ROE and ROA to measure firm performance from an accounting perspective and the SR to measure firm performance from the market perspective.

Eight regression models are used to investigate the relationship between derivatives usage and performance and firm value. These eight models are repeated for each dependent variable. Thus, in total there are 32 (8*4) models for all dependent variables, and these 32 models are structured as described below by using the following formula:

Firm Value/Performance = $\alpha + \beta$* derivatives use variables $_{it} + \beta_i * \sum_t$ Control variables $_+ \varepsilon_{it}$.

5.4 Dependent Variables

We use four dependent variables: one measures firm value, two other variables measure accounting performance, and another variable measures market performance. Tobin's Q is one of the best-known measurements of firm value in empirical studies in the field of finance and is used by different authors in the literature on risk management and the usage of derivatives in both the financial and non-financial sectors. Many authors use it in the non-financial sectors such as Allaynnis and Weston (2001), Pramborg (2004), Fauver and Naranjo (2010), Bartram et al. (2011), Allayannis et al. (2012), Choi et al. (2013) and Panaretou (2014). In the financial sector it is used by authors such as Hoyt and Liebenberg (2011), Jones et al. (2011), Fung et al. (2012) and Egly and Sun (2014).

Jones et al. (2011) argue that, although charter value might not be directly observed, theory suggests that Tobin's Q should be a useful proxy for it and they formulate the relationship between charter value and Tobin's Q. The authors state that for publicly traded banks, Tobin's Q is defined as the market value of the banks' assets (i.e. market value of bank equity plus its debt) scaled by the replacement cost of the banks' assets. However, empirical studies have used different proxies and measurements to define Tobin's Q. In this study it is defined as the "market capitalization plus the book value of liability all divided by the book value of assets". This measurement is used by Hoyt and Liebenberg (2011) and Fung et al. (2012) in the financial sector. It is also used by Allayannis et al. (2012) and Choi et al. (2013) in the non-financial sector. The latter authors take the log of the ratio, in order to solve the problem of skewness in their Tobin's Q mean value. Similarly, this research uses the log transformation to solve the skewness problem.

We use two variables to measure the accounting performance and one variable to measure market performance, in order to examine the relationship between the use of derivatives and financial performance. The first accounting variable is the Return on Equity (ROE), which we calculate as the ratio of net income to book value of equity. Fung et al. (2012) employ ROE, which is also defined as the ratio of net income to book value of equity to measure insurers' accounting-based financial performance in the financial sector. Choi et al. (2013) use operating income scaled by the market value of equity as a proxy for ROE in order to measure the accounting performance in the non-financial sector.

The Return on Assets (ROA) of a firm is used as a second dependent variable to measure accounting performance. Choi et al. (2013) argue that the ROE and ROA can be used as alternative measures of firm performance. They use net income scaled by total assets as a proxy for ROA which we also employ in this research.

Stock Return (SR) measured on an annual basis is employed to measure market performance. SR is defined as the price at period two minus the price at period one all divided by the price at period one. Different authors use stock return to measure market performance such as Scott and Peterson (1986), Choi and Elyasiani (1997), Beltratti and Stulz (2012) in the financial sector and Nelson et al (2005) in the non-financial sector.

Koski and Pontiff (1999) compare higher moments of the return distributions of mutual funds and risk measures for users and non-users of derivatives in order to analyse how derivatives use impacts the relationship between risk and past performance. They propose that managers might react slowly to new cash flows into a fund, specifically after robust performance and fund risk drops until managers totally invest the cash. Likewise, after poor performance, investors redeem shares, and fund firms' risk rises as managers borrow to cover redemptions. Brown et al. (1996) and Chevalier and Ellison (1997) argue that

changes in risk and past performance are negatively related, which they attribute to managerial incentive gaming. Table 5 in appendix 5B shows more details.

5.5 Explanatory Variables

As mentioned earlier, derivatives are used by financial firms for two purposes, hedging and trading. The use of derivatives for hedging is the main independent variable in this research, and has various proxies depending on the type of hedging derivatives and risk exposures or underlying assets. In this empirical chapter dummy variables are employed to measure the use of derivatives in general and the use of the derivatives under the three types of hedge in order to reduce the interest rate (IR) and foreign exchange rate (FX) risks, in order to answer the research questions and to test the hypotheses. The study classifies the usage of derivatives according to the hedge accounting requirements of IAS 39. Most authors such as Allayannis and Weston (2001); Clark et al. (2008); Bartram et al. (2011); Allayannis et al. (2012) and Perez-Gonzalez and Yun (2013) use dummy variables as proxies for derivatives hedging, as the notional amounts are not available or not disclosed clearly by most firms.

Therefore, several dummy variables are used separately to test the hypotheses in this study, which are also employed in separate models. One dummy variable measures the use of derivatives in general and takes a value of one for firms that use derivatives and zero otherwise. Then two dummy variables indicate the use of derivatives for hedging purposes or trading purposes and take a value of one for firms that use derivatives for these purposes and zero otherwise. The fourth one is an interactive dummy variable which accounts for the scenarios where firms use derivatives for both purposes. The three dummy variables describing the use of derivatives for hedging purposes under hedge type are the fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), which take a value of one for firms that use derivatives for these purposes and zero otherwise.

Five dummy variables describe the use of derivatives for hedging purpose under the FV, CF and NI to reduce FX risk and IR risk. These take a value of one for firms that use derivatives for these purposes and zero otherwise (see Table 6 in Appendix 5B).

5.6 Control Variables

There are various factors that can be used as control variables, which have an effect on firm value and performance and can explain the expected cross-sectional and time-series firm value. According to previous studies, these factors will have various impacts on risk management strategies and their relationship to firm value and performance. These factors are firm size, profitability, leverage, liquidity, investment opportunities, dividends, industry diversification, geographic diversification, financial crisis effect dummy and industry dummy. Table 7 in Appendix 5B summarizes the measurement of these factors.

Firm Size: An important factor that could affect the Tobin's Q is firm value, as documented by a large number of authors (such as Allayannis & Ofek, 2001; Allayannis & Weston, 2001; Guay & Kothari, 2003; Adam & Fernando, 2006; Purnanandam, 2007; Hoyt & Liebenberg, 2011; Allayannis et al., 2012 and Kim et al., 2013) who use the natural logarithm of total assets. For example, Allayannis and Weston (2001) argue that their results regarding Tobin's Q show different outcomes between large firms and small firms.

Profitability: In this research the ratio of net income to total assets is employed following Purnanandam (2007) and Ahmed et al. (1997) who used this ratio for the financial sector. Also, in the non-financial sector Allayannis and Weston (2001) and Allayannis et al. (2012) employ the return on assets, which is defined as the ratio of net income to total assets, as a proxy for profitability. However, other measurements are used by different

authors as a proxy for profitability. For example, Kim et al. (2013) use the ratio of earnings before interest and taxes to sales.

Leverage: Most important articles use leverage to control for other factors that might affect the Tobin's Q of the firm, as documented by a large number of authors (Allayannis & Ofek, 2001; Allayannis & Weston, 2001; Guay & Kothari, 2003; Adam & Fernando, 2006; Purnanandam, 2007; Hoyt & Liebenberg, 2011; Allayannis et al., 2012 and Kim et al., 2013). However, different studies use various measurements of leverage. For instance, Kim et al. (2013) use the ratio of total debt to total assets and we in this study employ this definition of leverage.

Liquidity: This study employs the ratio of cash to total assets as a proxy to measure liquidity. Sinkey and Carter (2000) argue that liquidity can be used an alternative for hedging and they use liquid assets divided by total assets to measure liquidity. Shiu (2007) also uses the ratio of cash to total assets for the same purpose.

Investment Opportunities: Allayannis and Weston (2001) argue that firms that tend to use derivatives for hedging are expected to have higher growth opportunities than firms that do not hedge. It is considered crucial to control for investment opportunities, as they are expected to affect the firm's value. Various authors (Allayannis & Ofek, 2001; Allayannis & Weston, 2001; Guay & Kothari, 2003; Adam & Fernando, 2006; Allayannis et al., 2012 and Kim et al., 2013) use the ratio of capital expenditures to sales to measure investment opportunities. However, in this research the ratio of book to market ratio is employed to capture the impact of growth and investment opportunities on firm value. This ratio is defined as the book value of assets divided by the book value of debt plus the market value of equity. Hentschel and Kothari (2001) use data from both financial and non-financial sectors and they use this ratio to measure the growth and investment opportunities.

Dividends: Empirical studies show that dividends are an important factor that needs to be controlled for, as it has a significant impact on Tobin's Q. The study uses a dummy variable with the value of one when firm pays dividends in the current year and zero otherwise, following a variety of important papers in the field of risk management (Allayannis & Ofek, 2001; Pramborg, 2004; Adam & Fernando, 2006; Fauver & Naranjo, 2010; Bartram et al., 2011 and Hoyt & Liebenberg, 2011).

Industrial Diversification: A dummy variable that takes the value of one when a firm tends to operate in more than one segment of business and zero otherwise, is used as a proxy for industrial diversification and is employed to capture the impact of this vital factor. Similarly, Allayannis and Weston (2001) use a dummy variable as a proxy for industrial diversification. We can argue that this variable is a measure of natural hedging as firms reduce their risk of focusing on one business line or segment by obtaining another source of income as well.

Geographical Diversification: Is defined as a dummy variable with a value of one when a firm operates in countries outside of the United Kingdom and zero otherwise, as a proxy for this important factor. Allayannis and Weston (2001) and Pramborg (2004) use geographical diversification to control for factors that are expected to have an impact on the firm value. We can argue that this variable is a measure of natural hedging as firms reduce their risk of focusing their business on one country by obtaining another source of income as well.

Financial Crisis: Another dummy variable is used to control for the last global financial crisis, which started late in 2007 and lasted until 2009, as most economists and specialists document. In this study, the crisis is considered an important period which needs to be controlled for to capture any change in derivatives usage. Therefore, the years 2008 and

2009 are represented by a dummy variable with the value of one and zero for the other years.

Industry Effect: The classification of industry is important to capture the impact of firms' industry, which is expected to be associated with different levels of investment, affecting Tobin's Q (Pramborg, 2004). Therefore, a dummy variable with the value of one for a particular industry and zero otherwise is used. Since, our dataset includes three sectors and four subsectors, we use six dummy industries (7-1) to capture industry effects.

5.7 Empirical Regression Results and Analysis

The results of these regression models are analysed and discussed in the following sections.

5.7.1 Static Models Regression Results

We run four different regression models by using the OLS estimator on the panel data in order to investigate the impact of the derivatives usage on both the firm value and performance. Also, we run four different regression models by using the OLS estimator on the panel data in order to examine the impact of FX and IR derivatives usage on firm value and performance under the three types of hedge. Dummy variables are used to indicate different types of derivatives usage in the regressions of the eight models. The results of these various regressions are discussed for the firm value (Ln (TQ)), accounting performance (ROE and ROA) and market performance (SR) separately in the following discussion.

5.7.1.1 Firm Value Regression Results

As mentioned in the variables specifications section of this chapter, the dependent variable Ln (TQ) is used as a proxy for the firm value in order to examine the impact of general derivatives usage on firm value and to specifically examine the impact of FX and

IR derivatives usage on the firm value under the three types of hedge. We expect according to the theory and the prior empirical studies in the literature on risk management that the use of derivatives in general and particularly for hedging purposes can create value for firms. Table 8 in Appendix 5C shows the results of the eight models of the OLS estimator.

The results of model 1, which uses a dummy variable indicating derivatives use that takes a value of one for firms that use derivatives and zero otherwise as the main independent variable, indicate a positive and statistically significant relationship with firm value at the 5% level of significance. Also, the results of model 2, which uses dummy variables indicating derivatives use for hedging purposes or trading purposes that take a value of one for firms that use derivatives and zero otherwise as the main independent variable, show a positive and significant relationship between the use of derivatives for trading purposes and firm value at the 1% level of significance, while, it shows a positive and insignificant relationship between the use of derivatives for hedging purposes and firm value. These results change when we drop the use of derivatives for trading purpose in model 3; then it shows a positive and significant relationship between the use of derivative for hedging purposes and firm value at the 5% level of significance. Model 4, which uses the interactive derivative dummy variable indicating derivatives use for hedging purposes and trading purposes at the same time, which takes a value of one for firms that use derivatives for both purposes and zero otherwise as the main independent variable, shows a positive and significant relationship between the use of derivatives for both purposes at the same time and firm value at the 1% level of significance. The results for the first four variables of derivatives usage (DU, DH, DT and DHT) of the first four models are consistent with the theory and with previous empirical studies of financial and non-financial firms such as Fung et al. (2012), Allayannis and Weston (2001) and Panaretou (2014), respectively. Therefore, we can conclude that our results for the first four models

are consistent with our hypothesis $H1_A$ that the use of derivatives for hedging positively affects firm value.

As mentioned above, we run another four different regression models in order to investigate the impact of FX and IR derivatives usage on firm value. For example, in model 5, we use three dummy variables indicating derivatives use for hedging purposes against the fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of Ln (TQ) show positive relationships between the three types of hedge (FV, CF and NI) and the firm value but they are insignificant, except the results for the NI, which shows a positive and significant association with firm value at the 1% level of significance. Therefore, we can conclude that our results for model 5 are consistent with our hypothesis $H2_A$ that the effect of the three types of hedge (FV, CF and NI) has a positive impact on the value of UK financial firms.

Model 6, uses two dummy variables indicating derivatives use for hedging purposes against the fair value hedge in order to reduce risk of foreign exchange rate (FX) risk or interest rate (IR) risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of Ln (TQ) show that the use of derivatives for FX risk under the fair value hedge has a positive and significant relationship with firm value at the 10% level of significance, while, the use of derivatives for IR risk under the fair value hedge has a positive and insignificant relationship with firm value.

In model 7, two dummy variables are used indicating derivatives use for hedging purposes against the cash flow hedge (CF) in order to reduce FX risk or IR risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of Ln (TQ) show statistically significant positive relationships between firm

value and the use of derivatives under CF in order to reduce FX and IR risks at the 1% and 5% levels of significance, respectively. Model 8, uses one dummy variables indicating derivatives use for hedging purpose against the net investment hedge (NI) in order to reduce FX risk, which takes a value of one for firms that use derivatives and zero otherwise as the main independent variables. The outcomes show statistically significant and positive relationship between firm value and the use of derivative under NI in order to reduce FX risks at the 1% level of significance. Therefore, we can conclude that our results for models 6, 7 and 8 are consistent with our hypotheses $H3_A$ and $H4_A$ that FX and IR derivatives usage for hedging has a positive impact on the value of UK financial firms.

In the same table we can observe different and surprising results for some of the control variables. For example, almost all the eight models show a statistically negative and significant association between the firm value and all of Firm Size, Profitability and Investment Opportunities at the 1% and 5% levels of significance. Some of these results are inconsistent with the theory and with the finance literature, although some of them are consistent with some of the empirical studies in the field of risk management, such as Choi et al. (2013) who find a negative and significant association between firm value and profitability and find a negative but insignificant relationship with firm size.

Also, the dummy Financial Crisis variable indicates a negative and significant relation with firm value at the 1% level of significance in the period of the crisis, which we assume was the years 2008 and 2009. This negative sign suggests that the firms that used derivatives during the crisis incurred more costs than gains and this reduced firm value. Moreover, model 4 shows that there is a positive and significant relationship between Leverage and firm value at the 1% level of significance. However, the results of Leverage for the other models show positive but insignificant relationships with firm value. The

results of the eight models show that there are positive and significant relationships between Liquidity and firm value at the 1% level of significance.

However, the results of the Industry Diversification dummy variable and the Dividend dummy variable, which are used only in Five models, due to the fitness of the other models, show positive and significant associations with the firm value at the 1% level of significance. The constant shows a positive sign and significance at the 1% level in all models. Also, all the models seem to be well fitted and the explanatory variables that are used in the regression models satisfactorily explain the dependent variable of firm value as the values of the R-squared are at the acceptable level.

5.7.1.2 Accounting Performance Regression Results

We use two definitions as the dependent variables for the accounting performance, the ROE and ROA, and the regression models are repeated and run separately for each of them. Table 9 in Appendix 5C reports the regression results of the ROE for the eight models by using the OLS. The outcomes show positive but insignificant relationships between the DU, DH, DT and DHT and the accounting performance of the ROE. These results suggest that the usage of derivatives can have a positive impact on the performance of firms and these results support Choi et al. (2013) who find a positive and significant relationship between the uses of derivatives and accounting performance as well.

For instance, the results of model 1, which uses a dummy variable indicating derivatives use that takes a value of one for firms that use derivatives and zero otherwise as the main independent variable, indicate a positive and insignificant relationship with accounting performance of the ROE. Also, the results of model 2, which uses a dummy variable indicating derivatives use for hedging purposes or trading purposes that takes a value of one for firms that use derivatives and zero otherwise as the main independent variable, show positive and insignificant relationships between the use of derivatives for both

purposes and the accounting performance of the ROE. These results do not change when we drop the use of derivatives for trading purposes in model 3. In model 4, which uses the interactive derivative dummy variable indicating derivatives use for hedging purposes and trading purposes at the same time, which takes a value of one for firms that use derivatives for both purposes and zero otherwise as the main independent variable, the results show a positive and insignificant relationship between the use of derivatives for both purposes at the same time and accounting performance of ROE. The results for the first four variables of derivatives usage (DU, DH, DT and DHT) of the first four models are consistent with the theory and with the empirical studies of financial and non-financial firms. These outcomes suggest that the use of derivatives in general or for hedging and trading or both probably affects the firms' accounting performance positively. These results are consistent with the results reported by Choi et al. (2013) but are inconsistent with Fung et al. (2012). Therefore, we can conclude that our results for the first four models are consistent with our hypothesis $H1_B$ that the use of derivatives for hedging positively affects firm performance of UK financial firms.

As mentioned above, we run another four different regression models in order to investigate the impact of FX and IR derivatives usage on the accounting performance. For example, in model 5, which uses the three dummy variables indicating derivatives use for hedging purposes against the fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), which take a value of one for firms that use derivatives and zero otherwise as the main independent variables, the results of ROE show positive relationships between the three types of hedge (FV, CF and NI) and the accounting performance, but they are insignificant, except the results for the FV, which show a negative and insignificant association with ROE. Therefore, we can conclude that our results for model 5 are consistent with our hypothesis $H2_B$ that the three types of hedge

(FV, CF and NI) have a positive impact on the performance of UK financial firms, except for FV result, which is inconsistent with our hypothesis.

Model 6, uses two dummy variables indicating derivatives use for hedging purposes against the fair value hedge in order to reduce foreign exchange rate (FX) risk or interest rate (IR) risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROE show that the use of derivatives for FX risk under fair value hedge has a positive and insignificant relationship with ROE, while, the use of derivative for IR risk under fair value hedge have negative and insignificant relationship with accounting performance of the ROE.

Model 7, uses two dummy variables indicating derivatives use for hedging purposes against the cash flow hedge (CF) in order to reduce FX risk or IR risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROE show an insignificant positive relationship between accounting performance of ROE and the use of derivatives under CF in order to reduce FX, while there is a negative insignificant relationship with IR risks. The results are similar, in model 8, which uses one dummy variables indicating derivatives use for hedging purpose against the net investment hedge (NI) in order to reduce FX risk, which takes a value of one for firms that use derivatives and zero otherwise as the main independent variables. The outcomes show insignificant and positive relationship between ROE and the use of derivatives under NI in order to reduce FX risks. Therefore, we can conclude that our results for models 6, 7 and 8 are consistent with our hypotheses $H3_B$ and $H4_B$ that the use of FX and IR derivatives for hedging has a positive impact on the performance of UK financial firms as measured by ROE, except for FVIR and CFIR results, which are inconsistent with hypotheses.

Further, the firm characteristic control variables generally show insignificant positive and negative associations with the accounting performance of the ROE. The only variable that show significant relationships is Dividend. The constant shows mixed results of positive and negative signs and is insignificant in all models of the three estimators and the R-squared percentages are quite low as well.

On the other hand, Table 10 in Appendix 5C presents the alternative measurement or definition for the accounting performance ROA, by repeating the same eight models of the OLS, estimator. The results of model 1, which uses the dummy variable indicating derivatives use that takes a value of one for firms that use derivatives and zero otherwise as the main independent variable, indicate a negative and insignificant relationship with accounting performance as indicated by the ROA. Also, the results of model 2, which uses the dummy variable indicating derivatives use for hedging purposes or trading purposes that takes a value of one for firms that use derivatives and zero otherwise as the main independent variable, show a positive and insignificant relationship between the use of derivatives for hedging purposes and accounting performance. However, the model shows a negative and significant relationship between the use of derivatives for trading purposes and accounting performance at the 1% level of significance. These results change when we drop the use of derivatives for trading purposes in model 3, which then shows a negative and insignificant relationship between the use of derivative for hedging purposes and accounting performance of the ROA. Model 4, which uses the interactive derivative dummy variable indicating derivatives use for hedging purposes and trading purposes at the same time, which takes a value of one for firms that use derivatives for both purposes and zero otherwise as the main independent variable, shows a negative and significant relationship between the use of derivatives for both purposes at the same and accounting performance of the ROA at the 1% level of significance. These results are in line with Fung et al. (2012) who find a negative and significant association between

derivatives usage and accounting performance. Therefore, we can conclude that our results for the first four models are inconsistent with our hypothesis $H1_B$, which assumes the effect of the use of derivatives for hedging positively affects firm performance of UK financial firms.

As mentioned above, we run another four different regression models in order to investigate the impact of FX and IR derivatives usage on the accounting performance of the ROA. For example, model 5, uses the three dummy variables indicating derivatives use for hedging purposes against the fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI) that take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROA show a positive and significant association between CF and the accounting performance of the ROA at the 1% level of significance. However, the FV and NI results show negative and significant association with the accounting performance of the ROA at the 5% and 1% levels of significance. Therefore, we can conclude that our results for model 5 are inconsistent with our hypothesis $H2_B$, which assumes the effect of the three types of hedge (FV, CF, NI) has a positive impact on the firm performance of UK financial firms, except for CF results, which are consistent with our hypothesis.

Model 6, uses two dummy variables indicating derivatives use for hedging purposes against the fair value hedge in order to reduce foreign exchange rate (FX) risk or interest rate (IR) risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROA show that the use of derivatives for FX and IR risks under fair value hedge has negative and insignificant relationships with accounting performance of the ROA.

Model 7, uses two dummy variables indicating derivatives use for hedging purposes against the cash flow hedge (CF) in order to reduce FX risk or IR risk, which take a value

of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROA show negative but insignificant relationships between accounting performance of the ROA and the use of derivatives under CF in order to reduce FX and IR risks. The outcomes are similar, in model 8, which uses one dummy variables indicating derivatives use for hedging purpose against the net investment hedge (NI) in order to reduce FX risk, which takes a value of one for firms that use derivatives and zero otherwise as the main independent variables. The outcomes show a statistically significant and negative relationship between accounting performance of the ROA and the use of derivative under NI in order to reduce FX risks at the 1% level of significance. Therefore, we can conclude that our results for models 6, 7 and 8 are inconsistent with our hypotheses $H3_B$ and $H4_B$, which assume the effect of FX and IR derivatives usage for hedging has a positive impact on the firm performance of UK financial firms.

Moreover, the ROA regression results show mixed and significant outcomes for the firm characteristics of the control variables. For example, Firm Size shows a positive and significant relationships with ROA at the 1% level of significance in all models. However, Leverage and Geographical Diversification variables indicate negative and significant associations with the accounting performance of the ROA at different levels of significance, 1% and 5%, for most of the models. The constant shows a negative sign and is significant at the 1% level of significance in all models and the R-squared percentages are relatively low in all the models as well. Finally, both the ROE and ROA regression results show negative and insignificant relationships between the Financial Crisis dummy variable and the accounting performance during the period of the crisis, except in models 7 and 8 in ROE outcomes that show positive and insignificant relationships.

5.7.1.3 Market Performance Regression Results

We also employ the stock return (SR) as a proxy for the market performance and the same regression models and OLS estimator are used to run the regressions for this dependent variable. Table 11 in Appendix 5C reports the regression results for the SR. The outcomes are similar to the ROA results, with a few differences or exceptions. For example, models 2 and 4 show negative and significant associations of DT and DHT with market performance at the 5% level of significance.

