Hedging and Company Value – A Comparison between South Africa and United States of America

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ABSTRACT---- ***The purpose of the study was to determine the impact of hedging with derivatives on company value on listed non-financial companies in South Africa (SA) and compare these with companies in a developed nation like the United States of America (USA) in terms of how the use of derivatives impacts on the company value. The premium or discount in company value is represented by the Tobin's Q ratio. The study analyses the different types of derivatives and what impact each type of derivative has on the company value from 2006-2009. In most cases, the outcome of the analysis did not find strong evidence that users' of derivatives' company values trade at a premium to non-users.***

Keywords---- Derivatives, Financial instruments, Fixed-effects, Hedging, Risk management, South Africa, Tobin's Q

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1. INTRODUCTION

Corporate risk management was initially not considered important in valuing a company based on the underlying assumptions of Miller and Modigliani (1958) (M&M) maximisation of shareholder theory based on conditions held in a "perfect world". The M&M theory holds that corporate financing decisions cannot be used to increase a company's value in "perfect" markets since shareholders can easily replicate them (Miller and Modigliani, 1958). The "perfect world" has changed since the earlier days of the M&M theory. Changes in financial markets caused by globalisation and deregulation of major industries, companies began operating and expanding globally to reach new markets and explore global competitive opportunities. Due to these changes, corporate financial risks have also increased. This is due to foreign exchange rate volatility, interest rate volatility and changes in commodity prices. Corporate risk management strategies have had to evolve to keep up with the change in these financial risks.

In the modern day, for companies to survive the increase in business risk, the risk management function has become synonymous with curbing volatile cash flows and protecting profits against increments in costs. Companies can no longer rely on natural hedges created by having operations overseas and foreign sales alone. Another form of managing these risks is the use of hedging with financial instruments such as hedging with derivatives. Companies hedge against increases in exchange rate, interest rates and commodity pricing by using forward exchange contracts, swaps, options and futures. The M&M model assumptions imply that the decisions to hedge are irrelevant because stakeholders already protect themselves from these risks by holding well-diversified portfolios and also find it difficult to replicate the hedging decisions made by companies. This does not hold in today's business environment. Companies in South Africa (SA) have had to expand and adapt to these increased corporate risks as well. The search for mitigating strategy from these risks has led to the increase use of hedging with derivatives in the SA corporate world. The actual effects of these actions require investigation and that is the motivating factor for this study. The study therefore seeks to determine the impact of hedging with derivatives on the value of non-financial companies listed in SA.

The remainder of the paper is as follows. Section 2 provides the conceptual and theoretical background of the study and reviews related empirical studies on how it impacts the company value. Section 3 discusses the methodology of the study and states the hypothesis to be tested. Section 4 presents results and discuses the findings, section 5 highlights the limitations of the study and Section 6 gives recommendations for future research and concludes the study.

2. REVIEW OF LITERATURE

The literature associated with the topic is review in order to provide a good background for the topic under investigation and to ascertain the current state of research on the topic. The section is divided to subsections.

2.1 *Conceptual and Theoretical Background*

In the modern world of finance today, the M&M framework of 'perfect market' condition assumptions does not hold and capital market imperfections occur. These market imperfections consist of direct and indirect costs of financial distress (bankruptcy), costly external funding and corporate taxes (Stulz, 1996, 2000; Bartram, 2002). To mitigate these new market imperfections companies' are using risk management tools to counteract these new risks. These capital market imperfections provide positive support to the decision to use corporate hedging. Corporate hedging is a form of corporate risk management. The theory behind corporate risk management is to reduce the variability and volatility in a company's cash flows. This means that the company value is less variable, but more importantly is that the low values occur with a lesser probability than without hedging (Bartram, 2000).

The positive theories of risk management posit that increasing shareholder value is a concave objective function because of capital market imperfections (Bartram, 2000). Therefore, reducing cash flow volatility results in decreasing the costs associated with these market imperfections. This results in larger cash flows which occur to the owners (shareholders) and higher expected increase in company value (Bartram, 2000).

The earlier existing theories describing the rewards for derivatives usage is based on the rationale for hedging that includes: managerial incentives, financial distress (bankruptcy) costs, corporate taxes and the underinvestment problem. The earlier theoretical theories are mixed on the positive values of hedging. The various rationales why companies hedge are briefly explained below:

2.1.1 *Rationales for Hedging*

Manager Incentive- An agency relationship exists between managers and the shareholders (owners) of companies. The managers have better information (asymmetric information to shareholders) about the operations (Aretz and Bartram, 2009). The two parties do not always share common goals, conflicts can then emerge. Managers may not always act in the best interest of shareholder, which is an incentive to hedge and in turn reduces agency costs.

Financial distress costs - can occur in companies that experience cash flow volatility which can hamper its liquidity to fully meet fixed payment obligations (like wages and interest on debt) on time. Smith and Stulz (1985) first introduced this argument and concluded that it may be advantageous for companies that reduce the volatility of their cash flows given the existence of financial distress costs or tax structure.

Corporate taxes- Most corporate tax laws are progressive in nature i.e. the higher the companies' taxable income the lower the marginal tax rate, which can give rise to indirect tax effects which leads to tax convexity (Mayers and Smith, 1990). With the benefit of hedging to reduce the tax burden, the more special tax saving items and if a companies' income falls into the convexity region of the tax code, will have more of an incentive to hedge (Aretz and Bartram, 2009).

Underinvestment problem-Due to the high costs associated with raising external capital, companies may under invest in positive net present value (NPV) projects. Managers who act in the interest of shareholders may not realise all profitable projects when faced with high leverage, which have increased financial risk and more volatile cash flows and have to satisfy bondholders first (Bessembinder, 1991; Bartram, 2000). To increase shareholder value, derivatives can be used to allow companies to improve the available internal funding (Bessembinder, 1991).

