THE IMPACT OF DERIVATIVES ON FIRM VALUE

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DECLARATION

We hereby declare that:

(1) This UBFZ3026 Research Project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the research project.

(4) The word count of this research report is 14590 words.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BMD	Bursa Malaysia Derivatives Berhad
CAPEX	Capital Expenditures
CEO	Chief Executive Officer
CP	Commodity Price
CPO	Crude Palm Oil
COMMEX	Commodity and Monetary Exchange
DFFITS	Difference between the Fitted Values
DPS	Dividend per Share
ECM	Random Effect Model
EPS	Earning per Share
EVA	Economic Value Added
GMM	Generalized Method of Moments
GDP	Gross Domestic Product
FCD	Foreign Currency Derivatives
FCPO	Crude Palm Oil Futures
FE	Fixed Effect
FKB3	3 Month Kuala Lumpur Interbank Offered Rate Futures
FKLI	FTSE Bursa Malaysia KKLCI Futures
FMG3	3-Year Malaysian Government Securities Futures
FMG5	5-Year Malaysian Government Securities Futures
FPKO	Crude Palm Kernel Oil Futures
FTSE	Financial Times and London Stock Exchange
FUPO	USD Crude Palm Oil Futures

FX	Foreign Exchange
IR	Interest Rate
IRD	Interest Rate Derivatives
JSE	Johannesburg Stock Exchange
KLCE	Kuala Lumpur Commodities Exchange
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
KLOFFE	Kuala Lumpur Options and Financial Futures Exchange
LR	Likelihood Ratio
MDEX	Malaysian Derivatives Exchange
MME	Malaysian Monetary Exchange
MVA	Market Value Added
MVE	Market Value
NPV	Net Present Value
OKLI	FTSE Bursa Malaysia KLCI Options
OLS	Ordinary Least Squares
OSIRIS	Online Search Information Retrieval Information Storage
PE	Pooled Effect
PS	Preferred Stock
RE	Random Effect
REIT	Real Estate Investment Trust
R&D	Research and Development
ROA	Return on Asset
ROE	Return on Equity
SGX	Singapore Exchange

SSFs	Single Stock Futures
SMEs	Small and Medium-sized Enterprise
TA	Total Assets
TSE	Tehran Stock Exchange
UK	United Kingdom
US	United State
USD	United State Dollar

PREFACE

Derivative is the financial instrument in which the value is derived from an underlying asset such as interest rate, common stock, foreign exchange rate, commodity, etc. The use of derivatives by non-financial firms was sharply increasing over the past few decades. The purpose of using derivatives by a company is to hedge the risk they are facing in their daily business operations. For example, derivatives are used to hedge the interest rate risk because the fluctuation of interest rate may incur a higher cost of debt to the firm. Anyhow, do the firm hedging activities lead to enhance or improve the firm value? It has been an argument among many researchers in the past. Whether derivatives will increase the firm value is still on the debate. Therefore, we have conducted this research to discover whether it will increase the market value of a firm by using financial derivatives.

In this research, the total numbers of 300 Malaysian non-financial firms (based on their market capitalization) were selected, from the year 2007 to 2009. Tobin's Q was used as a measurement of firm value; leverage, firm size, dividend per share, profitability and investment growth were control variables; interest rate derivative, foreign currency derivative and commodity derivatives were dummy variables. Pooled data technique was used in our research.

ABSTRACT

Over the recent decade, firms increasingly using derivative to hedge their position. The empirical research on the valuation effect derivative has on firm value still remains debated. The purpose of our study is to investigate the effect of using derivative has on firm value in the Malaysia market by using a sample of top 300 non-financial firms in terms of market capitalization from the year 2007 to 2009. Secondary data and quantitative approach were used in our study. The required financial data were collected from companies' annual reports and OSIRIS database. To carry out the analysis, we used ordinary least squares (OLS) and panel data technique to estimate our model. The paper concluded that the usage of derivative could not improve the firm value. We found that commodity and currency derivative was not significantly related to the firm value. Interest rate derivative was partially significant to firm value; however, it was in a negative relationship.

CHAPTER 1
INTRODUCTION

1.1 Introduction

This chapter provides the overall picture of the research project. It gives an introduction about the background of the research, followed by the problem statements, research questions and research objectives.

1.2 Background of the Study

Derivative is the security whose price is derived from an underlying asset. It serves as a contract between two or more parties on the trading of the underlying asset in the future point of time. In the derivatives market, the most common types of derivatives are future contracts, forward contracts, options and swaps. The main purpose of using derivatives by a firm is to hedge risk. Some may use to speculate and to earn an abnormal profit. According to Nguyen and Faff (2003), firms appeared to use interest rate derivatives to minimize the risk of financial distress. They found that firms used derivatives as a hedge rather than to speculate in the foreign exchange market.

Alkeback, Hagelin and Pramborg (2006) discovered that 59 percent of the non-financial firms in Sweden used derivatives in 2003 compared to 52 percent in 1996, which was a significant increase in derivatives usage among the SMEs. Besides that, the exchange exposure was the most the Swedish firms to manage with, compared to interest rate exposure. In 2003, almost every firm used derivative to manage their foreign exchange exposure and interest rate exposure.

Nguyen and Faff (2003) discovered that leverage and firm size were the two most important factors that induced a firm to make use of financial derivatives. However, Carter and Sinkey (1998) did not find the level of participation in the market for interest-rate derivatives was positively related to size. Other than that, El-Masry (2006) argued that larger firms were more likely to use derivatives than medium and smaller firms; public companies were more likely to use derivatives than private firms; and derivatives usage was greatest among international firms. Furthermore, Hentschel and Kothari (2001) examined that financial institutions hold slightly more interest rate derivatives compared with non-financial firms. Raturi (2005) suggested that derivatives were used by larger companies, especially in the life insurance industry.

On the other hand, except for the banks and financial firms, the use of derivatives by non-financial firms has grown rapidly in the last two decades. However, up to present, there is a little consensus regarding what is the effect of the use of derivatives on the market value of the firm (Bartram, Brown & Conrad, 2006). The Modigliani and Miller (1958) paradigm predict that the use of derivatives cannot add value if markets are perfect. However, modern finance theories indicate that there are certain circumstances under which a hedging program using derivatives can be a value enhancing.

Smith and Stulz (1985) argued that hedging could reduce the probability of a firm encountering financial distress by reducing the variance in firm value. For example, banks can use derivatives to reduce the probability of financial distress due to the uncertainty of the fluctuation in interest rate. However, from the finding of Carter and Sinkey (1998), community banks may reject to use derivatives because the cost of implementing a risk-management program was higher, such as the start-up costs like hiring trained personnel and development of the internal control systems.

Bartram *et al.* (2006) examined the effect of derivative use on firm risk and

value by using a large sample of non-financial firms from 47 countries. They found strong evidence that the use of financial derivatives could reduce both total risk and systematic risk, thus it led to a lower market beta and lower discount rate, therefore a higher firm value. Junior and Laham (2008) also found that the adoption of a hedging policy would increase the firm value.

Other than that, the use of derivatives would be influenced by managers because he was the one who responsible to diversify the risk relating to the firm. Smith and Stultz (1985) investigated that if managers' wealth was in aligning with the firm value, then it was optimal for them to completely hedge the value of the firm.

1.3 Derivatives in Malaysia

In the year of 1980, Malaysia set up the first derivative exchange which was known as Kuala Lumpur Commodities Exchange (KLCE). At the same year, KLCE introduced the first derivative product - Crude Palm Oil (CPO) future contract to the public and it was actively traded in KLCE. Up to present, CPO is still the main derivative product of KLCE, even though KLCE has introduced other commodity future contracts on rubber, tin, cocoa and etc. Although other commodity future contracts are less actively traded compared with CPO, but since they are good substitute contracts traded in foreign exchanges such as Tokyo, London and etc., therefore it would not be taken off from KLCE. Due to the reason that MME was unable to maintain the single contract by itself, it was forced to be merged with KLCE and became a new entity called COMMEX.[1]

In addition, the Kuala Lumpur Options and Financial Futures Exchange (KLOFFE) was the first Malaysian financial derivatives exchange which

[1] Bacha, O. I., & Merican, O. M. I. (2003). *The market for financial derivatives: Removing impediments to growth*, 4-5

was established by a consortium of private companies in 1990. It launched the first product - Stock Index Future contract that based on a revamped Kuala Lumpur Composite Index (KLCI) in 1995. After five years later, KLOFFE introduced another product which was index option as its second product. For the KLCI options, it has a vary strike price in call and put option give to investors. However, in early 1999, the owner of KLOFFE sold the financial derivative exchange to the Kuala Lumpur Stock Exchange (KLSE) and become a KLSE's wholly-owned subsidiary.[2]

In December 2000, KLOFFE and COMMEX merged together and became Malaysian Derivatives Exchange (MDEX). As a result of merging, MDEX was a single exchange that for all derivatives trading needs to consolidate into this exchange. Due to MDEX was a subsidiary that wholly owned by KLSE, therefore KLSE was a single exchange in Malaysia that provided the trading in stocks as well as both commodity and financial derivatives. After that, KLSE has changed its name to Bursa Malaysia Berhad, therefore MDEX became Bursa Malaysia Derivatives Berhad (BMD).[3]

Since the entire derivatives are consolidated in BMD, therefore, now we have commodity, equity and financial derivatives that are ready to be traded in BMD. In total there are nine derivative contracts which are being traded in BMD by today. The nine derivatives contracts are stated at Table 1.1.

[2] *Deravatif in Malaysia*, Retrieved March 06, 2011, from http://www.scribd.com/doc/8246440/deravatif-in-malaysia, 5-6.
[3] *Deravatif in Malaysia*, Retrieved March 06, 2011, from http://www.scribd.com/doc/8246440/deravatif-in-malaysia, 6.

Table 1.1: The Different Types of Derivatives Traded at BMD

Commodity Derivatives	**Equity Derivatives**	**Financial Derivatives**
Crude Palm Oil Futures (FCPO)	FTSE Bursa Malaysia KLCI Futures (FKLI)	3 Month Kuala Lumpur Interbank Offered Rate Futures (FKB3)
USD Crude Palm Oil Futures (FUPO)	FTSE Bursa Malaysia KLCI Options (OKLI)	3-Year Malaysian Government Securities Futures (FMG3)
Crude Palm Kernel Oil Futures (FPKO)	Single Stock Futures (SSFs)	5-Year Malaysian Government Securities Futures (FMG5)

(Source: Bursa Malaysia, 2011)[4]

Among the equity derivatives, SSF is the most recent contract (introduced in 2006) that was added in. These futures are based on the individual stocks that listed on Bursa Malaysia and most of them are blue-chip stocks.[5] Other than that, FUPO is a crude palm oil futures contract that is denominated in USD, whereas FCPO is denominated in Ringgit, both of them are treated as the worldwide pricing benchmark for palm oil. Bursa Malaysia has enlarged the offering in commodity derivatives that denominated on USD to globalize Malaysian futures market and Bursa Malaysia's position. As a result, BMD has become the market that is internationally competitive on futures trading.[6]

[4] *Derivatives products*, Retrieved March 12, 2011 from http://www.bursamalaysia.com/website/bm/derivatives/products/

[5] *Single Stock Futures (SSFs),* Retrieved March 12, 2011, from http://www.bursamalaysia.com/website/bm/products_and_services/derivative_resources/downloads/faq_ssf.pdf, 1-2.

[6] *USD Crude Palm Oil Futures (FUPO),* Retrieved March 12, 2011, from http://www.bursamalaysia.com/website/bm/derivatives/products/Commodity_Derivatives/fupo2.html

1.4 Problem Statement

Over the recent decade, firms increased to use derivative to hedge their position. The derivative market has experienced a rapid growth over the recent year. Even though information on firm derivative usages is widely available, the empirical research regarding whether the use of derivative will increase a firm value is still debatable.

Modigliani and Miller (1958) suggest that firm value will be independent of hedging if perfect capital markets exist (without transaction costs, taxes, bankruptcy cost, agency costs and information asymmetry). The main reason is because rational investors are assumed to diversify their portfolio themselves and therefore there is no value added for a firm to engage in hedging transaction. However, does derivative actually enhancing the firm value in reality? The empirical finding of whether used of derivative for hedging purposes has or has no impact on firm value is still mixed.

Many researchers have conducted empirical work on the impact of using derivative usage on firm value over recent decade. The result of the research is still mixed and therefore we cannot conclude whether hedging has significant impact on firm value. Jorion (1990) found that hedging on foreign currency has no impact on firm value. This result was inconsistent with the finding of Allayannis and Weston (2001). They found that the use of foreign currency derivatives would create value to the firm. Jin and Jorion (2006) investigated the U.S Oil and gas sector and they found an insignificant impact hedging has on firm value. Graham and Rogers (2001) found that hedging would create value to firm by enhancing their debt capacity. A similar research was conducted by Hagelin and Pramborg (2002) in Swedish firms and found that hedging would have a positive effect on firm value.

As a whole, the findings of empirical studies remain controversial; it is not clear whether the decision to use derivatives has an effect on firm valuation. Therefore, this paper extends the literature by testing the hypothesis of whether the use of derivatives is rewarded by a higher market value of a firm, using a sample of Malaysia's firm.

1.5 Research Questions

This research is important to allow us to examine whether the use of derivatives affects the value of Malaysian non-financial firms. More specifically, we would like to investigate:

1. What is the effect of derivatives use on the firm value?
2. What type of derivatives will have significant impact on firm value?
3. Is the use of derivative can be served as an important indicator to measure the value of the firm?