Models 1, 2 and 3 show insignificant negative relationships of DU and DH with the market performance of the SR. The coefficients of these independent variables are very low compared to those reported in the previous regressions. Some of these results, although insignificant, are consistent with the relevant theories and with some prior empirical studies. For example, Flannery and James (1984) and Kwan (1991) find a significantly inverse relationship between derivatives usage for interest rate risk fluctuations and bank stock returns. Therefore, we can conclude that our results for the first four models are inconsistent with our hypothesis $H1_B$, which assumes that the use of derivatives for hedging positively affects firm performance of UK financial firms.

As mentioned above, we run another four different regression models to investigate the impact of FX and IR derivatives usage on the market performance of the SR. For example, model 5, uses three dummy variables indicating derivatives use for hedging purposes against the fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of SR show a positive but insignificant association between FV and market performance. However, the NI results show negative and significant association with the market performance of the SR at the 10% level of significance, while the CF results show negative but insignificant association with the

market performance of the SR. Therefore, we can conclude that our results for model 5 are inconsistent with our hypothesis $H2_B$, which assumes that the three types of hedge (FV, CF, NI) have a positive impact on the firm performance of UK financial firms, except for FV results, which are consistent with our hypothesis $H2_B$.

Model 6, uses two dummy variables indicating derivatives use for hedging purposes against the fair value hedge in order to reduce foreign exchange rate (FX) risk or interest rate (IR) risk, which take a value of one for firms that use derivatives and zero otherwise as the main independent variables. The results of ROA show that the use of derivatives for FX risk under the fair value hedge has negative and insignificant relationships with market performance of the SR, while the use of derivatives for IR risk under the fair value hedge has positive and insignificant relationships with market performance of the SR.

In model 7, two dummy variables indicate derivatives use for hedging purpose against the cash flow hedge (CF) in order to reduce FX risk or IR risk, which take a value of one for firms that use derivatives and zero otherwise, are the main independent variables. The results of SR show negative and insignificant relationships between market performance and the use of derivatives under CF in order to reduce FX and IR risks. In model 8, one dummy variable is used indicating derivatives use for hedging purpose against the net investment hedge (NI) in order to reduce FX risk, which takes a value of one for firms that use derivatives and zero otherwise as the main independent variables. The outcomes show a statistically significant and negative relationship between market performance of the SR and the use of derivatives under NI in order to reduce FX risks at the 10% level of significance. Therefore, we can conclude that our results for models 6, 7 and 8 are inconsistent with our hypotheses $H3_B$ and $H4_B$, which assume that FX and IR derivatives usage for hedging has a positive impact on the firm performance of UK financial firms.

Furthermore, when we consider the control variables, the Firm Size and the Profitability variables show positive and significant relationships with the market performance of the SR at the 1%, 5% and 10% levels of significance in the eight models. However, the Investment Opportunities variable indicates a negative and significant association with the market performance at the 1% level of significance for seven of the models.

Also, the Financial Crisis dummy variable shows negative and significant relationships with the market performance of the SR in all the models. This suggests that the SR was affected negatively and dropped in the period of the crisis, which is consistent with the reality of world financial markets in that critical period. The constant shows a negative sign and is significant at the 1% and 5% levels of significance in all the models and the R-squared percentages are relatively low in all the models as well as ROE.

5.8 Discussion

According to the prior literature and the empirical results, we expect firms that use derivatives to have higher firm value and their accounting and market performance to be better than those of non-users of derivatives. The results surprisingly show that the mean values for Ln (TQ) of non-users are higher than those of users of derivatives, except when the derivatives are used for the purpose of trading. These results are consistent with the results of Panaretou (2014) who studies the usage of derivatives in the UK market by non-financial firms and finds that the Tobin's Q mean values of the non-hedgers are higher than those of the hedgers. Our firm value regression results for the first four models are in line with the theory and with the empirical studies of financial and non-financial firms such as Fung et al. (2012), Allayannis and Weston (2001) and Panaretou (2014), respectively. Thus, we can argue that the use of derivatives in general and for hedging purpose can create value for a firm.

The results of accounting performance show that the users of derivatives have higher performance than the non-users of derivatives. These results are consistent with the theories and support some prior empirical studies in the field of risk management, such as Choi et al. (2013) who find the users of derivatives have higher mean values than the non-users of derivatives for ROA. Our ROE regression results for the first four models suggest that the use of derivatives in general or for hedging and trading or both is likely to affects the firms' accounting performance positively and these results are consistent with the results reported by Choi et al. (2013) but are inconsistent with Fung et al. (2012).

However, our ROA regression results for the first four models are in line with Fung et al. (2012) who find a negative and significant association between derivatives usage and accounting performance. Likewise, our SR regression results for the first four models are consistent with Flannery and James (1984) and Kwan (1991) who find a significantly inverse relationship between derivatives usage for interest rate risk fluctuations and bank stock returns.

In addition, we shed more light and focus on the usage of derivatives under the three types of hedge: fair value hedge (FV), cash flow hedge (CF) and net investment hedge (NI), in order to reduce financial market risk. More specifically, we focus on the use of derivatives for hedging foreign exchange rate risk (FX) and interest rate risk (IR). This is, to our best knowledge, the first study that explores the effect of derivatives usage from this perspective. It is diffcult to compare our findings here to previous emiprical studies in the liteature because of our classification, which follows the hedging accounting requirements of IAS 39. However, Panaretou (2014) finds that in total 71.79% and 68.22% of the firms in her sample use derivatives for FX and IR risks, respectively, whereas, Nelson (2005) finds 33.7% and 26% and use derivatives for FX, IR and OT risks, respectively.

Our regression results of the three types of hedge (FV, CF and NI) show a positive impact on the firm value of UK financial firms. Similarly, our ROE regression results of the three types of hedge (FV, CF, NI) indicate a positive impact on the firm performance of UK financial firms. However, our ROA regression results for the three types of hedge (FV, CF and NI) show a negative impact on the firm performance of UK financial firms, except for CF results, which show a positive impact. Also, our SR regression results for the three types of hedge (FV, CF and NI) indicate a negative on the firm performance of UK financial firms, except for the FV results, which show a positive impact.

The UK financial firms in our sample tend to use the three types of hedge FV, CF and NI in order to reduce different type of risks. The results show that on average UK financial firms tend to mitigate their FX and IR risks under the FV about 16% and 19%, respectively. The results show that on average 22% and 20% of UK fiancial firms tend to mitigate their FX and IR risks, respectively, under the CF. Our firm value regression results of the two risks FX and IR under the three types of hedge show a positive impact on the firm value of UK financial firms. Also, our ROE regression results of the two risks FX and IR under the three types of hedge indicate a positive impact on the firm performance of UK financial firms. However, our ROA regression results of the two risks FX and IR under the three types of hedge show a negative impact on the firm performance of UK financial firms. Likewise, our SR regression results of the two risks FX and IR under the three types of hedge indicate a negative impact on the firm performance of UK financial firms.

Also, we can argue that foreign exchange rate risk and interest rate risk are considered very crucial to hedge by the financial firms in our sample. These results are in line with the literature and support some empirical studies in the field of risk management. For instance, Sinkey and Carter (2000) study the financial characteristics of financial

institutions and find that 65.6% and 32.7% of the banks in their sample use derivative contracts for IR and FX risks. Likewise, Hentschel and Kothari (2001) study the use of derivatives by US financial and non-financial firms and find that firms in their sample employ derivatives to mitigate FX risk and IR risk.

Moreover, Grant and Marshall (1997) study the use of derivatives in large UK firms and find that the majority of UK firms use derivatives to matigate both FX and IR risks. Also, Adedeji and Baker (2002) study the use of IR derivatives in the UK firms and find that 34.3% of the firms in their sample use IR derivatives to reduce their financial risk. We can argue that our results vary depending on the type of hedge and type of risks that firms seek to reduce. Also, we can argue that hedging the FX risk and IR risk is considered very crucial for the financial firms in our sample. These results are consistent with the literature and support some prior empirical studies in the field of risk management.[14]

For instance, Bartram et al. (2011) study the effect of the use of financial derivative for non-financial firms in the US and find that the firms in their sample employ derivatives to mitigate FX risk and IR risk. Also, Ahmed et al. (2011) who study the effects of SFAS 133 on the risk relevance of accounting measures of banks' derivative exposures find that the financial institutions in their sample tend to use financial derivatives to hedge FX risk and IR risk. Clark et al. (2008) study financial derivatives usage in financial firms and find a strong link between derivatives usage and risk sensitivities for both FX and IR risks. Moreover, Brewer et al. (2000) find that banks' management are concerned more about IR risk and swap contracts are the most important. Choi and Elyasiani (1997) find that forward contracts are the most significant derivatives used to reduce IR risk.

[14] Such as Choi and Elyasiani (1997), Brewer et al. (2000), Allayannis and Weston (2001), Clark et al. (2008), Ahmed et al. (2011), Bartram et al. (2011), Choi et al. (2013), Fung et al. (2012), and Panaretou (2014).

On the other hand, the control variables' results show that the users of derivatives have higher performance than the non-users of derivatives. These results are consistent with the theories and support some empirical studies in the field of risk management, such as Choi et al. (2013) who find the users of derivatives have higher mean values than the non-users of derivatives for ROA, firm size, profitability, leverage, investment opportunities, geographical diversification and industry diversification.

Also, we assume that larger firms will tend to use derivatives more than smaller firms. The data indicate that the sample varies in size between large, medium and small firms, depending on the sector. For instance, the banking sector is the largest of the three sectors, and uses more derivatives than other sectors, which is consistent with and supports the results in the literature and is in line with what we would expect, given that banks are larger financial institutions and more prone to be engaged with activities of financial transactions which carry higher risks. Guay and Kothari (2003) find evidence that the larger firms in their sample tend to use more derivatives. Hentschel and Kothari (2001) who use data for large financial and non-financial US firms document that 62% of their data sample disclosed derivatives usage activities, while Nelson et al. (2005) who also use US non-financial firms find 21.6% of their sample use derivatives only for hedging purpose. Panaretou (2014) use data of UK non-financial firms and find about 87% of their data sample use derivatives for hedging purposes.

Moreover, we predict that the users of derivatives will perform better than non-users and thus they will generate better profitability, will afford more leverage, will have more liquid assets and will have more investment opportunities than non-users of derivatives. Our results for Profitability and Investment Opportunties are in line with some previous findings in the literature. For instance, Adam and Fernando (2006) find that firms that

tend to use more derivatives will incure less losses. Guay and Kothari (2003) argue that firms that use more derivatives will have greater investment opportunities.

Our findings do not support Bartram et al. (2011) who argue that the usage of financial derivatives by financial firms was to blame for the last financial global crisis, and the most harmful factor for the global economic recession. However, these results are consistent with the results of Dai and Lapointe (2010) who suggest that according to their results the last financial crisis was not caused by financial derivatives. Also, our results support Perez-Gonzales and Yun (2013) who argue that derivatives are the most powerful tools that can be used to reduce risks and increase firm value. This means that the crisis does not cause firms in our sample to reduce their use of derivatives and they continue to employ derivatives as much as or more than before the crisis. This also supports Dai and Lapointe (2010) who suggest that according to their results, the last financial crisis was not caused by financial derivatives.

Finally, we assume that the users of derivatives pay less dividends than non-users and diversify their business more. The results indicate that the three sectors tend to pay dividends, diversify their business activities and have foreign branches and activities in countries other than the UK. For example, the results indicate that about 47% of the firms pay dividends, 78% of the firms diversify their business and their activities and 60% of the firms have branches and business activities in countries other than the UK. Our results regarding Geographical Diversification are consistent with Guay and Kothari (2003) who find that the use of derivatives increase among firms characterised by Geographical Diversification.

5.9 Conclusion

The work reported in this empirical chapter aims to shed light on the ways the UK financial firms implement risk management policies through the use of financial

derivatives and to examine whether hedging with financial derivatives affects firm value and performance. It also investigates the relationship between FX derivatives usage and IR derivatives usage under the three hedge types and their impact on firm value and performance of UK financial firms.

In this chapter we present the regression results of the OLS method because all the results of this method are consistent and significant for the eight models that we run in the regression. Therefore, we believe that the OLS method is more suitable for our data in order to apply our static model. The overall results of the whole sample show mixed expected and unexpected outcomes for the independent variables and the control variables; some of them are consistent with the theories and some prior empirical studies in the field of risk management. For example, the derivatives dummy variables show consistent positive and significant relationships with firm value, while the results for accounting and market performance show mixed positive and negative relationships with both significant and insignificant relationships. Theoretically, the use of derivatives for hedging can increase firm value, as documented by previous empirical studies (Gay & Nam, 1998; Allayannis & Weston, 2001; Nocco & Stulz, 2006; Mackay & Moeller, 2007; Bartram et al., 2011; and Perez-Gonzalez & Yun, 2013).

Also, the regression results of the whole sample show very significant and important findings regarding the use of derivatives for hedging purpose to reduce FX and IR risks. Specifically, our results in most of the regression models of Ln (TQ) suggest that there is a positive and significant relationship between the use of derivatives in order to reduce FX and IR risks and firm value. We can argue that some of our results on firm value in these regressions are consistent with the theory of risk management and with some pervious empirical studies of the literature in both sectors, financial and non-financial

firms, such as Fung et al. (2012), Allayannis and Weston (2001) and Panaretou (2014), respectively.

Nevertheless, the results for accounting performance, especially the regression of ROA, show also somewhat unexpected outcomes in most of the regression models. For example, our findings for ROA show that the use of derivatives in order to reduce FX and IR risks has a negative and significant impact on accounting performance. However, the regression results of ROE do not show significant relationships between the use of derivatives in order to reduce FX and IR risks and accounting performance in most of the models.

Moreover, the results of market performance show mixed negative and positive significant and insignificant relationships between the use of derivatives in order to reduce FX and IR risks and market performance of SR under the three types of hedge. The results of the Financial Crisis dummy variable in general show that there is a negative impact on both firm value and performance of the UK financial firms of this sample. Also, the firms' characteristics show inconsistent outcomes for both firm value and performance, with some of them in line with the theories and empirical studies in the literature. The results of Ln (TQ) regressions in all models show higher R^2 percentages than the models dealing with the alternative dependent variables, ROE, ROA and SR of the accounting and market performance, respectively.

Finally, the results show that the users of derivatives tend to have more leverage and generate more profit than the non-users of derivatives. Interestingly the effect of the last financial crisis can be seen clearly in the years 2008 and 2009 and the impact of the crisis was more for non-users of derivatives than users of derivatives. These results are consistent with the results of Dai and Lapointe (2010) who suggest that according to their results, the last financial crisis was not caused by financial derivatives. Also, these

outcomes are in line with the theory of risk management and with some empirical studies such as Smith and Stulz (1985) and Perez-Gonzales and Yun (2013).

Our findings are significant and consistent with the theory and empirical studies outcomes, although they vary between the four dependent variables. Also, we can conclude that our findings support the notion in the risk management literature, that the effect of derivatives usage on the firm value and performance is mixed and ambiguous.

Chapter 6

Conclusion

6.1 Summary

Financial theories argue that in imperfect markets firms can add value through the use of sensible risk management policies. Accordingly, hedging with financial derivatives which reduce risks can enhance firms' value and performance. Financial firms play a vital role in the economy and economic development. However, they are often perceived as the riskier part of the economic system, mainly because they have high levels of leverage and offer highly risky products and services. They also need to deal with different types and levels of customers and with different geographic locations, domestically and internationally. Thus, they have to deal with different types of risk while conducting their business activities and the use of financial derivatives can be a helpful tool for off-balance sheet risk management.

This research concentrates on the use of financial derivatives for the UK financial industry. We collect data from annual reports and the DataStream. Our unbalanced dataset comprises information on 128 UK financial firms and covers the time period between 2005 and 2014. Our dataset includes three sectors of the financial industry: Banking (BS), Equity Investment (EIS) and Financial Services (FSS). The FSS sector comprises four subsectors: Assets Managers (AMSS), Consumer Finance (CFSS), Investment Services (ISSS) and Specialty Finance (SFSS).

We employ the OLS estimator of the Panel Data technique. Our regression results show both expected and unexpected outcomes for the independent variables and the control variables, some of them statistically significant and consistent with existing theories and empirical studies in the field of risk management. We conclude that the regressions show statistically positive and significant relationships between the use of derivatives for hedging and firm value and the results are consistent in almost all regression models. Our regression results show some significant relationships between the use of derivatives

under the three types of hedge in order to reduce FX and IR risks and both firm value and performance. Also, the regression results for ROA and SR suggest that the use of derivatives for FX and IR hedging has mixed positive and negative significant impact on accounting and market performance.

Overall, we can argue that our results of the regression with Ln (TQ) and ROA as the dependent variables are generally more consistent and significant. Also, the regression results suggest that the effect of derivatives usage on the firm's value and performance is ambiguous, which is in line with previous findings in the risk management literature.

6.2 Main Findings

The results of the descriptive statistics in chapter 5 show that 35.18% of the firms use derivatives, 32.14% use them for hedging only, 14.5% use them for trading only, and 11.5% use them for both purposes (in the same year). The descriptive statistics also show that 22.2% of the firms use derivatives under fair value hedge, about 28% use derivatives under cash flow hedge and 7.2% use derivatives under net investment.

In our regression analysis, we use four dependent variables: logarithm of Tobin's Q (Ln (TQ)) to measure firm value, return on equity (ROE) and return on assets (ROA) to measure accounting performance, and stock return (SR) to measure market performance. We report interesting and significant findings, which are consistent with the theories and support some results in the empirical studies in the literature in the field of risk management. We also conclude that the foreign exchange rate risk and interest rate risk are considered very crucial for the financial firms in our sample to hedge. However, surprisingly, the results of univariate tests show that the mean values for Ln (TQ) of the non-users are higher than for the users of derivatives. In contrast, the ROE, ROA, SR and control variables' outcomes show that the users of derivatives perform significantly better

than the non-users of derivatives. These results are consistent with the theories and support some existing empirical studies in the field of risk management.

In the empirical chapter (chapter 5), the aim is to shed light on the ways that UK financial firms implement risk management policies through the use of financial derivatives and to examine whether hedging with financial derivatives affects firm value and performance. Our regression results show both expected and unexpected outcomes for the independent variables and the control variables, some of them consistent with the theories and the empirical studies in the field of risk management. We find statistically positive and significant relationships between the use of derivatives for hedging and firm value and the results are consistent in almost all regression models.

Moreover, in the same chapter the aims to shed more light on the usage of derivatives under the three types of hedge, FV, CF and NI, in order to reduce FX and IR. Our regression results show some significant relationships between the use of derivatives under the three types of hedge in order to reduce FX and IR risks and improve both firm value and performance. We can argue that most of our findings from these different regressions are significant and consistent with the theory of risk management, although they vary among regressions dealing with the four dependent variables. However, we can argue that our results for both Ln (TQ) and ROA regression are more consistent and significant in most of the regression models. Overall, we can conclude that our findings support the notion in the risk management literature that the effect of derivatives usage on the performance is mixed and ambiguous.

6.3 Recommendations

Our results reveal that UK firms might be conservative in terms of risk management policies, specifically regarding the use of derivatives for risk hedging, as only about 32.14% of the total observations of firms in our sample show use of derivatives for

hedging purposes. Most firms are concerned with FX and IR risks, which are hedged with various derivatives. This could be because the rules, such as FRS 13, IAS 39 and LSE, regarding the use of derivatives in the UK financial system exert discipline on firms to follow this conservative policy. Also, UK firms seek to avoid falling into financial distress, thereby incurring a bankruptcy cost. Rajan and Zingales (1995) argue that the financial system rules and the bankruptcy law in the UK make firms afraid of bankruptcy costs. Therefore, we believe that management should focus more on developing employees who work and deal with the use of derivatives and risk management policy, to increase their knowledge and make them more familiar with these types of complex tools.

Moreover, it can be suggested that these firms could increase their use of derivatives for hedging purposes in order to get more benefits from these off-balance sheet innovations, as only about 32.14% of the total observations of firms in our sample use derivatives for hedging purposes. Also, they should improve their level of disclosure of these types of data in order to cope with the new rules and regulations on disclosure and transparency. Finally, according to our results and to the reasons and points mentioned, we can argue that financial firms are more qualified to use financial derivatives and have the ability to improve their risk management policies according to the requirement of IAS 39, more than non-financial firms.

6.4 Research Implications

As we know, firms have different stakeholders who have different interests. Firms always try to satisfy their stakeholders in order to survive in the market and in the competition with their rivals. Our findings show that in general there is a positive relationship between the use of derivatives for hedging purposes and firm value. Also, our results reveal that UK firms might be conservative in terms of risk management policies, specifically

regarding the use of derivatives for risk hedging, as our results show that 32.14% of the total observations of firms in our sample use derivatives for hedging purposes. Most firms are concerned with FX and IR risks, which are hedged with various derivatives. Therefore, we believe that our results could have implications for the different stakeholders of the firms in the financial industry such as regulators, employees, customers, creditors, and shareholders.

For example, the regulators in the UK are concerned that financial firms who use derivatives do not affect the stability of the financial system in the UK, can reduce their solvency risks, apply market regulations correctly and do not affect their consumers negatively. Also, potential investors in these firms will be happier to invest their wealth in firms that are concerned about their risk management and use appropriate methods to hedge their exposures. This will also have a positive impact on the capital market. Moreover, financial firms who use derivatives to hedge their IR and FX risks can provide more safety for their customers, especially those who deposit their money in banks or other financial firms. As a result, those customers will tend to save their money in these institutions that give them more security. Also, we believe that such a strategy will have a positive impact on the employees of financial firms, in terms of better job security. The study will also help those who work and deal with the use of derivatives and risk management policy, in term of encouraging them to get more focus and training in order to increase their knowledge and make them more familiar with these types of complex tools.

Finally, the results can give the decision makers of these financial firms more confidence to decide to use financial derivatives as a tool to manage and control their financial risks. Off-balance sheet hedging can help firms to transfer their negative risks and reduce their overall exposures. Thus, these firms can have a competitive advantage over their rival

firms that do not use financial derivatives for hedging purposes. We also think that our results can encourage the top management of the financial firms to focus more on developing their employees who work and deal with the use of derivatives and risk management policy.

6.5 Research Limitations

This research aims to shed light on the ways that firms in the UK financial industry implement their risk management policies through the use of financial derivatives and to examine whether hedging with financial derivatives affects firm value and performance. Our objective was to collect data about all financial firms in the UK financial industry. However, due to the analysis technique and accounting issues, we could not fully achieve our target.

The FRS 13 terms and conditions are applied to all publicly traded financial and non-financial firms that use financial instruments, except insurance firms and so we do not include insurance firms with the other financial firms in our sample. Also, we do not use the data of real estate firms, due to the nature of their business activities.

Moreover, the firms in our sample tend to disclose more qualitative data rather than numerical and quantitative data; this might be because full implementation of the disclosure standard was not yet compulsory during the sample period. This led us to use and focus more on dummy variables for derivatives variables instead of using notional amounts. However, it became compulsory for all firms, financial and non-financial, to disclose and implement hedging accounting from 1st January 2015 according to the requirements and rules of IAS 39.

Finally, working with a balanced dataset over the ten-year period, would ideally be preferable, but due to data limitations, we work with an unbalanced dataset, so as to

increase the number of sample observations. Our data sample is reduced for various reasons, such as one year or less of financial reports, missing financial reports, missing accounting data (for more details see chapter 3 section 3.4).

6.6 Future Research

The previous literature about risk management in the financial industry is scant and focuses on the effect of derivatives usage on risk. Most of these studies focus on the banking industry and a few on insurance and there is no study to our best knowledge that studies the financial industry as a whole from a risk management perspective. This research seeks to shed more light on the ways that UK financial firms conduct their risk management policies by using financial derivatives and to examine whether the usage of derivatives has an impact on the firms' value and performance in this important sector. However, we could not include all sectors of the financial industry in our research for the reasons mentioned in the above section and we could not collect quantitative data of notional amounts to test the intensity of hedging by derivatives usage.

We believe that in the future it will be easier to collect quantitative data about notional amounts as it became compulsory for all firms, financial and non-financial, to disclose and implement hedging accounting from 1st January 2015, according to the requirements and rules of IAS 39. Thus, future more ambitious research could include all types of financial firms, using quantitative data of notional amounts in one study.

Furthermore, it would be very interesting to study and explore the determinants that can affect the decisions about hedging for financial firms. Also, it would be a worthwhile future project to investigate whether the financial firms have an optimal hedging policy to implement effective risk management and so conduct their business activities safely. Finally, it would be very interesting to study the use of derivatives for hedging purposes in different countries worldwide.

