

Characteristics of South African firms that hedge against foreign exchange risk

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ABSTRACT

Increased globalisation of international business and operations results in an increase of firms facing foreign exchange risk. One of the ways to mitigate this risk is the use of currency derivatives to hedge this foreign exchange exposure. This research explores the characteristics of South African firms that use currency derivatives in contrast to those that do not.

The data is collected and calculated from financial statement of firms listed on the main board of the JSE. The variables are tested using t-tests to accept or reject the hypothesis.

There are five characteristics which are tested, level of foreign exchange exposure, firm size, propensity to bankruptcy, underinvestment in growth opportunities and level of managerial ownership.

The findings for the theories on bankruptcy costs and managerial ownership affecting a firm's decision to hedge are consistent with previous literature indicating that these characteristics are not significant in determining a firm's policy on hedging.

The literature also supports the test results for the theory on firm size and level of foreign exposure, stating that the larger firms and those with higher levels of foreign exposure are more likely to hedge their foreign exchange risk with the use of currency derivatives.

In conflict with international trends high growth opportunities is not seen as significant within the South African context.

The key finding is that firm size and level of foreign exchange are the prominent characteristics in the South African context when describing whether a firm will hedge its foreign exchange exposure with currency derivatives or not.

DECLARATION

I, Katherine Arnold, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Signed at

On the day of 2010

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CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this research is to describe which characteristics are shown by, South African firms that hedge their foreign exchange exposure with currency derivatives. The research attempts to describe, which firm specific characteristics lead to a firms choice to hedge through the use of currency derivatives.

1.2 Context of the study

The growth and development of technology increases the ability of firms to function and compete on an international level (Morey and Simpson 2001). The improvement of communication allows for selling outputs and sourcing inputs on a world-wide scale (Morey and Simpson 2001). Firms follow a global strategy for a variety of reasons including to diversify product offering, lower operation costs or in order to gain access to new untapped markets (Gamble, Thompson and Strickland 2008). South African firms are no exception to this international trend (Fourie and Mohr 2007). Many South African firms use or are part of global supply chains, importing and exporting components and products on a daily basis.

These global operations result in firms being exposed to foreign exchange risk, as a range of currencies is used during international trade transactions (Mathur and Knowles 1985). Foreign exchange risk, is the risk faced by a firm because of the change in value of a foreign asset, liability or cash flow relative to the domestic currency caused by changes in future exchange rates (Glaum 1990).

Up until the 1970's exchange rates were fixed according to the Bretton Woods system, the termination of this system led to volatility and unanticipated changes in the exchange rate market (Soenen and Madura 1991). This volatility results in firms being exposed to exchange rate risk. In South Africa, it was in 1979 after the release of the De Kock Commission that the rand began to float against other world currencies (Firer, Ross, Westerfield and Jordon 2004).

To put in perspective the volatility and therefore risk firms face with foreign exchange exposure a direct quote reads, “the rand/dollar exchange rate falling by 41, 5 per cent during 2001, and recovering 28 per cent by the end of 2002!” (Firer et al. 2004:701).

The graphs below show the rand against three major world currencies for a period of 180 days from the 09/12/2009 – 06/06/2010. These illustrate how a change in exchange rates have a large impact on the value of a firm’s cash flows, assets or liabilities if denominated in a foreign currency.