2.2 *Review of Empirical Studies*

The empirical literature has evolved over the last 30 years. There is a vast body of knowledge and various approaches have been utilised to investigate the relationship of the use of hedging and value benefits. Most studies have been done on developed nations as data has been available. Regulation surrounding the use of derivatives and disclosure by companies has allowed more studies to be done around the world due to the availability of improved data surrounding companies' use of derivatives.

The empirical literature is divided into two approaches on how hedging adds value. The first approach is the *indirect* approach in which examining whether the cross-sections variation in companies' hedging policies is consistent with the companies hedging to reduce cash flow variation. The second approach is the *direct* approach which directly measures whether hedging is an explanatory variable.

1) **Indirect approach:** Before the improvement of disclosure of derivative use, earlier studies used survey data in the form of questionnaires, sent to managers of companies to determine usage. However, non-response bias and non-respondent feedback could occur. Other studies also made use of keyword searches analysing the use of derivatives amongst companies. Further improvement in the quality of disclosure allowed quantitative methods on derivative usage to measure the extent of hedging. The empirical evidence is mixed on the rationale to use derivatives and its benefits (Aretz & Bartram, 2009; Bartram, Brown & Fehle, 2009; Qing, 2007; Triki, 2005).

2) **Direct approach:** This approach is divided into two camps. Firstly, some studies have analysed the derivative use on the companies' returns by examining how derivative use affects the sensitivity of the return to movements around changes in exchange rates, interest rates and commodity prices. The literature generally revealed that hedging is efficient in reducing the sensitivity (Bartram, Brown & Fehle, 2009; Qing, 2007; Carter, Rogers & Simkins, 2006).

Secondly, the direct impact derivatives might have on the company market value was analysed. The first pioneering study that directly measured the impact of derivatives on company value was Allayannis & Weston (2001). They used a sample of 720 large non-financial US companies for the period 1990 to 1995 and examined the use of foreign currency derivatives (FCD) and the impact on company value. They used Tobin's Q (which is the ratio of a company's market value to the replacement value of its assets) as a proxy for company value and the study reveals a positive relationship between hedging and company value after accounting for a series of control variables that impact company value. The impact was statistically significant on the average; it revealed a 4.8% premium for companies' that used FCD to limit their foreign exchange exposure. Guay and Kothari (2003) argued that in risk management practices, just using derivatives in isolation cannot alone account for the 5% premium in the Allayannis & Weston (2001) study and that companies make use of other methods in risk management programs and derivative use is only a small part of it.

More studies followed the Allayannis & Weston (2001) studying the impact of interest rate and foreign exchange derivatives on 1) financial and non-financial companies, 2) risk management of commodity producers and 3) risk management of commodity prices of specific commodity users. Most of the studies were done on US companies. More research was done after 2001 in other countries around the world. Some studies have followed the initial Allayannis and Weston (2001) model and others have made operational adjustments depending on the economic environment (Bartram, Brown and Conrad, 2009; Qing, 2007). There have been mixed results. Magee (2009), studied 408 large USA non-financial companies (1996-2000), found support for the Allayannis and Weston (2001) study. However, Magee (2009) used a similar time period to Allayannis and Weston (2001) also accounted for the fact that the value can be affected by other foreign currency exogenous factors and controlling for these factors found that the value is not significantly affected.

In a different approach, Nain (2004) studied US companies hedging exposure in relation to the companies industries hedging activity and its competitiveness. Nain (2004) found that in widely used hedged industries an unhedged (hedged) company's profits are more (less) exposed to foreign exchange cost shocks. He also concluded that unhedged (hedged) companies Tobin's Q was on average 5% lower (more) in industries where frequent hedging takes place. This suggests that unhedged companies are discounted in value by investors when compared to other hedged companies. Carter, *et al.* (2006) examined 29 US airlines fuel hedging policy and the impact on company value between 1994-2000; concluded that hedging with relation to oil prices in the airline industry is positively related to company value and the premium is over 5%. On the other hand, Jin and Jorion (2006) studied 119 US oil and gas producing companies (1998-2001) and found no significant relationship with fuel hedging and value (Tobin's Q).

Lookman (2004) also analysed oil and gas producing companies and found that hedging would only benefit if a company's commodity price exposure was a secondary risk and not a primary risk. Thereby suggested that hedging is a managerial boosting activity and after accounting for it, the hedging premium is insignificant. In a study done on 176 large French non-financial companies' use of currency derivative during 2004, Clarke, Judge and Mefteh (2006) found no significant increase in company value with the use of derivatives. The direct benefits supporting the positive impact of hedging increasing company market value is mixed.

As can be seen from the above, most of the previous studies have focused on larger more developed nations over different time frames. South Africa (SA) is a smaller emerging market that has a high resource commodity export base and its companies' profitability is impacted differently to developed nations (South Africa, 2010).The SA economy is influenced by volatility in international markets, currencies and commodity prices (South Africa, 2010). Hence there is a need to examine this relationship in the SA context.

3. METHODOLOGY

The methodology adopted in this study is focus of this section. The various steps are highlighted, hypotheses are stated and the sample size, methods of collection and data sources are enumerated.

3.1 *Sample and data collection*

The purposeful population sample frame of 161 listed companies on the Johannesburg Stock Exchange (JSE) within the FTSE/JSE All Share Index (All Share) as at 28 February 2010 was used. Out of this sample, 117 non-financial companies are included and companies in the financial sector are eliminated. The annual financial reports of the non-financial companies, which are sourced from companies' websites were analysed over a 4 year period from 2006-2009.

Annual financial data for the sample was collected from the BFA Macgregor's database and used in the analysis. These companies cover all the major industries in South Africa.

The sample of 117 companies annual financial statements were manually analysed from 2006-2009. By using keyword searches including "hedging", "financial instruments", "risk management" and "derivatives" in the notes to the financial statements to determine whether they use derivatives or not. If a company indicates usage of derivatives of any form it is considered to be following a hedging policy and the use of derivatives and hence, classified as a 'hedger' and a 'non-hedger' if not. The companies identified as hedgers are further allocated into groups depending on the type of derivative used. The groups are classified into users of FCD, IRD and COD users. Companies can be allocated to more than one group if they use FCD, IRD, and COD type of derivatives.