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Appendices

Chapter 2

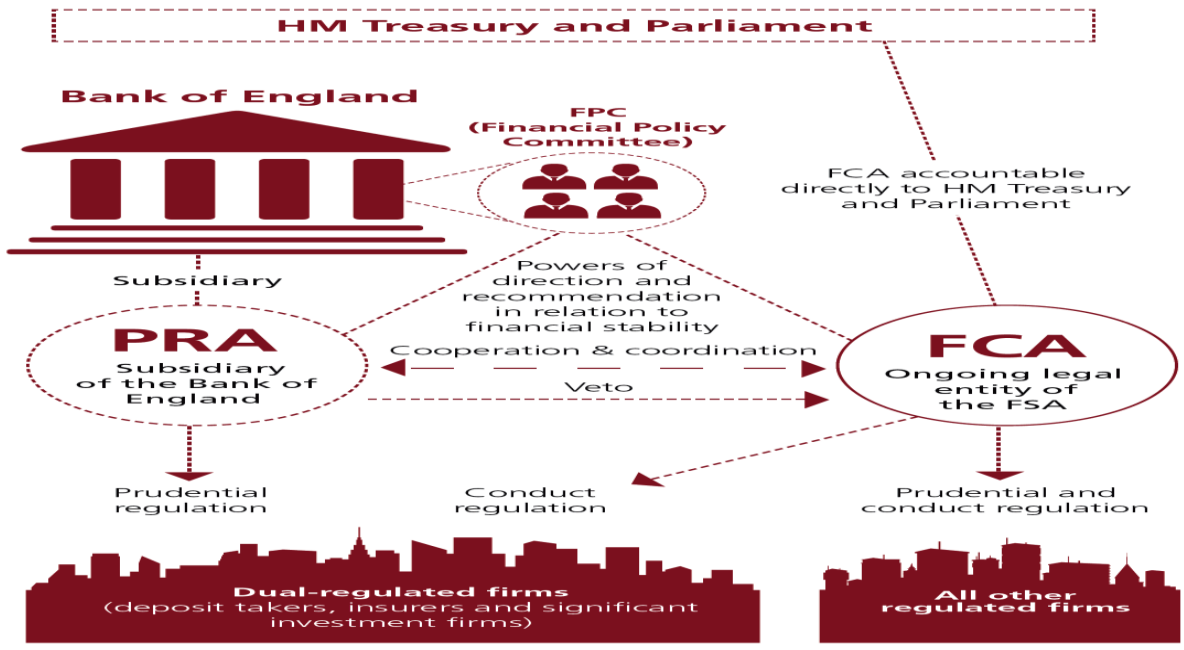
Appendix 2A

Table 1: The Role of the Financial Services Industry in the UK Economy

Sectors		Businesses	Households	Public Sector
Banking	Financial infrastructure	1. Financing 2. Financial management 3. Risk	1. Secured lending 2. unsecured lending 3. Saving and	1. Built infrastructure finance 2. Financial
Insurance		1. Commercial insurance 2. Specialty risks	1. P&C insurance 2. Life Insurance 3. Private pensions	
Investment		1. Venture capital 2. Liquid Investments	1. Mutual Funds 2. Wealth protection 3. Investment trusts	1. Infrastructure investing 2. Sovereign debt funds

Source: HM Treasury May 2009, hm-treasury.gov.uk.

Figure 1: The New Regulatory Structure



Source: Financial Conduct Authority Diagram, from Business plan 2013/14, p.58, Chartered Insurance Institute report April 2013.

Chapter 3

Appendix 3A

Table 1: List of Data Sample Firms and the Number of Yearly Observations.

No.	Firm	Years	Sector	The average of the Total Assets in million
1	BARCLAYS	10	Banking	1376870
2	ROYAL BANK OF SCTL.GP.	10	Banking	1396220
3	STANDARD CHARTERED	10	Banking	297289
4	BCB HOLDINGS	10	Banking	545.72
5	HSBC HDG. (ORD $0.50)	10	Banking	1434730
6	LLOYDS BANKING GROUP	10	Banking	703055
7	EUROPEAN ISLAMIC INV.BK.	8	Banking	195.69
8	SECURE TRUST BANK	3	Banking	591.62
9	BANK OF GEORGIA HDG.	2	Banking	2427.96
10	ENERGISER INVS.	10	Equity Investments	3.23
11	TISO BLACKSTAR GROUP	10	Equity Investments	97.75
12	AVANTI CAPITAL	10	Equity Investments	16.38
13	SPARK VENTURES	10	Equity Investments	63.83
14	EPE SPECIAL OPPS.	10	Equity Investments	29.35
15	RAB SPECIAL SITUATIONS	10	Equity Investments	43.52
16	ELEPHANT CAPITAL	7	Equity Investments	27.53
17	SCHRODERS	10	Asset Managers	11150.83
18	RATHBONE BROTHERS	10	Asset Managers	1139.29
19	ABERDEEN ASSET	10	Asset Managers	3298.85
20	BREWIN DOLPHIN HOLDINGS	10	Asset Managers	499.12
21	MAN GROUP	10	Asset Managers	6988.53
22	FIRST PROPERTY GROUP	10	Asset Managers	30.45
23	LIONTUST ASSET MAN	10	Asset Managers	48.69
24	HENDERSON GROUP	10	Asset Managers	1130.08
25	MITON GROUP	10	Asset Managers	57.12
26	BROOKS MACDONALD GROUP	9	Asset Managers	35.83
27	ASHCOURT ROWAN	9	Asset Managers	67.20
28	MATTIOLI WOODS	9	Asset Managers	27.46
29	CHARLEMAGNE CAPITAL	8	Asset Managers	30.23
30	CITY OF LONDON INV.GP.	8	Asset Managers	14.71
31	ASHMORE GROUP	8	Asset Managers	542.26
32	POLAR CAPITAL HOLDINGS	7	Asset Managers	61.07
33	HARGREAVES LANSDOWN	7	Asset Managers	303.03
34	RECORD	7	Asset Managers	34.59
35	JUPITER FUND MANAGEMENT	4	Asset Managers	737.50
36	AFH FINANCIAL GROUP	3	Asset Managers	16.16
37	CLOSE BROTHERS GROUP	10	Investment Services	5947.82
38	CHARLES STANLEY GROUP	10	Investment Services	328.71
39	NUMIS	10	Investment Services	297.56
40	PANMURE GORDON	10	Investment Services	84.58
41	WALKER CRIPS GROUP	10	Investment Services	60.26
42	IMPAX ASTMGMT GROUP	10	Investment Services	21.86
43	ICAP	10	Investment Services	56862.07
44	FISKE	10	Investment Services	16.66
45	LONDON STOCK EX.GROUP	10	Investment Services	102139
46	W H IRELAND GROUP	10	Investment Services	92.04
47	MARECHALE CAPITAL	10	Investment Services	0.92
48	INVESTEC	10	Investment Services	38545.55
49	POLEMOS	10	Investment Services	7.49
50	IG GROUP HOLDINGS	9	Investment Services	759.72
51	LONDON CAPITAL GP.HDG.	9	Investment Services	56.12
52	ARDEN PARTNERS	8	Investment Services	22.99
53	CENKOS SECURITIES	8	Investment Services	66.48
54	SHARE	6	Investment Services	29.83
55	PROVIDENT FINANCIAL	10	Consumer Finance	1596.08
56	S & U	10	Consumer Finance	81.07
57	PARK GROUP	10	Consumer Finance	59.08
58	PARAGON GP.OF COS.	10	Consumer Finance	10220.43
59	H&T GROUP	8	Consumer Finance	106.33
60	INTERNATIONAL PSNL.FIN.	7	Consumer Finance	731.70
61	MONEYSWAP (DI)	3	Consumer Finance	1.77
62	CAMELLIA	10	Specialty Finance	665.86
63	GUINNESS PEAT	10	Specialty Finance	1783.10

Table 1: (continued) List of Data Sample Firms and the Number of Yearly Observations.

No.	Firm	Years	Sector	The Average of the Total Assets in Million
64	LEEDS GROUP	10	Specialty Finance	19.93
65	WESTERN SELECTION	10	Specialty Finance	13.15
66	CITY OF LONDON GROUP	10	Specialty Finance	14.76
67	ARBUTHONT BANKING GROUP	10	Specialty Finance	605.68
68	INTERMEDIATE CAPITAL GROUP	10	Specialty Finance	2430.01
69	HIGHWAY CAPITAL	10	Specialty Finance	0.35
70	COBURG GROUP	10	Specialty Finance	1.02
71	WORLDSEC	10	Specialty Finance	1.41
72	CAPITAL MAN.& INV.	10	Specialty Finance	40.36
73	PRIVATE & COML.FIN.GP.	9	Specialty Finance	103.30
74	WESTSIDE INVESTMENTS	10	Specialty Finance	2.15
75	LEGENDARY INVESTMENTS	10	Specialty Finance	1.03
76	ADVFN	10	Specialty Finance	7.12
77	SIGMA CAPITAL GROUP	10	Specialty Finance	7.74
78	STARVEST	10	Specialty Finance	3.64
79	LIGHTHOUSE GROUP	10	Specialty Finance	28.06
80	METAL TIGER	10	Specialty Finance	1.91
81	GLEDHOW INVS.	10	Specialty Finance	0.69
82	FAIRPOINT GROUP	10	Specialty Finance	44.12
83	VOLVERE	10	Specialty Finance	19.71
84	IP GROUP	10	Specialty Finance	240.30
85	MXC CAPITAL	10	Specialty Finance	18.90
86	INSETCO	9	Specialty Finance	8.59
87	FRENKEL TOPPING GROUP	10	Specialty Finance	6.82
88	CRAVEN HOUSE CAPITAL	9	Specialty Finance	4.68
89	JELF GROUP	10	Specialty Finance	115.36
90	BLUE STAR CAPITAL	10	Specialty Finance	3.32
91	AMEDEO RESOURCES	9	Specialty Finance	3.73
92	MINERAL & FINL.INVS	9	Specialty Finance	1.61
93	JARVIS SECURITIES	10	Specialty Finance	11.79
94	INTL.MNG. & INFR.CORP.	9	Specialty Finance	18.64
95	IMPACT HOLDINGS	9	Specialty Finance	8.73
96	RED LEOPARD HOLDINGS	9	Specialty Finance	0.29
97	TRADING EMISSIONS	9	Specialty Finance	369.71
98	DRAGANFLY INVESTMENTS	9	Specialty Finance	1.76
99	POWER CAPITAL GLOBAL	9	Specialty Finance	1.69
100	LIVERMORE INVS.GP.	9	Specialty Finance	173.60
101	AMPHION INNOVATIONS	9	Specialty Finance	28.93
102	GLOBAL BRANDS	8	Specialty Finance	2.23
103	VERDES MANAGEMENT SUSP	8	Specialty Finance	0.41
104	IRF EUROPEAN FIN.INVS.	7	Specialty Finance	627.71
105	EUROCASTLE INV.	9	Specialty Finance	3549.05
106	OTTOMAN FUND	9	Specialty Finance	105.97
107	B P MARSH & PARTNERS	8	Specialty Finance	56.43
108	TEJOORI	8	Specialty Finance	18.12
109	AVARAE GLOBAL COINS	8	Specialty Finance	11.05
110	IMPERIAL INNOVATIONS GP.	8	Specialty Finance	191.69
111	1PM	8	Specialty Finance	8.93
112	ALECTO MINERALS	8	Specialty Finance	3.81
113	ZIM NRG	8	Specialty Finance	0.42
114	VOLTA FINANCE	8	Specialty Finance	143.31
115	BRAVEHEART INV.GP.	7	Specialty Finance	6.18
116	NOVA RESOURCES	7	Specialty Finance	1.74
117	ETAIREIA INVESTMENTS	7	Specialty Finance	0.30
118	QATAR INVESTMENT	7	Specialty Finance	139.78
119	SYMPHONY INTL.HDG.	7	Specialty Finance	303.75
120	POLO RESOURCES	7	Specialty Finance	144.06
121	SHELLSHOCK	7	Specialty Finance	3.06
122	EARLY EQUITY	7	Specialty Finance	0.27
123	ANGELFISH INVESTMENTS	6	Specialty Finance	0.61
124	HELLENIC CAPITAL	6	Specialty Finance	0.16
125	ARGO GROUP	6	Specialty Finance	23.20
126	NORTHWEST INV.GROUP	4	Specialty Finance	1.98
127	TMT INVESTMENTS	4	Specialty Finance	18.21
128	ASIA WEALTH GP.HOLDINGS	3	Specialty Finance	1.66
Number of Observations		1114		

Table 2: List of Firms that Use Derivatives and Disclosure of Quantitative Data.

No.	Firm	Years	Sector	Hedging/ Trading /Both	Quantitative Data of Notional Amount
1	BARCLAYS	10	Banks	Both	Available for all years for both
2	ROYAL BANK OF	10	Banks	Both	Available for trading only
3	STANDARD CHARTERED	10	Banks	Both	Available for all years for both
4	HSBC HDG. (ORD $0.50)	10	Banks	Both	Available for all years for both
5	LLOYDS BANKING	10	Banks	Both	Available for all years for both
6	SECURE TRUST BANK	3	Banks	Hedging	Available for all years
7	BANK OF GEORGIA HDG.	2	Banks	Trading	Not Available
8	ENERGISER INVS.	3	Equity	Hedging	Not Available
9	TISO BLACKSTAR GROUP	4	Equity	Hedging	Not Available
10	RAB SPECIAL	10	Equity	Trading	Not Available
11	SCHRODERS	10	Asset Managers	Hedging	Available for five years (2005-
12	RATHBONE BROTHERS	10	Asset Managers	Both	Available for three years (2005-
13	MAN GROUP	8	Asset Managers	Hedging	Available for all years
14	FIRST PROPERTY GROUP	9	Asset Managers	Hedging	Not Available
15	HENDERSON GROUP	10	Asset Managers	Hedging	Available for all years
16	CHARLEMAGNE CAPITAL	8	Asset Managers	Both	Not Available
17	CITY OF LONDON	6	Asset Managers	Trading	Not Available
18	ASHMORE GROUP	8	Asset Managers	Hedging	Available for all years
19	POLAR CAPITAL	7	Asset Managers	Hedging	Available for all years
20	RECORD	7	Asset Managers	Hedging	Available for all years
21	JUPITER FUND	4	Asset Managers	Hedging	Available for all years
22	CLOSE BROTHERS	10	Investment	Both	Available for all years
23	CHARLES STANLEY	1	Investment	Hedging	Not Available
24	NUMIS	10	Investment	Hedging	Not Available
25	IMPAX ASTMGMT	4	Investment	Hedging	Not Available
26	ICAP	10	Investment	Hedging	Not Available
27	FISKE	5	Investment	Trading	Not Available
28	LONDON STOCK	10	Investment	Both	Not Available
29	INVESTEC	10	Investment	Both	Available for one year only
30	IG GROUP HOLDINGS	9	Investment	Both	Not Available
31	ARDEN PARTNERS	4	Investment	Trading	Not Available
32	CENKOS SECURITIES	5	Investment	Hedging	Not Available
33	SHARE	2	Investment	Both	Not Available
34	PROVIDENT FINANCIAL	10	Consumer	Hedging	Available for all years
35	S & U	9	Consumer	Hedging	Not Available
36	PARAGON GP.OF COS.	10	Consumer	Hedging	Available for all years except
37	H&T GROUP	6	Consumer	Hedging	Available for all years
38	INTERNATIONAL	7	Consumer	Hedging	Available for all years
39	GUINNESS PEAT GP.	10	Specialty Finance	Both	Not Available
40	LEEDS GROUP	8	Specialty Finance	Hedging	Available for five years (2007-
41	WESTREN SELECTION	3	Specialty Finance	Hedging	Not Available
42	CITY OF LONDON GROUP	5	Specialty Finance	Hedging	Not Available
43	ARBUTHONT	7	Specialty Finance	Hedging	Available for all years
44	INTERMEDIATE	10	Specialty Finance	Hedging	Available for all years
45	COBURG GROUP	4	Specialty Finance	Hedging	Not Available
46	PRIVATE &	10	Specialty Finance	Hedging	Available for all years
47	ADVFN	8	Specialty Finance	Hedging	Not Available
48	JELF GROUP	5	Specialty Finance	Hedging	Not Available
49	TRADING EMISSIONS	9	Specialty Finance	Both	Not Available
50	LIVERMORE INVS.GP.	8	Specialty Finance	Both	Not Available
51	EUROCASTLE INV.	8	Specialty Finance	Hedging	Not Available
52	IMPERIAL INNOVATIONS	4	Specialty Finance	Hedging	Not Available
53	ALECTO MINERALS	2	Specialty Finance	Both	Not Available
54	VOLTA FINANCE	8	Specialty Finance	Hedging	Not Available
55	SYMPHONY INTL.HDG.	2	Specialty Finance	Hedging	Not Available

Table 3: List of Firms that Use Derivatives and Disclosed Notional Amount.

No.	Firm	Years	Sector	Hedging/ Trading /Both	Quantitative Data of Notional Amount
1	BARCLAYS	10	Banks	Both	Available for all years for both
2	ROYAL BANK OF	10	Banks	Both	Available for trading only
3	STANDARD CHARTERED	10	Banks	Both	Available for all years for both
4	HSBC HDG. (ORD $0.50)	10	Banks	Both	Available for all years for both
5	LLOYDS BANKING	10	Banks	Both	Available for all years for both
6	SECURE TRUST BANK	3	Banks	Hedging	Available for all years
7	SCHRODERS	10	Asset Managers	Hedging	Available for five years (2005-
8	RATHBONE BROTHERS	10	Asset Managers	Both	Available for three years (2005-
9	MAN GROUP	8	Asset Managers	Hedging	Available for all years
10	HENDERSON GROUP	10	Asset Managers	Hedging	Available for all years
11	ASHMORE GROUP	8	Asset Managers	Hedging	Available for all years
12	POLAR CAPITAL	7	Asset Managers	Hedging	Available for all years
13	RECORD	7	Asset Managers	Hedging	Available for all years
14	JUPITER FUND	4	Asset Managers	Hedging	Available for all years
15	CLOSE BROTHERS	10	Investment	Both	Available for all years
16	INVESTEC	10	Investment	Both	Available for one year only
17	PROVIDENT FINANCIAL	10	Consumer	Hedging	Available for all years
18	PARAGON GP.OF COS.	10	Consumer	Hedging	Available for all years except
19	H&T GROUP	6	Consumer	Hedging	Available for all years
20	INTERNATIONAL	7	Consumer	Hedging	Available for all years
21	LEEDS GROUP	8	Specialty Finance	Hedging	Available for five years (2007-
22	ARBUTHONT	7	Specialty Finance	Hedging	Available for all years
23	INTERMEDIATE	10	Specialty Finance	Hedging	Available for all years
24	PRIVATE &	10	Specialty Finance	Hedging	Available for all years

Table 4: List of Firms that Use Derivatives and did not Disclose Notional Amount.

No.	Firm	Years	Sector	Hedging/ Trading /Both	Quantitative Data of Notional Amount
1	BANK OF GEORGIA HDG.	2	Banks	Trading	Not Available
2	ENERGISER INVS.	3	Equity	Hedging	Not Available
3	TISO BLACKSTAR GROUP	4	Equity	Hedging	Not Available
4	RAB SPECIAL	10	Equity	Trading	Not Available
5	FIRST PROPERTY	9	Asset Managers	Hedging	Not Available
6	CHARLEMAGNE CAPITAL	8	Asset Managers	Both	Not Available
7	CITY OF LONDON	6	Asset Managers	Trading	Not Available
8	CHARLES STANLEY	1	Investment	Hedging	Not Available
9	NUMIS	10	Investment	Hedging	Not Available
10	IMPAX ASTMGMT	4	Investment	Hedging	Not Available
11	ICAP	10	Investment	Hedging	Not Available
12	FISKE	5	Investment	Trading	Not Available
13	LONDON STOCK	10	Investment	Both	Not Available
14	INVESTEC	10	Investment	Both	Available for one year only
15	IG GROUP HOLDINGS	9	Investment	Both	Not Available
16	ARDEN PARTNERS	4	Investment	Trading	Not Available
17	CENKOS SECURITIES	5	Investment	Hedging	Not Available
18	SHARE	2	Investment	Both	Not Available
19	S & U	9	Consumer	Hedging	Not Available
20	PARAGON GP.OF	10	Consumer	Hedging	Available for all years except
21	GUINNESS PEAT	10	Specialty Finance	Both	Not Available
22	LEEDS GROUP	8	Specialty Finance	Hedging	Available for five years (2007-
23	WESTERN	3	Specialty Finance	Hedging	Not Available
24	CITY OF LONDON	5	Specialty Finance	Hedging	Not Available
25	COBURG GROUP	4	Specialty Finance	Hedging	Not Available
26	ADVFN	8	Specialty Finance	Hedging	Not Available
27	JELF GROUP	5	Specialty Finance	Hedging	Not Available
28	TRADING EMISSIONS	9	Specialty Finance	Both	Not Available
29	LIVERMORE INVS.GP.	8	Specialty Finance	Both	Not Available
30	EUROCASTLE INV.	8	Specialty Finance	Hedging	Not Available
31	IMPERIAL INNOVATIONS	4	Specialty Finance	Hedging	Not Available
32	ALECTO MINERALS	2	Specialty Finance	Both	Not Available
33	VOLTA FINANCE	8	Specialty Finance	Hedging	Not Available
34	SYMPHONY INTL.HDG.	2	Specialty Finance	Hedging	Not Available

Table 5: Banking Sector Details.

No.	Firm	Years	Hedging/ Trading or Both	Quantitative Data of Notional Amount	The Average of the Total Assets in Million
1	BARCLAYS	10	Both	Available for all years for both	1376870
2	ROYAL BANK OF SCTL.GP.	10	Both	Available for trading only	1396220
3	STANDARD CHARTERED	10	Both	Available for all years for both	297289
4	BCB HOLDINGS	10	None	Zero	545.72
5	HSBC HDG. (ORD $0.50)	10	Both	Available for all years for both	1434730
6	LLOYDS BANKING GROUP	10	Both	Available for all years for both	703055
7	EUROPEAN ISLAMIC	8	None	Zero	195.69
8	SECURE TRUST BANK	3	Hedging	Available for all years	591.62
9	BANK OF GEORGIA HDG.	2	Trading	Not Available	2427.96
Number of Observations		73	Total Average		579103

Table 6: Equity Investment Sector Details.

No.	Firm	Years	Hedging/ Trading or Both	Quantitative Data of Notional Amount	The Average of the Total Assets in Million
1	ENERGISER INVS.	10	Hedging	Not Available	3.23
2	TISO BLACKSTAR GROUP	10	Hedging	Not Available	97.75
3	AVANTI CAPITAL	10	None	Zero	16.38
4	SPARK VENTURES	10	None	Zero	63.83
5	EPE SPECIAL OPPS.	10	None	Zero	29.35
6	RAB SPECIAL SITUATIONS	10	Trading	Not Available	43.52
7	ELEPHANT CAPITAL	7	None	Zero	27.53
Number of Observations		67	Total Average		40.23

Table 7: Financial Services Sector Details.