1.6 Research Objectives

The main objective of this research is to investigate whether the derivatives are positively related to the firm value in Malaysia. As what we have stated in the problem statement, the effect of derivatives usage on firm value is still debatable because the results from various empirical researches show their own interpretation. Therefore this issue becomes our main purpose to conduct this research project. In order to have a deep understanding on the research, we specifically discuss the three main derivatives in the market which are interest rate derivatives, currency derivatives, and commodity derivatives. The objectives are specifically stated in the three forms show in the following.

The first objective is to determine whether the interest rate derivative is positively related to firm value. Interest rate derivative is a form of derivative used to hedge the interest rate risk resulting from the fluctuation of interest rate, and thus affect the financial planning of a company. But how is the effectiveness of hedging interest rate by using the derivative?

The second objective is to find out whether the usage of currency derivative is positively related to firm value. For a multinational enterprise, they always deal with the foreign business partners. Because of this, they are facing the currency risk at all time and hence to use derivative to minimize the risk and losses. Therefore we want to discover if the usage of derivative can really help the firms to minimize the currency risk.

The third objective is to determine whether the use of commodity derivative is positively related to firms' market value. This type of derivative is always used by those companies or manufacturers to hedge the fluctuation of commodity price. For example, Airline industries buy the jet-fuel forward contract to lock in the price of fuel at a certain rate in the future point of time.

1.7 Chapter Layout

The research paper consists of five chapters and is organized as follows:

Chapter 1 of this research project first illustrates the background of the research, then toward to explain the problem statements, and the objectives of this research which is going to be conducted. In Chapter 2, we conduct a literature review on the journals and use the findings and results given by these journals to support our research project. Chapter 3 discusses on the sample, key variables, and methodology used to examine the Malaysian firms' valuation reaction to the use of derivatives and. Besides that, we also develop the hypothesis and conceptual

framework for this research project. Chapter 4 discusses about our findings, researched results and we conclude our research project in chapter 5.

CHAPTER 2
LITERATURE REVIEW

2.1 Definition of Derivatives

From the definition of Chance and Brooks (2009), derivative is defined as the financial instruments whose returns are derived from those of other financial instruments. That is, their performance depends on how other financial instruments perform. Derivatives serve a valuable purpose in providing a means of managing financial risk. By using derivatives, companies and individuals can transfer, for a price, any undesired risk to other parties who either have risks that offset or want to assume that risk. There are different types of derivatives such as forward contract, future contract, swap, option, equity derivative, foreign exchange derivative, interest rate derivative and commodity derivative.

2.2 The Use of Derivatives to Hedge Risk

According to a survey from the International Swaps and Derivatives Association[7], there were 94% of the world's 500 largest companies in 2009 used the derivatives to manage and hedge their business and financial risks. The survey found that foreign exchange derivatives were the most widely used instruments which were 88 percent, followed by interest rate derivatives (83 percent) and commodity derivatives.

[7] *International swaps and derivatives association*, News release April 12, 2009. Retrieved March 10, 2010, from http://www.isda.org/press/press042309der.pdf

From the article of David Harper (2010)[8], he mentioned the uses and the functions performed by derivatives are as follow:

- **Foreign Exchange Risk**: The risk that changes in the currency exchange rate will have an adverse effect on the company's revenue. It also known as currency risk.

- **Interest Rate Risk:** Companies can hedge interest-rate risk in various ways. Consider a company wishes to sell a division in one year but the interest rate is expected to fall in the future, then it could purchase (or 'take a long position on') a Treasury futures contract to lock in the interest rate by today. Thus, the company is effectively locking in the future interest rate.

- **Commodity or Product Input Hedge:** This is the risk commonly faced by companies that are heavily sensitive to the price change of raw-material inputs or commodities. For example airline industry, it consumes lots of jet fuel. In the past, most airlines have given a great deal of consideration to hedging against crude-oil price increases.

2.3 Research Theory

2.3.1 Interest Rate Derivatives

Interest rate derivatives are instruments whose payoffs are dependent in some way on the level of interest rates. In the 1980s and 1990s, the volume of trading in interest rate derivatives in both the over-the-counter and exchange-traded markets increased very quickly. Many new products were developed to meet particular needs of end-users. The key challenges

[8] Harper, D. (2010). *How companies use derivatives to hedge risk*. Retrieved March 10, 2010, from http://www.investopedia.com/articles/stocks/04/122204.asp

for derivatives traders are to find good, robust procedures for pricing and hedging these products.[9]

There are different types of interest rate derivatives, one of these is interest rate cap. It can be characterized as a portfolio of put options on zero-coupon bonds with payoffs on the puts occurring at the time they are calculated. Analogously to an interest rate cap, an interest rate floor is a portfolio of put options on interest rates or a portfolio of call options on zero-coupon bonds.[10]

Swap options, are options on interest rate swaps and are another increasingly popular type of interest rate option. They give the holder the right to enter into a certain interest rate swap at a certain time in the future. Many large financial institutions that offer interest rate swap contracts to their corporate clients are also preparing to sell swap options to them or buy swap options from them.[11]

2.3.2 Foreign Currency Derivatives

Firms in the plantation, industrial product, trading services, and consumer products manufacturing sectors are the main users of the foreign currency derivative (FCD) in Malaysia. It is a type of contract that derives the value from an underlying asset such as currency or exchange rate. Allayannis and Weston (2001) discovered that firm would have higher value by using currency derivatives in its risk management operation. In order to mitigate the impact of foreign exchange rate fluctuations, it has been claimed that firms could employ financial hedge strategies through foreign currency derivatives (Chiang & Lin, 2005). Since there are many investment tools

[9] Hull, J.C. (2006). *Options, Futures, and Other Derivatives, Seventh Edition*. Pearson/Prentice Hall. Page 639
[10] Hull, J.C. (2006). *Options, Futures, and Other Derivatives, Seventh Edition*. Pearson/Prentice Hall. Page 644
[11] Hull, J.C. (2006). *Options, Futures, and Other Derivatives, Seventh Edition*. Pearson/Prentice Hall. Page 650

are in high risk, in order to prevent unexpected losses in the future, investos tend to use foreign currency derivative to minimize the risk they are facing now such as foreign currency risk. Similar with the finding of Makar and Huffman (2008), they reported that US foreign-denominated debt issuers used foreign currency derivatives to hedge short-term risk effectively. Besides it also increased their firm value by not losing money on the premium paid out.

Bartram, Brown and Fehle (2006) found evidence that those firms have foreign currency transaction tend to use foreign currency derivatives. Foreign currency transaction normally comes with foreign currency risk. For the speculator, their motivation of using derivative is to earn an abnormal profit, so they intend to use FCD to speculate rather than to hedge, since this kind of derivative instrument is the marginal product that only needs minimum amount of initial capital and ends up to gain a huge profit. It is similar with the finding of Anand and Kaushik (2008) in which speculation was the objective of using foreign currency derivatives.

2.3.3 Commodity Derivatives

A commodity derivative is a derivative contact in which a commodity is the underlying asset. Commodity derivatives are the financial instruments that derive the value from the value of the underlying commodity in order to achieve price risk management (Lokare, 2007). It is necessary to understand the reason why commodity derivatives are important and also the role they can play in risk management. Because of the price of commodities, metals, shares and currencies fluctuate over time, the possibility of adverse price changes in the future creates risk for businesses. And hence derivatives are used by firms to reduce or eliminate price risk arising from unforeseen price changes (Ahuja, 2006).

Commodity derivatives are not new. In pre-Christian civilizations, forwards on agricultural products have already existed. Forwards are defined as contracts between two parties to deliver a certain product at an agreed price on the future certain date. On the other hand, futures are the standardized forwards that freely exchangeable on the market in which first appeared in Chicago in the 1840. Because the existence of exchanges that appeared to facilitate the matching of buyers and sellers of contracts, thereby lead to increase the liquidity of derivative markets. The historical role of commodity derivatives is that to hedge against inherent risks existing in commodity markets (Cinquegrana, 2008).

The commodity derivatives trading in India has its long history. In today's India, there are large numbers of agricultural commodity contracts are traded on the exchanges. The value of agricultural commodities traded as a proportion of overall GDP amounts to around 37 percent (70 percent of the agricultural GDP) in the country compared with the share of billion, oil and other metals is relatively low (Lokare, 2007).

2.4 Empirical Discussion

2.4.1 Interest Rate Derivatives

In the past few decades, the use of interest rate derivatives has grown substantially. Interest rate risk represents the most significant source of market risk for many lodging firms. Much of this exposure is from floating-rate bank loans because changes in interest rates can increase cash flow and earnings volatility in an uncertain interest rate environment. Higher interest rates can also make it more costly for firms to raise external financing. By matching the exposure of assets with the exposure of debt, managers can ensure that the supply of funds from operations and/or debt financing will match the demand for funds for its capital investment opportunities and reduce the need for costly external financing (Froot, Scharfstein & Stein, 1993). However, the recent research has questioned

their importance and their efficacy in the risk management toolbox of non-financial firms. Guay and Kothari (2000) argued that the effect of derivative use was too small; whereas Faulkender (2005) showed that the firms in the chemicals industry tend to use interest rate derivatives to speculate rather than to hedge.

Singh (2009) conducted a research to investigate the relationship between the interest rate derivative positions, debt maturity structure, and exposure for a sample of lodging firms, gaming firms, and lodging REITs, for the period from 2000 to 2004. The results showed that lodging firms were positively exposed to interest rate risk. Interest rate derivatives such as interest rate swaps and caps were used in conjunction with debt maturity structure to mitigate interest rate exposure and to lower borrowing costs. By issuing floating debt and swapping into fixed-rate debt, smaller unrated firms would realize benefits from lower financing costs, lower costs of financial distress, and lower interest rate exposure. On the other hand, firms with high debt ratings were more likely to issue fixed-rate debt and swap into floating-rate debt. In addition, the results supported the conclusion that the yield spread has a positive and significant effect on swap usage.

Covitz and Sharpe (2005) discovered that smaller firms have more exposure on interest rate from their liabilities compare to the larger firms. Thus, smaller firm will tend to use the derivative to neutralize the interest rate exposures. For the larger firms, they will use their choice of debt structure to limit their interest rate exposures rather than with derivatives.

Batram *et al.* (2006) examined whether derivatives use was associated with higher firm value on a sample of 7263 non-financial firms from 48 countries. In order to test the relationship between derivatives use and firm-specific as well as country-specific factors, two types of models were estimated. The first was a single-equation PROBIT model using the full sample of general derivatives. The second was a trivariate PROBIT model

with separate equations for FX, IR, and CP derivatives. They found that only the firm that using interest rate derivatives has a positive valuation effect.

Nelson, Moffitt, and Graves (2005) examined with the samples of 5700 non-financial firms and their use of currency, interest rate, and commodity derivatives. Tobin's Q as a proxy for firm value, they looked directly at the stock return performance of firms that disclosed the use of derivatives for the purpose of hedging. In the research they found that there was a negative effect of interest rate derivatives on firm value. Nguyen and Fatt (2007) addressed the question of whether the use of financial derivatives among a cross section of Australian firms delivered a positive increment in firm value. In doing so, they investigated both the relationship between an aggregate measure of derivatives and firm value as well as the impact that individual types of derivatives potentially have on firm market value, as proxied by Tobin's Q. The result showed that there was a negative relationship between derivatives use and firm value. Rather, their result strongly indicated that the use of derivatives in general and the use of interest rate derivatives in particular lead to a reduction in firm value or a 'derivative user' discount.

Ameer (2009) examined the state of risk management practices among Malaysian listed firms and evaluated the value-relevance of the notional amount of foreign-exchange (FCD) and interest-rate derivatives used by listed firms over the period 2003-2007. He applied the linear regression framework into his research and found that only a few firms hedge the market risks in Malaysia. The main users of the FCDs in Malaysia are the firm in the plantation, industrial product, trading services and consumer products manufacturing sectors. In addition, the total earning and the use of derivatives have a significant positive correlation. This findings showed that its contribution to a the valuation of firms was very minimal in Malaysia than other countries although there have a value-relevance by a disclosed notional amount of the derivatives

2.4.2 Foreign Currency Derivatives

Allayannis, Lel and Miller (2009) examined how corporate governance impacts firm value through hedging. They used foreign currency derivatives associated with a higher valuation for firms that have strong internal or external corporate governance. The data was collected from thirty-nine countries between 1990 and 1999 that were cross-listed in the U.S. as level II and level III ADRs, they split the country differences into internal (firm-level) as well as external (country-level) corporate governance structures. The researcher used the market-to-book ratio as a proxy for Tobin's Q to reflect a firm's market value. They concluded that hedging premium only for firms that have strong internal and external corporate governance, while there was no hedging premium for firms with weak corporate governance. With strong internal and external, foreign currency derivatives added value to the market firm value or vice versa.

Allayannis and Weston (2001) investigated the impact of using foreign currency derivative has on the firm value. They used 720 largest U.S. non-financial firms between 1990 and 1995 as a sample and used Tobin's Q as an approximation for firm's market value and robustness tests. They also measured the market-to-book ratio (simple Q) and the market-to-sales ratio. Their results concluded that foreign currency derivative was positively and significantly correlated with the firm value. The researcher also found that the firm value would be increased and if they performed hedging activities and vice versa.