3.2 *Model Specification*

The model used in this study is similar to the empirical model used in Allayannis and Weston (2001), Kapitsinas (2008), and Qing (2007) to determine the relationship between Tobin's Q and the use of hedging with derivatives while accounting for the control variables. The model is specifies as follows:

$$\ln(\textit{Tobin's } Q) = a + \beta \textit{hedge} + \gamma X + \varepsilon$$

where:

i. ln(*Tobin's Q*) = log of Tobin's Q = proxy for company value. The natural logarithm of Tobin's Q is used to account for the skewness caused by the alternative ways of calculating Tobin's Q.

ii. The *hedge* dummy is utilised depending on which sample group is been investigated and determines if the company uses FCD, IRD, COD type of derivatives.

iii. In all the cases the coefficient of the hedge dummy β is interpreted as a premium or a discount on company value due to hedging, depending on the sign of the coefficient.

iv. The X is use as a control variables that have been identified as impacting on value.

v. The ε is the error term.

3.3 *Hypotheses*

The hypotheses to be tested in this study are stated below. The main hypothesis of this research is defined as *there is a difference of hedgers Tobin's Q vs non-hedgers for all non-financial companies in SA when compared to USA companies.* In order to posit on the main hypothesis, four sub-hypothesis were defined as follows:

Sub – Hypothesis 1: There is a difference of FCD hedgers Tobin's Q vs non-hedgers of FCD for all non-financial companies in SA when compared to USA companies.

Sub – Hypothesis 2: There is a difference of interest rate derivative (IRD) hedgers Tobin's Q vs non-hedgers of IRD for all SA non-financial companies.

Sub - Hypothesis 3: There is a difference of commodity type derivative (COD) hedgers Tobin's Q vs non-hedgers of COD for all SA non-financial companies.

Sub - Hypothesis 4: There is a difference on the company value for all non-financial companies in SA and users of different types of derivatives.

3.4 *Estimation Techniques*

The study uses a multivariate cross-sectional analysis using a pooled ordinary least squares (OLS) regression methodology in order to isolate other factors that could affect company value and the hedging relationship. When using cross-sectional data over different time periods and utilising dummy variables, unobserved individual company effects (heterogeneity) can be eliminated and these individual characteristics will not be taken into account which will lead to bias in the results. Normally pooled OLS regression is used in analysing cross-sectional data, but cannot eliminate this bias that will occur. Therefore, another econometric method was utilised, a fixed-effects model panel OLS regression analysis, was conducted as a robustness check (Allayannis and Weston, 2001; Qing, 2007). The fixed-effects model allows constants to differ across cross-section units by estimating different constants for each cross-section (Qing, 2007). In the fixed-effects model, each company is assigned a unique intercept (Qing, 2007). In panel data, heteroscedasiticity can occur amongst standard errors in the cross-sectional dimensions and therefore the White cross-section technique (1980) is used to correct the standard error terms (Kapitsinas, 2008; White,1980). The White (1980) cross-section method is robust for conteracting cross-equation correlation (Kapitsinas, 2008).

3.5 *Statistical Test*

Statistical tests were conducted to ensure that the model is adequate and free from errors before testing the hypothesises

1) Univariate tests were conducted to test the equality of means (two sample t-tests) and medians (Wilcoxon/Mann-Whitney median test) whether the use of derivatives is a value increasing activity for all companies and for selected types of derivatives used and

2) The researcher uses control variables (independent) to determine the impact on the Tobin's Q (dependent variable) which is used as the proxy for value. The study is based on a similar methodology used by Allayannis and Weston (2001) and adapted in parts based on previous studies for comparative purposes.

3.6 *Variables Measurement and Definition*

The study is quantitative in nature using statistical techniques and statistical package to analysis the data collected from company financial statements. The main variable that forms part of the whole quantitative study is the use of Tobin's Q as a measure (proxy) for value and growth of a company. One of the benefits of using Tobin's Q is that it can be used in comparing companies operating in various sectors much easier than stock returns or accounting measures. There are various definitions of Tobin's Q in the literature. Lindenberg and Ross (1981) defined Tobin's Q as the sum of Total Assets and market value of Equity minus the book value of Equity all divided by Total Assets (main definition). Two other alternative Tobin's Q definitions were included in the study 1) ratio of market value to book value of Equity (alternative definition 1), 2) market value of Equity to total Sales (alternative definition 2). All the definitions mentioned for Tobin's Q are included as measures of company value and used as a robustness check.

The following controlling variables are also used in examining the relationship between the use of derivatives and the impact on companies' value. These are described and explained below:

a) **Profitability (ROA):** A profitable company is more likely to trade at a higher premium relative to a less profitable one. A higher Tobin's Q is expected in profitable companies. The Return on Assets (ROA) which is Net Income divide by Total Assets is used as a measure of profitability (Allayannis and Weston, 2001).

b) **Size (TOT ASS or SALES):** The size of the company has been found to be positively related to the decision to hedge and the use of derivatives (Graham and Rogers, 2002). However, Allayannis and Weston (2001) found a negative relationship between size and Tobin's Q. Sales or Total Assets have been used in similar studies as a proxy for size of a company.

c) **Leverage (LEV):** A company's capital structure has an impact on its value. The theory suggests that the more leverage increases the more value increases due to the tax benefits of debt. However, the leverage factor is found to be ambiguous in nature towards the value in some studies (Faulkender and Petersen, 2006). The Long-term debt to Shareholders' equity is used as a measure of leverage (Allayannis and Weston, 2001).

d) **Access to financial markets (DIV)**: A company's ability to access funding is an important determinant of its investment in profitable projects. It is most likely that if a company pays a dividend that it is not financially constrained, may have a lower Tobin's Q, which is expected to be negatively related. (Lang and Stulz, 1994; Servaes, 1996; Allayannis and Weston, 2001). If a company pays a dividend in the current year, a dividend dummy of one is given and zero if it did not.