No.	Firm	Years	Hedging/ Trading or both	Quantitative Data of Notional Assets	The Average of the Total Assets in Million
Assets Managers					
1	SCHRODERS	10	Hedging	Available for five years	11150.83
2	RATHBONE BROTHERS	10	Both	Available for three years	1139.29
3	ABERDEEN ASSET	10	None	Zero	3298.85
4	BREWIN DOLPHIN HOLDINGS	10	None	Zero	499.12
5	MAN GROUP	10	Hedging	Available for all years	6988.53
6	FIRST PROPERTY GROUP	10	Hedging	Not Available	30.45
7	LIONTUST ASSET MAN	10	Hedging	Available for all years	48.69
8	HENDERSON GROUP	10	None	Zero	1130.08
9	MITON GROUP	10	None	Zero	57.12
10	BROOKS MACDONALD GROUP	9	None	Zero	35.83
11	ASHCOURT ROWAN	9	None	Zero	67.20
12	MATTIOLI WOODS	9	None	Zero	27.46
13	CHARLEMAGNE CAPITAL	8	Both	Not Available	30.23
14	CITY OF LONDON INV.GP.	8	Trading	Not Available	14.71
15	ASHMORE GROUP	8	Hedging	Available for all years	542.26
16	POLAR CAPITAL HOLDINGS	7	Hedging	Available for all years	61.07
17	HARGREAVES LANSDOWN	7	None	Zero	303.03
18	RECORD	7	Hedging	Available for all years	34.59
19	JUPITER FUND MANAGEMENT	4	Hedging	Available for all years	737.50
20	AFH FINANCIAL GROUP	3	None	Zero	16.16
Number of Observations		169	Average		1310.65
Investment Services					
21	CLOSE BROTHERS GROUP	10	Both	Available for all years	5947.82
22	CHARLES STANLEY GROUP	10	Hedging	Not Available	328.71
23	NUMIS	10	Hedging	Not Available	297.56
24	PANMURE GORDON	10	None	Zero	84.58
25	WALKER CRIPS GROUP	10	None	Zero	60.26
26	IMPAX ASTMGMT GROUP	10	Hedging	Not Available	21.86
27	ICAP	10	Hedging	Not Available	56862.07
28	FISKE	10	Trading	Not Available	16.66
29	LONDON STOCK EX.GROUP	10	Both	Not Available	102139
30	W H IRELAND GROUP	10	None	Zero	92.04
31	MARECHALE CAPITAL	10	None	Zero	0.92
32	INVESTEC	10	Both	Available for one year only	38545.55
33	POLEMOS	10	None	Zero	7.49
34	IG GROUP HOLDINGS	9	Both	Not Available	759.72
35	LONDON CAPITAL GP.HDG.	9	None	Zero	56.12
36	ARDEN PARTNERS	8	Trading	Not Available	22.99
37	CENKOS SECURITIES	8	Hedging	Not Available	66.48
38	SHARE	6	Both	Not Available	29.83
Number of Observations		170	Average		11407.77
Consumer Finance					
39	PROVIDENT FINANCIAL	10	Hedging	Available for all years	1596.08
40	S & U	10	Hedging	Not Available	81.07
41	PARK GROUP	10	None	Zero	59.08
42	PARAGON GP.OF COS.	10	Hedging	Available for all years except	10220.43
43	H&T GROUP	8	Hedging	Available for all years	106.33
44	INTERNATIONAL PSNL.FIN.	7	Hedging	Available for all years	731.70
45	MONEYSWAP (DI)	3	None	Zero	1.77
Number of Observations			Average		1828.10
Specialty Finance					
46	CAMELLIA	10	None	Zero	665.86
47	GUINNESS PEAT	10	Both	Not Available	1783.10
48	LEEDS GROUP	10	Hedging	Available for five years	19.93
49	WESTERN SELECTION	10	Hedging	Not Available	13.15
50	CITY OF LONDON GROUP	10	Hedging	Not Available	14.76
51	ARBUTHONT BANKING GROUP	10	Hedging	Available for all years	605.68
52	INTERMEDIATE CAPITAL GROUP	10	Hedging	Available for all years	2430.01
53	HIGHWAY CAPITAL	10	None	Zero	0.35
54	COBURG GROUP	10	Hedging	Not Available	1.02
55	WORLDSEC	10	None	Zero	1.41
56	CAPITAL MAN.& INV.	10	None	Zero	40.36
57	PRIVATE & COML.FIN.GP.	9	Hedging	Available for all years	103.30
58	WESTSIDE INVESTMENTS	10	None	Zero	2.15
59	LEGENDARY INVESTMENTS	10	None	Zero	1.03

Table 7: (continued) Financial Services Sector Details.

No.	Firm	Years	Hedging/ Trading	Quantitative Data of Notional Assets	The Average of the Total Assets in Million
60	ADVFN	10	Hedging	Not Available	7.12
61	SIGMA CAPITAL	10	None	Zero	7.74
62	STARVEST	10	None	Zero	3.64
63	LIGHTHOUSE	10	None	Zero	28.06
64	METAL TIGER	10	None	Zero	1.91
65	GLEDHOW INVS.	10	None	Zero	0.69
66	FAIRPOINT GROUP	10	None	Zero	44.12
67	VOLVERE	10	None	Zero	19.71
68	IP GROUP	10	None	Zero	240.30
69	MXC CAPITAL	10	None	Zero	18.90
70	INSETCO	9	None	Zero	8.59
71	FRENKEL TOPPING	10	None	Zero	6.82
72	CRAVEN HOUSE	9	None	Zero	4.68
73	JELF GROUP	10	Hedging	Not Available	115.36
74	BLUE STAR CAPITAL	10	None	Zero	3.32
75	AMEDEO	9	None	Zero	3.73
76	MINERAL &	9	None	Zero	1.61
77	JARVIS SECURITIES	10	None	Zero	11.79
78	INTL.MNG. &	9	None	Zero	18.64
79	IMPACT HOLDINGS	9	None	Zero	8.73
80	RED LEOPARD	9	None	Zero	0.29
81	TRADING EMISSIONS	9	Both	Not Available	369.71
82	DRAGANFLY	9	None	Zero	1.76
83	POWER CAPITAL	9	None	Zero	1.69
84	LIVERMORE	9	Both	Not Available	173.60
85	AMPHION	9	None	Zero	28.93
86	GLOBAL BRANDS	8	None	Zero	2.23
87	VERDES	8	None	Zero	0.41
88	IRF EUROPEAN	7	None	Zero	627.71
89	EUROCASTLE INV.	9	Hedging	Not Available	3549.05
90	OTTOMAN FUND	9	None	Zero	105.97
91	B P MARSH &	8	None	Zero	56.43
92	TEJOORI	8	None	Zero	18.12
93	AVARAE GLOBAL	8	None	Zero	11.05
94	IMPERIAL	8	Hedging	Not Available	191.69
95	1PM	8	None	Zero	8.93
96	ALECTO MINERALS	8	Both	Not Available	3.81
97	ZIM NRG	8	None	Zero	0.42
98	VOLTA FINANCE	8	Hedging	Not Available	143.31
99	BRAVEHEART	7	None	Zero	6.18
100	NOVA RESOURCES	7	None	Zero	1.74
101	ETAIREIA	7	None	Zero	0.30
102	QATAR INVESTMENT	7	None	Zero	139.78
103	SYMPHONY	7	Hedging	Not Available	303.75
104	POLO RESOURCES	7	None	Zero	144.06
105	SHELLSHOCK	7	None	Zero	3.06
106	EARLY EQUITY	7	None	Zero	0.27
107	ANGELFISH	6	None	Zero	0.61
108	HELLENIC CAPITAL	6	None	Zero	0.16
109	ARGO GROUP	6	None	Zero	23.20
110	NORTHWEST	4	None	Zero	1.98
111	TMT INVESTMENTS	4	None	Zero	18.21
112	ASIA WEALTH	3	None	Zero	1.66
Number of Observations		577	Average		181.75
Number of Observations of		974	Total Average of whole sector		2290.42

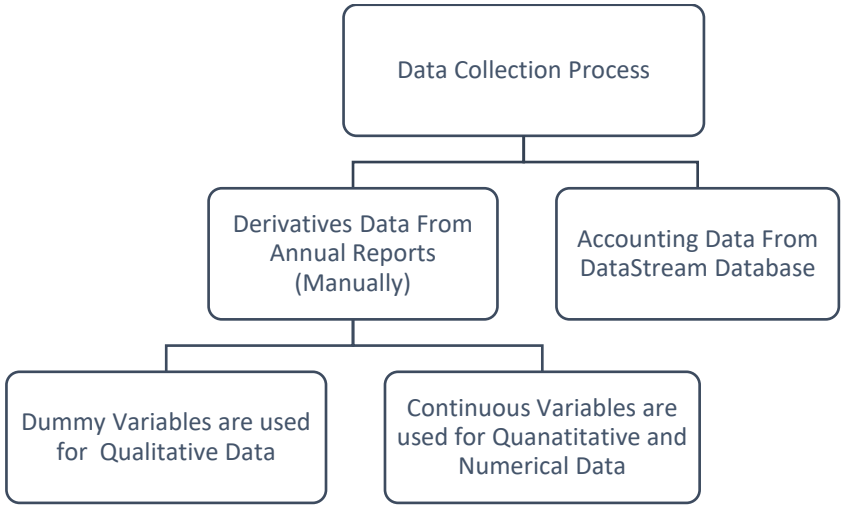
Table 8: Distribution of Financial Firms by Sector and Subsector Type.

No	Sector/ Subsector	Number of firms	Number of Observations	Period of time
1	Banking	8	73	2005-2014
2	Equity Investment	7	67	2005-2014
3	Financial Services	113	974	2005-2014
Total of firms		128		
Total Number of Observations		1114		
Subsectors of the Financial Services Sector				
4	Asset Managers	20	169	2005-2014
5	Investment Services	18	170	2005-2014
6	Consumer Finance	7	58	2005-2014
7	Specialty Finance	68	577	2005-2014
Total of firms		113		
Total Number of Observations		974		

Appendix 3B

The data collection process:

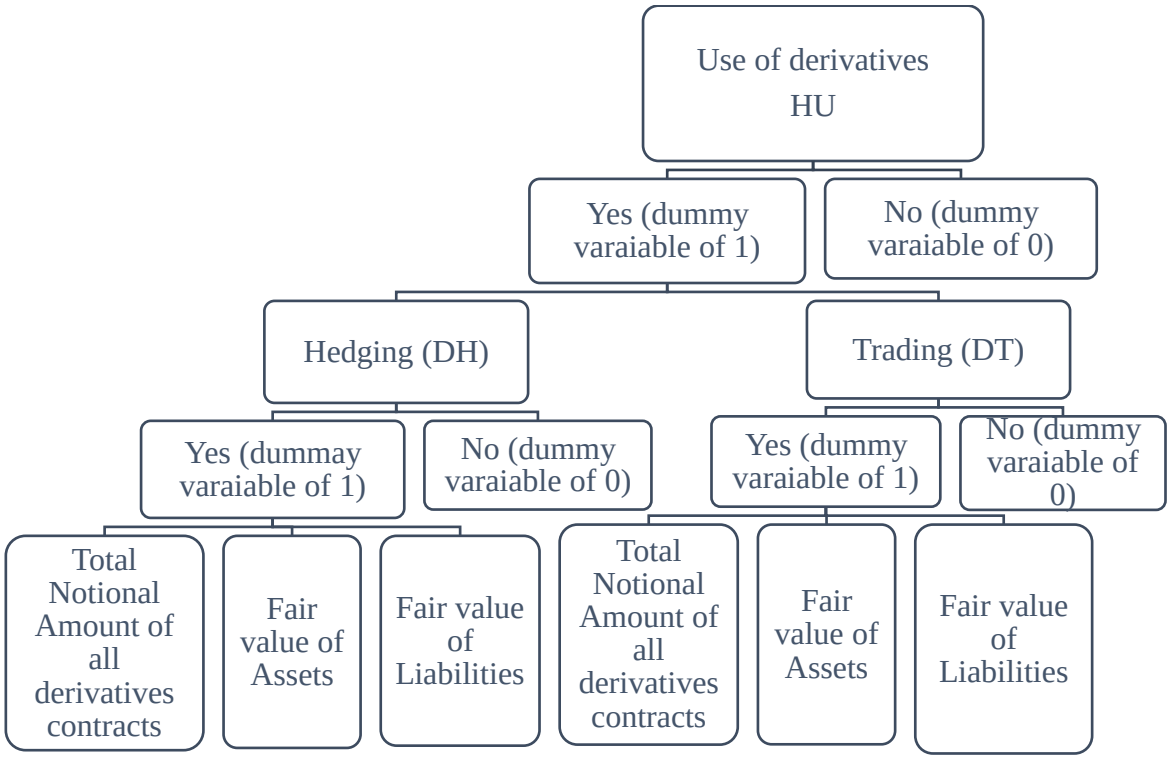
Figure 1: The Main Data Collection Process



The process of collecting derivatives' data included six steps as follows:

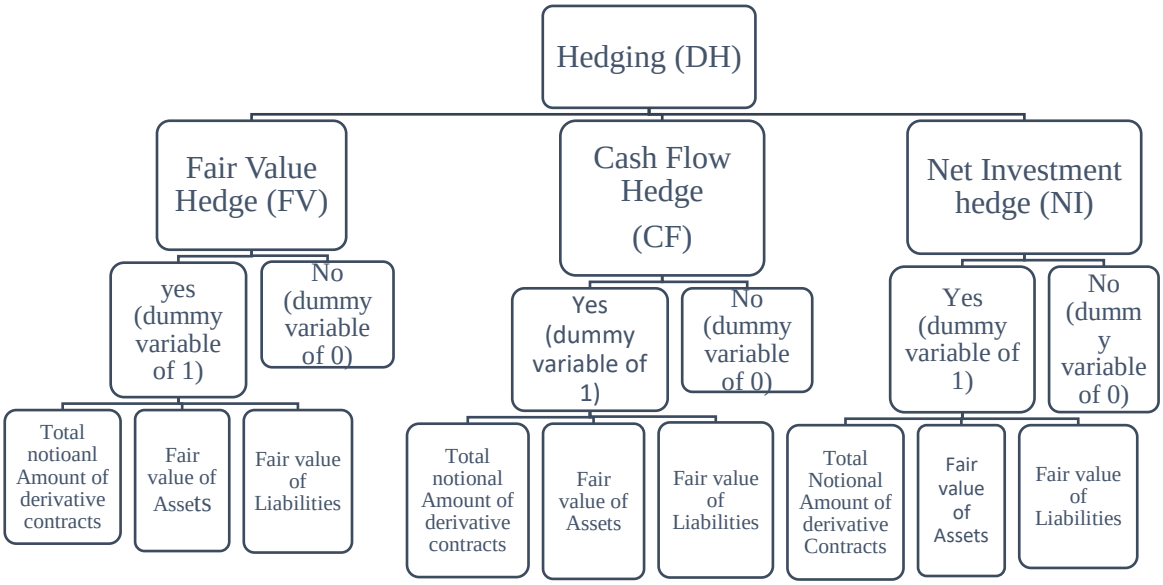
Step one: The usage of derivatives in general.

Figure 2: The Usage of Derivatives in General



Step Two: The Usage of Derivatives for Hedging.

Figure 3: The usage of derivatives for hedging



Step three: The usage of derivatives for hedging purpose according to the type of hedge and type of risks.

Figure 4: Fair Value Hedge

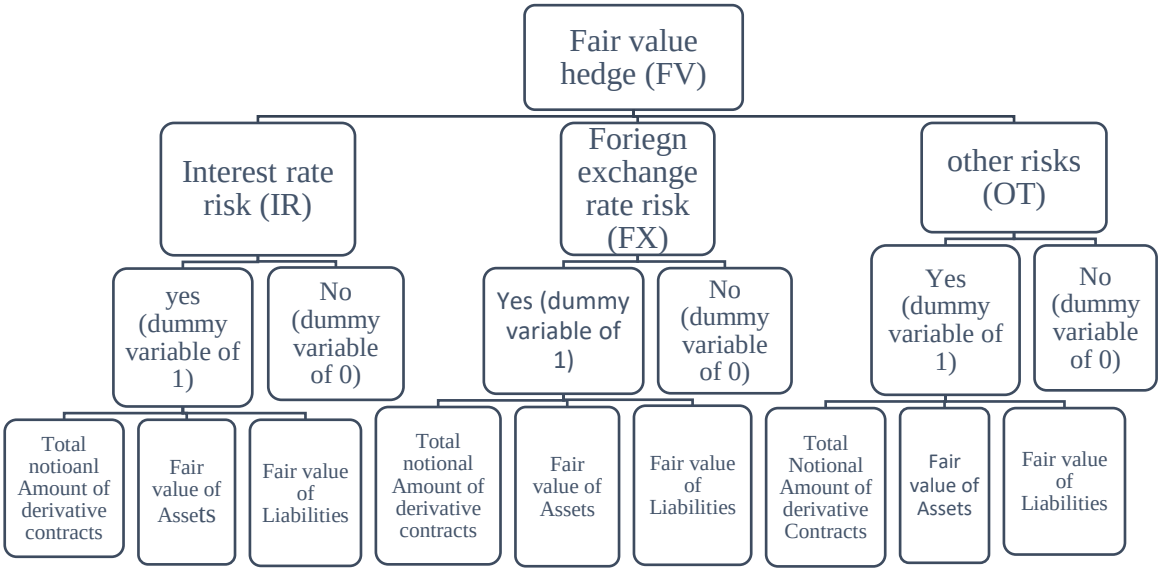


Figure 5: Cash Flow Hedge

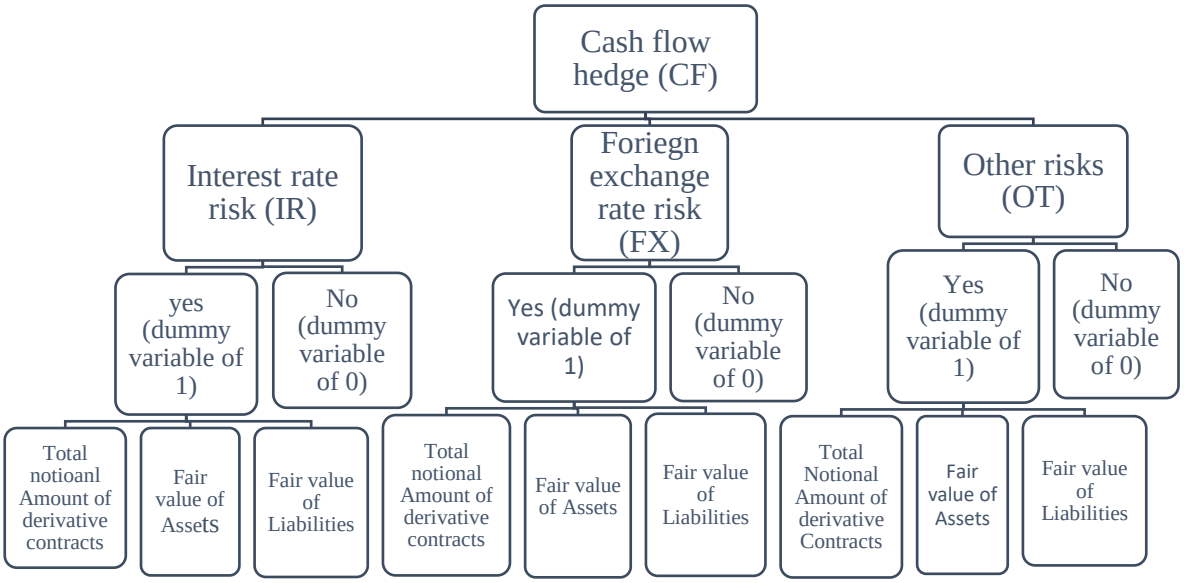
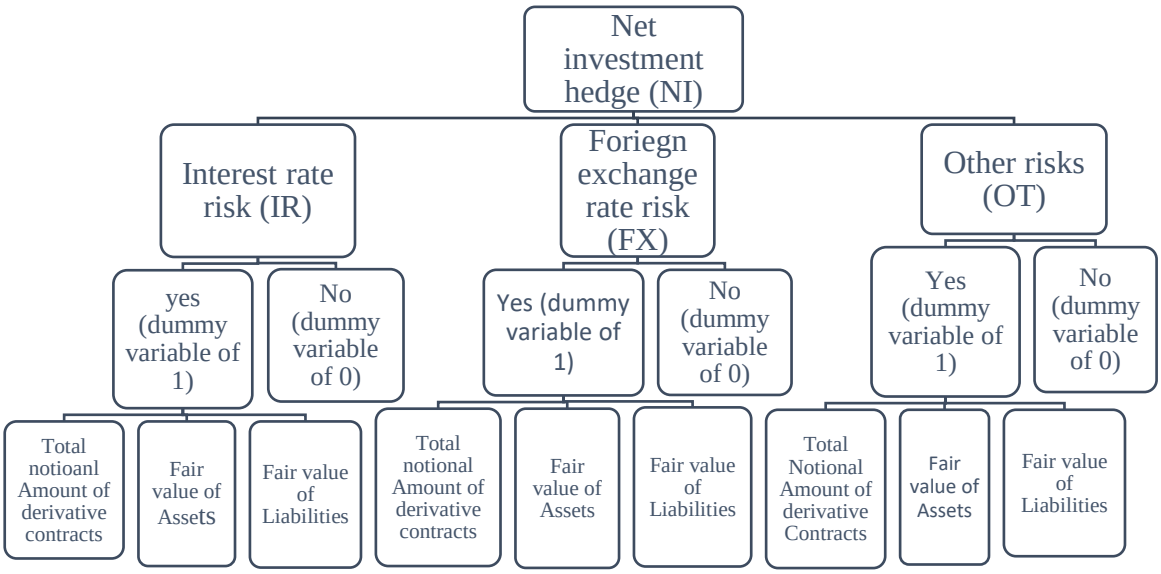


Figure 6: Net Investment Hedge



Step four: The usage of derivative contracts for hedging purpose according to fair value hedge and the type of risks.

Figure 7: The Hedge of Fair Value under Interest Rate Risk

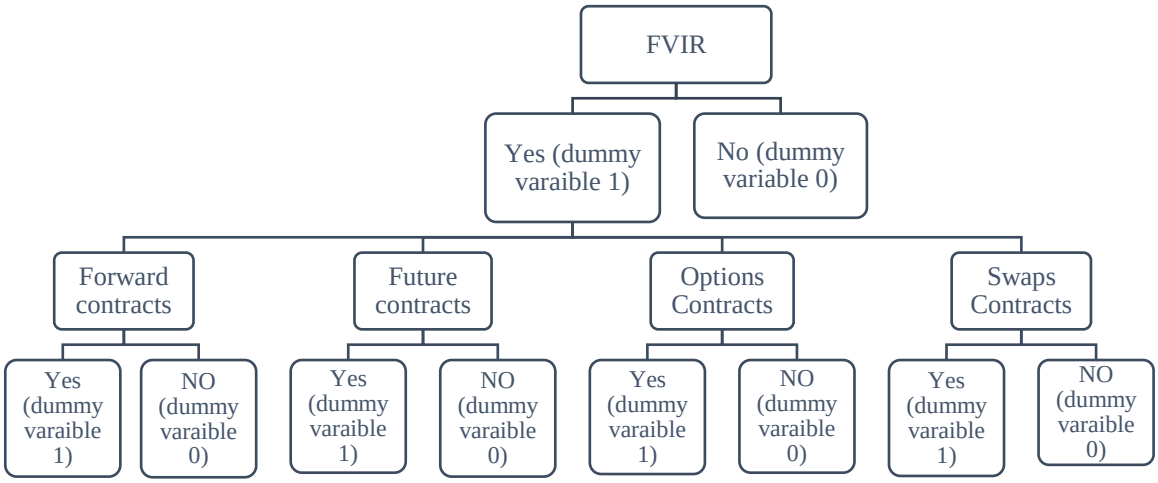


Figure 8: The Hedge of Fair Value under Foreign Exchange Rate Risk

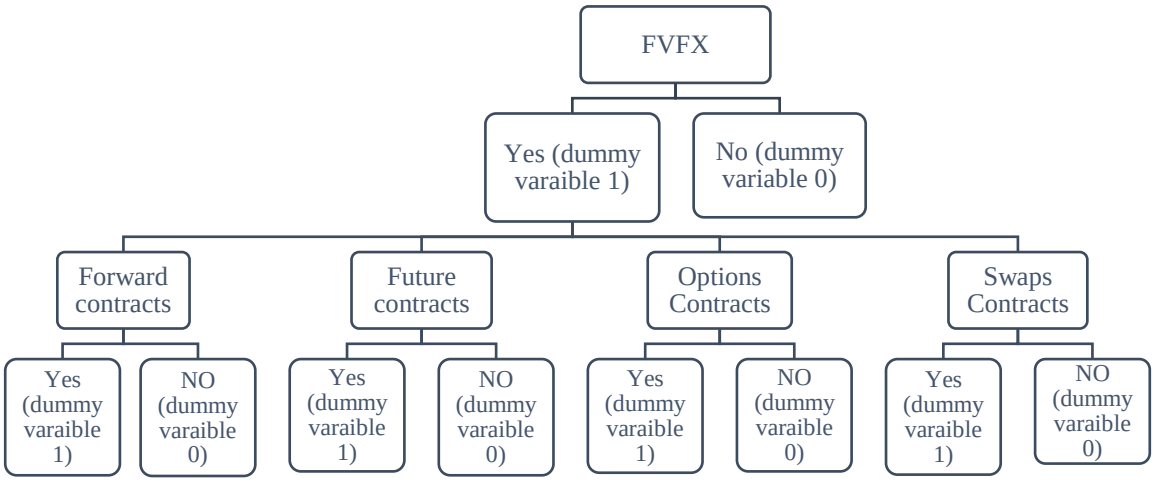
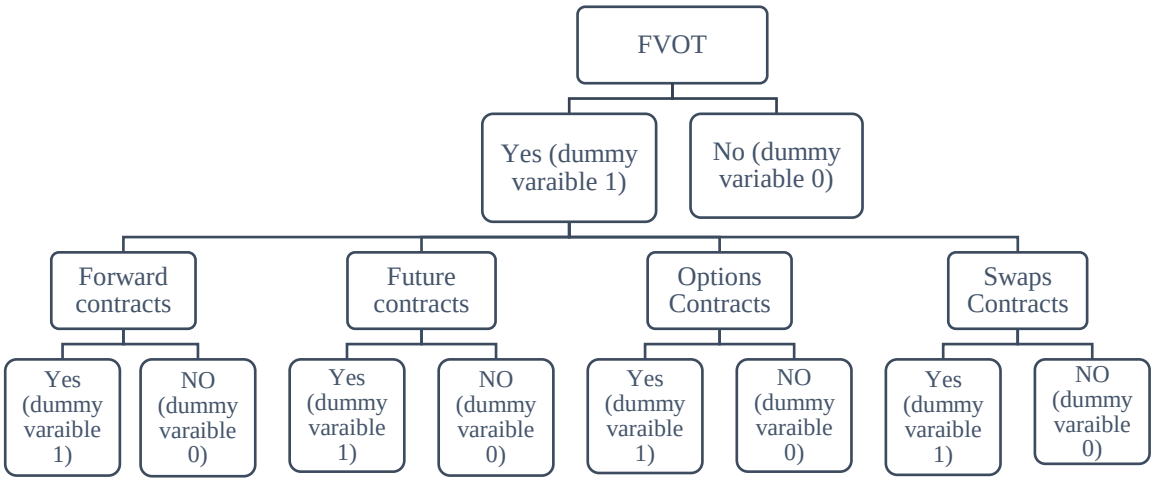


Figure 9: The Hedge of Fair Value under Other Risks



Step five: The usage of derivative contracts for hedging purpose according to cash flow hedge and the type of risks.