Nguyen and Faff (2003) reexamined on an empirical exploration of the motives behind the aggregate use of financial derivatives- foreign currency and interest rate derivatives by Australian companies. This journal data contained sample of non-financial Australian companies- 469 firms from 1999 and 2000 from the Connect database. Logit and Tobit regression and also the LR (likelihood ratio) statistic tests were used to analyze the result. The result showed that foreign currency derivative appeared to be cost-

based and related to the issuance of foreign-currency-denominated debt. The use of FCD was strongly linked to value-enhancing motives.

Capstaff, Marshall and Hutton (2007) investigated the use of FCD by French firms before and after the introduction of the euro. The purpose was to examine if the introduction of euro currency on financial practices would actually reduced the currency risk, and hence reduced the motive of using foreign currency derivative to hedge the risk. Samples of 120 French firms were collected across the periods before and after the introduction of the euro 1996 and 2000. Various types of method were used to test the result, such as F-statistic, Jarque–Bera (J–B), Ryan Joiner statistics, the White's test, Berry and Feldman graphical technique and also DFFITS test. As a result, after the adoption of the euro, the level of exposure to foreign currency risk decreased, hence lead to a decrease in the level of foreign currency derivative usage.

Allayannis and Ofek (1997) examined the purpose of using foreign currency derivatives. The total of 500 non-financial firms was selected as the sample. The researcher found that there was a strong negative association between foreign currency derivative use and firm exchange-rate exposure, the meaning is that firms used derivatives to hedge rather than to speculate in the foreign exchange markets. A firm's exposure to exchange-rate movements was mitigated through the use of foreign currency derivatives.

Makar and Huffman (2008) examined the relationship between UK multinationals' stock returns and changes in the principal exchange rate. They also investigated whether the firms effectively used foreign currency derivatives and foreign-denominated debt to lower the currency risk associated with the bilateral exchange rate to which they were more likely to expose with. The sample consisted of 44 firms UK multinationals listed in the June 2001 FTSE 250 that operated in the non-financial sector, for the 1999–2002 sample periods. They used OLS Regression, the Shapiro–

Wilk test for non-normality, and the White test for heteroskedasticity and also hypothesis tests. The result indicated that the currency risk could be effectively hedged by the financial currency-hedge techniques.

Hentschel and Kothari (2001) conducted a research to investigate whether the use of derivatives allowed firms to reduce their level of riskiness. A total number of 325 non-financial firms and 100 financial firms were selected as the sample. They used Tobin's Q, univariate test and multivariate test to test their result. Their result indicated that there was no significant relationship between the volatility of a firm's stock prices and the size of the firm's derivatives position.

Magee (2009) investigated the effect of foreign currency hedging with derivatives on firm value in a dynamic panel framework by using the system generalized method of moments (GMM) estimator. By using the system GMM estimator, it allows the researcher to control for unobserved firm specific factors, persistence in firm value and feedback from the past amounts of firm value to the current amount of foreign currency hedging. The sample consisted of 408 large U.S. non-financial firms with foreign sales from operation abroad during the period of 1996 to 2000 which was measured by Tobin's Q. The result showed that the foreign currency hedging would increase firm value when foreign currency hedging was assumed to be strictly exogenous. However, the researcher also found that the use of foreign currency derivatives no longer affect the firm value.

2.4.3 Commodity Derivatives

Commodity derivatives markets have witnessed tremendous growth in recent years. Chang, Hong and Kuan (2005) examined the impact of hedging activities of Canadian oil and gas companies on their stock return and firm value for the period of 2000-2002. The impact of hedging on firm value was measured by Tobin's Q ratio by using both linear and nonlinear

models. They found that the large Canadian oil and gas firms were able to hedge against the downside risk induced by unfavorable oil and gas price changes. However, gas hedging appeared to be more effective than oil hedging when downside risk presented. Therefore, hedging for gas (together with profitability, leverage and reserves) has a significant impact on firm value.

Bartram *et al.* (2006) did a survey on the effect of derivative use on firms' risk measures and value. The derivative use was more prevalent in firms with higher exposures to interest rate risk, exchange rate risk and commodity prices. They did the research by using a large sample of 6,888 non-financial firms from 47 countries. They found strong evidence that the use of financial derivatives reduced both total risk and systematic risk and there was a positive relationship of derivative use on firm value but the effect was not strong.

Carter, Rogers and Simkins (2002) examined a sample of firms in which hedging positions could achieve economically significant objectives. They investigated jet fuel hedging behavior of firms in US airline industry during 1994-2000 to examine whether such hedging is a source of value for these companies. The result showed that jet fuel hedging was positively related to airline future purchases of jet fuel. They found evidence to support view that airlines, on average, increased firm value by using derivatives to hedge against changes in jet fuel prices.

However, Jin and Jorion (2006) examined the hedging activities of a sample of 119 U.S. oil and gas produce from 1998 to 2001 with the measurement of Q ratios, it showed that hedging did not affect the market value and there was no difference in firm values between firms that hedged and firms that did not hedge.

From the research of Hentschel and Kothari (2001) using data from financial statements of 425 large U.S. corporations, they investigated

whether firms systematically reduce or increase their riskiness with derivatives. They found that many of the largest U.S. corporations were active participants in derivatives markets and manage their exposures with large derivatives positions. Firms with derivatives hold similar notional principals of foreign exchange and interest rate derivatives but they hold almost no commodity derivatives. Non-financial firms hold slightly more foreign exchange derivatives, while financial institutions hold slightly more interest rate derivatives. In the research, they found out that there was no association between the volatility of a firm's stock prices and the size of the firm's derivatives position. Moreover, a firm's exposures to variations in interest and exchange rates were not directly related to the firm's derivatives position.

Nelson *et al.* (2005) examined the annual stock performance of 1,308 U.S. firms over the period per year 1995-1999. They found that firms that hedged outperform other securities by 4.3 percent per year on average. They pointed out that the over performance was entirely due to larger firms that hedged currency. However, they discovered that there were no abnormal returns for firms to hedge either with interest rate or commodity derivatives.

2.4.4 Firm Size

Cohen, Levin, and Mowery (1987) found that there was no significant relationship between size and R & D intensity once care is taken to separate the influence of business unit and firm size. Therefore, we might have to take into account any other factors to get accurate point.

Mak and Kusnadi (2005) examined the impact of corporate governance mechanisms on the firm value of Singapore and Malaysia firms. The sample included 271 firms listed on the SGX and 279 firms listed on the KLSE, financial data, board composition, ownership structure, and other

relevant data for each firm for the 1999 or 2000 financial years. They used Tobin's Q and multivariate tests as measurement. The result showed that there was an inverse relationship between board size and firm value in both countries.

Ushijima (2003) investigated the evaluation of corporate multinational and its effect on the stock market valuation of the firm. The sample was balanced panel of manufacturing firm continually listed on Tokyo Stock Exchange from 1985 to 1995, total of 5124 firm-year observations. This project was measured by simple proxy of Tobin's Q. The result showed that firm size which was a central screw to the multinational company and multiplier value for the company was not value negative with itself, in fact the value of multinational firm increase with its firm size, which presumably, monitoring problem would be worse, could not be recovered by theory.

2.4.5 Leverage

Before a firm undertakes a project, it must have sufficient funds with itself. Normally, a big firm will borrow loan from bank or issue bond to raise funds, then it only can increase their potential returns. However, at the same time the companies' debt will increase as well. Leverage is calculated by the amount of debt that uses to finance firm's assets. Firms that have more debts than assets are considered as high leverage firm. Investor usually will advert to the high leverage firms because there are high possibilities that the firm may not be able to repay the debt. According to Ward and Price (2006), financial leverage was the proportion of capital, the greater the level of debt, the higher the leverage.

According to Modigliani and Miller's (1958), return on equity should be increased if the firm's level of debt increases. Besides, Ward and Price (2006) indicated that if there was an increase in debt-equity ratio,

shareholder returns would raise. However, Rajan and Zingales (1995) argued that there was a negative relationship between debt and profitability.

Iturriaga and Crisostomo (2010) examined the effect of leverage, dividend payout, and ownership concentration on firm value with or without growth opportunities. A total of 213 samples from Brazilian firms were collected between 1995 and 2004. They used Generalized Method of Moments (GMM), Hansen Test and Arellano-Bond to test the results. The result showed that leverage has a dual effect on the value of the firm, which was negative for firms with growth opportunities and positive for firms without growth opportunities.

Rayan (2008) examined whether the firms' financial leverage was positively or negatively related to firm value in a South African context. The data that they used in their research was secondary data, which was sourced from Mcgregor BFA database for the period 1998-2007. 113 Johannesburg Stock Exchange (JSE) listed firm were included, which were stratified by industry. The method used was regression analysis. The result showed that there was a negative relationship between firm value and firms leverage.

Salehi and Biglar (2009) examined whether the capital structure decision would have an impact on firms' performance. They applied the data of 117 corporate in Tehran Stock Exchange (TSE) in a 5-year time horizon (2002-2007). Descriptive statistics containing mean, standard deviation and inferential statistics containing Pearson Correlation, and ANOVA test were used in their research. The result showed that firm value was negatively related to the firm's financial leverage.

2.4.6 Investment Growth

Previous literatures have tried to examine the impact of the firm's long term capital expenditure or spending decision on its market value. Fama and Jensen (1985) stated that during the efficient market, if the managers decide to choose the investment project with positive NPV value, the firm value and shareholders wealth thus can be maximized and market reaction should be positively for any announcement of a new investment decisions by a firm.

Ehie and Kingsley (2010) investigated the relationship between the investments in R&D and market value among the firms by using a sample of 26,499 US firms over the period of 1990 to 2007. After they controlled the firm and market-related factors, they found out that R&D expenditures gave persistent positive effect on market value for both manufacturing and service firms.

Bajo, Bigelli and Sandri (1998) studied the new investment announcements by Italian firms listed on the Milan Stock Exchange in a period of 1989-1995. They found that there was a positive relationship between stock price and new investment decisions. In additions, stock price responded better for joint venture announcements and for non-state owned companies.

Chung, Wright and Charoenwong (1998) examined the effect of corporate capital expenditure decisions on share prices. They collected the data on capital expenditure announcements from US companies using Nexis/Lexis services over the 15 year period (1981-1995). By using the certain sample selection criteria, they gathered 308 capital expenditure announcements and computed the Tobin's Q for each company, and then they separated the company into high Tobin's Q group and low Tobin's Q group. According to previous studies, firms with high Tobin's Q ratio were expected to have positive NPV projects and vice versa, thus increased in

capital expenditures of those firm were expected to be positively accepted by the market and hence increased in share price and vice versa.

However, the firms with low Tobin's Q ratios were perceived as having a lack of valuable or low profitable investment opportunities. Market reactions generally were less positive toward the announcements of capital expenditure increase, but tend to view favorably if it reduced capital expenditures. They discovered that market did respond strongly to good decisions when there was an increase of capital expenditures by the firms with high Tobin's Q and vice versa. However, the decision to decrease (increase) the capital spending by the firms with high Tobin's Q (low's Q firm) did not have significant negative impact on market reactions. They concluded that firm's growth prospects determined the market's reaction to their capital expenditure decisions.

2.4.7 Dividend Per Share

Miller and Modigliani's (1961) irrelevance theorems proposed that relationship between dividend policy and firm's value is independent under certain assumptions such as perfect capital market and in the absence of taxes, bankruptcy costs, and asymmetric information. The distribution of cash dividend to shareholders was believed that should not have any impact on a firm's stock prices. Lastly, the Miller and Modigliani concluded that firm's value could only be affected by firm's investment policy alone which generated future cash flow based on the investment undertaken and not influenced by the manner in which its cash flows were split between dividend and retained earnings.

"Dividend signaling hypothesis" was initially mentioned in Lintner (1956) paper, and further enhanced by Fama, Fisher, Jensen, and Roll (1969) and Ambarish, John, and Williams (1987). They believed that manager could distribute dividend to signal asymmetric information about the firm's

future growth prospects, because manager was believed to have reliable private information about the firm future financial position and could signal those private information to investor through dividend distributions. Market generally believed that dividend change announcement would convey valuable information regarding the firm future growth prospects and earnings. Therefore, an announcement of a dividend increasing or decreasing was followed by an increase or decrease of stock prices subsequently.

Lang and Litzenberger (1989) suggested that free cash flow hypothesis explaining stock price reaction to dividend change announcements. Significant stock price behavior (increase in stock price) could occur when investors expected that the increase of dividend could limit the cash flow available for the firm's managers to invest in the negative NPV or wasteful projects, whereas investors expected that announcements of decrease of dividend may signal that firm's overinvesting policy and thus decrease of stock prices subsequently.

Azhagaiah and Priya (2008) examined the relationship between the shareholders' wealth and dividend policy on Organic and Inorganic Chemical Companies in India over the period of 1997 to 2006. During that period, any companies paid dividend for 3 years or more were treated as dividend paying company, otherwise was served as a non-paying company. The result indicated that there was a significant difference in average market value relative to book value of equity between dividend companies and non-dividend companies of both organic and inorganic chemical companies. They concluded that generally higher dividend did increase the market value of the firm and vice versa.

2.4.8 Profitability

Modigliani and Miller (1958) stated that a firm's value could be maximized by using more debt in its capital structure; debt would help the firm to decrease their average cost of capital and enhance profitability as long as its ROA was greater than the before-tax interest paid on debt. ROE was found to be insignificant in determining the firm value.