e) **Investment opportunities (GRO):** It has been argued in the literature that a company's future prospects has an impact on value and that hedgers are more likely to have larger investment opportunities (Froot*et al.*, 1993; Allayannis and Ofek, 2001). The ratio of Capital Expenditures to Sales is used, similar to the study done by Servaes (1996). The ratio is expected to be positive for value.

f) **Industrial diversification (DIVERSE):** There is evidence in the literature that suggests that industrial diversification can impact the company value negatively (Lang and Stulz, 1994; Servaes, 1996). To control for diversification, the researcher uses a dummy variable of one if a company operates in more than one segment and zero otherwise (Allayannis and Weston, 2001).

g) **Geographic diversification (FSTS):** There are several theories that indicate that geographic diversification (multi-nationality) is positively related to company value (Bodnar, Tang &Weintrop, 1997). Companies disclose foreign sales and this is an indication of a multinational company. The ratio of foreign Sales to total Sales is used as an indicator of multi-nationality (Allayannis and Weston, 2001).

h) **Industry effects (IND):** A company's industry hedging activity has an impact on its value. A hedger that is in a high Tobin's Q industry will have a higher value not necessarily because of its use of derivatives but just because of the industry it belongs. A dummy variable is allocated to each industry segment to account for industry effects (Allayannis and Weston, 2001).

i) **Time effects (TIME):** Changes over time can have an impact on value due to changes in economic and other factors. Each year end is allocated a year dummy (Allayannis and Weston, 2001).

4. RESULTS AND DISCUSSION

The results from this research are presented here and followed by the discussion of the findings in order to gain useful insight.

4.1 Presentation of Results

The various results from the data analysis are presented below.

4.1.1 Presentation of Statistics of Companies

The Table 1 (below), shows the breakdown of the sampled companies into the different types of derivatives used over the four year period.

Table 1: Sample statistics of companies' hedging over time

Years	2006	2007	2008	2009	Total
Full Sample - All Firms					
Number of Firms	108	110	116	117	451
Hedgers	92	97	107	111	407
%	85.2%	88.2%	92.2%	94.9%	90.1%
Non Hedgers	16	13	9	6	44
%	14.8%	11.8%	7.8%	5.1%	9.9%
FCD types					
Number of Firms	108	110	116	117	451
FCD Users	87	91	99	102	379
%	80.6%	82.7%	85.3%	87.2%	84.0%
Non FCD users	21	19	17	15	72
%	19.4%	17.3%	14.7%	12.8%	16.0%
IRD types					
Number of Firms	108	110	116	117	451
IRD Users	51	53	60	61	225
%	47.2%	48.2%	51.7%	52.1%	49.8%
Non IRD users	57	57	56	56	226
%	52.8%	51.8%	48.3%	47.9%	50.2%
COD types					
Number of Firms	108	110	116	117	451
COD Users	24	25	29	28	106
%	22.2%	22.7%	25.0%	23.9%	23.5%
Non COD users	84	85	87	89	345
%	77.8%	77.3%	75.0%	76.1%	76.5%

Source: Author's computation

The sample of companies was made up of large, medium and small companies from various industries, with 94.9% of companies hedging in 2009 and 90%over the four year period. The most popular derivative type used is FCD (84%), followed by IRD (50%) and COD (24%).

4.1.2 *Descriptive Statistics*

Table 2 (below) shows the descriptive statistics of the full sample with the various variables employed in the study. The statistics of the full sample of non-financial companies with the various variables are summarised in this table. The following samples are presented namely; 1) Panel A: All companies (full sample), 2) Panel B: All Hedgers and 3) Panel C: Non-Hedgers.