Figure 10: The Hedge of Cash Flow under Interest Rate Risk

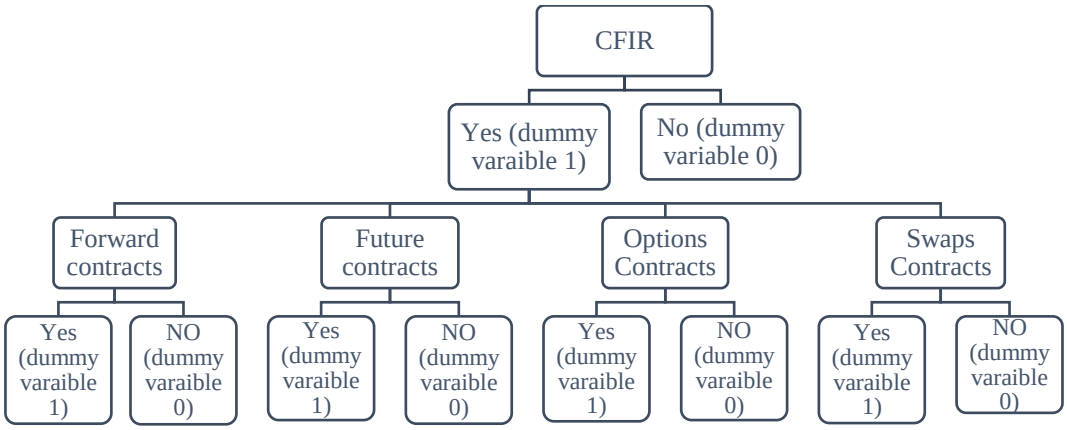


Figure 11: The Hedge of Cash Flow under Foreign Exchange Rate Risk

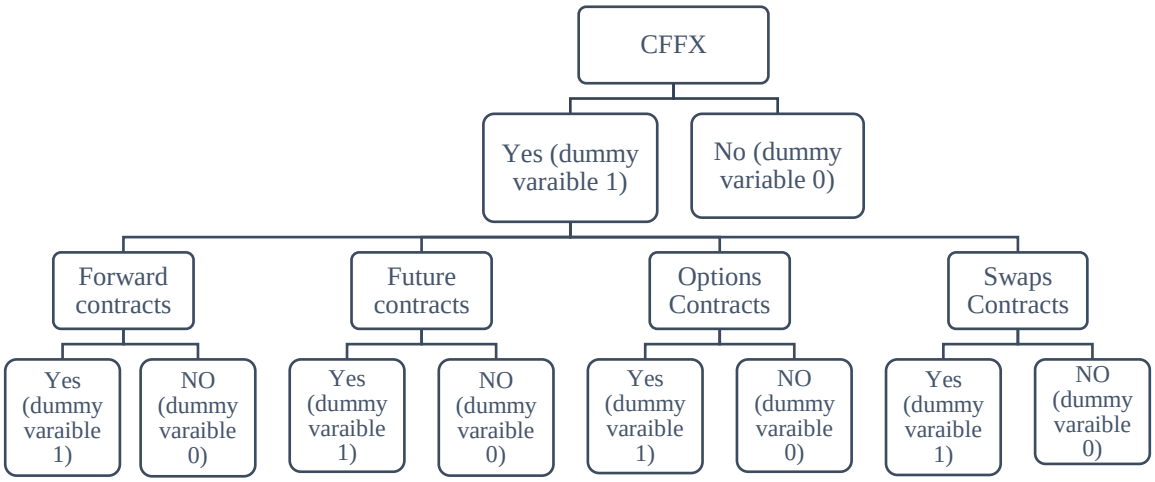
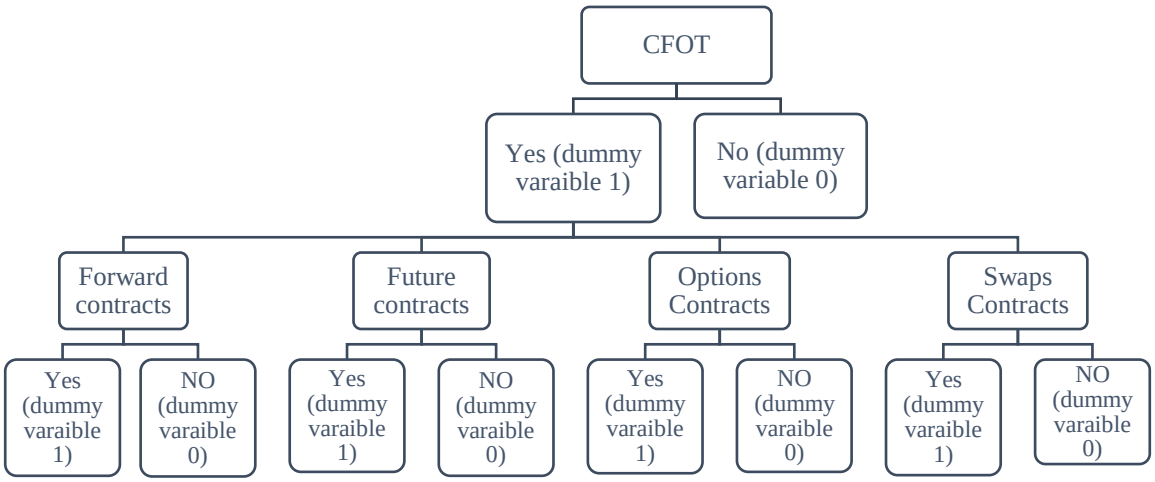


Figure 12: The Hedge of Cash Flow under Other Risks



Step six: The usage of derivative contracts for hedging purpose according to net investment hedge and the type of risks.

Figure 1: The Hedge of Net Investment under Interest Rate Risk

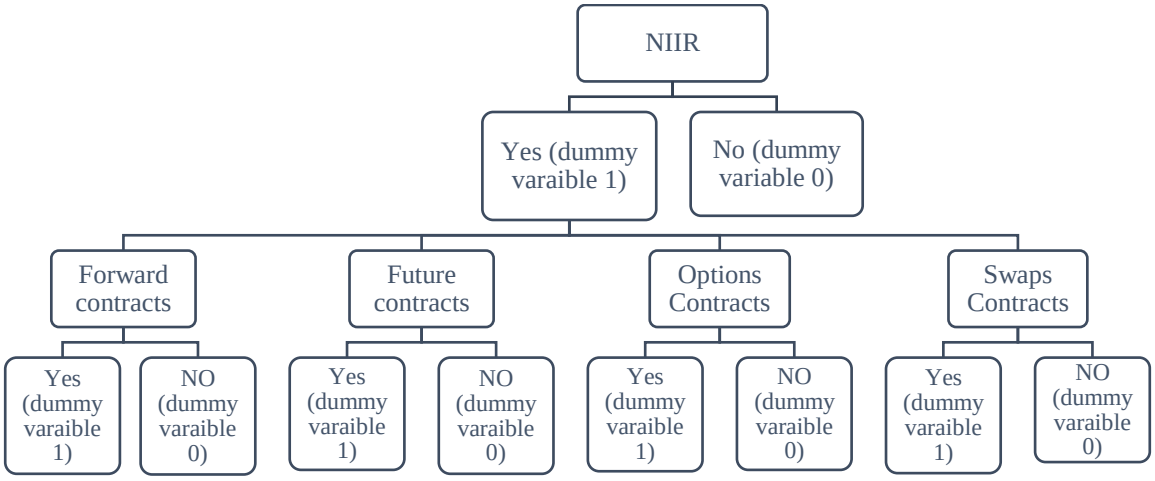


Figure14: The Hedge of Net Investment under Foreign Exchange Rate Risk

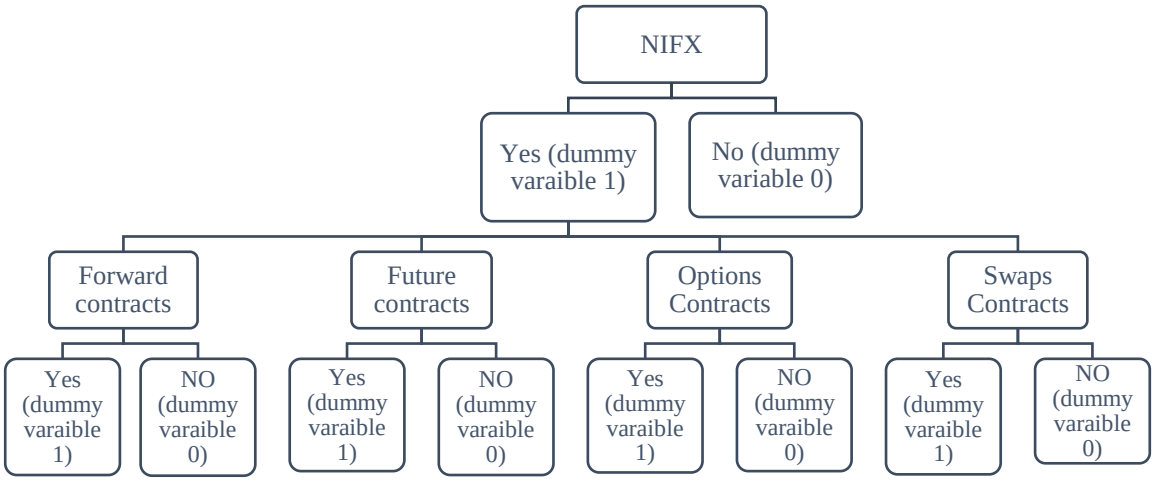
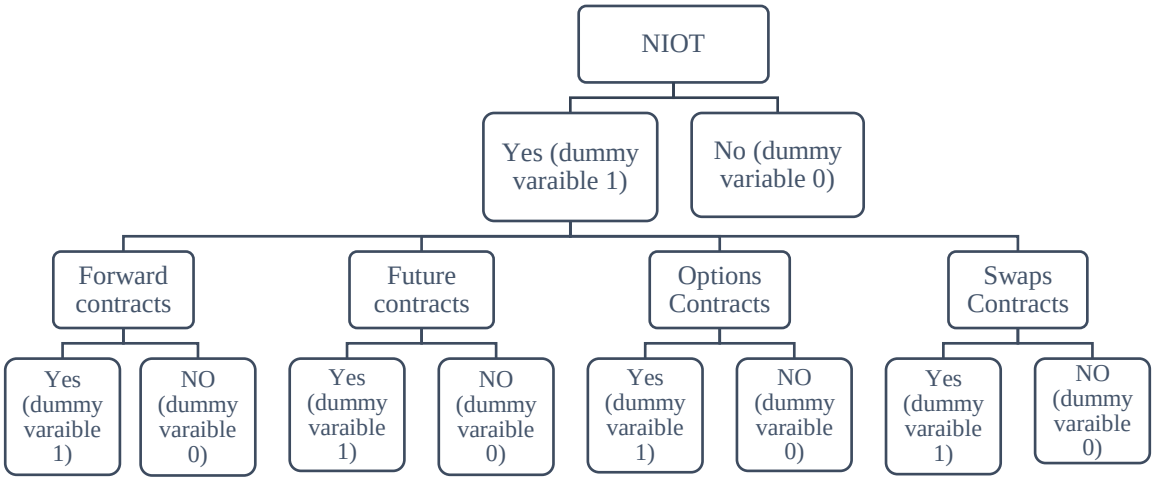


Figure 25: The Hedge of Net Investment under Other Risks



Appendix 3C

Table 9: Statistics for the Whole Sample.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	1114	35.2 %	392	64.8%	722
2	Hedging dummy	1114	32.14%	358	67.86%	756
3	Trading dummy	1114	14.54%	162	85.46%	952
4	Fair value hedge dummy	1114	22.17%	247	77.83%	867
5	Foreign exchange rate of Fair value hedge dummy	1114	15.62%	174	84.38%	940
6	Interest rate of Fair value hedge	1114	18.94%	211	81.06%	903
7	Other risks of Fair value hedge dummy	1114	05.48%	61	94.52%	1053
8	Cash flow hedge dummy	1114	27.92%	311	72.08%	803
9	Foreign exchange rate of cash flow hedge dummy	1114	21.90%	244	88.1%	870
10	Interest rate of cash flow hedge dummy	1114	20.47%	228	79.53%	886
11	Other risks of cash flow hedge	1114	05.12%	57	94.88%	1057
12	Net Investment hedge dummy	1114	07.18%	80	92.82%	1034
13	Foreign exchange rate of net investment hedge	1114	07.18%	80	92.82%	1034
14	Interest rate of net investment hedge dummy	1114	0	0	100%	1114
15	Other risks of net investment hedge dummy	1114	0	0	100%	1114
16	Foreign exchange rate of Fair value hedge: Forward	1114	10.05%	112	89.95%	1002
17	Foreign exchange rate of Fair value hedge: future	1114	02.06%	23	97.94%	1091
18	Foreign exchange rate of Fair value hedge: Option	1114	02.69%	30	97.31%	1084
19	Foreign exchange rate of Fair value hedge: Swap	1114	10.50%	117	89.50%	997
20	Foreign exchange rate of Fair value hedge: other	1114	01.26%	14	98.74%	1100
21	Interest rate of Fair value hedge: Forward contracts	1114	01.44%	16	98.56%	1098
22	Interest rate of Fair value hedge: Future contracts	1114	01.97%	22	98.03%	1092
23	Interest rate of Fair value hedge: Option contracts	1114	03.14%	35	96.86%	1079
24	Interest rate of Fair value hedge: Swap contracts	1114	15.89%	177	84.11%	937
25	Interest rate of Fair value hedge: Other contracts	1114	02.51%	28	97.49%	1086
26	Other risks of Fair value hedge: Forward contracts	1114	0	0	100%	1114
27	Other risks of Fair value hedge: Future contracts	1114	00.89%	10	99.11%	1104
28	Other risks of Fair value hedge: Option contracts	1114	02.33%	26	97.67%	1088
29	Other risks of Fair value hedge: Swap contracts	1114	00.18%	2	99.82%	1112
30	Other risks of Fair value hedge: other contracts	1114	03.77%	42	96.23%	1072
31	Foreign exchange rate of Cash flow hedge: Forward	1114	15.98%	178	84.02%	936
32	Foreign exchange rate of Cash flow hedge: Future	1114	02.15%	24	97.85%	1090
33	Foreign exchange rate of Cash flow hedge: Option	1114	03.68%	41	96.32%	1073
34	Foreign exchange rate of Cash flow hedge: Swap	1114	11.58%	129	88.42%	985
35	Foreign exchange rate of Cash flow hedge: Other	1114	02.33%	26	97.67%	1088
36	Interest rate of Cash flow hedge: Forward contracts	1114	03.59%	40	96.41%	1074
37	Interest rate of Cash flow hedge: Future contracts	1114	02.15%	24	97.85%	1090
38	Interest rate of Cash flow hedge: Option contracts	1114	01.97%	22	98.03%	1092
39	Interest rate of Cash flow hedge: Swap contracts	1114	17.15%	191	82.85%	923
40	Interest rate of Cash flow hedge: Other contracts	1114	03.14%	35	96.86%	1079
41	Other risks of Cash flow hedge: Forward contracts	1114	00.72%	8	99.28%	1106
42	Other risks of Cash flow hedge: Future contracts	1114	0	0	100%	1114
43	Other risks of Cash flow hedge: Option contracts	1114	01.17%	13	98.83%	1101

44	Other risks of Cash flow hedge: Swap contracts	1114	00.45%	5	99.55%	1109
45	Other risks of Cash flow hedge: Other contracts	1114	03.86%	43	96.14%	1071
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
46	Foreign exchange rate of Net Investment hedge: Forward	1114	06.55%	73	93.45%	1041
47	Foreign exchange rate of Net Investment hedge: Future	1114	0	0	100%	1114
48	Foreign exchange rate of Net Investment hedge: Option	1114	0	0	100%	1114
49	Foreign exchange rate of Net Investment hedge: Swap	1114	01.17%	13	98.83%	1101
50	Foreign exchange rate of Net Investment hedge: Other	1114	0	0	100%	1114
51	Interest rate of Net Investment hedge: Forward	1114	0	0	100%	1114
52	Interest rate of Net Investment hedge: Future	1114	0	0	100%	1114
53	Interest rate of Net Investment hedge: Option	1114	0	0	100%	1114
54	Interest rate of Net Investment hedge: Swap	1114	0	0	100%	1114
55	Interest rate of Net Investment hedge: Other	1114	0	0	100%	1114
56	Other Risks of Net Investment hedge: Forward	1114	0	0	100%	1114
57	Other Risks of Net Investment hedge: Futures	1114	0	0	100%	1114
58	Other Risks of Net Investment hedge: Option	1114	0	0	100%	1114
59	Other Risks of Net Investment hedge: Swap	1114	0	0	100%	1114
60	Other Risks of Net Investment hedge: Other	1114	0	0	100%	1114
Continuous Variables						
61	Ratio of total trading	1026	11.9346	74	0	952
62	Total Notional amount contracts of trading	1026	1.25e+13	74	0	952
63	Assets of total trading	1026	155679.6	72	0	954
64	Liability of total trading	1036	155224.3	71	0	965
65	Ratio of total hedging	926	.305699	169	0	757
66	Total Notional amount contracts of Hedging	926	4.31e+10	169	0	757
67	Assets of total Hedging	978	918.6947	182	0	796
68	Liabilities of total Hedging	978	815.1695	168	0	810
69	Ratio of total Fair value of Hedging	969	.2117709	101	0	868
70	Total Notional amount of Fair value Hedging	969	2.32e+10	101	0	868
71	Assets of Fair value Hedging	1009	693.8535	118	0	891
72	Liabilities of Fair value Hedging	1009	582.4979	113	0	896
73	Ratio of total cash flow of Hedging	941	.213158	138	0	803
74	Total Notional amount of cash flow of Hedging	941	3.48e+10	138	0	803
75	Assets of cash flow of Hedging	1003	563.5289	143	0	860
76	Liabilities of cash flow of Hedging	1004	470.741	132	0	872
77	Ratio of total Net Investment of Hedging	1074	.005919	42	0	1032
78	Total Notional amount of Net Investment of Hedging	1074	3.14e+09	42	0	1032
79	Assets of Net Investment of Hedging	1100	65.74576	41	0	1059
80	Liabilities of Net Investment of Hedging	1100	156.0219	52	0	1048

Table 10: Statistics for the Banking Sector Sub-Sample.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	73	75.34%	55	24.66%	18
2	Hedging dummy	73	72.60%	53	67.40%	20
3	Trading dummy	73	71.23%	52	28.77%	21
4	Fair value hedge dummy	73	72.60%	53	27.4%	20
5	Foreign exchange rate of Fair value hedge dummy	73	49.35%	36	50.65%	37
6	Interest rate of Fair value hedge	73	71.23%	52	28.77%	21
7	Other risks of Fair value hedge dummy	73	09.58%	7	90.42%	66
8	Cash flow hedge dummy	73	68.49%	50	31.51%	23
9	Foreign exchange rate of cash flow hedge dummy	73	57.53%	42	42.5%	31
10	Interest rate of cash flow hedge dummy	73	68.49%	50	31.51%	23
11	Other risks of cash flow hedge	73	08.22%	6	91.78%	67
12	Net Investment hedge dummy	73	56.16%	41	43.84%	32
13	Foreign exchange rate of net investment hedge	73	56.16%	41	43.84%	32
14	Interest rate of net investment hedge dummy	73	0	0	100%	73
15	Other risks of net investment hedge dummy	73	0	0	100%	73
16	Foreign exchange rate of Fair value hedge: Forward	73	17.81%	13	82.19%	60
17	Foreign exchange rate of Fair value hedge: future	73	04.11%	3	95.89%	70
18	Foreign exchange rate of Fair value hedge: Option	73	10.96%	8	89.1%	65
19	Foreign exchange rate of Fair value hedge: Swap	73	49.32%	36	50.68%	37
20	Foreign exchange rate of Fair value hedge: other	73	0	0	100%	73
21	Interest rate of Fair value hedge: Forward contracts	73	0	0	100%	73
22	Interest rate of Fair value hedge: Future contracts	73	0	0	100%	73
23	Interest rate of Fair value hedge: Option contracts	73	08.22%	6	91.78%	67
24	Interest rate of Fair value hedge: Swap contracts	73	67.12%	49	32.88%	24
25	Interest rate of Fair value hedge: Other contracts	73	04.11%	3	95.89%	70
26	Other risks of Fair value hedge: Forward contracts	73	0	0	100%	73
27	Other risks of Fair value hedge: Future contracts	73	0	0	100%	73
28	Other risks of Fair value hedge: Option contracts	73	06.85%	5	93.15%	68
29	Other risks of Fair value hedge: Swap contracts	73	0	0	100%	73
30	Other risks of Fair value hedge: other contracts	73	02.74%	2	97.26%	71
31	Foreign exchange rate of Cash flow hedge: Forward	73	34.25%	25	65.75%	48
32	Foreign exchange rate of Cash flow hedge: Future	73	21.92%	16	78.08%	57
33	Foreign exchange rate of Cash flow hedge: Option	73	04.11%	3	95.89%	70
34	Foreign exchange rate of Cash flow hedge: Swap	73	46.58%	34	53.15%	39
35	Foreign exchange rate of Cash flow hedge: Other	73	0	0	100%	73
36	Interest rate of Cash flow hedge: Forward contracts	73	08.22%	6	91.78%	67
37	Interest rate of Cash flow hedge: Future contracts	73	21.92%	16	78.08%	57
38	Interest rate of Cash flow hedge: Option contracts	73	02.74%	2	97.53%	71
39	Interest rate of Cash flow hedge: Swap contracts	73	68.49%	50	31.51%	23
40	Interest rate of Cash flow hedge: Other contracts	73	04.11%	3	95.89%	70
41	Other risks of Cash flow hedge: Forward contracts	73	02.74%	2	97.26%	71
42	Other risks of Cash flow hedge: Future contracts	73	0	0	100%	73
43	Other risks of Cash flow hedge: Option contracts	73	04.11%	3	95.89%	70
44	Other risks of Cash flow hedge: Swap contracts	73	04.11%	3	95.89%	70
45	Other risks of Cash flow hedge: Other contracts	73	0	0	100%	73
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	73	46.58%	34	63.42%	39
47	Foreign exchange rate of Net Investment hedge: Future	73	0	0	100%	73
48	Foreign exchange rate of Net Investment hedge: Option	73	0	0	100%	73
49	Foreign exchange rate of Net Investment hedge: Swap	73	17.81%	13	82.19%	60
50	Foreign exchange rate of Net Investment hedge: Other	73	0	0	100%	73
51	Interest rate of Net Investment hedge: Forward	73	0	0	100%	73
52	Interest rate of Net Investment hedge: Future	73	0	0	100%	73
53	Interest rate of Net Investment hedge: Option	73	0	0	100%	73
54	Interest rate of Net Investment hedge: Swap	73	0	0	100%	73
55	Interest rate of Net Investment hedge: Other	73	0	0	100%	73
56	Other Risks of Net Investment hedge: Forward	73	0	0	100%	73
57	Other Risks of Net Investment hedge: Futures	73	0	0	100%	73
58	Other Risks of Net Investment hedge: Option	73	0	0	100%	73
59	Other Risks of Net Investment hedge: Swap	73	0	0	100%	73
60	Other Risks of Net Investment hedge: Other	73	0	0	100%	73
Continuous Variables						
61	Ratio of total trading	73	10.9972	52	0	21
62	Total Notional amount contracts of trading	73	1.78e+13	52	0	21
63	Assets of total trading	73	215252.8	52	0	21
64	Liability of total trading	73	211689.4	52	0	21
65	Ratio of total hedging	63	.17488	43	0	20
66	Total Notional amount contracts of Hedging	63	1.66e+11	43	0	20
67	Assets of total Hedging	73	3147.179	50	0	23
68	Liabilities of total Hedging	73	2687.312	50	0	23
69	Ratio of total Fair value of Hedging	63	.0669343	43	0	20
70	Total Notional amount of Fair value Hedging	63	5.27e+10	43	0	20
71	Assets of Fair value Hedging	73	1620.094	49	0	24
72	Liabilities of Fair value Hedging	73	1314.062	49	0	24
73	Ratio of total cash flow of Hedging	63	.1126882	40	0	23
74	Total Notional amount of cash flow of Hedging	63	1.18e+11	40	0	23
75	Assets of cash flow of Hedging	73	1496.642	49	0	24
76	Liabilities of cash flow of Hedging	73	1246.114	49	0	24
77	Ratio of total Net Investment of Hedging	62	.0041496	32	0	30
78	Total Notional amount of Net Investment of Hedging	62	4.10e+09	32	0	30
79	Assets of Net Investment of Hedging	73	96.90471	27	0	46
80	Liabilities of Net Investment of Hedging	73	218.2374	37	0	36