Hall and Brummer (1999) determined which internal performance measures of a company correlate the best with its external performance measures as represented by the Market value added (MVA) of the corporation. MVA is the external method that used to determine the wealth of shareholder while for the internal measures of shareholder value creation is Economic value added (EVA) and other variable or ratios. As a result, they found out that there was a positive correlation coefficient between MVA and discounted EVA when inflation adjustments to the data had been made. Besides, there were slightly lower positive correlations were obtained between MVA and more traditional accounting-based corporate performance measures such as return on assets (ROA), return on equity (ROE), earnings per share (EPS) and dividends per share (DPS).

Mir and Nishat (2004) examined the link between corporate governance structure and the firm performance in Pakistan by using weighted least square regression techniques. The sample consisted of 248 firms randomly selected from the listed companies during 2003. The parameters of corporate governance were related to management, shareholders or stakeholders and board of directors, etc. While return on asset (ROA), Tobin's Q and stock return were included in performance parameter. The result showed that there was positive impact on firm performance by corporate governance structure variables such as percentage block holding by individuals and family members and by industrial companies. However, the percentage of block holding by insider has negative signal

on firm performance. If CEO acts as chairperson of board of directors, the firm performance will be affected negatively. There was no impact on firm performance shown by the composition of board. Furthermore, the firm size has a positive impact on the performance of firm but the expected leverage has a negative relationship with performance.

Ukenna, Ijeoma, Anionwu, and Olise (2010) studied on the relationship between the human capital in a company and the firm's performance. Their research objective was to find out to what extend the investment on human capital of a company will impact on its overall performance. Second, they wished to discover the perception of a small company regarding to the relationship between human capitals investment and the firm's performance. They used a sample of twenty five small scale business in Nigeria with the criteria of the amount of staff was less than six and its capital base was not more than hundred thousand naira. The business owners were drawn from bookshops, supermarkets, business centers, computer schools, and sellers of computer accessories. The result showed that there was a strong relationship between the human capital effectiveness and financial performance of a small scale firm.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlined the research design, described the sample population and sampling procedures and methods used for data collection. The variables and formulas used in this study were shown and the data analysis technique used will be explained.

3.2 Research Design

The study was aimed at examining the valuation effect of derivatives used in Malaysia market using a sample of 300 non-financial firms over the period 2007-2009. The research adopted quantitative approach and secondary data were used for this study. The approach taken was the application of linear regression framework and panel data technique.

3.3 Data Collection Method

Sample companies were selected based on their market capitalization. The sample in this study comprised the top 300 non-financial firms in terms of market capitalization. The required financial data were collected from OSIRIS database and annual reports of companies over the years 2007-2009. Firms were classified as derivative user or non-user of derivatives based on a search from their annual reports for information about the use of derivatives. We used a dummy variable that was set to one for firms that use any types of derivatives and zero for non-user firms.

The aggregate use of financial derivative was separated into three subsets which are foreign currency derivative, interest rate derivative and commodity derivative. Dummy variable was assigned to each type of derivatives.

3.4 Variables Specification

3.4.1 Dependent Variable

Market values of the firm will be the dependent variable and it was proxy by Tobin's Q. We adopted the formula approximate q developed by Chung and Pruitt (1994); where the approximate q was calculated by using market value of firm value plus preferred share plus debt and then divided by book value of the total assets; where debt was the value of the firm's short-term liabilities minus short-assets plus book value of the firm's long-term debt.

3.4.2 Independent Variables

There are three independent variables which included foreign currency derivatives, interest rate derivatives and commodity derivatives. We assigned a dummy variable that was set to zero for firms that do not use derivatives and one for firm that use derivatives.

3.4.3 Control Variables

We included the following control variables, as in Allayannis and Weston (2001). The set of control variables in Tobin's Q regression included factors known to explain the cross-section of firm value. These factors included:

i. *Size.* The logarithm of total assets was used to control for firm size. Even though the relationship between firm value and firm size remained mixed, but we controlled the firm size for two reasons. According to Allayannis and Weston (2001), they found differences in Tobin's Q for small firm compared to larger firm where small firms were associated with higher Tobin's Q. But, on the other hand, Bodnar, Marston and Hayt (1998)[12] found that large firms were more likely to hedge than small firms.

ii. *Leverage.* Leverage was proxy by the ratio of long-term debt to the market value of firm. According to Fama and French (1998) and Allayannis and Weston (2001), they found a negative relationship between leverage and firm value.

iii. *Profitability.* Profitability was considered as a key value driver. We used the return on assets and return on equity to control for profitability.

iv. *Investment growth.* Investment opportunity is proxy by CAPEX (the ratio of capital expenditures to market value of firm). According to Myers (1976), future investment opportunities will have an impact on firm value. Hedgers may have larger investment opportunities, thus it is important to control the variable.

v. *Dividend per share.* We controlled for dividends by using dividend per share rather than dummy variable. According to the study conducted by Fama and French (1998), they found that dividends announcement will convey information about future profitability.

Finally we excluded the variables, industrial and geographic diversification, that appeared in Allayannis and Weston (2001).

[12] Bodnar, G. M., Marston, R. C., & Hayt, G. (1998). 1998 Survey of financial risk management by U.S. non-financial firms. Wharton/CIBC World Markets 1998 Financial Risk Management Survey: Executive Summary.

3.5 Data Analysis Technique

3.5.1 Tobin's Q

The firm's market value was calculated by using the formula of approximate q (Chung and Pruitt, 1994)[13]. We adopted the formula approximate q developed by Chung and Pruitt (1994), as the measurement of the firm market value in our research. They created a simple formula to approximate the Tobin's q of Lindenberg and Ross (1981)[14] where the formula involved relatively easy calculation compared to the L-R's Tobin's q and required only basic accounting data that can be easily collected from financial statement of the firms. A very high correlation between the Lindenberg-Ross's Tobin's q and approximate q have been observed. They found that at least 96.6 percent of the variability of Tobin's q was explained by approximate q. The primary difference between L-R and approximate Tobin's q is that the latter assumed that the replacement values of a firm's plant, equipment and inventories equal to their book value. The formula was defined as:

Approximate q= (MVE+PS+DEBT)/TA

MVE = product of a firm's share price and the number of common stock shares outstanding

PS = liquidating value of the firm's outstanding preferred stock

DEBT = short-term liabilities - short-term assets + book value of long term debt

TA = book value of the total assets of the firm

In using the formula to calculate q value, we might get a negative value. Some of the firms did not use long term debt to finance their business and

[13] Chung, K. H. & Pruitt., S. W. (1994). A simple approximation of Tobin's q, financial management, 23(3),70-74

[14] Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q ratio and industrial organization. *Journal of Business*, 1-32

they have more short term assets than short term liabilities; this has resulted in a negative debt value. When this negative debt value is too big and overweighs the market value of firm and preferred shares, the q value will turn out to be a negative value.

3.5.2 Multivariate Analysis

From the empirical research of Khediri (2010), he developed the multivariate analysis and estimated a specification for the regression models to investigate whether derivatives use are valued at a premium. He estimated the following equations:

$$\text{Tobin's } Q_{it} = \alpha + \beta \text{ (derivatives use decision)} + \sum\lambda_j \text{ (control variable j)} + \mu_i + \varepsilon_{it}$$

Where:

Tobin's Q = Market value of the firm and measure how much value is created for given amount of assets.

Derivatives = Dummy variable equal to 1 for firm using derivatives, otherwise 0

Derivatives use extent = Firm's outstanding notional amount of derivatives scaled by firm size

α = Constant

β = Estimated coefficient for corporate hedging proxies.

λ = Estimated coefficient for control variables.

μ_i = Individual effect of firm.

ε_{it} = Error term.

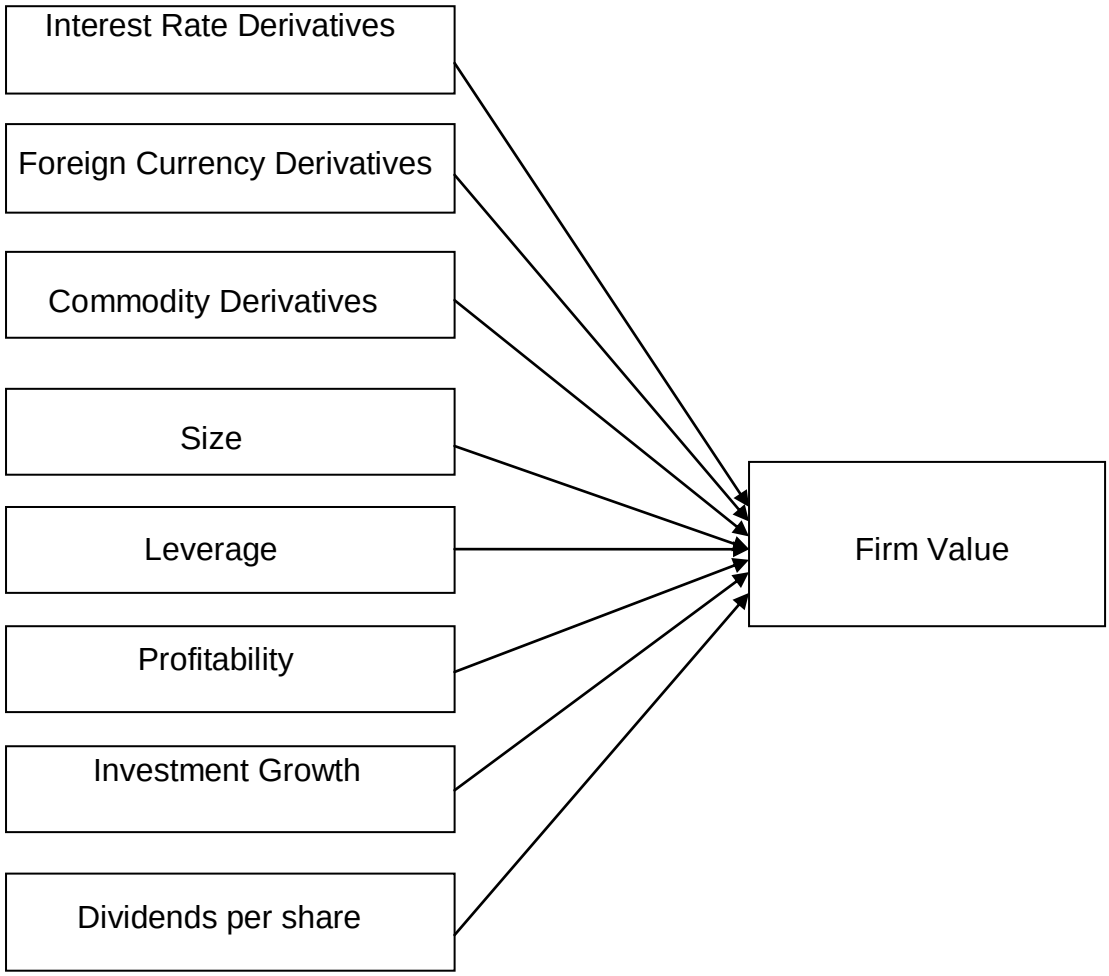
Since our research objectives are similar with that objectives founded in Khediri's research, thus we adopted the formula used by Khediri's.

Our multivariate analysis is as below:

$$\text{Tobin's Q} = \beta_1 + \beta_2\,\text{DUMINT} + \beta_3\,\text{DUMCOM} + \beta_4\,\text{DUMCUR} + \beta_5\,\text{SIZE} + \beta_6\,\text{LEV} + \beta_7\,\text{ROA} + \beta_8\,\text{ROE} + \beta_9\,\text{INVG} + \beta_{10}\,\text{DPS}$$

β_1	= Constant
β_2 DUMINT	= 1 if firm using interest rate derivative and 0 otherwise
β_3 DUMCOM	= 1 if firm using commodity derivative and 0 otherwise
β_4 DUMCUR	= 1 if firm using currency derivative and 0 otherwise
β_5 SIZE	= Log of total assets
β_6 LEV	= Leverage; calculated by total debt divided by total equity
β_7 ROA	= Return on asset; calculated by net income divided by total assets
β_8 ROE	= Return on equity; calculated by net income divided by shareholders' equities
β_9 INVG	= Investment growth; calculated by capital expenditure divided by market value of firm
β_{10} DPS	= Dividend per share

Figure 3.1: Conceptual Framework



3.5.3 White Heteroskedasticity-Consistent Standard Error and Covariance

Heteroskedasticity-consistent standard errors and covariance has been used to deal with the problem of heteroskedasticity by producing more normally-distributed standard errors.

3.5.4 Panel Data Techniques

Panel data, also called longitudinal data or cross sectional time series data, are data where multiple cases were observed at two or more time periods. In this study, panel data technique is used and different empirical models are considered. Most other studies assume is used and different empirical models are considered. Most other studies assume that the unobservable individual effect is zero and use a pooling regression to estimate the Tobin's Q equation. The assumption of zero unobservable individual effect is too strong that there is large heterogeneity across firms. To control for individual firms heterogeneity, we employ a random effect as well as fixed effect model.

-FIXED EFFECT MODEL

Fixed effects model is the model to use when you want to control for omitted variables that differ between cases but are constant over time. It lets you use the changes in the variables over time to estimate the effects of the independent variables on your dependent variable, and is the main technique used for analysis of panel data.

There are five assumptions under this model:

i. Assumed that intercept and slopes are the same over time and individuals and the error term captures over time and individuals.

ii. Assumed the slope coefficients are constant but the intercept varies over individuals.

iii. Assumed the slope coefficients are constant but the intercept varies over individual and time.

iv. Assumed that all coefficients vary over individuals.

v. Assumed the intercept and coefficients vary over individual and time.