Table 2: Summary statistics - Full Sample of Companies Studied

PANEL A: All Companies (full sample)		**No of Obs.**	**Mean**	**Std Dev.**	**Median**	**Perc Q1**	**Perc Q3**
Total Assets (R'm)	TA	451	24 692	63 768	5 688	2 113	16 482
Total Sales (R'm)	S	451	20 643	44 323	6 432	2 577	20 105
Market Cap (R'm)	MV	451	29 075	71 828	6 394	2 032	17 658
Hedge Type							
Hedgers		407	0.90	0.43	0.0	1.0	1.0
FCD users		379	0.84	0.36	0.0	1.0	1.0
IRD users		225	0.50	0.02	0.0	1.0	1.0
COD users		106	0.23	0.28	0.0	1.0	1.0
Tobin's Q							
Tobin's Q	(TA-E+MV) / TA	451	2.08	1.45	1.74	1.28	2.48
Alter.1 Tobin's Q	MV / E	451	3.76	5.17	2.65	1.67	4.39
Alter.2 Tobin's Q	MV / S	451	1.61	1.93	1.01	0.47	2.11
Control Variables							
Profitability	ROA%	451	0.09	0.08	0.09	0.05	0.14
Leverage	LT / E	451	0.38	1.04	0.14	0.02	0.38
Access to financial markets	DIV dummy	451	0.80	0.40	1.00	1.00	1.00
Investment opportunities	CAPEX / S	451	0.12	0.31	0.06	0.03	0.12
Ind. Diversification	dummy	451	0.39	0.49	0.00	0.00	1.00
Geographic diversification	FS / S	451	0.24	0.29	0.10	0.00	0.39
PANEL B - All Hedgers		**No of Obs.**	**Mean**	**Std Dev.**	**Median**	**Perc Q1**	**Perc Q3**
Total Assets (R'm)	TA	407	27 052	66 664	6 961	2 777	21 379
Total Sales (R'm)	S	407	22 616	46 216	7 350	3 254	22 828
Market Cap (R'm)	MV	407	31 759	75 088	7 386	2 189	19 780
Hedge Type							
All Hedgers		407	0.90	0.43	0	1	1
FCD users		379	0.84	0.36	0	1	1
IRD users		225	0.50	0.02	0	1	1
COD users		106	0.23	0.28	0	1	1
Tobin's Q							
Tobin's Q	(TA-E+MV) / TA	407	1.95	1.05	1.70	1.25	2.33
Alter.1 Tobin's Q	MV / E	407	3.60	5.03	2.60	1.65	4.21
Alter.2 Tobin's Q	MV / S	407	1.49	1.48	0.96	0.47	2.01
Control Variables							
Profitability	ROA%	407	0.10	0.08	0.09	0.0	0.1
Leverage	LT / E	407	0.40	1.09	0.15	0.0	0.4
Access to financial markets	DIV dummy	407	0.82	0.38	1.00	1.0	1.0
Investment opportunities	CAPEX / S	407	0.10	0.15	0.06	0.0	0.1
Ind. Diversification	dummy	407	0.38	0.49	0.00	0.0	1.0
Geographic diversification	FS / S	407	0.26	0.30	0.11	0.0	0.4
PANEL C: Non-Hedgers		**No of Obs.**	**Mean**	**Std Dev.**	**Median**	**Perc Q1**	**Perc Q3**
Total Assets (R'm)	TA	44	2 865	7 353	1 056	523	2 030
Total Sales (R'm)	S	44	2 397	3 831	1 015	293	1 657
Market Cap (R'm)	MV	44	4 245	7 642	1 887	1 196	3 781
Hedge Type							
Non-Hedgers		44	0.10	0.43	0	0	0
Tobin's Q							
Tobin's Q	(TA-E+MV) / TA	44	3.33	3.12	2.31	1.54	3.38
Alter.1 Tobin's Q	MV / E	44	5.26	6.14	3.57	1.89	4.95
Alter.2 Tobin's Q	MV / S	44	2.70	4.15	1.55	0.49	2.87
Control Variables							
Profitability	ROA%	44	0.09	0.09	0.10	0.0	0.2
Leverage	LT / E	44	0.14	0.19	0.04	0.0	0.2
Access to financial markets	DIV dummy	44	0.59	0.50	1.00	0.0	1.0
Investment opportunities	CAPEX / S	44	0.24	0.87	0.08	0.0	0.1
Ind. Diversification	dummy	44	0.43	0.50	0.00	0.0	1.0
Geographic diversification	FS / S	44	0.04	0.07	0.00	0.0	0.0

Source: *Author's computation*

It can be seen from Table 2 (above) that the sampled companies have on average large Sales and Total Assets. They are profitable, leveraged, have foreign sales and are diversified in many industries. Their Tobin's Q ratios are also above 1 indicating that they are valued higher by investors than their assets are worth.

4.1.3 *Test of Hypothesis*

The univariate analysis was used to test the main hypothesis of the differences in means /medians between hedgers and non-hedgers. The main hypothesis of differences was also tested in isolating for periods of an appreciating and depreciating currency environment using the R/U$ exchange rate. The results are presented in Table 3.

In Table 3, Panel A, which shows the results for equality of mean and median differences for all companies in the sample for the various variables distinguishing between hedgers (column 1) and non-hedgers (column 2), the mean/median differences (column 3), t-stat and p-values with significance at 1% are indicated in the next two columns. In Panel B, the testing results of the equality of mean and median differences during a deprecating and appreciating periods of the R/US$ impact on hedgers and non-hedgers and significance level as indicated by the p-value are summarised.

Table 3: Comparison of differences for hedgers and non-hedgers

Panel A: Hedgers vs. non-hedgers, full sample

Variable	(1) Hedgers	(2) Non-Hedgers	(3) = (1)-(2) Difference	T stat / (mean)	P-Value 1% sig.level)
no of obs.	407	44			
Total Assets (R'm) (mean)	27 052	2 865	24 187	6.94	0.000*
Total Assets (R'm) (median)	6 961	1 056	5 904	-	0.000*
Sales (R'm) (mean)	22 616	2 397	20 219	8.56	0.000*
Sales (R'm) (median)	7 350	1 015	6 335	-	0.000*
Tobin's Q (mean)	1.95	3.33	-1.38	-2.92	0.006*
Tobin's Q (median)	1.70	2.31	-0.61	-	0.000*
Alter.1 Tobin's Q (mean)	3.60	5.26	-1.66	-1.74	0.088
Alter.1 Tobin's Q (median)	2.60	3.56	-0.96	-	0.050
Alter.2 Tobin's Q (mean)	1.49	2.70	-1.21	-1.91	0.062
Alter.2 Tobin's Q (median)	0.95	1.55	-0.60	-	0.103

* indicates significance at 1 %

Panel B: Hedgers vs. non-hedgers currency impact

Appreciation period 2007 & 2009					
No of Obs.	208	19			
Tobin's Q (mean)	1.95	2.99	-1.04	-1.900	0.074
Tobin's Q (median)	1.74	2.35	-0.61	-	0.032
Alter.1 Tobin's Q (mean)	3.60	4.74	-1.14	-0.890	0.380
Alter.1 Tobin's Q (median)	2.69	3.31	-0.62	-	0.227
Alter.2 Tobin's Q (mean)	1.55	2.42	-0.87	-1.460	0.160
Alter.2 Tobin's Q (median)	1.00	1.60	-0.60		0.310
Depreciation period 2006 & 2008					
No of Obs.	199	25			
Tobin's Q (mean)	1.93	3.58	-1.65	-2.26	0.033
Tobin's Q (median)	1.68	2.29	-0.60	-	0.008*
Alter.1 Tobin's Q (mean)	3.59	5.66	-2.07	-1.47	0.150
Alter.1 Tobin's Q (median)	2.56	3.73	-1.17	-	0.079
Alter.2 Tobin's Q (mean)	1.42	5.08	-3.66	-1.44	0.160
Alter.2 Tobin's Q (median)	0.92	1.47	-0.56	-	0.183

* indicates significance at 1 %

Source: Author's computation

It can be seen in Table 3 (above), Panel A, that the mean / median differences of Total Assets and Sales is significant ($p<0.000$) in favour of hedgers over non-hedgers, indicating that hedgers have higher value of Total Assets and Sales. The mean / median difference of the main hypothesis of value as indicated by Tobin's Q value of -1.38 and -0.61, is negative and significant ($p<0.00$) in both instances, which indicates that the non-hedgers Tobin's Q value is higher. This

indicates that hedgers do not trade at a premium value over non-hedgers contrary to what the theory suggests. The alternative Tobin's Q results are mixed.