Table 11: Statistics for the Equity Investment Sector Sub-Sample.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	67	26.86%	18	73.14%	49
2	Hedging dummy	67	11.94%	8	88.06%	59
3	Trading dummy	67	14.93%	10	85.07%	57
4	Fair value hedge dummy	67	11.94%	8	88.06%	59
5	Foreign exchange rate of Fair value hedge dummy	67	05.97%	4	94.03%	63
6	Interest rate of Fair value hedge	67	11.94%	8	88.06%	59
7	Other risks of Fair value hedge dummy	67	02.98%	2	97.02%	65
8	Cash flow hedge dummy	67	05.97%	5	94.03%	63
9	Foreign exchange rate of cash flow hedge dummy	67	05.97%	5	94.03%	63
10	Interest rate of cash flow hedge dummy	67	05.97%	5	94.03%	63
11	Other risks of cash flow hedge	67	02.98%	2	97.02%	65
12	Net Investment hedge dummy	67	05.97%	4	94.03%	63
13	Foreign exchange rate of net investment hedge	67	05.97%	4	94.03%	63
14	Interest rate of net investment hedge dummy	67	0	0	100%	67
15	Other risks of net investment hedge dummy	67	0	0	100%	67
16	Foreign exchange rate of Fair value hedge: Forward	67	05.97%	4	94.03%	63
17	Foreign exchange rate of Fair value hedge: future	67	0	0	100%	67
18	Foreign exchange rate of Fair value hedge: Option	67	02.98%	2	97.02%	65
19	Foreign exchange rate of Fair value hedge: Swap	67	0	0	100%	67
20	Foreign exchange rate of Fair value hedge: other	67	0	0	100%	67
21	Interest rate of Fair value hedge: Forward contracts	67	0	0	100%	67
22	Interest rate of Fair value hedge: Future contracts	67	0	0	100%	67
23	Interest rate of Fair value hedge: Option contracts	67	0	0	100%	67
24	Interest rate of Fair value hedge: Swap contracts	67	11.94%	8	88.06%	59
25	Interest rate of Fair value hedge: Other contracts	67	0	0	100%	67
26	Other risks of Fair value hedge: Forward contracts	67	0	0	100%	67
27	Other risks of Fair value hedge: Future contracts	67	0	0	100%	67
28	Other risks of Fair value hedge: Option contracts	67	0	0	100%	67
29	Other risks of Fair value hedge: Swap contracts	67	0	0	100%	67
30	Other risks of Fair value hedge: other contracts	67	02.98%	2	97.02%	65
31	Foreign exchange rate of Cash flow hedge: Forward	67	05.97%	4	94.03%	63
32	Foreign exchange rate of Cash flow hedge: Future	67	0	0	100%	67
33	Foreign exchange rate of Cash flow hedge: Option	67	02.98%	2	97.02%	65
34	Foreign exchange rate of Cash flow hedge: Swap	67	0	0	100%	67
35	Foreign exchange rate of Cash flow hedge: Other	67	0	0	100%	67
36	Interest rate of Cash flow hedge: Forward contracts	67	0	0	100%	67
37	Interest rate of Cash flow hedge: Future contracts	67	0	0	100%	67
38	Interest rate of Cash flow hedge: Option contracts	67	0	0	100%	67
39	Interest rate of Cash flow hedge: Swap contracts	67	05.97%	4	94.03%	63
40	Interest rate of Cash flow hedge: Other contracts	67	0	0	100%	67
41	Other risks of Cash flow hedge: Forward contracts	67	0	0	100%	67
42	Other risks of Cash flow hedge: Future contracts	67	0	0	100%	67
43	Other risks of Cash flow hedge: Option contracts	67	0	0	100%	67
44	Other risks of Cash flow hedge: Swap contracts	67	0	0	100%	67
45	Other risks of Cash flow hedge: Other contracts	67	02.98%	2	97.02%	65
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	67	05.97%	4	94.03%	63
47	Foreign exchange rate of Net Investment hedge: Future	67	0	0	100%	67
48	Foreign exchange rate of Net Investment hedge: Option	67	0	0	100%	67
49	Foreign exchange rate of Net Investment hedge: Swap	67	0	0	100%	67
50	Foreign exchange rate of Net Investment hedge: Other	67	0	0	100%	67
51	Interest rate of Net Investment hedge: Forward	67	0	0	100%	67
52	Interest rate of Net Investment hedge: Future	67	0	0	100%	67
53	Interest rate of Net Investment hedge: Option	67	0	0	100%	67
54	Interest rate of Net Investment hedge: Swap	67	0	0	100%	67
55	Interest rate of Net Investment hedge: Other	67	0	0	100%	67
56	Other Risks of Net Investment hedge: Forward	67	0	0	100%	67
57	Other Risks of Net Investment hedge: Futures	67	0	0	100%	67
58	Other Risks of Net Investment hedge: Option	67	0	0	100%	67
59	Other Risks of Net Investment hedge: Swap	67	0	0	100%	67
60	Other Risks of Net Investment hedge: Other	67	0	0	100%	67
Continuous Variables						
61	Ratio of total trading	59	0	0	0	59
62	Total Notional amount contracts of trading	59	0	0	0	59
63	Assets of total trading	59	0	0	0	59
64	Liability of total trading	59	0	0	0	59
65	Ratio of total hedging	59	0	0	0	59
66	Total Notional amount contracts of Hedging	59	0	0	0	59
67	Assets of total Hedging	59	0	0	0	59
68	Liabilities of total Hedging	59	0	0	0	59
69	Ratio of total Fair value of Hedging	59	0	0	0	59
70	Total Notional amount of Fair value Hedging	59	0	0	0	59
71	Assets of Fair value Hedging	59	0	0	0	59
72	Liabilities of Fair value Hedging	59	0	0	0	59
73	Ratio of total cash flow of Hedging	59	0	0	0	59
74	Total Notional amount of cash flow of Hedging	59	0	0	0	59
75	Assets of cash flow of Hedging	59	0	0	0	59
76	Liabilities of cash flow of Hedging	59	0	0	0	59
77	Ratio of total Net Investment of Hedging	59	0	0	0	59
78	Total Notional amount of Net Investment of Hedging	59	0	0	0	59
79	Assets of Net Investment of Hedging	59	0	0	0	59
80	Liabilities of Net Investment of Hedging	59	0	0	0	59

Table 12: Statistics for the Financial Services Sector Sub-Sample.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	974	32.75%	319	67.25%	655
2	Hedging dummy	974	30.49%	297	69.51%	677
3	Trading dummy	974	10.27%	100	89.73%	874
4	Fair value hedge dummy	974	19.09%	186	80.91%	788
5	Foreign exchange rate of Fair value hedge dummy	974	13.76%	134	86.24%	840
6	Interest rate of Fair value hedge	974	15.50%	151	84.5%	823
7	Other risks of Fair value hedge dummy	974	05.34%	52	94.66%	922
8	Cash flow hedge dummy	974	26.38%	257	73.62%	717
9	Foreign exchange rate of cash flow hedge dummy	974	20.33%	198	79.67%	776
10	Interest rate of cash flow hedge dummy	974	17.86%	174	82.14%	800
11	Other risks of cash flow hedge	974	05.03%	49	94.97%	925
12	Net Investment hedge dummy	974	03.59%	35	96.41%	939
13	Foreign exchange rate of net investment hedge	974	03.59%	35	96.41%	939
14	Interest rate of net investment hedge dummy	974	0	0	100%	974
15	Other risks of net investment hedge dummy	974	0	0	100%	974
16	Foreign exchange rate of Fair value hedge: Forward	974	09.75%	95	90.25%	879
17	Foreign exchange rate of Fair value hedge: future	974	02.05%	20	97.95%	954
18	Foreign exchange rate of Fair value hedge: Option	974	02.05%	20	97.95%	954
19	Foreign exchange rate of Fair value hedge: Swap	974	08.32%	81	91.68%	893
20	Foreign exchange rate of Fair value hedge: other	974	01.44%	14	98.56%	960
21	Interest rate of Fair value hedge: Forward contracts	974	01.64%	16	98.36%	958
22	Interest rate of Fair value hedge: Future contracts	974	02.26%	22	97.74%	952
23	Interest rate of Fair value hedge: Option contracts	974	02.98%	29	97.02%	945
24	Interest rate of Fair value hedge: Swap contracts	974	12.32%	120	87.68%	854
25	Interest rate of Fair value hedge: Other contracts	974	02.57%	25	97.43%	949
26	Other risks of Fair value hedge: Forward contracts	974	0	0	100%	974
27	Other risks of Fair value hedge: Future contracts	974	01.03%	10	98.97%	964
28	Other risks of Fair value hedge: Option contracts	974	02.16%	21	97.84%	953
29	Other risks of Fair value hedge: Swap contracts	974	00.21%	2	99.79%	972
30	Other risks of Fair value hedge: other contracts	974	03.90%	38	96.10%	936
31	Foreign exchange rate of Cash flow hedge: Forward	974	15.29%	149	84.71%	825
32	Foreign exchange rate of Cash flow hedge: Future	974	00.82%	8	99.18%	966
33	Foreign exchange rate of Cash flow hedge: Option	974	03.69%	36	96.31%	938
34	Foreign exchange rate of Cash flow hedge: Swap	974	09.75%	95	90.25%	879
35	Foreign exchange rate of Cash flow hedge: Other	974	02.67%	26	97.33%	948
36	Interest rate of Cash flow hedge: Forward contracts	974	03.49%	34	96.51%	940
37	Interest rate of Cash flow hedge: Future contracts	974	00.82%	8	99.18%	966
38	Interest rate of Cash flow hedge: Option contracts	974	02.05%	20	97.95%	954
39	Interest rate of Cash flow hedge: Swap contracts	974	14.07%	137	85.93%	837
40	Interest rate of Cash flow hedge: Other contracts	974	03.29%	32	96.71%	942
41	Other risks of Cash flow hedge: Forward contracts	974	00.62%	6	99.38%	968
42	Other risks of Cash flow hedge: Future contracts	974	0	0	100%	974
43	Other risks of Cash flow hedge: Option contracts	974	01.03%	10	98.97%	964
44	Other risks of Cash flow hedge: Swap contracts	974	00.21%	2	99.79%	972
45	Other risks of Cash flow hedge: Other contracts	974	04.21%	41	95.79%	933
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	974	03.59%	35	96.41%	939
47	Foreign exchange rate of Net Investment hedge: Future	974	0	0	100%	974
48	Foreign exchange rate of Net Investment hedge: Option	974	0	0	100%	974
49	Foreign exchange rate of Net Investment hedge: Swap	974	0	0	100%	974
50	Foreign exchange rate of Net Investment hedge: Other	974	0	0	100%	974
51	Interest rate of Net Investment hedge: Forward	974	0	0	100%	974
52	Interest rate of Net Investment hedge: Future	974	0	0	100%	974
53	Interest rate of Net Investment hedge: Option	974	0	0	100%	974
54	Interest rate of Net Investment hedge: Swap	974	0	0	100%	974
55	Interest rate of Net Investment hedge: Other	974	0	0	100%	974
56	Other Risks of Net Investment hedge: Forward	974	0	0	100%	974
57	Other Risks of Net Investment hedge: Futures	974	0	0	100%	974
58	Other Risks of Net Investment hedge: Option	974	0	0	100%	974
59	Other Risks of Net Investment hedge: Swap	974	0	0	100%	974
60	Other Risks of Net Investment hedge: Other	974	0	0	100%	974
Continuous Variables						
61	Ratio of total trading	896	3.6529	22	0	874
62	Total Notional amount contracts of trading	896	1.20e+11	22	0	874
63	Assets of total trading	896	789.3996	20	0	876
64	Liability of total trading	896	688.0262	19	0	877
65	Ratio of total hedging	804	.350343	126	0	678
66	Total Notional amount contracts of Hedging	804	1.22e+09	126	0	678
67	Assets of total Hedging	846	74.5717	132	0	714
68	Liabilities of total Hedging	846	21.88888	118	0	728
69	Ratio of total Fair value of Hedging	847	.3191549	58	0	789
70	Total Notional amount of Fair value Hedging	847	1.32e+09	58	0	789
71	Assets of Fair value Hedging	877	36.08825	69	0	808
72	Liabilities of Fair value Hedging	877	22.394	64	0	813
73	Ratio of total cash flow of Hedging	815	.2541661	98	0	717
74	Total Notional amount of cash flow of Hedging	815	7.22e+08	98	0	717
75	Assets of cash flow of Hedging	867	77.11862	94	0	773
76	Liabilities of cash flow of Hedging	868	12.99097	83	0	785
77	Ratio of total Net Investment of Hedging	949	.0115814	10	0	939
78	Total Notional amount of Net Investment of Hedging	949	6.76e+07	10	0	939
79	Assets of Net Investment of Hedging	964	5.6535	14	0	950
80	Liabilities of Net Investment of Hedging	964	2.556933	15	0	949

Table 13: Statistics for the Assets Managers Sub-Sample of the FSS.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	169	51.47%	87	48.53%	82
2	Hedging dummy	169	43.78%	74	56.82%	95
3	Trading dummy	169	15.38%	26	84.62%	143
4	Fair value hedge dummy	169	18.93%	32	81.07%	137
5	Foreign exchange rate of Fair value hedge dummy	169	11.83%	20	88.17%	149
6	Interest rate of Fair value hedge	169	13.61%	23	86.39%	146
7	Other risks of Fair value hedge dummy	169	05.92%	10	94.08%	159
8	Cash flow hedge dummy	169	30.17%	51	69.83%	118
9	Foreign exchange rate of cash flow hedge dummy	169	22.48%	38	77.52%	131
10	Interest rate of cash flow hedge dummy	169	12.43%	21	83.57%	148
11	Other risks of cash flow hedge	169	03.55%	6	96.45%	163
12	Net Investment hedge dummy	169	0	0	100%	169
13	Foreign exchange rate of net investment hedge	169	0	0	100%	169
14	Interest rate of net investment hedge dummy	169	0	0	100%	169
15	Other risks of net investment hedge dummy	169	0	0	100%	169
16	Foreign exchange rate of Fair value hedge: Forward	169	11.83%	20	88.17%	149
17	Foreign exchange rate of Fair value hedge: future	169	07.10%	12	92.90%	157
18	Foreign exchange rate of Fair value hedge: Option	169	05.33%	9	94.67%	160
19	Foreign exchange rate of Fair value hedge: Swap	169	05.33%	9	94.67%	160
20	Foreign exchange rate of Fair value hedge: other	169	02.96%	5	97.04%	164
21	Interest rate of Fair value hedge: Forward contracts	169	07.10%	12	92.90%	157
22	Interest rate of Fair value hedge: Future contracts	169	05.33%	9	94.67%	160
23	Interest rate of Fair value hedge: Option contracts	169	10.65%	18	89.35%	151
24	Interest rate of Fair value hedge: Swap contracts	169	11.83%	20	88.17%	149
25	Interest rate of Fair value hedge: Other contracts	169	05.33%	9	94.67%	160
26	Other risks of Fair value hedge: Forward contracts	169	0	0	100%	169
27	Other risks of Fair value hedge: Future contracts	169	05.92%	10	94.08%	159
28	Other risks of Fair value hedge: Option contracts	169	05.33%	9	94.67%	160
29	Other risks of Fair value hedge: Swap contracts	169	0	0	100%	169
30	Other risks of Fair value hedge: other contracts	169	0	0	100%	169
31	Foreign exchange rate of Cash flow hedge: Forward	169	20.71%	35	79.29%	134
32	Foreign exchange rate of Cash flow hedge: Future	169	0	0	100%	169
33	Foreign exchange rate of Cash flow hedge: Option	169	04.14%	7	95.86%	162
34	Foreign exchange rate of Cash flow hedge: Swap	169	02.37%	4	97.63%	165
35	Foreign exchange rate of Cash flow hedge: Other	169	0	0	100%	169
36	Interest rate of Cash flow hedge: Forward contracts	169	08.88%	15	91.12%	154
37	Interest rate of Cash flow hedge: Future contracts	169	0	0	100%	169
38	Interest rate of Cash flow hedge: Option contracts	169	05.33%	9	94.67%	160
39	Interest rate of Cash flow hedge: Swap contracts	169	08.88%	15	91.12%	154
40	Interest rate of Cash flow hedge: Other contracts	169	05.33%	9	94.67%	160
41	Other risks of Cash flow hedge: Forward contracts	169	03.55%	6	96.45%	163
42	Other risks of Cash flow hedge: Future contracts	169	0	0	100%	169
43	Other risks of Cash flow hedge: Option contracts	169	0	0	100%	169
44	Other risks of Cash flow hedge: Swap contracts	169	0	0	100%	169
45	Other risks of Cash flow hedge: Other contracts	169	0	0	100%	169
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	169	0	0	100%	169
47	Foreign exchange rate of Net Investment hedge: Future	169	0	0	100%	169
48	Foreign exchange rate of Net Investment hedge: Option	169	0	0	100%	169
49	Foreign exchange rate of Net Investment hedge: Swap	169	0	0	100%	169
50	Foreign exchange rate of Net Investment hedge: Other	169	0	0	100%	169
51	Interest rate of Net Investment hedge: Forward	169	0	0	100%	169
52	Interest rate of Net Investment hedge: Future	169	0	0	100%	169
53	Interest rate of Net Investment hedge: Option	169	0	0	100%	169
54	Interest rate of Net Investment hedge: Swap	169	0	0	100%	169
55	Interest rate of Net Investment hedge: Other	169	0	0	100%	169
56	Other Risks of Net Investment hedge: Forward	169	0	0	100%	169
57	Other Risks of Net Investment hedge: Futures	169	0	0	100%	169
58	Other Risks of Net Investment hedge: Option	169	0	0	100%	169
59	Other Risks of Net Investment hedge: Swap	169	0	0	100%	169
60	Other Risks of Net Investment hedge: Other	169	0	0	100%	169
Continuous Variables						
61	Ratio of total trading	149	.577378	6	0	143
62	Total Notional amount contracts of trading	149	2.02e+07	6	0	143
63	Assets of total trading	149	1.16225	4	0	145
64	Liability of total trading	149	.1483333	3	0	146
65	Ratio of total hedging	147	.211478	52	0	95
66	Total Notional amount contracts of Hedging	147	6.41e+08	52	0	95
67	Assets of total Hedging	152	11.8703	40	0	112
68	Liabilities of total Hedging	152	14.7327	38	0	114
69	Ratio of total Fair value of Hedging	155	.3175974	18	0	137
70	Total Notional amount of Fair value Hedging	155	1.58e+09	18	0	137
71	Assets of Fair value Hedging	160	23.05128	18	0	142
72	Liabilities of Fair value Hedging	160	27.30171	17	0	143
73	Ratio of total cash flow of Hedging	152	.1552979	34	0	118
74	Total Notional amount of cash flow of Hedging	152	1.45e+08	34	0	118
75	Assets of cash flow of Hedging	152	2.722366	22	0	130
76	Liabilities of cash flow of Hedging	152	4.557816	21	0	131
77	Ratio of total Net Investment of Hedging	169	0	0	0	169
78	Total Notional amount of Net Investment of Hedging	169	0	0	0	169
79	Assets of Net Investment of Hedging	169	0	0	0	169
80	Liabilities of Net Investment of Hedging	169	0	0	0	169

Table 14: Statistics for the Investment Services Sub-Sample of the FSS.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	170	47.06%	80	52.94%	90
2	Hedging dummy	170	41.76%	71	58.24%	99
3	Trading dummy	170	26.47%	45	73.53%	125
4	Fair value hedge dummy	170	35.29%	60	64.71%	110
5	Foreign exchange rate of Fair value hedge dummy	170	20%	34	80%	136
6	Interest rate of Fair value hedge	170	32.94%	56	67.06%	114
7	Other risks of Fair value hedge dummy	170	05.29%	9	94.71%	161
8	Cash flow hedge dummy	170	37.65%	64	62.35%	106
9	Foreign exchange rate of cash flow hedge dummy	170	31.17%	53	68.83%	117
10	Interest rate of cash flow hedge dummy	170	28.82%	49	71.18%	121
11	Other risks of cash flow hedge	170	05.29%	9	94.71%	161
12	Net Investment hedge dummy	170	09.41%	16	90.59%	154
13	Foreign exchange rate of net investment hedge	170	09.41%	16	90.59%	154
14	Interest rate of net investment hedge dummy	170	0	0	100%	170
15	Other risks of net investment hedge dummy	170	0	0	100%	170
16	Foreign exchange rate of Fair value hedge: Forward	170	11.18%	19	88.82%	151
17	Foreign exchange rate of Fair value hedge: future	170	0	0	100%	170
18	Foreign exchange rate of Fair value hedge: Option	170	0	0	100%	170
19	Foreign exchange rate of Fair value hedge: Swap	170	14.71%	25	85.29%	145
20	Foreign exchange rate of Fair value hedge: other	170	0	0	100%	170
21	Interest rate of Fair value hedge: Forward contracts	170	02.35%	4	97.65%	166
22	Interest rate of Fair value hedge: Future contracts	170	02.94%	5	97.06%	165
23	Interest rate of Fair value hedge: Option contracts	170	0	0	100%	170
24	Interest rate of Fair value hedge: Swap contracts	170	21.18%	36	78.82%	134
25	Interest rate of Fair value hedge: Other contracts	170	06.47%	11	93.53%	159
26	Other risks of Fair value hedge: Forward contracts	170	0	0	100%	170
27	Other risks of Fair value hedge: Future contracts	170	0	0	100%	170
28	Other risks of Fair value hedge: Option contracts	170	0	0	100%	170
29	Other risks of Fair value hedge: Swap contracts	170	0	0	100%	170
30	Other risks of Fair value hedge: other contracts	170	05.29%	9	94.71%	161
31	Foreign exchange rate of Cash flow hedge: Forward	170	26.47%	45	73.53%	125
32	Foreign exchange rate of Cash flow hedge: Future	170	0	0	100%	170
33	Foreign exchange rate of Cash flow hedge: Option	170	05.88%	10	94.12%	160
34	Foreign exchange rate of Cash flow hedge: Swap	170	18.24%	31	81.76%	139
35	Foreign exchange rate of Cash flow hedge: Other	170	05.88%	10	94.12%	160
36	Interest rate of Cash flow hedge: Forward contracts	170	05.88%	10	94.12%	160
37	Interest rate of Cash flow hedge: Future contracts	170	0	0	100%	170
38	Interest rate of Cash flow hedge: Option contracts	170	0	0	100%	170
39	Interest rate of Cash flow hedge: Swap contracts	170	19.41%	33	80.59%	137
40	Interest rate of Cash flow hedge: Other contracts	170	06.47%	11	93.53%	159
41	Other risks of Cash flow hedge: Forward contracts	170	0	0	100%	170
42	Other risks of Cash flow hedge: Future contracts	170	0	0	100%	170
43	Other risks of Cash flow hedge: Option contracts	170	0	0	100%	170
44	Other risks of Cash flow hedge: Swap contracts	170	0	0	100%	170
45	Other risks of Cash flow hedge: Other contracts	170	05.29%	9	94.71%	161
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	170	09.41%	16	90.59%	154
47	Foreign exchange rate of Net Investment hedge: Future	170	0	0	100%	170
48	Foreign exchange rate of Net Investment hedge: Option	170	0	0	100%	170
49	Foreign exchange rate of Net Investment hedge: Swap	170	0	0	100%	170
50	Foreign exchange rate of Net Investment hedge: Other	170	0	0	100%	170
51	Interest rate of Net Investment hedge: Forward	170	0	0	100%	170
52	Interest rate of Net Investment hedge: Future	170	0	0	100%	170
53	Interest rate of Net Investment hedge: Option	170	0	0	100%	170
54	Interest rate of Net Investment hedge: Swap	170	0	0	100%	170
55	Interest rate of Net Investment hedge: Other	170	0	0	100%	170
56	Other Risks of Net Investment hedge: Forward	170	0	0	100%	170
57	Other Risks of Net Investment hedge: Futures	170	0	0	100%	170
58	Other Risks of Net Investment hedge: Option	170	0	0	100%	170
59	Other Risks of Net Investment hedge: Swap	170	0	0	100%	170
60	Other Risks of Net Investment hedge: Other	170	0	0	100%	170
Continuous Variables						
61	Ratio of total trading	141	4.80632	16	0	125
62	Total Notional amount contracts of trading	141	1.65e+11	16	0	125
63	Assets of total trading	141	986.4589	16	0	125
64	Liability of total trading	141	817.0033	16	0	125
65	Ratio of total hedging	110	.359789	11	0	99
66	Total Notional amount contracts of Hedging	110	2.40e+09	11	0	99
67	Assets of total Hedging	146	59.21997	39	0	107
68	Liabilities of total Hedging	146	19.9813	32	0	114
69	Ratio of total Fair value of Hedging	121	.1306728	11	0	110
70	Total Notional amount of Fair value Hedging	121	1.04e+09	11	0	110
71	Assets of Fair value Hedging	146	54.12394	32	0	114
72	Liabilities of Fair value Hedging	146	18.38435	20	0	126
73	Ratio of total cash flow of Hedging	117	.2108848	11	0	106
74	Total Notional amount of cash flow of Hedging	117	1.22e+09	11	0	106
75	Assets of cash flow of Hedging	168	15.31897	31	0	137
76	Liabilities of cash flow of Hedging	169	7.883	29	0	140
77	Ratio of total Net Investment of Hedging	155	.0292716	1	0	154
78	Total Notional amount of Net Investment of Hedging	155	5.23e+08	1	0	154
79	Assets of Net Investment of Hedging	170	7.149909	11	0	159
80	Liabilities of Net Investment of Hedging	170	3.917111	9	0	161