The model is adequate if we want to draw inferences only about the examined individuals.

$$Y_{i,t} = \alpha_i + x_{i,t}\beta + e_{i,t}$$

$Y_{i,t}$ = dependent variable

α_i = unobserved random variable characterizing each unit of observation

$x_{i,t}$ = vector of observable random variables

β = vector of parameter of interest

$e_{i,t}$ = stochastic error uncorrelated with x

-RANDOM EFFECT MODEL

The random effect model is the model to use when there are some omitted variables may be constant over time but vary between cases, or there are some omitted variables that may be fixed between cases but vary over time.

The key assumption under this model is there are unique, time constant attributes of individuals that are the results of random variation and do not correlate with the individual regressors. This model is adequate, if we want to draw inferences about the whole population, not only the examined sample.

If the cross section data are “drawn” from a large population, they may not act in a similar way with respect to the independent variable.

Start with basic model

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + u_{it}$$

Instead of treating β_1 as fixed, we assume that it is a random variable with a mean value of β_1, and the intercept value for an individual company can be expressed as

$$\beta_{1i} = \beta_1 + \varepsilon i \qquad i = 1,2,...,50$$

Where εi is a random error term with a mean value of zero and variance of σ_e^2

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_i + u_{it}$$

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + w_{it}$$

The composite error term w_{it} consists of two components, εi which is the cross section, or individual-specific, error component, and u_{it}, which and is the combined times series and cross section error component.

In ECM (random effect model), the intercept β_1 represents the mean value of the entire cross sectional intercepts and the error component εi represents the (random) deviation of individual intercept from this mean value.

3.5.5 Hausman Specification Test

Hausman specification test (Hausman, 1978) was conducted to statistically test which empirical model is most suitable for estimating Tobin's Q equation. The test evaluated the significance of an estimator versus an alternative estimator. It helped one evaluate if a statistical model corresponds to the data.

3.6 Hypotheses Development

3.6.1 Interest Rate Derivatives

Singh (2009) found that lodging firms were positively exposed to interest rate risk. According to him, smaller unrated firms tend to benefits from lower cost of financing, financial distress and interest rate exposure if a firm issue floating debt and swapping into fixed-rate debt. By contrast, firms with high debt ratings were more likely to issue fixed-rate debt and swap into floating-rate debt. In short, the results supported the conclusion that the yield spread has a positive and significant effect on swap usage. In addition, Batram *et al.* (2006) also discovered that only the firm that using interest rate derivatives had a positive valuation effect. Moreover, Covitz and Sharpe (2005) investigated that smaller firms have more exposure on interest rate from their liabilities compared to the larger firms. Therefore, smaller firms tend to use derivative to neutralize their interest rate exposures whereas, larger firms will use their choice of debt structure to limit the interest rate exposures rather than with derivatives.

However, the authors examined non-financial firms with their use of commodity derivatives, currency and interest rate, and their finding showed a negative impact of interest rate derivatives on firm value (Nelson *et al.,* 2005). Besides, Nguyen and Fatt (2007) also found that there was an adverse relationship between firm value and derivatives use. They investigated both the relationship between firm value and aggregate measure of derivatives as well as the impact that individual types of derivatives potentially have on firm market value. Their result strongly indicated that the use of interest rate derivatives in particular and the use of derivatives in general lead to a reduction in firm value or a ‘derivative user’ discount.

As a result, different authors came out with different result regarding to the issue of whether the interest rate derivative can affect firm value. Some

authors found that there was a positive effect of interest rate derivatives on firm value and vice versa. Therefore, the hypothesis was proposed as:

H_1: Interest rate derivative is positively related to firm value

3.6.2 Foreign Currency Derivatives

Firms in the plantation, industrial product, trading services, and consumer products manufacturing sectors are the main users of the FCDs in Malaysia. From the research of Hentschel and Kothari (2000), they found there was no significant relationship between the volatility of a firm's stock price and the size of the firm's derivative position. Besides that, Magee (2009) suggested the foreign currency hedging has no impact on firm value after controlling for the dependence of foreign currency hedging on past amounts of firm.

Bartram et al. (2006) studied on the purpose of using derivatives by a firm. The firms with foreign currency transactions tend to use foreign currency derivatives, this is because foreign currency transaction normally comes with foreign currency risk. Once the risk has been hedged, shareholder wealth maximization will be achieved, therefore firm value will increase.
From the findings of Allayannis and Weston (1998), there was evidence that the use of currency derivative was in a positive association with the firm value. Besides that, Makar and Huffman (2008) found US foreign-denominated debt issuers could hedge short-term risk effectively by using foreign currency derivatives. Thus, we develop our research hypothesis as:

H_1: Currency derivative is positively related to firm value

3.6.3 Commodity Derivatives

From the research of Chang *et al.* (2005), they found that hedging activities in an operation has a significant impact on firm value. They conducted a study on the impact of hedging activities of Canadian oil and gas companies on their stock return and firm value for the period of 2000-2002. The impact of hedging on firm value was measured by Tobin's Q ratio by using both linear and nonlinear models. The result indicated that in particular hedging for gas, together with profitability, leverage and reserves has a significant impact on firm value.

Besides that, Bartram *et al.* (2006) also agreed that the use of commodity derivative will improve the firm value. They conducted a survey on the effect of derivative use on firms' risk measures and value by using a large sample of 6,888 non-financial firms from 47 countries. They found strong evidence that the use of financial derivatives reduced both total risk and systematic risk and there was a positive relationship of derivative used on firm value but not strong.

Another research from Carter *et al.* (2002) investigated jet fuel hedging behavior of firms in US airline industry during 1994-2000 to examine whether such hedging was a source of value for these companies. The result showed that they found evidence to support the view that airlines, on average, increased firm value by using derivatives to hedge against changes in jet fuel prices.

However, Jin and Jorion (2006) found that there was no difference in firm values between firms that hedge and firms that do not hedge. They used the sample of 119 U.S. oil and gas produce from 1998 to 2001 with the measurement of Q ratios.

Nelson *et al.* (2005) examined the annual stock performance of 1,308 U.S. firms over the period per year 1995-1999. They found that firms that hedge

outperformed other securities by 4.3 percent per year on average. However, they found no abnormal returns for firms hedging either interest rates or commodities.

From all the researchers' works stated as above, they have found a different answer about the issue of whether the firm value will be improved if the firm undergoing hedging activities. In common sense, if a firm was using derivative to hedge the firm's risk in a correct manner, theoretically it will reduce the firm's risk overall, then it should lead to firm value improvement. Thus, we developed the hypothesis as:

H_1: The commodity derivative is positively related to firm value

CHAPTER 4
DATA ANALYSIS

4.1 Descriptive Statistic

Table 4.1 to 4.4 provide a summary of the descriptive statistic of dependent variable (Tobin's Q) and independent variables (interest rate derivative, commodity derivative, currency derivative, ROA, ROE, firm size, leverage, investment growth and dividend per share) from year 2007 to 2009 and panel data which includes all the three years. The mean, median, maximum, and minimum of each variable are shown in the tables.

From the result of descriptive statistic of pooled data shown in Table 4.1, it showed that the mean (medium) of Tobin's Q was 0.8634 (0.5576). This indicated that the firm market value was less than the recorded value of the assets of the company, in other words Malaysia listed companies have been undervalued by the market. The profitability ratios (ROE and ROA) recorded a mean (medium) value of 0.1226 (0.11135) and 0.0794 (0.0664) respectively. While for the leverage, it has recorded the mean of 0.4046 which indicated that Malaysia listed companies in average financed their assets by debt in around 40.46 percent. In terms of dividend per share, it showed that Malaysia listed companies in average has paid out the dividend of RM 0.10 per shares to their shareholders. Lastly, the investment growth (ratio of CAPEX to market value of firm) has recorded the mean of 38.21 percent.

For the descriptive statistic of year 2007 shown in Table 4.2, it showed that the mean (medium) of Tobin's Q is 1.1462 (0.726980). This indicated that their market value was more than the recorded value of the assets of the company, in other words, Malaysia listed companies in average has been overvalued by the market in 2007. The profitability ratios (ROE and ROA)

recorded the mean (medium) value of 15.16 percent (13.18 percent) and 9.57 percent (7.28 percent) respectively. While the mean value of leverage was 0.2676777 which indicated that Malaysia listed companies on average financed their assets by debt in around 26.77 percent. In terms of the investment growth, it has recorded the mean of 26.04 percent. Lastly, Malaysia listed companies in average paid RM 0.10 dividends per share to their shareholders in 2007.

Followed by the descriptive statistic of 2008 shown in Table 4.3, it showed that the mean (median) of Tobin's Q ratio was 0.7369. This indicated that their market value was less than the recorded value of the assets of the company, in other words, Malaysia listed companies have been undervalued by the market. While the mean of profitability ratios (ROE and ROA) were 11.30 percent (11.68 percent) and 7.59 percent (6.80 percent) respectively. Whereas the mean of leverage was 0.56675 which indicated that 56.69 percent of the assets of Malaysia listed companies were financed by debt. In terms of the investment growth, the mean value was recorded at 0.523241 or 52.32 percent. Lastly, Malaysia listed companies in average have paid out dividend of RM 0.09 per share to their shareholders in 2008.

Lastly in Table 4.4, it shows the descriptive statistic for the year 2009. The mean of Tobin's Q for Malaysia listed companies was 0.7991, this indicated that the Malaysia listed companies in average has been undervalued by the market in 2009. The profitability ratios (ROE and ROA) have recorded a mean (median) value of 10.32 percent (9.64 percent) and 6.66 percent (5.69 percent) respectively. Whereas the mean value of leverage was 0.379421 which indicated that 37.94 percent of the assets of Malaysia listed companies were financed by debt. In terms of the investment growth, the mean value was recorded at 36.28 percent. Besides that, Malaysia listed companies in average has paid out the dividend of RM 0.11 per share to their shareholders in 2009.

Table 4.1: Descriptive Statistic for Pooled Data

	TOBIN'S Q	SIZE	ROE	ROA	LEVERAGE	INVESTMET GROWTH	DPS
Mean	0.863412	9.026994	0.122577	0.079398	0.404621	0.382106	0.101050
Median	0.557654	8.969425	0.111350	0.066443	0.124200	0.101006	0.040000
Maximum	8.836000	10.85350	2.326960	2.701200	34.36550	8.787456	2.450000
Minimum	-0.403709	5.842217	-1.890900	-0.412100	-0.684500	0.000100	0.000000
Std. Dev.	1.070044	0.572208	0.220637	0.127190	1.327634	0.767974	0.211906
Skewness	3.243932	-0.036297	1.003207	10.09638	19.28258	4.353325	5.873345
Kurtosis	17.71621	6.593048	47.88707	205.1491	479.5712	30.50664	49.73962
Jarque-Bera	9699.715	484.3223	75707.81	1547700.	8572776.	31215.79	87096.64
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	777.0706	8124.295	110.3197	71.45822	364.1589	343.8953	90.94500
Sum Sq. Dev.	1029.350	294.3524	43.76378	14.54348	1584.588	530.2163	40.36875
Observations	900	900	900	900	900	900	900

Table 4.2: Descriptive Statistic for 2007

	TOBIN'S Q	SIZE	ROE	ROA	LEVERAGE	INVESTMENT GROWTH	DPS
Mean	1.146171	8.968566	0.151579	0.095665	0.267677	0.260382	0.101677
Median	0.726980	8.926669	0.131750	0.072769	0.096440	0.077100	0.040000
Maximum	20.13330	10.83070	2.326960	2.701200	3.044900	2.273400	2.450000
Minimum	-0.290100	5.842217	-0.673300	-0.405100	-0.684500	0.000100	0.000000
Std. Dev.	1.687333	0.621360	0.224883	0.176707	0.457681	0.447515	0.221612
Skewness	6.078472	-0.556215	5.274280	10.87435	3.128022	2.684497	6.473189
Kurtosis	58.94660	7.656380	51.26643	159.5770	15.28245	10.15063	58.02580
Jarque-Bera	40972.66	286.4922	30511.50	312366.9	2374.958	999.4693	39943.09
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	343.8514	2690.570	45.47378	28.69947	80.30315	78.11474	30.50310
Sum Sq. Dev.	851.2811	115.4404	15.12115	9.336368	62.63222	59.88058	14.68445
Observations	300	300	300	300	300	300	300

Table 4.3: Descriptive Statistic for 2008

	TOBIN'S Q	SIZE	ROE	ROA	LEVERAGE	INVESTMENT GROWTH	DPS
Mean	0.736890	9.037429	0.112971	0.075936	0.566765	0.523241	0.092842
Median	0.430700	8.962243	0.116800	0.068019	0.168000	0.129129	0.040000
Maximum	9.396400	10.84410	1.995400	0.726900	34.36550	8.787456	1.450000
Minimum	-0.403709	5.843506	-1.890900	-0.412100	0.000000	0.000200	0.000000
Std. Dev.	1.098916	0.557227	0.234531	0.096291	2.149144	1.051162	0.173482
Skewness	4.328630	0.081503	-1.428010	0.521425	13.34520	3.805062	4.356782
Kurtosis	28.90108	6.574752	41.79082	14.91633	206.2192	21.51589	27.33534
Jarque-Bera	9322.676	160.0678	18911.05	1788.581	525130.2	5009.400	8351.690
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	221.0671	2711.229	33.89115	22.78073	170.0295	156.9723	27.85270
Sum Sq. Dev.	361.0775	92.84013	16.44644	2.772314	1381.027	330.3772	8.998677
Observations	300	300	300	300	300	300	300

Table 4.4: Descriptive Statistic for 2009

	TOBIN'S Q	SIZE	ROE	ROA	LEVERAGE	INVESTMENT GROWTH	DPS
Mean	0.799126	9.074988	0.103184	0.066594	0.379421	0.362754	0.108714
Median	0.493094	8.984830	0.096361	0.056944	0.122650	0.099450	0.040000
Maximum	8.750100	10.85350	1.700000	0.697100	5.120300	4.805500	2.360000
Minimum	-0.212900	7.835988	-1.858000	-0.410700	0.000000	0.000879	0.000000
Std. Dev.	0.982379	0.531055	0.198686	0.087756	0.652305	0.657876	0.235930
Skewness	3.615790	0.776749	-1.232071	1.374339	3.306734	3.174749	5.664781
Kurtosis	22.31386	3.626742	48.51502	16.84041	17.35362	15.14826	43.81736
Jarque-Bera	5316.511	35.07698	25971.12	2488.903	3122.054	2348.705	22430.20
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	239.7377	2722.496	30.95513	19.97807	113.8263	108.8263	32.61420
Sum Sq. Dev.	288.5555	84.32395	11.80331	2.302620	127.2249	129.4076	16.64324
Observations	300	300	300	300	300	300	300

4.2 Pearson Correlation

Table 4.5 reports the Pearson correlation coefficients between the dependent variable (Tobin's Q) and explanatory variables. It reported a set of bivariate correlation coefficients results between Tobin's Q and all independent variables. Tobin's q, proxy of the firm value, was negatively and significantly correlated with interest rate derivative used at 5 percent level but was positively correlated with commodity and currency derivatives used. The correlation between interest rate derivative and Tobin's Q was only -0.07.