In Table 3, Panel B, when isolating the currency periods, in the appreciation period, all the Tobin's Q variables differences are negative and not significant at a 1% level ($p>0.01$ in all instances) between hedgers and non-hedgers is in favour of non-hedgers. This indicates that hedgers do not trade at a premium when compared to non-hedgers during an appreciating period this is also contrary to the theory that non-hedgers' value should decrease in an appreciating environment. In a depreciating period, all the Tobin's Q variables differences are negative, and not significant at the 1% level ($p>0.01$ in all instances) in favour of non-hedgers except for the main Tobin's Q median which is significant ($p<0.000$). The overall results when comparing between hedgers and non-hedgers during appreciation and depreciation periods of the R/US$ is in favour of non-hedgers and hedgers do not trade at a premium but is mostly not significant which is different from the theory.

4.1.4 *Summary of the OLS and Panel OLS Regression Results*

In the multivariate analysis, the pooled OLS regression methodology was used and a fixed-effects panel OLS (to take into account for unobserved individual effects and serial correlation) regression to test if a relationship exists between derivative use and the impact on the company value. The two methods showed similar results and the fixed-effects panel and pooled OLS differences in results are summarised below.

Table 4: Effect of derivative use on company value: Fixed-effects panel OLS regression results using ln(Total Assets) for size

Panel A: Dependent variable ln(Tobin's Q) , size ln(Total Assets)

ln(Tobin's Q)	All Hedgers	FCD's	IRD's	COD's
No of Obs of users.	407	379	225	106
No of Obs of non users.	44	72	226	345
R^2	0.687	0.681	0.677	0.678
C	1.360 (4.086)*	1.280 (4.065)*	1.220 (3.796)*	1.245 (3.888)*
HDG	-0.240 (-1.944)			
FCD		-0.130 (-1.568)		
IRD			-0.014 (-0.217)	
COD				**0.035 (0.520)**
ROA	2.804 (7.092)*	2.777 (7.132)*	2.702 (6.625)*	2.686 (6.565)*
LOG TOT AS	-0.085 (-2.778)*	-0.094 (-2.819)*	-0.100 (-2.852)*	-0.105 (-3.044)*
LEV	-0.032 (-1.826)	-0.043 (-2.285)	-0.032 (-1.754)	-0.031 (-1.678)
DIV	0.113 (2.103)	0.127 (2.290)	0.120 (2.229)	0.121 (2.198)
GRO	-0.060 (-1.319)	-0.053 (-1.176)	-0.045 (-0.989)	-0.046 (-0.100)
DIVERSE	**-0.003 (-0.046)**	0.008 (0.142)	0.010 (0.182)	0.012 (0.219)
FSTS	0.015 (0.134)	0.019 (0.158)	0.023 (0.192)	0.006 (0.050)
IND	0.003 (1.325)	0.004 (1.454)	0.004 (1.584)	0.004 (1.544)
Time	-0.083 (-0.083)	-0.069 (-0.982)	-0.062 (-0.841)	-0.062 (-0.825)

* indicates significance at 1% level
t-statistics are in parenthesis

Panel B: Dependent variable ln(Altern.1 Tobin's Q), size ln(Total Assets)

ln(Altern.1 Tobin's Q)	All Hedgers	FCD's	IRD's	COD's
No of Obs of users.	407	379	225	106
No of Obs of non users.	44	72	226	345
R^2	0.623	0.623	0.624	0.623
C	1.744 (3.889)*	1.695 (3.837)*	1.638 (3.598)*	1.706 (3.870)*
HDG	-0.030 (-0.193)			
FCD		**0.088 (0.688)**		
IRD			-0.104 (-0.889)	
COD				-0.060 (-0.512)
ROA	3.274 (5.373)*	3.209 (5.255)*	3.276 (5.460)*	3.286 (5.426)*
LOG TOT AS	-0.142 (-2.816)*	-0.150 (-2.925)*	-0.126 (-2.310)*	-0.141 (-2.785)*
LEV	0.117 (1.847)	0.124 (1.963)	0.122 (1.902)	0.115 (1.825)
DIV	0.341 (3.311)*	0.339 (3.321)*	0.326 (3.272)*	0.343 (3.314)*
GRO	-0.105 (-0.987)	-0.098 (-0.911)	-0.102 (-0.972)	-0.102 (-0.979)
DIVERSE	0.034 (0.368)	0.038 (0.421)	0.026 (0.275)	0.035 (0.384)
FSTS	-0.235 (-1.184)	-0.232 (-1.174)	-0.226 (-1.152)	-0.207 (-1.042)
IND	0.011 (2.124)	0.011 (2.188)	0.012 (2.217)	0.011 (2.170)
Time	-0.110 (-0.951)	-0.103 (-0.855)	-0.113 (-0.968)	-0.108 (-0.925)