Table 15: Statistics for the Consumer Finance Sub-Sample of the FSS.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	58	72.41%	42	27.59%	16
2	Hedging dummy	58	72.41%	42	27.59%	16
3	Trading dummy	58	0	0	100%	58
4	Fair value hedge dummy	58	32.76%	19	67.24%	39
5	Foreign exchange rate of Fair value hedge dummy	58	17.24%	10	82.76%	48
6	Interest rate of Fair value hedge	58	34.48%	20	65.52%	38
7	Other risks of Fair value hedge dummy	58	15.52%	9	84.48%	49
8	Cash flow hedge dummy	58	72.41%	42	27.59%	16
9	Foreign exchange rate of cash flow hedge dummy	58	44.83%	26	55.17%	32
10	Interest rate of cash flow hedge dummy	58	70.68%	41	29.32%	17
11	Other risks of cash flow hedge	58	17.24%	10	82.76%	48
12	Net Investment hedge dummy	58	15.52%	9	84.48%	49
13	Foreign exchange rate of net investment hedge	58	15.52%	9	84.48%	49
14	Interest rate of net investment hedge dummy	58	0	0	100%	58
15	Other risks of net investment hedge dummy	58	0	0	100%	58
16	Foreign exchange rate of Fair value hedge: Forward	58	0	0	100%	58
17	Foreign exchange rate of Fair value hedge: future	58	0	0	100%	58
18	Foreign exchange rate of Fair value hedge: Option	58	0	0	100%	58
19	Foreign exchange rate of Fair value hedge: Swap	58	17.24%	10	82.76%	48
20	Foreign exchange rate of Fair value hedge: other	58	0	0	100%	58
21	Interest rate of Fair value hedge: Forward contracts	58	0	0	100%	58
22	Interest rate of Fair value hedge: Future contracts	58	0	0	100%	58
23	Interest rate of Fair value hedge: Option contracts	58	0	0	100%	58
24	Interest rate of Fair value hedge: Swap contracts	58	34.48%	20	65.52%	38
25	Interest rate of Fair value hedge: Other contracts	58	0	0	100%	58
26	Other risks of Fair value hedge: Forward contracts	58	0	0	100%	58
27	Other risks of Fair value hedge: Future contracts	58	0	0	100%	58
28	Other risks of Fair value hedge: Option contracts	58	0	0	100%	58
29	Other risks of Fair value hedge: Swap contracts	58	0	0	100%	58
30	Other risks of Fair value hedge: other contracts	58	15.52%	9	84.48%	49
31	Foreign exchange rate of Cash flow hedge: Forward	58	13.79%	8	86.21%	50
32	Foreign exchange rate of Cash flow hedge: Future	58	0	0	100%	58
33	Foreign exchange rate of Cash flow hedge: Option	58	0	0	100%	58
34	Foreign exchange rate of Cash flow hedge: Swap	58	43.10%	25	56.90%	33
35	Foreign exchange rate of Cash flow hedge: Other	58	0	0	100%	58
36	Interest rate of Cash flow hedge: Forward contracts	58	15.52%	9	84.48%	49
37	Interest rate of Cash flow hedge: Future contracts	58	0	0	100%	58
38	Interest rate of Cash flow hedge: Option contracts	58	0	0	100%	58
39	Interest rate of Cash flow hedge: Swap contracts	58	70.69%	41	29.31%	17
40	Interest rate of Cash flow hedge: Other contracts	58	0	0	100%	58
41	Other risks of Cash flow hedge: Forward contracts	58	0	0	100%	58
42	Other risks of Cash flow hedge: Future contracts	58	0	0	100%	58
43	Other risks of Cash flow hedge: Option contracts	58	0	0	100%	58
44	Other risks of Cash flow hedge: Swap contracts	58	0	0	100%	58
45	Other risks of Cash flow hedge: Other contracts	58	17.24%	10	82.76%	48
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	58	15.52%	9	84.48%	49
47	Foreign exchange rate of Net Investment hedge: Future	58	0	0	100%	58
48	Foreign exchange rate of Net Investment hedge: Option	58	0	0	100%	58
49	Foreign exchange rate of Net Investment hedge: Swap	58	0	0	100%	58
50	Foreign exchange rate of Net Investment hedge: Other	58	0	0	100%	58
51	Interest rate of Net Investment hedge: Forward	58	0	0	100%	58
52	Interest rate of Net Investment hedge: Future	58	0	0	100%	58
53	Interest rate of Net Investment hedge: Option	58	0	0	100%	58
54	Interest rate of Net Investment hedge: Swap	58	0	0	100%	58
55	Interest rate of Net Investment hedge: Other	58	0	0	100%	58
56	Other Risks of Net Investment hedge: Forward	58	0	0	100%	58
57	Other Risks of Net Investment hedge: Futures	58	0	0	100%	58
58	Other Risks of Net Investment hedge: Option	58	0	0	100%	58
59	Other Risks of Net Investment hedge: Swap	58	0	0	100%	58
60	Other Risks of Net Investment hedge: Other	58	0	0	100%	58
Continuous Variables						
61	Ratio of total trading	58	0	0	0	58
62	Total Notional amount contracts of trading	58	0	0	0	58
63	Assets of total trading	58	0	0	0	58
64	Liability of total trading	58	0	0	0	58
65	Ratio of total hedging	48	.5640737	32	0	16
66	Total Notional amount contracts of Hedging	48	2.51e+09	32	0	16
67	Assets of total Hedging	49	235.1154	29	0	20
68	Liabilities of total Hedging	49	30.9754	31	0	18
69	Ratio of total Fair value of Hedging	58	.3330098	19	0	39
70	Total Notional amount of Fair value Hedging	58	1.26e+09	19	0	39
71	Assets of Fair value Hedging	58	10.9	10	0	48
72	Liabilities of Fair value Hedging	58	10.08889	18	0	40
73	Ratio of total cash flow of Hedging	48	.3499913	32	0	16
74	Total Notional amount of cash flow of Hedging	48	1.61e+09	32	0	16
75	Assets of cash flow of Hedging	49	257.9942	26	0	23
76	Liabilities of cash flow of Hedging	49	31.25567	24	0	25
77	Ratio of total Net Investment of Hedging	58	.0096158	9	0	49
78	Total Notional amount of Net Investment of Hedging	58	1.69e+07	9	0	49
79	Assets of Net Investment of Hedging	58	.1666667	3	0	55
80	Liabilities of Net Investment of Hedging	58	.5166667	6	0	52

Table 16: Statistics for the Specialty Finance Sub-Sample of the FSS.

No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs
Dummy Variables						
1	The usage of derivative in general	577	19.06%	110	80.94%	467
2	Hedging dummy	577	19.06%	110	80.94%	467
3	Trading dummy	577	05.03%	29	94.97%	548
4	Fair value hedge dummy	577	12.99%	75	87.01%	502
5	Foreign exchange rate of Fair value hedge dummy	577	12.13%	70	87.87%	507
6	Interest rate of Fair value hedge	577	09.01%	52	90.99%	525
7	Other risks of Fair value hedge dummy	577	04.16%	24	95.84%	553
8	Cash flow hedge dummy	577	17.33%	100	82.67%	477
9	Foreign exchange rate of cash flow hedge dummy	577	14.04%	81	85.96%	496
10	Interest rate of cash flow hedge dummy	577	10.92%	63	89.08%	514
11	Other risks of cash flow hedge	577	04.16%	24	95.84%	553
12	Net Investment hedge dummy	577	01.73%	10	98.26%	567
13	Foreign exchange rate of net investment hedge	577	01.73%	10	98.26%	567
14	Interest rate of net investment hedge dummy	577	0	0	100%	577
15	Other risks of net investment hedge dummy	577	0	0	100%	577
16	Foreign exchange rate of Fair value hedge: Forward	577	09.71%	56	90.29%	521
17	Foreign exchange rate of Fair value hedge: future	577	01.39%	8	98.61%	569
18	Foreign exchange rate of Fair value hedge: Option	577	01.91%	11	98.09%	566
19	Foreign exchange rate of Fair value hedge: Swap	577	06.41%	37	93.59%	540
20	Foreign exchange rate of Fair value hedge: other	577	01.56%	9	98.44%	568
21	Interest rate of Fair value hedge: Forward contracts	577	0	0	100%	577
22	Interest rate of Fair value hedge: Future contracts	577	01.39%	8	98.61%	569
23	Interest rate of Fair value hedge: Option contracts	577	01.91%	11	98.09%	566
24	Interest rate of Fair value hedge: Swap contracts	577	07.63%	44	92.37%	533
25	Interest rate of Fair value hedge: Other contracts	577	00.87%	5	99.13%	572
26	Other risks of Fair value hedge: Forward contracts	577	0	0	100%	577
27	Other risks of Fair value hedge: Future contracts	577	0	0	100%	577
28	Other risks of Fair value hedge: Option contracts	577	02.07%	12	97.93%	565
29	Other risks of Fair value hedge: Swap contracts	577	00.35%	2	99.65%	575
30	Other risks of Fair value hedge: other contracts	577	03.47%	20	96.53%	557
31	Foreign exchange rate of Cash flow hedge: Forward	577	10.57%	61	89.43%	516
32	Foreign exchange rate of Cash flow hedge: Future	577	01.39%	8	98.61%	569
33	Foreign exchange rate of Cash flow hedge: Option	577	03.29%	19	96.71%	558
34	Foreign exchange rate of Cash flow hedge: Swap	577	06.07%	35	93.93%	542
35	Foreign exchange rate of Cash flow hedge: Other	577	02.77%	16	97.23%	561
36	Interest rate of Cash flow hedge: Forward contracts	577	0	0	100%	577
37	Interest rate of Cash flow hedge: Future contracts	577	01.39%	8	98.61%	569
38	Interest rate of Cash flow hedge: Option contracts	577	01.91%	11	98.09%	566
39	Interest rate of Cash flow hedge: Swap contracts	577	08.32%	48	91.68%	529
40	Interest rate of Cash flow hedge: Other contracts	577	02.07%	12	97.93%	565
41	Other risks of Cash flow hedge: Forward contracts	577	0	0	100%	577
42	Other risks of Cash flow hedge: Future contracts	577	0	0	100%	577
43	Other risks of Cash flow hedge: Option contracts	577	01.73%	10	98.26%	567
44	Other risks of Cash flow hedge: Swap contracts	577	00.35%	2	99.65%	575
45	Other risks of Cash flow hedge: Other contracts	577	03.81%	22	96.19%	555
No.	Variable name	No. Obs	Mean of Users	No. of Obs	Mean of Non-Users	No. of Obs

46	Foreign exchange rate of Net Investment hedge: Forward	577	01.73%	10	98.26%	567
47	Foreign exchange rate of Net Investment hedge: Future	577	0	0	100%	577
48	Foreign exchange rate of Net Investment hedge: Option	577	0	0	100%	577
49	Foreign exchange rate of Net Investment hedge: Swap	577	0	0	100%	577
50	Foreign exchange rate of Net Investment hedge: Other	577	0	0	100%	577
51	Interest rate of Net Investment hedge: Forward	577	0	0	100%	577
52	Interest rate of Net Investment hedge: Future	577	0	0	100%	577
53	Interest rate of Net Investment hedge: Option	577	0	0	100%	577
54	Interest rate of Net Investment hedge: Swap	577	0	0	100%	577
55	Interest rate of Net Investment hedge: Other	577	0	0	100%	577
56	Other Risks of Net Investment hedge: Forward	577	0	0	100%	577
57	Other Risks of Net Investment hedge: Futures	577	0	0	100%	577
58	Other Risks of Net Investment hedge: Option	577	0	0	100%	577
59	Other Risks of Net Investment hedge: Swap	577	0	0	100%	577
60	Other Risks of Net Investment hedge: Other	577	0	0	100%	577
Continuous Variables						
61	Ratio of total trading	548	0	0	0	548
62	Total Notional amount contracts of trading	548	0	0	0	548
63	Assets of total trading	548	0	0	0	548
64	Liability of total trading	548	0	0	0	548
65	Ratio of total hedging	499	.3593013	31	0	468
66	Total Notional amount contracts of Hedging	499	4.45e+08	31	0	468
67	Assets of total Hedging	146	10.03008	24	0	475
68	Liabilities of total Hedging	146	24.90641	17	0	482
69	Ratio of total Fair value of Hedging	513	.5029647	10	0	503
70	Total Notional amount of Fair value Hedging	513	1.29e+09	10	0	503
71	Assets of Fair value Hedging	513	26.02222	9	0	504
72	Liabilities of Fair value Hedging	513	46.64444	9	0	504
73	Ratio of total cash flow of Hedging	498	.2908901	21	0	477
74	Total Notional amount of cash flow of Hedging	498	4.04e+07	21	0	477
75	Assets of cash flow of Hedging	498	.4348	15	0	483
76	Liabilities of cash flow of Hedging	498	.4214444	9	0	489
77	Ratio of total Net Investment of Hedging	567	0	0	0	567
78	Total Notional amount of Net Investment of Hedging	567	0	0	0	567
79	Assets of Net Investment of Hedging	567	0	0	0	567
80	Liabilities of Net Investment of Hedging	567	0	0	0	567

Chapter 5

Appendix 5A

Table 1: Data Sample Summary

No	Industry	Sector or Subsector	Number of firms	Number of Observations	Period - time
1	Banks	Sector	8	73	2005-2014
2	Equity Investment Instruments	Sector	7	67	2005-2014
3	Financial Services	Sector	113	974	2005-2014
Total of firms		128			
Total Number of Observations		1114			
Subsectors of Financial Services Sector					
4	Asset managers	Subsector	20	169	2005-2014
5	Investment Services	Subsector	18	170	2005-2014
6	Consumer Finance	Subsector	7	58	2005-2014
7	Specialty Finance	Subsector	68	577	2005-2014
Total of firms		113			
Total Number of Observations		974			

Table 2: Descriptive Statistics for Whole Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln(TQ)	1,094	0.266582	0.651229	-2.23334	2.633483
ROE	1,097	-0.04502	0.790066	-6.62297	4.74359
ROA	1,104	-0.17355	0.878603	-7.72727	0.870296
SR	1,074	0.04582	0.623336	-1	7.6
DU	1,114	0.351885	0.477773	0	1
DH	1,114	0.321365	0.46721	0	1
DT	1,114	0.145422	0.352684	0	1
DHT	1,114	0.114901	0.319046	0	1
FV	1,114	0.221724	0.415593	0	1
CF	1,114	0.279174	0.448795	0	1
NI	1,114	0.071813	0.258295	0	1
FVFX	1,114	0.156194	0.363202	0	1
FVIR	1,114	0.189408	0.392008	0	1
CFFX	1,114	0.219031	0.413775	0	1
CFIR	1,114	0.204668	0.40364	0	1
NIFX	1,114	0.071813	0.258295	0	1
Firm Size	1,114	7.742267	1.550179	3.30103	12.37923
Profitability	1,104	-0.17355	0.878603	-7.72727	0.870296
Leverage	1,105	0.148604	0.218821	0	0.95247
Liquidity	1,114	0.310025	0.285487	0	0.906336
InvestOpportunties	1,095	1.450799	1.1905	0.002387	7.83433
Divided_dumy	1,114	0.470377	0.499346	0	1
FinCrisis_dumy	1,114	0.210952	0.408167	0	1
IndusDiver_dumy	1,114	0.783663	0.411932	0	1
GeogDiver_dumy	1,114	0.599641	0.490191	0	1

Table 3: Univariate Tests of Users and Non-Users

variable	Derivatives Users	Derivatives Non-Users	Difference	T-Statistic
Panel A: Users and Non-Users- Both Purposes				
Ln (TQ)	.2369089	.2831513	-.0462424	1.1263
ROE	.0695654	-.1087364	.1783017	-3.6015***
ROA	.0281859	-.2846119	.3127977	-5.7421***
SR	.1004508	.0152929	.0851579	-2.1507**
Firm Size	8.985186	7.067441	1.917745	-24.4348***
Profitability	.0281859	-.2846119	.3127977	-5.7421***
Leverage	.2293882	.1041904	.1251978	-9.4569***
Liquidity	.2286627	.3541997	-.125537	7.1658***
Investment Opportunities	1.731648	1.302736	.4289119	-5.7506***
Dividends	.7857143	.299169	.4865453	-17.5402***
Industry Diversification	.9260204	.7063712	.2196492	-8.7852***
Geographical Diversification	.7576531	.5138504	.2438026	-8.1577***
Panel B: Users and Non-Users- Hedging Purpose				
Ln (TQ)	.2328342	.2829971	-.0501629	1.1957
ROE	.073779	-.1025743	.1763533	-3.4840***
ROA	.0333849	-.2728506	.3062355	-5.4923***
SR	.1049807	.0170984	.0878823	-2.1710**
Firm Size	9.096545	7.100956	1.995589	-25.1048***
Profitability	.0333849	-.2728506	.3062355	-5.4923***
Leverage	.2479947	.1009716	.1470231	-11.0065***
Liquidity	.2147334	.35515	-.1404166	7.8737***
Investment Opportunities	1.742662	1.31711	.425552	-5.5652***
Dividends	.7988827	.3148148	.4840679	-16.9403***
Industry Diversification	.9469274	.7063492	.2405782	-9.4579***
Geographical Diversification	.7877095	.510582	.2771275	-9.1324***
Panel C: Users and Non-Users- Trading Purpose				
Ln (TQ)	.1850931	.2807462	-.0956531	1.7271*
ROE	.0669729	-.0644269	.1313998	-1.9568*
ROA	.0179817	-.2064839	.2244656	-3.0147***
SR	.0398241	.0468847	-.0070606	.1328
Firm Size	9.64217	7.418964	2.223205	-19.5525***
Profitability	.0179817	-.2064839	.2244656	-3.0147***
Leverage	.1514055	.1481233	.0032822	-.1763
Liquidity	.2347603	.3228327	-.0880724	3.6499***
Investment Opportunities	2.307385	1.308491	.9988941	-10.1468***
Dividends	.808642	.4128151	.3958268	-9.7099***
Industry Diversification	.9382716	.7573529	-.1809187	-5.2284***
Geographical Diversification	.8395062	.5588235	.2806826	-6.8759***

Table 4: Univariate Tests of Users and Non-Users under the Classification of FV, CF and NI

variable	Derivatives Users	Derivatives Non-Users	Difference	T-Statistic
Panel A: Users and Non-Users- Under FV				
Ln(TQ)	.179723	.2919114	-.1121884	2.3874***
ROE	.0358515	-.0685234	-.1043749	-1.8296*
ROA	.0043385	-.2248149	.2291534	-3.6314***
SR	.1166237	.025005	-.0916186	-2.0212**
Firm Size	9.463149	7.252004	2.211145	-24.5453***
Profitability	.0043385	-.2248149	.2291534	-3.6314***
Leverage	.2648672	.1151349	.1497323	-9.8824***
Liquidity	.1694901	.3500622	-.1805721	9.0852***
Investment Opportunities	1.950794	1.314173	.6366213	-7.4433***
Dividends	.805668	.3748558	.4308122	-12.8082***
Industry Diversification	.951417	.7358708	.2155462	-7.4294***
Geographical Diversification	.8825911	.5190311	.36356	-10.8046***
Panel B: Users and Non-Users- Under CF				
Ln(TQ)	.2251844	.2830245	-.05784	1.3256
ROE	.0665008	-.0891492	.15565	-2.9512***
ROA	.0311725	-.2538328	.2850053	-4.8986***
SR	.0771293	.0334017	.0437275	-1.0367
Firm Size	9.110531	7.212342	1.898189	-21.9347***
Profitability	.0311725	-.2538328	.2850053	-4.8986***
Leverage	.2465478	.1102412	.1363066	-9.6962***
Liquidity	.203468	.3512944	-.1478264	7.9675***
Investment Opportunities	1.790794	1.32426	.4665342	-5.8523***
Dividends	.7845659	.3486924	.4358735	-14.1983***
Industry Diversification	.9389068	.7235367	-.21537	-8.0493***
Geographical Diversification	.7948122	.5242839	.2699283	-8.5049***
Panel C: Users and Non-Users- Under NI				
Ln(TQ)	.0440627	.2841376	-.2400749	3.1877***
ROE	.0946845	-.0560121	-.1506966	-1.6439
ROA	.0114291	-.1879972	.1994263	-1.9577*
SR	.005954	.0490282	-.0430742	.5944
Firm Size	10.85974	7.50107	3.358666	-22.5181***
Profitability	.0114291	-.1879972	.1994263	-1.9577*
Leverage	.2664823	.1394042	.1270781	-5.0581***
Liquidity	.0775369	.3280126	.2504757	7.7588***
Investment Opportunities	3.010278	1.336132	1.674146	-12.5691***
Dividends	.9000000	.4371373	.4628627	-8.2231***
Industry Diversification	.95000	.770793	.179207	-3.7710***
Geographical Diversification	1	.5686654	.4313346	-7.7828***

Appendix 5B

Table 5: Dependent Variables Measurements

No	Variable	Notation	Measurement
1	Tobin's Q	Ln(TQ)	The natural log of the ratio of market capitalization plus total liability all divided by the book value of assets
2	Return on Equity	ROE	Net income divided by total shareholder of equity
3	Return on Assets	ROA	Net income divided by book value of total assets
4	Annual Stock Return	SR	Defined as price at period two minus price at period one all divided by period one

Table 6: Explanatory Variables Measurements

No	Variable	Notation	Measurement
Derivatives Usage Variables			
1	Derivative usage dummy	DU	1 if the firm uses derivatives in general for each purpose hedging or trading or both and 0 otherwise.
2	Derivative usage for hedging purpose dummy	DH	1 if the firm uses derivatives to hedge their total exposures only and 0 otherwise.
3	Derivative usage for trading purpose dummy	DT	1 if the firm uses derivatives to trade only and 0 otherwise.
4	Derivative usage for hedging and trading purpose at the same time dummy	DHT	1 if the firm uses derivatives in general for both purpose hedging and trading at the same time and 0 otherwise.
Type of Hedge Dummy Variables			
1	Derivative usage for fair value hedge dummy	FV	1 if the firm uses derivatives in general for fair value hedge and 0 otherwise.
2	Derivative usage for cash flow hedge dummy	CF	1 if the firm uses derivatives in general for cash flow hedge and 0 otherwise.
3	Derivative usage for net investment hedge dummy	NI	1 if the firm uses derivatives in general for net investment hedge and 0 otherwise.
Type of Hedge per Risk Dummy Variables			
1	Derivative usage for fair value hedge against foreign exchange rate risk dummy	FVFX	1 if the firm uses derivatives in general for fair value hedge in order to reduce foreign exchange rate risk and 0 otherwise.
2	Derivative usage for fair value hedge against interest rate risk dummy	FVIR	1 if the firm uses derivatives in general for fair value hedge in order to reduce interest rate risk and 0 otherwise.
4	Derivative usage for cash flow hedge against foreign exchange rate risk dummy	CFFX	1 if the firm uses derivatives in general for cash flow hedge in order to reduce foreign exchange rate risk and 0 otherwise.
5	Derivative usage for cash flow hedge against interest rate risk dummy	CFIR	1 if the firm uses derivatives in general for cash flow hedge in order to reduce interest rate risk and 0 otherwise.
7	Derivative usage for net investment hedge against foreign exchange rate risk	NIFX	1 if the firm uses derivatives in general for net investment hedge in order to reduce foreign exchange rate risk and 0 otherwise.