On the other hand, the correlation between Tobin's Q and commodity derivative was 0.011; whereas the correlation between Tobin's Q and currency derivatives was 0.03. ROA, ROE and DPS were found positively and significantly correlated with firm value at 1 percent level. The correlation between firm value and ROA was high at 0.517. While the correlation between firm value and ROE was also high at 0.475. The correlation between DPS and firm value was 0.456. Besides, firm size was also found to be negatively correlated with firm value where the correlation between the two variables was -0.059. On the other hand, firm value was negatively and significantly correlated with leverage and investment growth at 1 percent level. The correlation between firm value and leverage was -0.101. While the correlation between Tobin's Q and investment growth was -0.117.

4.3 Ordinary Least Square Result

At first, we conducted a simple ordinary least square (OLS) as shown in Table 4.6. It presented the detail of OLS results with and without the adjustment of heteroskedasticity in 2007, 2008, 2009 and pooled data. The results were separated into two columns for each years and pooled

data. One is the normal OLS results before the adjustment of heteroskedasticity (OLS) while the other one is the OLS results with the adjustment of heteroskedasticity (With H-C).

The firm size was significantly (0.05) and negatively related with firm value in 2007 without the adjustment of heteroskedasticity but insignificant with the adjustment of heteroskedasticity. This indicated that the firm value would decrease as its firm size to increase. However in 2008, both OLS with and without the adjustment of heteroskedasticity were significant positively related to firm value at one percent and five percent level of significance. Whereas the result in 2009 showed that it was not significant at all. In the pooled data, negative relationship was significantly (0.01) shown on both with and without the adjustment of heteroskedasticity.

In terms of return on equity (ROE), it was not significant in all the three years and pooled data with and without the adjustment of heteroskedasticity. In terms of the return on assets (ROA), the result showed that it was significantly and positively related to firm value in all the three years and also pooled data.

Besides that, both of the leverage and Investment growth were not significant in all the three years and pooled data without the adjustment of heteroskedasticity. As for dividend per share, it was significantly and positively related to firm value with and without the adjustment of heteroskedasticity in all the years (except 2008) and pooled data. It was consistent with the findings of Lang and Litzenberger (1989), Azhagaiah and Priya (2008), and Lintner (1956). They suggested that dividend announcement would affect the stock price of a firm, because market believed that valuable information about the firm future prospect and growth could be conveyed by an announcement of dividend.

In terms of the three types of derivatives, the commodity derivative was not significant in all the 3 years and also pooled data. While for the foreign

currency derivative, it was only significant in 2007 and this was consistent with the finding of Allayannis and Weston (2001), and Bartram *et al* (2006) which stated that FCD has significant impact (positive effect) on firm market value.

Whereas for the interest rate derivative, it was only the one of the derivatives which has the negative impact on firm value in 2007, 2008 and pooled data with the adjustment of heteroskedasticity. Our result supported the finding of Khediri (2010) in which there was a negative relationship between interest rate derivatives and firm value. However, this was not consistent with the findings of Singh (2009), and Batram *et al* (2006) which pointed out that firm that using interest rate derivatives have a positive valuation effect.

Table 4.5: Pooled Correlation Matrix

	Tobin's Q	Interest rate Derivatives	Commodity Derivatives	Currency Derivatives	Size	Leverage	ROA	ROE	Investment Growth	DPS
Tobin's Q	1	**-0.070***	0.011	0.030	-0.059	**-0.101****	**0.517****	**0.475****	**-0.117****	**0.456****
		0.037	0.740	0.361	.0075	0.003	0.000	0.000	0.000	.000
Interest rate Derivatives		1	**0.115****	**0.176****	**0.188****	**0.082***	0.000	0.038	0.001	-0.011
			0.001	0.000	0.000	0.014	0.999	0.251	0.984	0.750
Commodity Derivatives			1	**0.132****	0.044	-0.004	0.029	0.051	-0.031	0.044
				0.000	0.184	0.916	0.377	0.125	0.351	0.188
Currency Derivatives				1	**0.070***	0.009	0.033	**0.077***	**-0.069***	**0.158****
					0.035	0.794	0.329	0.021	0.037	0.000
Size					1	**0.176****	**-0.067***	-0.002	0.055	**0.095****
						0.000	0.046	0.948	0.101	0.004
Leverage						1	**-0.135****	**-0.114****	**0.406****	**-0.084***
							0.000	0.001	0.000	0.011
ROA							1	**0.802****	**-0.139****	**0.341****
								0.000	0.000	0.000
ROE								1	**-0.111****	**0.413****
									0.001	0.000
Investment Growth									1	**-0.110****
										0.001
DPS										1

***p<0.05, **p<0.01**

Table 4.6: Regression Results of the Factors That Affect Firm Value

Variable	**2007**		**2008**		**2009**		**Pooled**	
	OLS	**With H-C**	**OLS**	**With H-C**	**OLS**	**With H-C**	**OLS**	**With H-C**
Constant	4.1055	4.1055	-1.5763	-1.5763	0.7463	0.7463	1.3817	1.3817
Size	**-0.3730****	-0.3730	**0.2129****	**0.2129*****	-0.0543	-0.0543	**-0.099***	**-0.0990***
	(0.1578)	(0.2512)	(0.1060)	(0.0775)	(0.0863)	(0.0863)	(0.0522)	(0.0530)
ROE	0.6464	0.6464	-0.4545	-0.4545	-0.2871	-0.2871	0.3083	0.3083
	(0.9107)	(1.0690)	(0.4918)	(0.9300)	(0.3266)	(0.4462)	(0.2251)	(0.5300)
ROA	1.3670	**1.3670***	**5.8683*****	**5.8682*****	**6.2989*****	**6.2989*****	**2.9688*****	**2.9688*****
	(1.0740)	(0.7236)	(1.2728)	(1.6088)	(0.7827)	(1.6668)	(0.3806)	(1.0564)
Leverage	-0.0708	-0.0708	-0.0022	-0.0022	0.0724	0.0724	0.0051	0.0051
	(0.2199)	(0.1207)	(0.0304)	(0.0211)	(0.0723)	(0.0601)	(0.0240)	(0.0146)
Investment Growth	-0.1661	**-0.1661***	0.0663	0.0663	0.0469	0.0469	-0.0393	-0.0393
	(0.2041)	(0.0971)	(0.0623)	(0.0413)	(0.0645)	(0.0582)	(0.0411)	(0.0287)
DPS	**1.7382*****	**1.7382*****	0.5729	0.5729	**1.2593*****	**1.2593*****	**1.5908*****	**1.5908*****
	(0.5055)	(0.4439)	(0.3685)	(0.4377)	(0.2094)	(0.3318)	(0.1512)	(0.2516)
Commodity Derivative	-0.2274	-0.2274	0.0979	0.0979	0.0502	0.0502	-0.0155	-0.0155
	(0.3908)	(0.2353)	(0.0989)	(0.1163)	(0.1694)	(0.1144)	(0.0753)	(0.0366)
Currency Derivative	**0.4722****	0.4722	-0.0687	-0.0687	-0.0596	-0.0596	-0.055	-0.055
	(0.2096)	(0.3305)	(0.1246)	(0.1297)	(0.0935)	(0.0793)	(0.0645)	(0.0609)
Interest rate Derivative	-0.3845	**-0.3845****	**-0.402*****	**-0.402*****	-0.0563	-0.0563	**-0.1487***	**-0.1487****
	(0.2396)	(0.1556)	(0.1458)	(0.1075)	(0.1105)	(0.0923)	(0.0760)	(0.0712)
R^2	0.1905	0.1905	0.2425	0.2425	0.4993	0.4993	0.3650	0.3650
F-test	**7.5826*****	**7.5826*****	**10.3172*****	**10.3172******	**32.1267*****	**32.1267*****	**56.8381*****	**56.8381*****

*sig at 0.1, **sig at 0.05, ***sig at 0.01, std error are given in parentheses
Dependent variable: Firm Value (Tobin's Q)

4.4 Pooled Data Analysis

In this study, panel data technique was used. Table 4.7 shows the regression results of the model that examines the effect of the use of derivative on firm value. The model was derived based on pooled effect (PE), fixed effect (FE), and random effect (RE) methods. The original results of all the three methods that generated from E-view are shown in Appendix 1 (PE), Appendix 2 (FE), and Appendix 3 (RE). In order to choose which model is more suitable for estimating Tobin's Q equation, the Hausman specification test (Hausman, 1978)[15] as shown in Table 4.8 was conducted to statistically test these three methods. If the model is correctly specified and individual effect are uncorrelated with the dependent variable, the fixed effect and random effect estimators should not be statistically different. The statistic reported in Table 4.8 showed that the null hypothesis, the individual effects were uncorrelated with the other regressors and was rejected in one percent significance level. The result suggested that the fixed effect model was most appropriate in estimating the Tobin's Q equation.

From the results derived from fixed effect model, firm size was found to be significantly and negatively related to the firm value. This represented the larger the firm size, the lower the firm value. Our result supported the findings of Mak and Kusnadi (2005) in which there was an inverse relationship between firm value and firm size. However, it was not consistent with the findings of Ushijima (2003) in which the value of firm increased with its firm size.

Besides, we have observed a significant positive relationship between the leverage and firm value. It was consistent with the findings of Ward and Price (2006). They indicated that an increase in debt-equity ratio, shareholder returns would also to increase. However, Salehi and Biglar

[15] Hausman, J. (1978). Specification tests in econometrics, *Econometrica*, 46, 1251-1271.

(2009), and Rayan (2008) concluded that firm value and firm leverage were negatively correlated.

Furthermore, there was a significant positive relationship between firm value and ROA at one percent level of significance. Modigliani and Miller (1958) stated that a firm's value could be maximized by using more debt in its capital structure; debt allowed firm to decrease their average cost of capital and enhance profitability as long as its ROA was greater than the before-tax interest paid on debt. ROE was found to be insignificant in determining the firm value.

In addition, we found that there was a negative relationship between firm value and investment growth at one percent level of significance. According to research done by Chung *et al.* (1998), market perceived that firms with low Tobin's Q ratios having a lack of valuable or low profitable investment opportunities, therefore market reactions generally less positive about the announcements of capital expenditures increase by such firm; but tend to view favorably if it reduced capital expenditures. During the period of 2007-2009, Malaysia's economy has been badly affected by the US subprime crisis, therefore the market may perceived the company within the country has lack of valuable investment opportunity and did not feel optimistic if firms increased their capital spending.

The results indicated that the dividend was positively related to firm value and statistically significant at five percent level. It was consistent with the findings of Lang and Litzenberger (1989), Azhagaiah and Priya (2008), and Lintner (1956). They suggested that an announcement of dividend will increase the stock price and vice versa. The reason was, managers were believed to hold reliable insider information about the future financial position of a company and they could convey this information to investor through dividend distributions. Thus, an announcement of a dividend was believed to convey certain valuable information about the firm future prospect and growth to the public.

In terms of the three types of derivatives, the results showed that interest rate derivative has no significant impact on firm value. It was consistent with the findings of Nelson *et al.* (2005). However, Singh found that lodging firms were positively exposed to interest rate risk. Therefore a further empirical research should be conducted on this argument.

Besides that, the commodity derivative was also insignificant related to the firm value. This result was consistent with the research of Jin and Jorion (2004), they found that hedging did not affect firm value and there were no differences in firm's value between firm that hedge and firm that did not hedge. Besides that, Nelson *et al.* (2005) also found out there was no abnormal return for firms hedging either by interest rate or commodity derivatives.