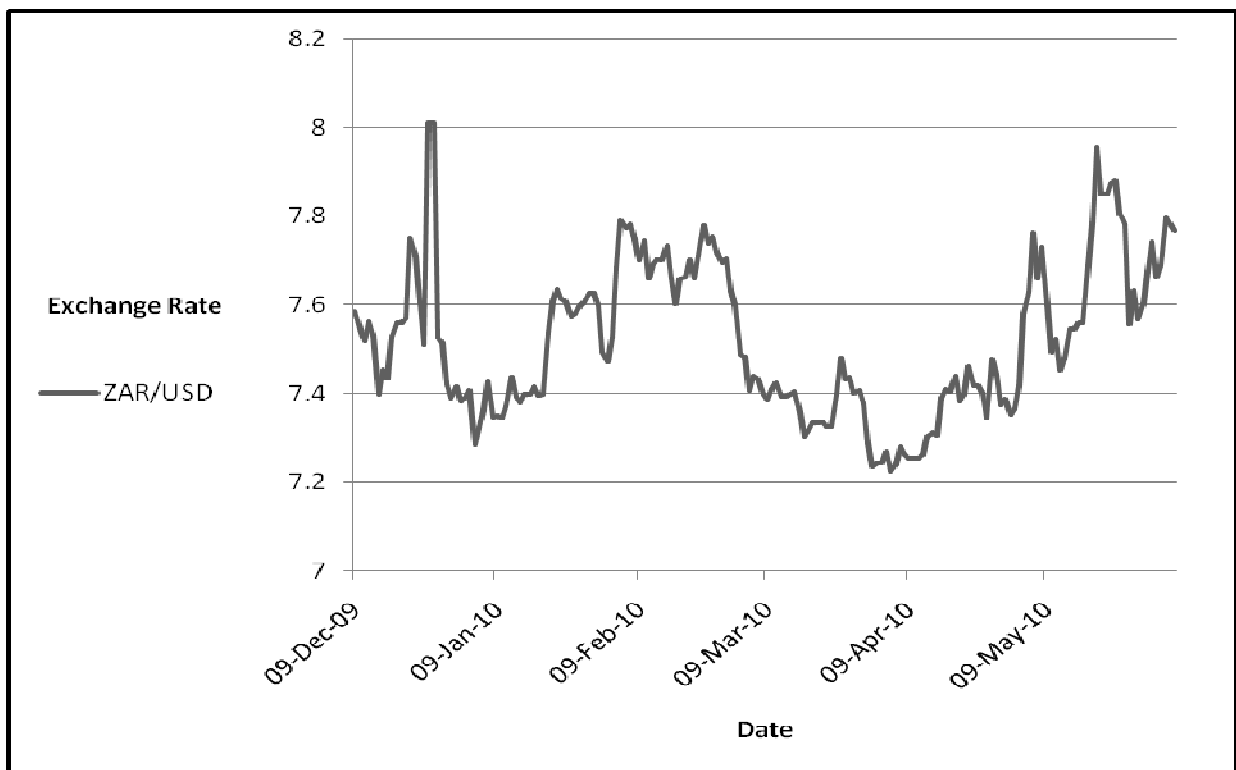


Figure 1:South Africa Rand to US Dollar Exchange Rate for 180 days between 09/12/2009 and 06/06/2010

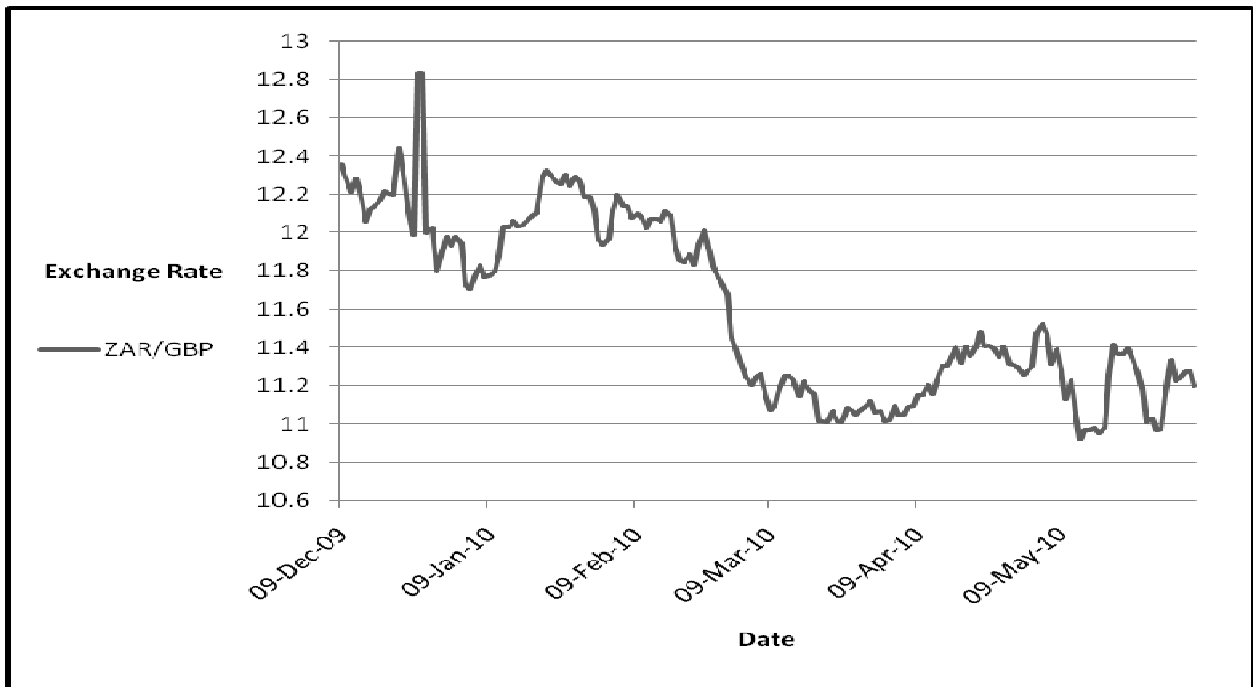


Figure 2: South African Rand to British Pound Exchange Rate for 180 days between 09/12/2009 and 06/06/2010