* indicates significance at 1% level
t-statistics are in parenthesis

Panel C: Dependent variable ln(Altern.2 Tobin's Q), size ln(Total Assets)

ln(Altern.2 Tobin's Q)	All Hedgers	FCD's	IRD's	COD's
No of Obs of users.	407	379	225	106
No of Obs of non users.	44	72	226	345
R^2	0.645	0.649	0.629	0.625
C	0.737	0.570	0.503	0.260
	(1.149)	(0.940)	(0.819)	(0.414)
HDG	-0.732			
	(-3.272)*			
FCD		-0.654		
		(-4.126)*		
IRD			**0.237**	
			(2.061)	
COD				-0.094
				(-0.568)
ROA	5.045	5.158	4.888	4.976
	(5.646)*	(6.093)*	(5.293)*	(5.291)*
LOG TOT AS	0.054	0.047	**-0.032**	0.014
	(0.814)	(0.695)	**(-0.464)**	(0.199)
LEV	0.033	**-0.021**	0.021	0.029
	(0.877)	**(-0.469)**	(0.509)	(0.693)
DIV	-0.069	-0.014	**0.004**	-0.027
	(-0.553)	(-0.118)	**(0.029)**	(-0.217)
GRO	1.971	2.010	2.025	2.054
	(4.736)*	(4.887)*	(4.425)*	(4.288)*
DIVERSE	-0.050	-0.031	-0.007	-0.032
	(-0.416)	(-0.256)	(-0.058)	(-0.260)
FSTS	0.135	0.141	0.130	0.191
	(0.477)	(0.497)	(0.448)	(0.632)
IND	0.002	0.002	0.002	0.003
	(0.305)	(0.316)	(0.298)	(0.397)
Time	-0.483	-0.457	-0.428	-0.439
	(-2.643)*	(-2.578)*	(-2.526)*	(-2.687)*

* indicates significance at 1% level
t-statistics are in parenthesis

Source: Authors computation

Panel A, Panel B and Panel C, represents the fixed-effects panelled OLS regression with the logarithm of Tobin's Q (main definition), alternative 1 Tobin's Q and alternative 2 Tobin's Q respectively, which are the dependent variables and control variables the independent variables. The logarithm of Total Assets is used as a proxy for size in this regression as used in the study of Allayannis and Weston (2001). The results of the various samples of hedgers and non-hedgers, FCD sample, IRD sample and COD sample relationships are presented and the related t-statistic is in parenthesis at the 1% significance level. The differences in the results noted amongst the variables and derivative types is in bolder text in the respective panel. ROA=Return on Assets; LOG TOT AS = Log of Total Assets; LEV=Levarage; DIV=Access to financial markets; GRO = Growth opportunities; DIVERSE = Diversified business; FSTS= Foreign Sales to Sales (multinationality); IND= Indusrty Effects and Time = Time effects

Table 4 (above) Panel A, Panel B and Panel C shows the results of the fixed-effects panel OLS regression for all the types of derivatives and using logarithm of Total Assets as a proxy for size for all the Tobin's Q definitions. The coefficient is used to show the relationship. If the coefficient is positive then the company value of hedgers is higher than non-hedgers. The R^2 is higher in the fixed-effects method than the pooled OLS which allows for a better fit amongst the variables. The results of the derivative use amongst the hedgers and various derivative types are mostly in favour of the non-hedgers and have similar signs when compared to the pooled OLS results.

When using the main definition of Tobin's Q, the hedgers discount is still 24% in the fixed-effect model but it is not statistically significant in favour of non-hedgers. The other coefficients differences range between 2-3% to the pooled OLS in favour of non-hedgers. However, when using the alternative 1 Tobin's Q definition the FCD types is positive in favour of hedgers which is 8.8% premium in the fixed-effects model and negative in the pooled OLS. The results are similar to the findings of Allayannis and Weston's (2001) study of the US which revealed a premium using a fixed-effects method on FCD users. Another difference noted is that amongst the COD users, when using Alternative 1 or 2 of Tobin's Q, the value is now negative and not positive, -6.0% and -9.4% in favour of non-users.

The results of the fixed-effects model on the control variables are similar in terms of the sign but differ in the magnitude of the coefficients when compared to the pooled OLS. The variables which show similar results are 1) the ROA, has a negative and a significant value which is in line with theory; 2) Size as measured by Total Assets is negative, significant and against the theory; 3) DIV which represents access to financial markets is positive and does not aligned to the theory and 4) the Industry effect is positive while the time effect is negative and are the same. The variables that are different and showed mixed results are leverage, diversity, growth opportunities and foreign sales. It was also noted that there were less significant differences using the fixed-effects model versus the pooled OLS results.

In summary, the results are mostly in favour of non-hedgers and reject the hypothesis that hedgers' values are higher than non-hedgers.

4.2 *Discussion of Findings*

The purpose of the study was to analyse if a relationship exists between users of derivatives and the different types and the impact on companies' value (as measured by Tobin's Q) of SA non-financial companies, thereafter, the results of which were compared to similar studies in the USA.

The study revealed that amongst SA non-financial companies, the use of derivatives for hedging purposes is a popular risk management tool. 94 percent of companies indicated that they use derivatives in mitigating volatile currencies, interest rates and commodity price movements in 2009. There was an increase in usage of derivatives during 2006-2009. The most popular type been FCD, 87% in 2009 and has steadily increased over a four year period. The theory suggests that only larger companies and not smaller companies make use of derivatives. The findings in SA are however contrary to what the theory suggests because the sample of hedgers drawn from the SA economy is made of up large, medium and small capital companies from diverse industries. The IRD is the second most popular. The COD type of derivative is the least popular which is mostly used by companies in the mining and resources industries. When comparing hedgers (407 observed) and non-hedgers (44 observed) over the four year period, Hedging companies appear to be larger, slightly more profitable, more leveraged, pay more dividends (which indicates access to financial markets and less constraints), more geographically diversified and have higher foreign sales than the total companies sample and non-hedging companies.

The comparative results of the equality of means and median test, however, reveal higher Tobin's Q on all the definitions in favour of non-hedgers, indicating that non-hedgers are valued higher using this measure. The results are similar for FCD, IRD and COD except that the results favour hedgers when alternative 2 Tobin's Q is used for IRD and COD users.