From the regression result, only the currency derivative was significantly related to the firm value; however, it was in negative relationship. This indicated that if the firms used FCD, they might experience loses. This was inconsistent with the finding of Allayannis and Weston (2001) and Bartram *et al.* (2006). The later researchers pointed out FCD has a significant positive effect on firm market value. However, our result supported the finding of Khediri (2010) in which derivative has a negative relationship with the firm value.

Furthermore, Nguyen and Faff (2003) discovered that the impact of FCD usage on exchange risk exposure was generally weak and lacks consistency. Bartram *et al.* (2004) revealed evidence of positive value effect of general derivatives use but only limited for firms without exposure. The impact of FCD usage, in particular, was found to be insignificant. Bodnar, Haty and Marston (1996)[16] provided extensive survey evidence on corporate derivatives use. Their evidence suggested that firms typically hedged with derivatives but did so imperfectly.

[16] Bodnar, G.M., Haty, G.S., & Marston, R.C. (1996). 1995 Wharton survey of derivatives usage by U.S. non-financial firms. *Financial Management,* 25(4), 113-133.

Table 4.7: Pooled Data Analysis of Value Effects of Derivatives Use Decision

Variables	**Pooled**	**Fixed**	**Random**
Constant	1.3817	3.0906	2.1403
Size	**-0.0990***	**-0.2528*****	**-0.1626*****
	(0.0522)	(0.0854)	(0.058)
ROE	0.3083	-0.3049	-0.0172
	(0.2251)	(0.1927)	(0.1753)
ROA	**2.9688*****	**1.7880*****	**2.1103*****
	(0.3806)	(0.3117)	(0.2889)
Leverage	0.0051	**0.0432****	0.0231
	(0.0240)	(0.0219)	(0.0192)
Investment Growth	-0.0393	**-0.2507*****	**-0.1639*****
	(0.0411)	(0.0509)	(0.0404)
DPS	**1.5908*****	**0.3811****	**1.1048*****
	(0.1512)	(0.1782)	(0.1411)
Commodity Derivative	-0.0155	0.0045	-0.0005
	(0.0753)	(0.0650)	(0.0594)
Currency Derivative	-0.055	**-0.2134***	-0.0846
	(0.0645)	(0.1261)	(0.0766)
Interest rate Derivative	**-0.1487***	0.2885	-0.0384
	(0.0760)	(0.1867)	(0.0958)
R^2	0.365	0.8579	0.2091
Hausman Test			0.0000
F-test	**56.8381*****	**11.5807*****	**26.1374*****

*sig at 0.10, **sig at 0.05, ***sig at 0.01, std error are given in parentheses
Dependent Variable: Firm Value (Tobin's Q)

Table 4.8: Hausman Specification Test

Correlated Random Effects - Hausman Test
Pool: HM
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	111.869283	9	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INTDERIVATIVES?	0.288476	-0.038449	0.025644	0.0412
COMDERIVATIVES?	0.004511	-0.000506	0.000699	0.8495
CURDERIVATIVES?	-0.213413	-0.084614	0.010048	0.1988
SIZE?	-0.252805	-0.162597	0.003943	0.1508
LEVERAGE?	0.043157	0.023077	0.000108	0.0534
ROA?	1.788026	2.110258	0.013711	0.0059
ROE?	-0.304914	-0.017187	0.006400	0.0003
INVESGROWTH?	-0.250748	-0.163891	0.000954	0.0049
DPS?	0.381134	1.104780	0.011865	0.0000

CHAPTER 5
CONCLUSION

5.1 Conclusion

The study examined the impact of derivatives on the sample of 300 Malaysia non-financial firms over the period 2007-2009. From the regression results, we concluded that interest rate derivatives and commodity derivatives have no significant impact on firm value, this result supported the finding of Nelson *et al.* (2005) in which the usage of these two derivatives have no effect on the firm's market value. On the other hand, the currency derivatives were partially significant but it is negatively related to the firms' market value. In other words, if the firm performs hedging activities by using currency derivatives, it will lower down its market value. This result was inconsistent with the findings of Allayannis and Weston (2001), Pramborg (2003), Nelson *et al.* (2005), and Allayannis *et al.* (2009). However, from the research of Nguyen and Faff (2003) they found currency derivatives usage was generally weak and lack consistent.

In terms of other explanatory variables, firm size and investment growth have a strong significant impact on firm value but in negative relationship. For leverage, ROA, and dividend per share, there were significant positively related to the firms' market value.

Therefore, we made a conclusion for the hypotheses that we developed in chapter 3:

1. Interest rate derivatives: Do not reject H_0. There is no evidence shows that interest rate derivative is positively related to firm value.

2. Currency derivatives: Do not reject H_0. There is no evidence shows that currency derivative is positively related to firm value.

3. Commodity derivatives: Do not reject H_0. There is no evidence shows that commodity derivative is positively related to firm value.

From the results, it seems like the hedging activities is independent from the management especially both of the commodity and interest rate derivatives. While for the currency derivatives is valued at a discount. The question of why currency derivatives use is valued at discount in Malaysia deserves further research.

5.2 Implications

Our results showed that the use of financial derivatives towards the potential impact on firms value in a broad sample of non-financial firms from 2007 to 2009. The result from the finding may be implying that how the firms truly use of financial derivatives and shareholder value influence by the finance policy.

From the regression results, the interest rate derivatives and commodity derivatives were not significantly and positively related to firm value, this implied that the use of interest rate derivatives and commodity derivatives did not have any impact on firms market value, hence whether or not the company has used these two derivatives would not improve company value and maximize shareholder wealth. Shareholder may find that interest rate derivatives and commodity derivatives are useless for firms and request management team to cut off the expenditure spend on derivatives and transfer the capital to other more profitable investments. Even result showed insignificant, it is still consistent with the findings of Nelson *et al.* (2005) and Khediri (2010) but it is inconsistent with other finding such as Ameer (2009), Covitz and Sharpe (2005), Bartram et al. (2006), Carter *et al.* (2002).

The currency derivative was partially significant but it was negatively related to the firms' market value. In other words, the currency derivatives has a negative impact on Malaysia's firm value, which means if the firm performs hedging activities by using currency derivatives, it will lower down its market value. This implies that management of the company may avoid using currency derivatives. Unlike interest rate and commodity derivatives, shareholder may avoid to invest in firms that use currency derivative as policy in managing currency risk. Firms with currency risk may have to choose other instruments to hedge the risk or alternative method to minimize it. Our result did not consistent with the findings of Allyannis and Weston (2001), Pramborg (2003), Nelson et al. (2005), and Allyannis *et al.* (2009). However, from the research of Nguyen and Faff (2003) they found currency derivatives usage was generally weak and lack consistent.

5.3 Limitations and Recommendations

We find some limitations on this study. Firstly, our data collection process was only restricted on companies' financial reports. All of the data that we needed in the research was based on the financial information of the Malaysia top 300 non-financial firms. Therefore, we collected the data such as derivative usage, ROA, total assets, market capitalization, net profits, current liabilities and others by looking at the companies' financial report one by one. This was time consuming because we need to collect the financial data of 300 companies for 3 years. Besides that, the financial report is less accuracy in communicating the real value of the enterprise and its future performance potential. Therefore, in order to improve the accuracy of the data that we collected, our suggestion is to use the online databases which are chargeable, such as OSIRIS and Bursa Station. These two online databases provide the financial statements for all the Malaysia companies in detailed. It will also show the financial reports of a particular company for few years in a page, it is easier for the analyst to collect data and compare the performance of a company across the time

series. However, these two online databases are chargeable, we have to pay before we can access to it.

Secondly, differences in accounting methods between companies will make it difficult in comparing the performance of the companies. For example, some firms may use LIFO method to prepare their financial report while some may use average cost method. Then direct comparison of financial data such as cost of goods sold between two companies may be misleading. The misleading value of cost of goods sold will have an impact on the gross profit and hence the net profit. Thus, it will lower down the accuracy of analysis by comparing the companies with different accounting method.

Besides that, some of the journals are chargeable. In Chapter 2, we conducted a literature review by reading on the journals that done by other researchers on the topic which was similar to our research. For some of the important journal which is directly discussing their findings on the impact on derivatives on firm value, we only found its paragraph of abstract but not in full journals, we are required to pay for it prior to access to the whole journals. Students may not afford to pay for it. Our suggestion is that the faculty should provide more and more free trial accessing to the external database which could let the students easily find the journals in completing their thesis.

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APPENDICES

Appendix 1: Result of Pooled Effect

Dependent Variable: TOBINSQ?
Method: Pooled Least Squares
Date: 03/01/11 Time: 18:38
Sample: 2007 2009
Included observations: 3
Cross-sections included: 300
Total pool (balanced) observations: 900

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.381719	0.468759	2.947609	0.0033
INTDERIVATIVES?	-0.148699	0.076007	-1.956399	0.0507
COMDERIVATIVES?	-0.015490	0.075347	-0.205578	0.8372
CURDERIVATIVES?	-0.054995	0.064544	-0.852067	0.3944
SIZE?	-0.099007	0.052188	-1.897131	0.0581
LEVERAGE?	0.005128	0.024043	0.213266	0.8312
ROA?	2.968806	0.380586	7.800624	0.0000
ROE?	0.308347	0.225074	1.369983	0.1710
INVESGROWTH?	-0.039265	0.041087	-0.955676	0.3395
DPS?	1.590784	0.151171	10.52305	0.0000

R-squared	0.364986	Mean dependent var	0.863412
Adjusted R-squared	0.358564	S.D. dependent var	1.070044
S.E. of regression	0.856995	Akaike info criterion	2.540280
Sum squared resid	653.6521	Schwarz criterion	2.593640
Log likelihood	-1133.126	Hannan-Quinn criter.	2.560664
F-statistic	56.83813	Durbin-Watson stat	0.820250
Prob(F-statistic)	0.000000		

Appendix 2: Result of Fixed Effect

Dependent Variable: TOBINSQ?
Method: Pooled Least Squares
Date: 03/01/11 Time: 18:45
Sample: 2007 2009
Included observations: 3
Cross-sections included: 300
Total pool (balanced) observations: 900

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.090641	0.769901	4.014335	0.0001
INTDERIVATIVES?	0.288476	0.186593	1.546018	0.1226
COMDERIVATIVES?	0.004511	0.065038	0.069360	0.9447
CURDERIVATIVES?	-0.213413	0.126143	-1.691834	0.0912
SIZE?	-0.252805	0.085447	-2.958603	0.0032
LEVERAGE?	0.043157	0.021865	1.973835	0.0489
ROA?	1.788026	0.311705	5.736271	0.0000
ROE?	-0.304914	0.192656	-1.582683	0.1140
INVESGROWTH?	-0.250748	0.050890	-4.927235	0.0000
DPS?	0.381134	0.178242	2.138289	0.0329
Fixed Effects (Cross)				
1--C	0.301243			
2--C	0.323240			
3--C	0.414843			
4--C	-0.226266			
5--C	0.900720			
6--C	0.407761			
7--C	2.794695			
8--C	0.876661			
9--C	0.640940			
10--C	0.891262			
11--C	-0.128941			
12--C	-0.010897			
13--C	6.764876			
14--C	0.126781			
15--C	0.096075			
16--C	2.867060			
17--C	0.105850			
18--C	4.707487			
19--C	-0.516373			
20--C	-0.235599			
21--C	-0.350889			
22--C	-0.168716			
23--C	0.387331			
24--C	0.580395			
25--C	0.027387			
26--C	-0.097769			
27--C	1.768882			
28--C	0.351990			
29--C	0.110320			
30--C	1.452386			

31--C	0.865832
32--C	0.066042
33--C	-0.300108
34--C	0.826531
35--C	-0.377849
36--C	0.298821
37--C	-0.254500
38--C	-0.105425
39--C	1.936487
40--C	0.090427
41--C	1.123728
42--C	-0.615710
43--C	-0.328558
44--C	-0.517337
45--C	0.420870
46--C	-0.144103
47--C	-1.039050
48--C	1.340976
49--C	-0.137368
50--C	-0.281652
51--C	-0.332505
52--C	-0.277337
53--C	0.064760
54--C	0.684611
55--C	-0.228950
56--C	0.257205
57--C	0.401800
58--C	1.791787
59--C	-0.149544
60--C	2.164580
61--C	-0.440664
62--C	0.092259
63--C	0.748344
64--C	0.739806
65--C	0.006138
66--C	1.244382
67--C	0.858343
68--C	0.386741
69--C	1.418879
70--C	0.423631
71--C	0.711054
72--C	0.211605
73--C	1.832551
74--C	1.427216
75--C	0.509018
76--C	0.649600
77--C	0.488031
78--C	0.464006
79--C	0.289630
80--C	2.891073
81--C	0.854196
82--C	0.932140
83--C	0.437455

84--C	0.112123
85--C	-0.188489
86--C	-0.100831
87--C	-0.148119
88--C	3.543283
89--C	0.732303
90--C	0.328476
91--C	0.548549
92--C	-0.211429
93--C	0.312736
94--C	0.119293
95--C	0.744009
96--C	0.497300
97--C	0.686946
98--C	0.738498
99--C	0.212651
100--C	0.854341
101--C	0.880783
102--C	-0.023158
103--C	0.293555
104--C	0.342462
105--C	1.137522
106--C	1.157321
107--C	0.428442
108--C	0.069574
109--C	0.476993
110--C	0.051904
111--C	0.210015
112--C	2.226218
113--C	0.716392
114--C	0.736729
115--C	0.615652
116--C	0.426039
117--C	1.356178
118--C	-0.595799
119--C	0.081541
120--C	1.188969
121--C	-0.476879
122--C	-0.503446
123--C	-0.125268
124--C	-0.469239
125--C	-0.289715
126--C	-0.517805
127--C	-0.173951
128--C	-0.735252
129--C	-0.095181
130--C	-0.283080
131--C	-0.843831
132--C	-0.422299
133--C	-0.403663
134--C	-0.805084
135--C	-0.907993
136--C	-0.177528