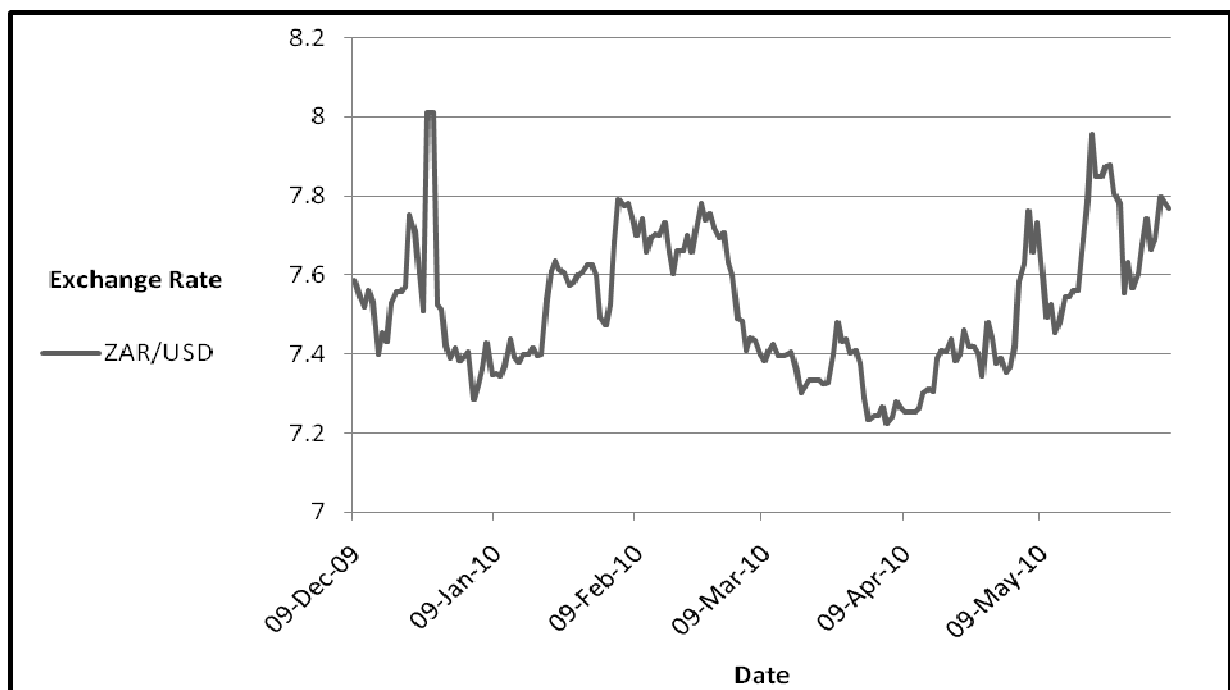


Figure 3: South African Rand to Euro Exchange rate for 180 days between 09/12/2009 and 06/06/2010

Numerous studies done throughout the world look at the characteristics of nonfinancial firms, which hedge their foreign exchange risk through currency derivatives including, Smith and Stulz (1985); Nance, Smith, and Smithson (1993); Geczy, Minton and Schrand (1996); Carroll, Fok and Chiou, (1997); Allayannis and Ofek (2001); PramBorg (2005); Hagelin and Pramborg (2006); Bartram et al. (2006). The studies cover nonfinancial firms in a variety of countries including the United States, Sweden, United Kingdom and Korea.

The increasing use of currency derivatives is apparent through various statistics, stated in (Bartram, Brown, and Fehle 2006:4) “Specifically, daily turnover of FX forwards and swaps grew from an average of 187 billion U.S dollars (USD) in 1989 to a peak of 1206 billion USD in 1998.” The use of derivatives by nonfinancial firms continues to grow and the notional value of foreign currency derivatives held by nonfinancial firms had increased to over 4 trillion USD by 2001 (Bartram et al 2006).

This research concentrates on the use of currency derivatives by South African non-financial firms and attempts to identify why some firms use currency derivatives while others do not. This focus on nonfinancial firms is important as the reasons for their choice of whether or not to use financial derivatives to hedge against currency exposure is least understood (Bartram et al 2006).

The research will attempt to address this particular issue within the South African context in order to describe whether South African derivative usage by non-financial firms is consistent with the international research.

1.3 Problem statement

Describe the characteristics of South African firms, who hedge against foreign exchange risk.

The purpose of the research is to use statistical methods as laid out in the research methodology chapter to describe which firm specific characteristics determine the use of currency derivatives, for currency hedging in South African non-financial firms.

1.4 Significance of the study

The study fills a gap in that this research as far as could be established has not been done with a focus on South African nonfinancial firms. A thorough search through South African journals, on the e-resources portal of Wits business school library found no similar studies. Additionally the internet searches using the terms of the research problem found no results for South Africa.

The study provides guidance to the financial departments of all South African firms who have foreign exchange exposure. CFO's and other employees of financial departments are able to use the study to measure their own hedging practises against the general trend.

This study is of use to financial institutions that sell financial currency derivatives. This study describes to traders, client service representatives and account managers of financial institutions the characteristics of nonfinancial firms that are likely to purchase and make use of financial derivatives. This allows the financial firms to focus on and market to specific customers, which are likely to use foreign exchange derivatives due to firm specific characteristics.

1.5 Delimitations of the study

- Only nonfinancial firms are included within the sample, because financial firms also sell derivatives and thus their determinants for using currency derivatives are different from non-financial firms (Allayannis and Ofek 2001).
- Foreign denominated debt, which is an alternative way to hedge foreign currency exposure, is not included in the study (Nance et al. 1993).
- Only foreign exchange exposure is focused on, e.g. no interest rate exposure is included in the study.
- Interest derivative, commodity derivative and equity derivative use is excluded.
- The report focuses only on currency derivatives.

- The report includes looking at using derivatives for currency hedging; other methods of hedging e.g. operational hedging are not included.
- The firms included are listed on the JSE main board in order to obtain the necessary financial data.
- The firms included have a market capitalisation as at 31/12/2008 as received from JSE main board any firms listed after this date were not included in the data.
- The firms included must have a functioning website and clear financial data.
- Remove firms with complicated corporate events in process which may affect the structure of the firm and future policy.
- Remove firms with geographical segmentation not clearly divided.