When conducting the univariate analysis and isolating the R/US$ currency movements during an appreciating and depreciating period for user and non-users, the results favoured non-users (non- hedgers) in an appreciating and depreciating setting. This indicates that hedgers do not trade at a premium (discount) when compared to non-hedgers during an appreciating (depreciating) period this is contrary to the theory that non-hedgers' value should decrease (increase) in an appreciating (depreciating) environment. When using the FCD sample and comparing the means and medians during an appreciating and depreciating period, similar to the Allayannis and Weston (2001) study who found a premium in favour of FCD users during an appreciating period, this study reveals different results to the Allayannis and Weston (2001) study and found in favour of non-FCD users in an appreciating period. FCD users should be valued higher in an appreciating period. However, in a depreciating period the results are in line with the theory for non-users to trade at a discount to FCD users during a depreciating period.

In summary, the univariate results, testing the main hypothesis of the differences in mean/median and significance showed mixed results in SA context across the derivative types. The results seem to be in favour of non-users of derivatives when the various variables are compared, which means that the users of derivatives are not valued at a premium above non-users as the theory postulates. The main hypothesis is therefore rejected. The sample of 44 non-users is small relative to other studies like Allayannis and Weston (2001) study and this should be considered when analysing and interpreting the results.

A multivariate analysis was performed to determine if a relationship exists between hedging and the impact it has on value after controlling for certain variables that could impact the value. Tobin's Q was the dependent variable used to represent the companies' value. The control variables are robust in controlling for, profitability, size, leverage, access to financial markets, investment opportunities, industrial diversification, industrial sector, geographic diversification and time effects.

A pooled OLS regression was performed and to account for unobserved company effects and serial correlation which could occur, which could bias the results, a fixed-effects panel model regression was used as a robustness test. The fixed-effects model allows for a better fit and results analysis as can be seen by the increase in the coefficient of multiple determination R^2 from around 0.36 to 0.68. The results of the regressions are mixed between the various definitions of Tobin's Q and vary in significance between the hedgers and types of derivatives. The size of the coefficients of the

models between the various definitions and types of derivatives also vary. In most of the regression results, there were varying discounts in favour of non-users of derivatives and not a premium in favour of hedgers as found in (Allayannis and Weston's, 2001) study when various definitions of Tobin's Q were used as the dependent variable.

There are a few exceptions when the results (fixed-effects model) indicated a premium namely; 1) Amongst the FCD's, using alternative 1 Tobin's Q, Total Assets and Sales as a proxy for size indicated a 8.8% and 4.6% premium respectively, in favour of FCD users, 2) IRD users using alternative 2 Tobin's Q (size=Total Asset and Sales) a premium of 23.7% and 43.1% respectively in favour of IRD users, 3) COD users using the main Tobin's Q definition (size =Total Assets) a premium of 3.5% and COD users using the alternative 2 (size = Sales), a premium of 2.8%. The control variables coefficients also differ amongst the expectation of the underlying theory and the impact on the value of Tobin's Q using the various methodologies.

As indicated in the results of this study, in the majority of cases the study did not find support in favour of hedging as a value increasing activity as previous studies have revealed. However, the results of this study corroborate some previous studies which did not find a premium in favour of hedgers. Jin and Jorion (2006) studied 119 US oil and gas producing companies (1998-2001) found no significant relationship with fuel hedging and value (Tobin's Q). Lookman (2004) also analysed oil and gas producing companies and found that hedging would only benefit if a company's commodity price exposure was a secondary risk and not a primary risk. Thereby, suggests that hedging is a managerial boosting activity and after accounting for it, the hedging premium is insignificant. In addition to the above, Clarke, Judge & Mefteh (2006) found no significant increase in company value with the use of derivatives in a study done on 176 large French non-financial companies' use of currency derivative during 2004.The direct benefits supporting the positive impact of hedging increasing company market value is mixed.

5. LIMITATIONS

It is pertinent to mention that this study has some limitations which might have impacted on the final results. Some of them are as highlighted below:

The sample size of the non-users of derivatives in this study is small relative to the users of derivatives over the time studied and needs to be considered when analysing and interpreting the results. The time frame of this study is also different from previous studies and this could impact on the results.

The study does not analyse the underlying hedging derivative strategies of companies. Also the managements' decision to hedge and the strategies surrounding the use of derivatives were not focused. In addition to the above, other risk management techniques used by the companies were not considered and that financial companies were excluded in the sample. Financial companies include companies whose prime business operates as a bank, real estate, life insurance, financial service or equity investment firms. Banks operate as counterparties in hedging contracts and it cannot be determined if it is for operational or trading purposes.

6. RECOMMENDATION FOR FUTURE RESEARCH AND CONCLUSION

In this section, recommendations are made and the research is concluded.

6.1 *Recommendation for Future Research*

Based on the results of this study and the observed limitations the study recommends that future researchers studying the impact of hedging on company's value in a South African context should consider the following:

1. Magee (2009), revealed that other external exogenous factors other than company specific factors can impact hedging and value, hence future study should consider i) using a dynamic panel framework model when the current value of a company depends on past value of such company and ii) test the assumption that hedging is strictly exogenous and control for the failure of this assumption.

2. The use of Lookman (2004) model which isolates a company primary and secondary risks and separately analyse the valuation effects for the different types of risk.

3. Future research should focus on the determination of other risk management techniques use by companies other than hedging and the impact it has on the companies' value in line with company strategy.

4. Also, research should be done in South African environment to test managers' motivation for the use of derivative and the influence it has on managerial incentive.

6.2 *Conclusions*

This study tried to determine the impact, hedging has on the company value in a South African environment and compare the results to studies done in the US. The analysis followed previous models methodologies for estimating the

hedging effect on company value. The model was adjusted to the local country environment, while understanding and using the latest evidence from related studies with regards to factors that influence the hedging activity.

The outcome of the study did not find strong evidence that companies using derivatives trade at a premium to non-users. This study however contributes to the growing literature and studies on hedging from an emerging market perspective. The percentage of companies using derivatives is increasing as noted in the samples over the four year period under study, indicating that hedging is a popular risk management tool amongst companies in SA. However, most the results were in favour of non-users of derivatives (non-hedgers). The results could have been influenced by the small sample size of non-users of derivatives over the four year period when compared to the high samples of users of derivatives and may not reflect the real impact of hedging on the company value.

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