Table 7: Control Variables Measurements

No	Variable	Notation	Measurement
1	Firm Size	Firm Size	Logarithm of total assets.
2	Profitability	Profitability	The ratio of net income to total assets.
3	Leverage	Leverage	The ratio of total debt to the total assets.
4	Liquidity	Liquidity	The ratio of cash divided by total assets.
5	Growth Opportunities	InvestOpportunties	Total assets divided by both market capitalization plus total debt.
6	Dividend	Divid_dumy	The dummy variable of one when the firm pays dividends in the current year and zero otherwise.
7	Industrial Diversification	IndusDiver_dumy	The dummy variable of one when the firm tends to operate in more than one segment of business
8	Geographical Diversification	GeogDiver_dumy	The dummy variable of one when the firm operates in one or more foreign country rather
9	Financial crisis	FinCrisis_dumy	The years 2008 and 2009 are used as the years of crisis peak and effect, represented by a dummy
10	Industry effect	Industry dummy	The dummy variable of one for a particular industry and zero otherwise.

Appendix 5C

Table 8: Ln (TQ) Results of the Whole Sample Regression

VARIABLES	(1) OLS Derivative Usage	(2) OLS Hedging & Trading	(3) OLS Hedging	(4) OLS Interaction of Both Hedging & Trading	(5) OLS Three Types of Hedge	(6) OLS FX & IR Risks under Fair Value Hedge	(7) OLS FX & IR Risks under Cash Flow Hedge	(8) OLS FX Risk under Net Investment Hedge
DU	0.0777**							
	(0.0388)							
DH		0.0505	0.0812**					
		(0.0433)	(0.0413)					
DT		0.160***						
		(0.0506)						
DHT				0.276***				
				(0.0643)				
FV					0.0117			
					(0.0437)			
CF					0.0310			
					(0.0426)			
NI					0.371***			
					(0.0690)			
FVFX						0.103*		
						(0.0526)		
FVIR						0.0665		
						(0.0591)		
CFFX							0.129***	
							(0.0435)	
CFIR							0.122**	
							(0.0524)	
NIFX								0.387***
								(0.0648)
Firm Size	-0.0465**	-0.0595***	-	-0.199***	-0.101***	-0.0760***	-0.0815***	-0.0960***
	(0.0205)	(0.0208)	(0.0207)	(0.0221)	(0.0213)	(0.0213)	(0.0216)	(0.0204)
Profitability	-0.164***	-0.160***	-	-0.158***	-0.162***	-0.169***	-0.170***	-0.161***
	(0.0338)	(0.0335)	(0.0338)	(0.0384)	(0.0330)	(0.0337)	(0.0335)	(0.0329)
Leverage	0.00153	0.0193	-0.00322	0.330***	-0.00231	-0.00868	-0.0244	0.00941
	(0.0923)	(0.0918)	(0.0926)	(0.0935)	(0.0924)	(0.0958)	(0.0941)	(0.0912)
Liquidity	0.192***	0.178***	0.193***	0.439***	0.187***	0.218***	0.211***	0.185***
	(0.0669)	(0.0668)	(0.0669)	(0.0743)	(0.0669)	(0.0687)	(0.0676)	(0.0668)
InvestOpportunties	-0.295***	-0.294***	-		-0.295***	-0.293***	-0.299***	-0.297***
	(0.0296)	(0.0302)	(0.0297)		(0.0296)	(0.0287)	(0.0276)	(0.0293)
Divid_dumy				0.116***	0.125***	0.118***	0.113***	0.129***
				(0.0440)	(0.0406)	(0.0407)	(0.0388)	(0.0402)
FinCrisis_dumy	-0.115***	-0.116***	-	-0.184***	-0.115***	-0.108***	-0.107***	-0.115***
	(0.0345)	(0.0345)	(0.0345)	(0.0375)	(0.0333)	(0.0336)	(0.0332)	(0.0333)
IndusDiver_dumy				0.184***	0.152***	0.148***	0.150***	0.154***
				(0.0464)	(0.0371)	(0.0376)	(0.0377)	(0.0371)
GeogDiver_dumy	-0.0315	-0.0337	-0.0324	-0.0409	-0.0390	-0.0405	-0.0439	-0.0343
	(0.0327)	(0.0325)	(0.0329)	(0.0402)	(0.0327)	(0.0340)	(0.0330)	(0.0327)
Constant	1.404***	1.446***	1.416***	1.654***	1.581***	1.471***	1.505***	1.545***
	(0.205)	(0.200)	(0.204)	(0.212)	(0.204)	(0.221)	(0.210)	(0.203)
Observations	1,072	1,072	1,072	1,090	1,072	1,072	1,072	1,072
R-squared	0.485	0.490	0.485	0.335	0.511	0.502	0.509	0.510
Number of unit	128	128	128	128	128	128	128	128

This table reports the results of static model of OLS regression estimator for the whole sample regression. In (TQ) represents the dependent variable for all models defined as the natural log of the ratio of total assets less the book value of equity plus the market value of equity all divided by the book value of assets. Different independent variables are used in each model that represent the usage of derivatives, which have a value of one for the use of derivatives and zero otherwise: DU represent the use of derivatives in general, DH represent the use of the derivatives for hedging purposes, DT represent the use of the derivatives for trading purposes and DHT represent the use of derivatives for both hedging and trading at the same time, FV represents derivative usage for fair value hedge dummy, CF represents derivative usage for cash flow hedge dummy and IN represents derivative usage for net investment hedge dummy, FVFX represents derivative usage for fair value hedge against foreign exchange rate risk dummy, FVIR represents derivative usage for fair value hedge against interest rate risk dummy, CFFX represents derivative usage for cash flow hedge against foreign exchange rate risk dummy, CFIR represents derivative usage for cash flow hedge against interest rate risk dummy and INFX represents derivative usage for net investment hedge against foreign exchange rate risk dummy. We use several control variables: Firm Size (Logarithm of total assets), Profitability (the ratio of net income to total assets), Leverage (the ratio of total debt to the total assets), Liquidity (Cash to total assets), InvestOpportunties (book to market ratio defined as the book value of assets divided by the book value of debt plus the market value of equity), Divid_dumy (a dummy variable of one when a firm pay dividends in the current year and zero otherwise and FinCrisis_dumy represent Financial Crisis effect (the years 2008 and 2009 are used as the years of crisis peak and effect, represented by a dummy variable of one and zero for the other years), IndusDiver_dumy (a dummy variable of one when a firm tends to operate in more rather than one segment of business and zero otherwise) and GeogDiver_dumy represent Geographical diversifications (a dummy variable of one when a firm operates on one or more than foreign country rather than United Kingdom and zero otherwise). All models include constant and the R-Squared are reported as well. The standard error is reported in parentheses below each coefficient. The stars represent the level of significance at 1%, 5% and 10%, respectively.

Table 9: ROE Results of the Whole Sample Regression

VARIABLES	(1) OLS Derivative Usage	(2) OLS Hedging & Trading	(3) OLS Hedging	(4) OLS Interaction of Both Hedging & Trading	(5) OLS Three Types of Hedge	(6) OLS FX & IR Risks under Fair Value Hedge	(7) OLS FX & IR Risks under Cash Flow Hedge	(8) OLS FX Risk under Net Investment Hedge
DU	0.0344							
	(0.0465)							
DH		0.0357	0.0402					
		(0.0547)	(0.0518)					
DT		0.0232						
		(0.0417)						
DHT				0.0351				
				(0.0433)				
FV					-0.0766			
					(0.0507)			
CF					0.0327			
					(0.0359)			
NI					0.0670			
					(0.0542)			
FVFX						0.0204		
						(0.0458)		
FVIR						-0.0830		
						(0.0711)		
CFFX							0.0235	
							(0.0306)	
CFIR							-0.0364	
							(0.0625)	
NIFX								0.0460
								(0.0539)
Firm Size	0.0283	0.0252	0.0269	-0.0168	-0.00466	-0.00244	-0.00816	-0.0100
	(0.0373)	(0.0392)	(0.0373)	(0.0366)	(0.0412)	(0.0408)	(0.0385)	(0.0417)
Profitability	0.335	0.336	0.335	0.329	0.327	0.326	0.327	0.328
	(0.223)	(0.223)	(0.223)	(0.220)	(0.222)	(0.222)	(0.221)	(0.221)
Leverage	0.124	0.124	0.120	0.192	0.185	0.201	0.177	0.168
	(0.269)	(0.275)	(0.272)	(0.258)	(0.279)	(0.290)	(0.285)	(0.267)
Liquidity	0.0427	0.0409	0.0431	0.0523	0.0317	0.0382	0.0326	0.0349
	(0.113)	(0.113)	(0.113)	(0.106)	(0.111)	(0.113)	(0.110)	(0.111)
InvestOpportunties	-0.0272	-0.0267	-0.0267		-0.0313	-0.0286	-0.0264	-0.0285
	(0.0226)	(0.0226)	(0.0226)		(0.0228)	(0.0228)	(0.0229)	(0.0226)
Divid_dumy				0.210***	0.220***	0.227***	0.217***	0.215***
				(0.0479)	(0.0493)	(0.0517)	(0.0491)	(0.0488)
FinCrisis_dumy	-0.00210	-0.00214	-	-0.00764	-3.57e-05	-0.00150	0.000656	0.00221
	(0.0572)	(0.0573)	(0.0572)	(0.0553)	(0.0572)	(0.0578)	(0.0574)	(0.0570)
IndusDiver_dumy				0.0209	0.0226	0.0175	0.0199	0.0237
				(0.0759)	(0.0760)	(0.0778)	(0.0776)	(0.0762)
GeogDiver_dumy	-0.0356	-0.0367	-0.0365	-0.0244	-0.0201	-0.0215	-0.0265	-0.0259
	(0.0578)	(0.0582)	(0.0583)	(0.0558)	(0.0596)	(0.0592)	(0.0592)	(0.0562)
Constant	-0.177	-0.161	-0.166	0.0351	0.0139	0.0271	0.0604	0.0524
	(0.328)	(0.335)	(0.330)	(0.329)	(0.350)	(0.362)	(0.343)	(0.354)
Observations	1,066	1,066	1,066	1,084	1,066	1,066	1,066	1,066
R-squared	0.115	0.115	0.115	0.125	0.127	0.127	0.126	0.126
Number of unit	128	128	128	128	128	128	128	128

This table reports the results of static model of OLS regression estimator for the whole sample regression. ROE represents the dependent variable for all models defined the ratio of net income to book value of equity. Different independent variables are used in each model that represent the usage of derivatives, which have a value of one for the use of derivatives and zero otherwise: DU represent the use of derivatives in general, DH represent the use of the derivatives for hedging purposes, DT represent the use of the derivatives for trading purposes and DHT represent the use of derivatives for both hedging and trading at the same time, FV represents derivative usage for fair value hedge dummy, CF represents derivative usage for cash flow hedge dummy and IN represents derivative usage for net investment hedge dummy, FVFX represents derivative usage for fair value hedge against foreign exchange rate risk dummy, FVIR represents derivative usage for fair value hedge against interest rate risk dummy, CFFX represents derivative usage for cash flow hedge against foreign exchange rate risk dummy, CFIR represents derivative usage for cash flow hedge against interest rate risk dummy and INFX represents derivative usage for net investment hedge against foreign exchange rate risk dummy. We use several control variables: Firm Size (Logarithm of total assets), Profitability (the ratio of net income to total assets), Leverage (the ratio of total debt to the total assets), Liquidity (Cash to total assets), InvestOpportunties (book to market ratio defined as the book value of assets divided by the book value of debt plus the market value of equity), Divid_dumy (a dummy variable of one when a firm pay dividends in the current year and zero otherwise and FinCrisis_dumy represent Financial Crisis effect (the years 2008 and 2009 are used as the years of crisis peak and effect, represented by a dummy variable of one and zero for the other years), IndusDiver_dumy (a dummy variable of one when a firm tends to operate in more rather than one segment of business and zero otherwise) and GeogDiver_dumy represent Geographical diversifications (a dummy variable of one when a firm operates on one or more than foreign country rather than United Kingdom and zero otherwise). All models include constant and the R-Squared are reported as well. The standard error is reported in parentheses below each coefficient. The stars represent the level of significance at 1%, 5% and 10%, respectively.

Table 10: ROA Results of the Whole Sample Regression

VARIABLES	(1) OLS Derivative Usage	(2) OLS Hedging & Trading	(3) OLS Hedging	(4) OLS Interaction of Both Hedging & Trading	(5) OLS Three Types of Hedge	(6) OLS FX & IR Risks under Fair Value Hedge	(7) OLS FX & IR Risks under Cash Flow Hedge	(8) OLS FX Risk under Net Investment Hedge
DU	-0.0149							
	(0.0429)							
DH		0.0265	-0.0116					
		(0.0460)	(0.0452)					
DT		-0.197***						
		(0.0581)						
DHT				-0.246***				
				(0.0630)				
FV					-0.0956**			
					(0.0468)			
CF					0.0816***			
					(0.0306)			
NI					-0.361***			
					(0.0818)			
FVFX						-0.0751		
						(0.0474)		
FVIR						-0.101		
						(0.0775)		
CFFX							-0.0340	
							(0.0354)	
CFIR							-0.0150	
							(0.0598)	
NIFX								-0.374***
								(0.0844)
Firm Size	0.296***	0.308***	0.295***	0.284***	0.314***	0.315***	0.292***	0.312***
	(0.0445)	(0.0466)	(0.0450)	(0.0489)	(0.0517)	(0.0516)	(0.0495)	(0.0507)
Leverage	-0.551**	-0.576***	-0.552**	-0.542**	-0.548**	-0.514**	-0.565**	-0.559**
	(0.221)	(0.223)	(0.222)	(0.219)	(0.231)	(0.243)	(0.238)	(0.224)
Liquidity	0.150	0.167	0.150	0.208	0.174	0.161	0.163	0.177
	(0.142)	(0.143)	(0.142)	(0.135)	(0.141)	(0.142)	(0.141)	(0.141)
InvestOpportunties	-0.0230	-0.0234	-0.0229		-0.0195	-0.0265	-0.0207	-0.0176
	(0.0176)	(0.0176)	(0.0175)		(0.0179)	(0.0176)	(0.0178)	(0.0177)
Divid_dumy				0.0209	0.0121	0.0221	0.00937	0.0103
				(0.0396)	(0.0416)	(0.0429)	(0.0416)	(0.0414)
FinCrisis_dumy	-0.0666	-0.0646	-0.0667	-0.0712	-0.0686	-0.0696	-0.0671	-0.0654
	(0.0633)	(0.0630)	(0.0633)	(0.0624)	(0.0630)	(0.0634)	(0.0633)	(0.0629)
IndusDiver_dumy				0.126	0.101	0.110	0.116	0.104
				(0.0820)	(0.0822)	(0.0844)	(0.0840)	(0.0824)
GeogDiver_dumy	-0.220***	-0.218***	-	-0.218***	-0.209***	-0.203***	-0.219***	-0.212***
	(0.0589)	(0.0585)	(0.0588)	(0.0584)	(0.0594)	(0.0599)	(0.0599)	(0.0580)
Constant	-2.817***	-2.834***	-	-2.733***	-2.935***	-3.050***	-2.879***	-2.927***
	(0.446)	(0.448)	(0.450)	(0.445)	(0.469)	(0.487)	(0.474)	(0.463)
Observations	1,081	1,081	1,081	1,099	1,081	1,081	1,081	1,081
R-squared	0.177	0.181	0.177	0.179	0.189	0.184	0.180	0.188
Number of unit	128	128	128	128	128	128	128	128

This table reports the results of static model of OLS regression estimator for the whole sample regression. ROA represents the dependent variable for all models defined the ratio of net income to total assets. Different independent variables are used in each model that represent the usage of derivatives, which have a value of one for the use of derivatives and zero otherwise: DU represent the use of derivatives in general, DH represent the use of the derivatives for hedging purposes, DT represent the use of the derivatives for trading purposes and DHT represent the use of derivatives for both hedging and trading at the same time, FV represents derivative usage for fair value hedge dummy, CF represents derivative usage for cash flow hedge dummy and IN represents derivative usage for net investment hedge dummy, FVFX represents derivative usage for fair value hedge against foreign exchange rate risk dummy, FVIR represents derivative usage for fair value hedge against interest rate risk dummy, CFFX represents derivative usage for cash flow hedge against foreign exchange rate risk dummy, CFIR represents derivative usage for cash flow hedge against interest rate risk dummy and INFX represents derivative usage for net investment hedge against foreign exchange rate risk dummy. We use several control variables: Firm Size (Logarithm of total assets), Leverage (the ratio of total debt to the total assets), Liquidity (Cash to total assets), InvestOpportunties (book to market ratio defined as the book value of assets divided by the book value of debt plus the market value of equity), Divid_dumy (a dummy variable of one when a firm pay dividends in the current year and zero otherwise and FinCrisis_dumy represent Financial Crisis effect (the years 2008 and 2009 are used as the years of crisis peak and effect, represented by a dummy variable of one and zero for the other years), IndusDiver_dumy (a dummy variable of one when a firm tends to operate in more rather than one segment of business and zero otherwise) and GeogDiver_dumy represent Geographical diversifications (a dummy variable of one when a firm operates on one or more than foreign country rather than United Kingdom and zero otherwise). All models include constant and the R-Squared are reported as well. The standard error is reported in parentheses below each coefficient. The stars represent the level of significance at 1%, 5% and 10%, respectively.

Table 11: SR Results of the Whole Sample Regression

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS
	Derivative Usage	Hedging & Trading	Hedging	Interaction of Both Hedging & Trading	Three Types of Hedge	FX & IR Risks under Fair Value Hedge	FX & IR Risks under Cash Flow Hedge	FX Risk under Net Investment Hedge
DU	-0.0234							
	(0.0461)							
DH		-0.00692	-0.0252					
		(0.0542)	(0.0522)					
DT		-0.0922**						
		(0.0444)						
DHT				-0.103**				
				(0.0508)				
FV					0.0286			
					(0.0674)			
CF					-0.0707			
					(0.0446)			
NI					-0.125*			
					(0.0683)			
FVFX						-0.0778		
						(0.0561)		
FVIR						0.0538		
						(0.0847)		
CFFX							-0.0475	
							(0.0394)	
CFIR							-0.00512	
							(0.0548)	
NIFX								-0.137**
								(0.0617)
Firm Size	0.0899***	0.0971***	0.0904***	0.0501**	0.0877***	0.0791***	0.0841***	0.0834***
	(0.0221)	(0.0231)	(0.0229)	(0.0206)	(0.0242)	(0.0240)	(0.0226)	(0.0230)
Profitability	0.0939***	0.0914***	0.0939***	0.0940***	0.0921***	0.0933***	0.0939***	0.0910***
	(0.0207)	(0.0207)	(0.0207)	(0.0208)	(0.0207)	(0.0207)	(0.0206)	(0.0205)
Leverage	-0.0927	-0.104	-0.0909	0.00823	-0.0674	-0.0920	-0.0644	-0.0761
	(0.135)	(0.135)	(0.134)	(0.135)	(0.140)	(0.140)	(0.150)	(0.140)
Liquidity	-0.0298	-0.0215	-0.0301	0.0439	-0.0329	-0.0436	-0.0334	-0.0317
	(0.0724)	(0.0730)	(0.0725)	(0.0741)	(0.0770)	(0.0763)	(0.0770)	(0.0762)
InvestOpportunties	-	-0.0845***	-		-0.0842***	-0.0858***	-0.0876***	-0.0830***
	(0.0189)	(0.0189)	(0.0191)		(0.0190)	(0.0184)	(0.0186)	(0.0180)
Divid_dumy				0.0799	0.0832*	0.0732	0.0835*	0.0793
				(0.0493)	(0.0486)	(0.0503)	(0.0492)	(0.0487)
FinCrisis_dumy	-0.396***	-0.395***	-0.396***	-0.413***	-0.392***	-0.392***	-0.391***	-0.394***
	(0.0322)	(0.0323)	(0.0322)	(0.0327)	(0.0322)	(0.0321)	(0.0322)	(0.0322)
IndusDiver_dumy				-0.0121	-0.0265	-0.0234	-0.0251	-0.0300
				(0.0656)	(0.0660)	(0.0672)	(0.0666)	(0.0660)
GeogDiver_dumy	-0.0533	-0.0523	-0.0530	-0.0508	-0.0439	-0.0449	-0.0423	-0.0480
	(0.0454)	(0.0457)	(0.0458)	(0.0464)	(0.0488)	(0.0487)	(0.0478)	(0.0464)
Constant	-0.553***	-0.573***	-0.558***	-0.411**	-0.489**	-0.477**	-0.506**	-0.456**
	(0.189)	(0.193)	(0.194)	(0.196)	(0.203)	(0.204)	(0.198)	(0.201)
Observations	1,043	1,043	1,043	1,061	1,043	1,043	1,043	1,043
R-squared	0.126	0.127	0.126	0.116	0.130	0.129	0.130	0.129
Number of unit	128	128	128	128	128	128	128	128

This table reports the results of static model of OLS regression estimator for the whole sample regression SR represents Stock Return as the dependent variable for all models defined as price at period two minus price at period one all divided by period one. Different independent variables are used in each model that represent the usage of derivatives, which have a value of one for the use of derivatives and zero otherwise: DU represent the use of derivatives in general, DH represent the use of the derivatives for hedging purposes, DT represent the use of the derivatives for trading purposes and DHT represent the use of derivatives for both hedging and trading at the same time, FV represents derivative usage for fair value hedge dummy, CF represents derivative usage for cash flow hedge dummy and IN represents derivative usage for net investment hedge dummy, FVFX represents derivative usage for fair value hedge against foreign exchange rate risk dummy, FVIR represents derivative usage for fair value hedge against interest rate risk dummy, CFFX represents derivative usage for cash flow hedge against foreign exchange rate risk dummy, CFIR represents derivative usage for cash flow hedge against interest rate risk dummy and INFX represents derivative usage for net investment hedge against foreign exchange rate risk dummy. We use several control variables: Firm Size (Logarithm of total assets), Profitability (the ratio of net income to total assets), Leverage (the ratio of total debt to the total assets), Liquidity (Cash to total assets), InvestOpportunties (book to market ratio defined as the book value of assets divided by the book value of debt plus the market value of equity), Divid_dumy (a dummy variable of one when a firm pay dividends in the current year and zero otherwise and FinCrisis_dumy represent Financial Crisis effect (the years 2008 and 2009 are used as the years of crisis peak and effect, represented by a dummy variable of one and zero for the other years), IndusDiver_dumy (a dummy variable of one when a firm tends to operate in more rather than one segment of business and zero otherwise) and GeogDiver_dumy represent Geographical diversifications (a dummy variable of one when a firm operates on one or more than foreign country rather than United Kingdom and zero otherwise). All models include constant and the R-Squared are reported as well. The standard error is reported in parentheses below each coefficient. The stars represent the level of significance at 1%, 5% and 10%, respectively.