1.6 Definition of terms

Exchange Rate Hedging: Reducing a firm's exposure to exchange rate fluctuations (Firer et al. 2004).

Derivative Security: "A financial asset that represents a claim to another financial asset"(Firer et al. 2004:699).

Exchange Rate Exposure: – This is financial risk arising from buying or selling at uncertain exchange rates in the near future (Firer et al. 2004).

Currency Forward: – A legal contract between two parties, dictating the sale of one currency for another in the future at an agreed price (Firer et al. 2004).

Currency Future: – A forward contract where gains and losses are realized daily (Firer et al. 2004).

Currency Swap: – A financial agreement by two parties to exchange specified currencies at specified intervals on a certain date (Firer et al. 2004).

Currency Option: – A financial derivative instrument, which gives the owner the right but not the obligation to buy or sell a currency at a specific price over a set period (Firer et al. 2004).

Economies of Scale: - Economies of Scale exist when the average cost per unit falls as the size of production increases (Firer et al. 2004).

Bond Covenant - The restrictions placed on a company by the bond holders of the company (Firer et al. 2004).

Ceteris Paribus – All other things remaining equal (Firer et al. 2004).

Interest Cover Ratio - $\text{Earning before income and tax} / \text{Interest Expense}$

1.7 Assumptions

- Assume the financial statements of the organisations reviewed have full disclosure of derivative usage as per IFRS standards (www.iasb.org). Companies listed on the JSE main board are required to comply with South African Generally Accepted Accounting Practise and some IFRS standards. Whether an organisation uses derivatives directly impact the results of this research. If a firm's derivative use is properly disclosed then it can be determined whether a firm hedges its foreign currency exposure or not.
- All financial statements of public companies are audited, to the same suitable level. The level of audit for companies listed on the JSE main board is of a high standard and is a requirement for listing. If the companies are not audited to this high level the research is open to incorrect results as the statements are not consistent.
- Assume that no geographical segmentation of data in the financial statements means that foreign exposure is too small to be recognised or there is no foreign exposure. This assumption allows a decision to be made on whether a firm hedges its foreign exchange exposure or not.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

It is becoming increasingly important for South African firms to address their foreign exchange exposure and consequently foreign exchange risk, in order to operate and therefore compete on an international level (Fourie and Mohr 2007). Allayannis and Ofek (2001) indicate that in order to protect themselves from unanticipated fluctuations in exchange rates i.e. exchange rate risk; firms use foreign currency derivatives and other hedging instruments.

This research focuses exclusively on the use of foreign currency derivatives to mitigate exchange rate risk. Moreover, the research examines what determines whether a non-financial firm will use foreign currency derivatives. Although not within a South African context, identifying the firm specific characteristics of currency hedging through currency derivatives is the subject of studies including, (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

This literature review focuses on the results obtained from these studies and the conclusions, which are derived.

Before describing the results obtained in previous research it is important to define exchange rate risk, which for the purpose of this research is defined as: “the probability of changes, for better or worse, in the home currency value of an asset, liability or cash flow stream caused by unexpected future exchange rate changes.” (Glaum 1990:66). As previously stated this risk can be mitigated using currency derivatives, but the question remains what determines whether firms use currency derivatives to manage this risk.

Each of the following statements regarding the characteristics of South African firms hedging foreign exchange risk is discussed individually and in detail in the sections following. To, begin increased exchange rate exposure is positively related to the

use of currency derivatives (Smith and Stulz 1985; Geczy et al. 1996; Allayannis and Ofek 2001; PramBorg 2005).

Studies have found that firm size is positively related to the incentive to use currency derivatives (Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006). Although most studies indicate that larger firms are more likely to use currency derivatives there is conflict with the theory of bankruptcy costs and the choice to use currency derivatives. The bankruptcy costs theory of currency derivative usage states that firms which are more likely to suffer from financial distress have greater incentive to use currency derivatives in order to create consistent cash flows, these are often the smaller firms (Nance et al. 1993; Geczy et al. 1996; Hagelin and Pramborg 2006). This conflict is expanded on in the relevant sections of the literature review.

Previous research further states that one of the characteristics of firms which use foreign exchange hedging is the level of managerial ownership (Smith and Stulz 1985; Geczy et al. 1996). The literature states that as managerial ownership increases so too does the incentive to use currency derivatives for hedging (Smith and Stulz 1985).

Finally the majority of previous studies find support for the underinvestment costs theory which states that firms with greater growth opportunities and stricter financial constraints are more likely to use currency derivatives (Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006).

2.2. Background discussion.

Exchange rates fluctuations, which are a change in currency prices, have an impact on the value of the firm, just as any other price change would affect the firm's cash flows, asset and liability values (Brown 2001). As firms are increasingly operating on a global level these price changes can: (1) Affect competition terms with foreign firms as a product reduces or increases in price compared to the foreign firms product; (2) Affect the prices of inputs and outputs for firms with supply chains operating

internationally; (3) Alter the underlying value of assets which are not held in the firms domestic currency (Bodnar and Gentry 1993:29).