137--C	-0.839133
138--C	-0.567085
139--C	-0.371744
140--C	0.370768
141--C	-0.744399
142--C	-0.291946
143--C	-0.513954
144--C	0.435673
145--C	-0.319179
146--C	-0.530779
147--C	0.873075
148--C	0.564812
149--C	0.176746
150--C	-1.204041
151--C	-0.383972
152--C	-0.682271
153--C	-0.560246
154--C	0.063033
155--C	-0.044211
156--C	-0.903405
157--C	-0.201357
158--C	0.453771
159--C	-0.123317
160--C	1.678678
161--C	-0.619737
162--C	-0.617862
163--C	-0.770390
164--C	-0.887731
165--C	-1.175807
166--C	-1.293682
167--C	-0.795160
168--C	0.145443
169--C	-0.417252
170--C	-0.080232
171--C	-0.882661
172--C	-0.704096
173--C	-0.024329
174--C	-1.012929
175--C	-0.590030
176--C	0.137834
177--C	-0.729940
178--C	0.045828
179--C	-0.170101
180--C	-0.738802
181--C	0.253380
182--C	0.768510
183--C	-0.168500
184--C	-0.658571
185--C	-0.643194
186--C	-0.310412
187--C	-0.389592
188--C	-0.536898
189--C	-0.179795

190--C	-0.752452
191--C	-0.447405
192--C	-0.537504
193--C	-0.307335
194--C	-0.019275
195--C	0.407213
196--C	-0.666976
197--C	0.319639
198--C	-0.450747
199--C	-0.197372
200--C	-0.247410
201--C	-0.644115
202--C	0.267128
203--C	-0.379032
204--C	-0.240242
205--C	-0.753454
206--C	-0.364616
207--C	-0.784357
208--C	-0.065541
209--C	-1.047176
210--C	-0.389935
211--C	-0.646241
212--C	-0.448688
213--C	-0.274207
214--C	0.107559
215--C	0.065229
216--C	-0.771804
217--C	-0.461638
218--C	-0.369913
219--C	0.078596
220--C	-1.020166
221--C	-0.457870
222--C	-0.728460
223--C	-0.380402
224--C	-0.879278
225--C	0.044452
226--C	-0.595089
227--C	-0.990054
228--C	-0.147925
229--C	-0.806377
230--C	-0.718580
231--C	-0.699646
232--C	1.762189
233--C	-0.498581
234--C	0.208342
235--C	-1.003470
236--C	-0.740667
237--C	-0.331241
238--C	-0.560938
239--C	-0.602584
240--C	-0.516947
241--C	-0.712449
242--C	-0.782752

243--C	-0.676290
244--C	-0.315631
245--C	0.627902
246--C	-0.322376
247--C	-0.972990
248--C	-0.728781
249--C	-0.621609
250--C	-0.790601
251--C	-0.959913
252--C	-0.729204
253--C	-0.025211
254--C	-0.187031
255--C	-0.475599
256--C	-0.500342
257--C	-0.995594
258--C	0.095173
259--C	-0.954220
260--C	-0.532140
261--C	-0.606273
262--C	-0.563906
263--C	-0.297057
264--C	-0.394075
265--C	-0.499422
266--C	-0.395952
267--C	-0.928782
268--C	-0.832072
269--C	-0.399136
270--C	1.665149
271--C	-0.622900
272--C	-0.673843
273--C	-0.392805
274--C	0.633924
275--C	0.083287
276--C	-0.792756
277--C	-0.669045
278--C	1.825006
279--C	-0.564215
280--C	-0.502314
281--C	-0.921908
282--C	-0.431008
283--C	-0.773042
284--C	0.064309
285--C	-0.803729
286--C	-0.545550
287--C	-0.549413
288--C	-0.680543
289--C	0.218466
290--C	-0.714958
291--C	-0.227884
292--C	-0.393114
293--C	-0.719318
294--C	-0.725600
295--C	-0.688328

296--C	-0.460292
297--C	-0.868783
298--C	-1.049521
299--C	0.255122
300--C	-1.012892

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.857860	Mean dependent var	0.863412
Adjusted R-squared	0.783783	S.D. dependent var	1.070044
S.E. of regression	0.497561	Akaike info criterion	1.707890
Sum squared resid	146.3120	Schwarz criterion	3.356713
Log likelihood	-459.5507	Hannan-Quinn criter.	2.337752
F-statistic	11.58074	Durbin-Watson stat	2.729316
Prob(F-statistic)	0.000000		

Appendix 3: Random Effect

Dependent Variable: TOBINSQ?
Method: Pooled EGLS (Cross-section random effects)
Date: 03/01/11 Time: 18:49
Sample: 2007 2009
Included observations: 3
Cross-sections included: 300
Total pool (balanced) observations: 900
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.140348	0.521649	4.103044	0.0000
INTDERIVATIVES?	-0.038449	0.095776	-0.401447	0.6882
COMDERIVATIVES?	-0.000506	0.059419	-0.008518	0.9932
CURDERIVATIVES?	-0.084614	0.076579	-1.104929	0.2695
SIZE?	-0.162597	0.057953	-2.805685	0.0051
LEVERAGE?	0.023077	0.019235	1.199733	0.2306
ROA?	2.110258	0.288876	7.305075	0.0000
ROE?	-0.017187	0.175262	-0.098062	0.9219
INVESGROWTH?	-0.163891	0.040446	-4.052077	0.0001
DPS?	1.104780	0.141088	7.830450	0.0000
Random Effects (Cross)				
1--C	0.311254			
2--C	0.322072			
3--C	0.364946			
4--C	-0.044834			
5--C	0.494957			
6--C	0.061310			
7--C	1.115054			
8--C	0.555165			
9--C	0.452285			
10--C	0.413031			
11--C	0.014232			
12--C	0.135121			
13--C	3.875115			
14--C	0.075729			
15--C	-0.132118			
16--C	1.491621			
17--C	0.066211			
18--C	3.531785			
19--C	-0.571820			
20--C	-0.060569			
21--C	-0.285849			
22--C	-0.129019			
23--C	0.094648			
24--C	0.440103			
25--C	0.135427			
26--C	-0.161409			
27--C	1.321489			
28--C	-0.054302			

29--C	0.047974
30--C	1.245901
31--C	0.729868
32--C	-0.172387
33--C	-0.352946
34--C	0.743936
35--C	-0.675588
36--C	-0.066785
37--C	-0.379489
38--C	-0.276894
39--C	1.499833
40--C	0.108602
41--C	0.800861
42--C	-0.563678
43--C	-0.259531
44--C	-0.221306
45--C	0.140497
46--C	-0.191708
47--C	-0.778597
48--C	0.766400
49--C	-0.294066
50--C	-0.544681
51--C	-0.262472
52--C	-0.336806
53--C	-0.010441
54--C	0.409532
55--C	-0.215624
56--C	0.242950
57--C	0.613819
58--C	1.473131
59--C	-0.060171
60--C	1.732958
61--C	-0.424247
62--C	0.036629
63--C	0.605059
64--C	0.769380
65--C	0.016111
66--C	1.140556
67--C	0.610549
68--C	0.102151
69--C	1.326156
70--C	0.314060
71--C	0.362008
72--C	0.041730
73--C	1.390021
74--C	0.780817
75--C	0.395938
76--C	0.465403
77--C	0.440384
78--C	0.266515
79--C	0.199272
80--C	2.124273
81--C	0.771599

82--C	0.966659
83--C	0.285123
84--C	0.130025
85--C	0.137558
86--C	-0.197766
87--C	-0.096499
88--C	3.120912
89--C	0.466255
90--C	0.276826
91--C	0.551145
92--C	-0.224216
93--C	0.230851
94--C	-0.008401
95--C	0.467668
96--C	0.062354
97--C	0.514802
98--C	0.582128
99--C	-0.002468
100--C	0.673211
101--C	0.684898
102--C	0.032217
103--C	0.238878
104--C	0.134824
105--C	0.755811
106--C	0.894520
107--C	0.255555
108--C	0.090038
109--C	0.456292
110--C	-0.032950
111--C	-0.100113
112--C	1.587289
113--C	0.589604
114--C	0.478073
115--C	0.420072
116--C	0.368225
117--C	1.127364
118--C	-0.446048
119--C	0.128693
120--C	0.907737
121--C	-0.185230
122--C	-0.057301
123--C	0.065438
124--C	-0.179873
125--C	-0.198579
126--C	-0.373722
127--C	-0.156274
128--C	-0.529064
129--C	-0.032692
130--C	-0.025527
131--C	-0.404927
132--C	-0.360689
133--C	-0.109004
134--C	-0.614930

135--C	-0.485634
136--C	0.082016
137--C	-0.558596
138--C	-0.129232
139--C	-0.247248
140--C	0.193347
141--C	-0.755596
142--C	-0.309617
143--C	-0.483759
144--C	0.404441
145--C	-0.029039
146--C	-0.411072
147--C	0.698865
148--C	0.737446
149--C	0.336541
150--C	-0.787918
151--C	-0.288598
152--C	-0.675739
153--C	-0.409079
154--C	0.413411
155--C	0.120313
156--C	-0.402707
157--C	0.003425
158--C	0.526791
159--C	-0.114078
160--C	1.431381
161--C	-0.452609
162--C	-0.290879
163--C	-0.326266
164--C	-0.518227
165--C	-0.651611
166--C	-0.810491
167--C	-0.339580
168--C	0.296811
169--C	-0.240750
170--C	-0.104518
171--C	-1.060802
172--C	-0.310676
173--C	0.289933
174--C	-0.730357
175--C	-0.409113
176--C	0.245272
177--C	-0.640560
178--C	-0.207544
179--C	-0.032968
180--C	-0.543389
181--C	0.086429
182--C	0.668291
183--C	-0.085389
184--C	-0.715069
185--C	-0.435109
186--C	-0.193066
187--C	-0.301756

188--C	-0.568220
189--C	-0.060373
190--C	-0.597850
191--C	-0.443565
192--C	-0.320869
193--C	-0.406533
194--C	0.106080
195--C	0.261031
196--C	-0.507544
197--C	0.183375
198--C	-0.541435
199--C	-0.119403
200--C	-0.226681
201--C	-0.635571
202--C	0.100866
203--C	-0.397147
204--C	-0.260167
205--C	-0.596005
206--C	-0.169752
207--C	-0.594734
208--C	-0.225263
209--C	-0.781463
210--C	-0.219342
211--C	-0.409492
212--C	-0.411928
213--C	-0.191529
214--C	0.072010
215--C	0.251908
216--C	-0.582210
217--C	-0.411247
218--C	-0.369527
219--C	-0.020186
220--C	-0.773694
221--C	-0.335504
222--C	-0.551342
223--C	-0.333941
224--C	-0.717805
225--C	-0.079165
226--C	-0.434587
227--C	-0.752317
228--C	-0.004802
229--C	-0.842688
230--C	-0.753515
231--C	-0.593562
232--C	1.382729
233--C	-0.338059
234--C	0.252212
235--C	-0.882727
236--C	-0.583308
237--C	-0.198641
238--C	-0.443601
239--C	-0.535815
240--C	-0.357195

241--C	-0.443328
242--C	-0.485546
243--C	-0.599012
244--C	-0.228617
245--C	0.665572
246--C	-0.318975
247--C	-0.721582
248--C	-0.505645
249--C	-0.397068
250--C	-0.588341
251--C	-0.564128
252--C	-0.463018
253--C	0.376241
254--C	-0.158865
255--C	-0.399923
256--C	-0.301952
257--C	-0.622614
258--C	0.255140
259--C	-0.689710
260--C	-0.359838
261--C	-0.493754
262--C	-0.423549
263--C	-0.263155
264--C	-0.373384
265--C	-0.326659
266--C	-0.215785
267--C	-0.646957
268--C	-0.630597
269--C	-0.312189
270--C	1.485541
271--C	-0.492894
272--C	-0.451038
273--C	-0.425832
274--C	0.712050
275--C	0.031178
276--C	-0.520961
277--C	-0.517702
278--C	1.704332
279--C	-0.526201
280--C	-0.507154
281--C	-0.799845
282--C	-0.463540
283--C	-0.562513
284--C	-0.042638
285--C	-0.665719
286--C	-0.361270
287--C	-0.370416
288--C	-0.610728
289--C	0.153061
290--C	-0.557896
291--C	-0.069529
292--C	-0.220445
293--C	-0.630144

294--C	-0.556228
295--C	-0.551743
296--C	-0.327792
297--C	-0.344366
298--C	-0.817212
299--C	0.203058
300--C	-0.538018

Effects Specification	S.D.	Rho
Cross-section random	0.652601	0.6324
Idiosyncratic random	0.497561	0.3676

Weighted Statistics

R-squared	0.209055	Mean dependent var	0.347853
Adjusted R-squared	0.201057	S.D. dependent var	0.587949
S.E. of regression	0.525530	Sum squared resid	245.8016
F-statistic	26.13744	Durbin-Watson stat	1.757847
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.312392	Mean dependent var	0.863412
Sum squared resid	707.7890	Durbin-Watson stat	0.610467