These unexpected and uncontrollable price changes lead to firms being exposed to exchange rate risk as previously defined in section 2.1. In order to mitigate this risk nonfinancial firms have increased the use of currency derivatives, be it forwards, futures, options and/or swaps (Pramborg 2005).

The question that this research explores and which previous research (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006) explores is what characteristics describe which nonfinancial firms will choose to use currency derivatives as a hedging mechanism. The exclusion of financial firms is because as sellers as well as buyers of currency derivatives, they have different underlying determinants for currency derivative use compared to nonfinancial firms (Allayannis and Ofek 2001).

It is important to note at this point that in measuring whether firms use currency derivatives to hedge the dependant variable is whether or not currency derivatives are used (Geczy et al. 1996). This could imply that currency derivatives are being used for speculation rather than simply for hedging purposes (Geczy et al. 1996).

However, it is determined that although not a direct measure of hedging the sample firms in the research are not using currency derivative to speculate (Geczy et al. 1996). This view is further confirmed in the research of (Allayannis and Ofek 2001), where it supports the theory that firms hedge their foreign exchange risk with currency derivatives as protection against exchange rate changes and not for speculative reasons. Therefore, for the remainder of the paper it is assumed that currency derivatives are used for hedging.

The remainder of the literature review discusses each factor and previously established firm specific characteristics of foreign exchange hedging through currency derivatives.

2.3. Firm specific characteristics of non-financial firms, who choose to hedge against foreign exchange risk using currency derivatives.

As globalisation continues throughout the business world it has become rare for a firm to be completely unaffected by foreign exchange exposure and therefore foreign exchange risk (Gamble et al 2008). However not all firms choose to mitigate this foreign exchange risk through hedging policies.

Therefore, studies either through surveys or by using financial information disclosed on accounting statements have sought to establish what firm specific characteristics determine the use of currency derivatives to hedge foreign exchange risk (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

2.3.1 Exchange Rate Exposure

In studies by Allayannis and Ofek (2001) and PramBorg (2005) the coefficient of exchange rate exposure of a firm is positive and is statistically significant. This implies that the decision of a firm to hedge foreign exchange exposure is strongly affected by the level of foreign exchange exposure within the firm. If a firm has a large amount of costs, prices and assets denominated in foreign currencies then a change in the foreign currency has a large impact on the value of the firm (Morey and Simpson 2001).

The larger the foreign exchange exposure of a firm the stronger the incentive to hedge with currency derivatives against this exposure is further reiterated in a study of international financial derivative usage (Bartram et al. 2006). Using currency derivatives enables firms with large foreign exchange exposure to control the level of costs and prices and the value of assets denominated in foreign currencies, this creates stability in cash flows and the ability to forecast more accurately (Bartram et al. 2006).

In order to measure the foreign exchange exposure of a firm, previous research uses three ratio's obtained from the financial statements (Geczy et al. 1996). These three

ratios are, “foreign net income to total sales (FORINC), “foreign sales to total sales (FORSALES) and the ratio of foreign assets to total assets (FORASSETS)” (Geczy et al.1996:1331).

The ratios show how large the foreign contributions are to total contributions, the larger the contribution of the foreign component, the greater the effect of a currency change on the firm.

The results obtained when using all of these ratios once more confirms, as in previous studies that the larger the foreign exchange rate exposure the larger the incentive to hedge (Geczy et al. 1996). Therefore greater foreign exchange exposure can be seen as a characteristic shown by firms which use currency derivatives to hedge exchange rate risk.

2.3.2 Hypotheses on Exchange Rate Exposure

There are three variables which are tested in relation to exchange rate exposure, below the hypotheses for each variable are laid out.

2.3.2a Hypothesis: Foreign Net Income/Total Sales

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Foreign Net Income to Total Sales for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively.

Alternative Hypothesis: $H_{1a}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean value for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Foreign Net Income to Total Sales.

2.3.2b Hypothesis: Foreign Sales/Total Sales

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Foreign Sales to Total Sales for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{1b}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Foreign Sales to Total Sales.

2.3.2c Hypothesis: Foreign Assets/Total Assets

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Foreign Assets to Total Assets for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{1c}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Foreign Assets to Total Assets.

2.3.3 Managerial Ownership

The second characteristic that is studied in relation to the decision to use currency derivatives to hedge foreign exchange risk is the element of managerial ownership (Smith and Stulz 1985; Geczy et al 1996).

Public company ownership is divided amongst shareholders (Firer et al. 2004). The make-up of the shareholders is unique for each organisation. Some organisations have large components of publicly held shares; some have individual shareholders which hold large percentages. These shareholders may or may not be involved in the daily decision making of a firm either at executive or managerial level.

However often in lieu of payment or as incentive management and executives are offered shares and therefore ownership in the company (Smith and Stulz 1985). Ownership in the company may change managements or the board's decisions in relation to hedging policy (Smith and Stulz 1985). From this point managerial applies to all managerial and executive ownership i.e. all parties involved in the hedging policy decision.

The thought process associated with this characteristic is as follows, if a manager owns significant shares within a firm then variance in the firm's cash flow and value due to exchange rate fluctuations directly affects the manager (Smith and Stulz 1985; Geczy 1996). Therefore in order to prevent changes of the managers own wealth , the manager follows a policy of hedging where possible, resulting in an expected positive relationship between managerial wealth directly invested in the firm and the use of currency derivatives to hedge foreign exchange exposure (Smith and Stulz 1985).

Geczy(1996) measures this managerial wealth invested directly in the firm by taking the “log of the market value of common shares beneficially owned (excluding options) by officers and directors as a group” (Geczy 1996:1334). Ideally the research requires a proxy that would measure the percentage of total managerial wealth invested in firms however total managerial wealth is recorded in the financial statements. By taking the log of the market value of common shares beneficially owned, the research can assume that total managerial wealth is constant across managers in all firms and that the size of the management team is constant across all firms (Geczy 1996).

In the results component of the Geczy (1996) study the Log of the Market Value of Managerial ownership is not deemed as statistically significant and can therefore not support the positive relationship laid out by (Smith and Stulz 1985). The research

explores this relationship to establish whether this relationship is indeed statistically significant within a South African context.

2.3.4 Hypothesis on Managerial Ownership

There is a singular variable to be tested under the characteristic of managerial ownership the hypothesis for the Log of the Market Value of Managerial ownership is as follows:

Hypothesis: Managerial Ownership

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Managerial Ownership for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively.

Alternative Hypothesis: $H_2: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean value for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Managerial Ownership.

2.3.5 Firm Size

Almost all previous studies establish that firm size is positively related with the incentive to hedge (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006). Throughout the literature this relationship is attributed to economies of scale (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

The literature states that in order to start a hedging program there is significant start-up and management costs (Hagelin and Pramborg 2006). The portion of fixed costs associated with a hedging program such as the training and hiring of employees and the development of hedging strategies leads to the allowance for economies of scale to develop (Hagelin and Pramborg 2006). Furthermore holding of derivative positions requires large cash amounts which are held as margin calls and bulk trades reduce trading costs (PramBorg 2005).

Throughout the previous research studies, various measurements are used to indicate size of the firm which are then used as independent variables within the analysis (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006). There are three measurements used to represent firm size, which incorporate the measurements, used throughout most of the other studies, these are total assets, total sales and book value of debt plus market value of equity (Carroll et al. 1997).

2.3.5 Hypotheses on Firm Size

As with foreign exposure there are three variables tested in relation to firm size, the hypothesis for each follows.

2.3.5a Hypothesis: Book Value of Debt plus the Market Value of Equity

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Book Value of Debt plus Market Value of Equity for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{3a}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as

this indicates that firms that hedge foreign exchange risk have a larger mean value of Book Value of Debt plus Market Value of Equity.

2.3.5b Hypothesis: Total Assets

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Total Assets for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{3b}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange have a larger mean value of Total Assets.

2.3.5c Hypothesis: Total Sales

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Total Sales for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{3c}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Total Sales.

2.3.6 Bankruptcy Costs

Some of the studies cite bankruptcy costs and the likelihood of bankruptcy as a characteristic of firms that use currency derivatives for the use of currency hedging (Smith and Stulz 1985; Mian 1996; Geczy et al. 1996; Carroll et al. 1997). The reasoning follows that hedging with currency derivatives reduces expected fluctuations in cash flows, which reduces the probability and therefore cost of bankruptcy and financial distress (Geczy et al. 1996; Carroll et al. 1997).

An example of a bankruptcy cost is the loss or disturbance of established relationships with either customers or suppliers, this is not only an immediate cost for the firm but a long term cost as relationships are often severed permanently (Geczy et al. 1996). As a measure for financial distress the borrowing capacity of a firm is examined as this shows the ability of a firm to pay off their debt and therefore remain solvent (Geczy et al.1996). Two measures are used to measure the borrowing capacity these are the interest cover ratio (COV_AV) and long term debt ratio (DE_AV) (Geczy et al.1996).

A firms interest cover ratio is its earnings before interest and tax (EBIT): interest expense, the higher the ratio the greater a firm's ability to cover its interest expense and the less chance that bankruptcy will occur. The long term debt ratio is the ratio of total debt: total assets. This shows a firm's ability to pay off debt if assets are sold. The smaller this ratio the less likely a firm will get into bankruptcy (Geczy et al. 1996).

This is compatible with the study by (Carroll et al.1997) where leverage ratios are used to indicate the probability of bankruptcy.

The literature finds that ceteris paribus, the lower a firm's interest coverage ratio and the higher a firm's debt ratio the more likely a firm is to hedge foreign exchange risk through the use of currency derivatives (Geczy 1996). Additionally (Carroll et al.1997) finds that a greater debt to firm size ratio leads to a higher probability of bankruptcy occurring, and that this results in a higher chance that a firm will use currency derivatives to hedge foreign exchange exposure in order to reduce the volatility of cash flows.

Carroll et al.(1997) and Mian (1996) further raise additional aspects of bankruptcy costs in that they are indirectly related to firm size. The research stipulates that smaller firms have a higher probability of bankruptcy and therefore smaller firms are more likely to hedge against foreign exchange exposure with currency derivatives to prevent financial distress (Carroll et al.1997).

This concept conflicts with the previous hypothesis that larger firms are more likely to hedge due to economies of scale experienced within a hedging program (Carroll et al.1997). The literature therefore highlights that a positive or negative relationship between firm size and hedging will be dependent on whether the economies of scale or financial distress argument are the dominant effect (Carroll et al.1997). The results within the literatures indicate that economies of scale is the dominant effect, although firms with higher leveraged positions were more likely to be hedged the result was not statistically significant (Carroll et al.1997; Mian 1996).

This indicates that there is weak support for the hypothesis that firms use currency derivatives to hedge foreign exchange risk in order to reduce bankruptcy costs (Geczy et al.1996; Carroll et al.1997).

2.3.7 Hypotheses of Bankruptcy Costs

There are 5 variables tested under the characteristic of bankruptcy costs these variables relate to the two different theories of bankruptcy costs the hypotheses are laid out below:

2.3.7a Hypothesis: Debt Ratio

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Debt Ratio for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{4a}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Debt Ratio.

2.3.7b Hypothesis: Interest Cover Ratio

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Interest Cover Ratio for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{4b}: \mu_1 - \mu_2 > 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a smaller mean value of Interest Cover Ratio.

Next the three variables relating to firm size are tested again. However as discussed in the literature above, under the bankruptcy costs hypothesis a firm that hedges its foreign exchange risk is expected to be smaller than a firm that does not hedge its foreign exchange risk.

2.3.7i Hypothesis: Book Value of Debt plus the Market Value of Equity

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Book Value of Debt plus the Market Value of Equity for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{4c}: \mu_1 - \mu_2 > 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a smaller mean value of Book Value of Debt plus Market Value of Equity.

2.3.7ii Hypothesis: Total Assets

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Total Assets for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{4d}: \mu_1 - \mu_2 > 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a smaller mean value of Total Assets as they are smaller firms.

2.3.7iii Hypothesis: Total Sales

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Total Sales for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{4e}: \mu_1 - \mu_2 > 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as

this indicates that firms that hedge foreign exchange risk are expected to have a smaller mean value of Total Sales as they are smaller firms.

2.3.8 Underinvestment Costs

A further firm specific characteristic cited within the literature for using currency derivatives to hedge foreign exchange exposure is growth opportunities of the firm (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006).

Geczy et al. (1996) uses two variables as proxies to indicate growth opportunity in a firm. The first is the level of research and development expenditure to total sales and the second variable is the ratio of a firm's capital expenditure on property, plant and equipment (Geczy et al. 1996).

The underinvestment characteristics as highlighted in the research of (Carroll et al.1997) is not exclusively dependant on the opportunities for growth within the firm but on liquidity and the ability to raise external capital for investment opportunities. Carroll et al (1997) stipulates that hedging reduces variation in cash flow and therefore firms can benefit from a reputation for hedging when raising external capital. Additionally as further indicated in the research of (Carroll et al.1997) less fluctuation in cash flows prevented through hedging can reduce the probability of bond covenants becoming binding which may result in a firm not having the ability to invest in a strong investment opportunity.

Within,(Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006) growth opportunities are found to be significant in determining whether firms choose to use currency derivatives to hedge against foreign exchange exposure.

2.3.9 Hypotheses on Underinvestment Costs

There are three variables tested under the theory underinvestment costs the hypotheses are as per below:

2.3.9a Hypothesis : R&D Expenses/ Sales Expense

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Research and Development expenses to Total Sales for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{5a}: \mu_1 - \mu_2 < 0$

Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Research and Development Expenses to Total Sales in order to keep cashflow consistent for Research and Development capital.

2.3.9b Hypothesis: Capital Expenditure on Plant, Property and Equipment / Firm Size

Null hypothesis: $H_0: \mu_1 = \mu_2$

Where μ_1 and μ_2 are defined as the mean value of Capital Expenditure on Plant , Property and Equipment for firms that do not hedge foreign exchange risk and firms that use derivatives to hedge their foreign exchange risk respectively

Alternative Hypothesis: $H_{5b}: \mu_1 - \mu_2 < 0$

. Where μ_1 and μ_2 represent the mean for firms that do not hedge their foreign exchange risk, and firms that use derivatives to hedge their foreign exchange risk respectively. A significant finding is the acceptance of the alternative hypothesis as this indicates that firms that hedge foreign exchange risk are expected to have a larger mean value of Capital Expenditure on Plant, Property and Equipment /Firm Size in order to keep cashflow consistent for capital expenditure on plant property and equipment.

2.4 Conclusion

In conclusion there is substantial research, which sets out to describe the characteristics of firms that choose to hedge their foreign exchange exposure through currency derivatives and those firms that do not (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

Firm specific characteristics are identified in an attempt to answer this question. The characteristics include exchange rate exposure, managerial ownership, firm size, bankruptcy costs and underinvestment costs. Through surveys (Smith and Stulz 1985; Nance et al. 1993; PramBorg 2005; Bartram et al. 2006) and statistical analysis, (Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; Hagelin and Pramborg 2006) certain of these factors are found to be significant and others are not.

All of the literature shows a statistically significant positive relationship between the level of exchange rate exposure and choosing to hedge with currency derivatives (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

Additionally firm size is found throughout the studies to be a characteristic of firms that use currency derivatives for foreign exchange hedging showing a significantly positive relationship, where the larger the firm the more propensity to use hedging (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

Managerial ownership as a characteristic of firms that hedge although highlighted as significant within (Smith and Stulz 1985) is not found to be significant in the study done by (Geczy et al.1996).

Throughout the literature, (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006;) the underinvestment

hypothesis is found to be statistically significant ,with greater growth opportunities being a firm specific characteristic of firms that use currency derivatives.

Finally, although (Smith and Stulz 1985) finds that the bankruptcy costs hypothesis holds later research by (Geczy et al.1996 and Carroll et.al. 1997) show weak support for this hypothesis, both in terms of firm size and financial distress costs.

A definite set of hypothesis is established with which to test South African firms on the firm specific characteristics of firms that hedge their foreign exchange.

2.4.1 Hypothesis on Exchange Rate Exposure

1a) Foreign Net Income/Total Sales

Alternative Hypothesis: $H_{1a}: \mu_1 - \mu_2 < 0$

1b) Foreign Sales/Total Sales

Alternative Hypothesis: $H_{1b}: \mu_1 - \mu_2 < 0$

1c) Foreign Assets/Total Assets

Alternative Hypothesis: $H_{1c}: \mu_1 - \mu_2 < 0$

2.4.2 Hypothesis on Managerial Ownership

2) Managerial Ownership

Alternative Hypothesis: $H_2: \mu_1 - \mu_2 < 0$

2.4.3 Hypotheses on Firm Size

3a) Book Value of Debt plus the Market Value of Equity

Alternative Hypothesis: $H_{3a}: \mu_1 - \mu_2 < 0$

3b)Total Assets

Alternative Hypothesis: $H_{3b}: \mu_1 - \mu_2 < 0$

3c) Total Sales

Alternative Hypothesis: $H_{3c}: \mu_1 - \mu_2 < 0$

2.4.4 Hypotheses on Bankruptcy Costs

4a) Debt Ratio

Alternative Hypothesis: $H_{4a}: \mu_1 - \mu_2 < 0$

4b) Interest Cover Ratio

Alternative Hypothesis: $H_{4b}: \mu_1 - \mu_2 > 0$

4c) Book Value of Debt plus the Market Value of Equity

Alternative Hypothesis: $H_{4c}: \mu_1 - \mu_2 > 0$

4d) Total Assets

Alternative Hypothesis: $H_{4d}: \mu_1 - \mu_2 > 0$

4e) Total Sales

Alternative Hypothesis: $H_{4e}: \mu_1 - \mu_2 > 0$

2.4.5 Hypotheses on Underinvestment Costs

5a) R&D Expenses/ Sales Expense

Alternative Hypothesis: $H_{5a}: \mu_1 - \mu_2 < 0$

5b) Cap Ex PPE / Firm Size

Alternative Hypothesis: $H_1: \mu_1 - \mu_2 < 0$

CHAPTER 3: RESEARCH METHODOLOGY

This research uses quantitative methods to describe the characteristics of South African firm's that use currency derivatives to hedge against foreign exchange exposure (Creswell 2003).

A set of independent variables is established and tested for each characteristic and related theory. These variables are calculated from figures obtained from the financial statements of South African public firms listed on the JSE main board.

Previous studies have used univariate tests and a logit regression to test each variable (Geczy et al.1996). During the research it is determined that it is not viable to run a logit regression on the South African data as the test is unable to determine a difference between firms that hedge and those that do not. As an alternative a t-test is run on the variables, to determine whether the null hypotheses for each variable is accepted or rejected and conclusively whether the theory relating to each variable, is a characteristics of firms that hedge their foreign exchange exposure through currency derivatives.

As well as expanding on all of the above, the research methodology chapter includes a discussion on the methodology, population, sample and data collection for this research. Additionally a discussion of validity and reliability within the context of this research is included.

3.1 Research methodology

This study uses quantitative methods to carry out the research. The literature states that in quantitative research it is possible to generate hypotheses, which has been done within the literature review and will be discussed in detail below (Creswell 2003; Golafshani 2003).

Quantitative research methodology is further appropriate for this study as; the focus is on the facts i.e. whether or not a firm uses currency derivatives and what is the characteristic of the firms that use currency derivatives to hedge against foreign exchange exposure (Golafshani, 2003).

The third aspect which allows for the use of quantitative methods in this study is that the information that is being used is in numerical form e.g. total foreign sales, or interest cover and these numbers can be quantified and summarized (Creswell 2003 and Golafshani 2003).

Finally, the last aspect of this research topic, which lends itself to using quantitative research, is that the results are expressed in statistical terminologies (Golafshani 2003).

The t-test calculates the summary statistics for each dependent variable for firms that do not hedge, and firms that hedge with regards to the independent variables.

Next the result when calculating the difference between the independent variable means indicates which difference $>$ $<$, will enable the acceptance or rejection of the null hypothesis. Next the assumption of normal distribution is tested, if this assumption is rejected then the result of the non parametric Mann-U-Whitney test is reviewed, where the hypothesis is either rejected or accepted (Hanke and Reitsch 1994).

Broadly the t-test relates to the stated hypotheses as follows:

All quantitative figures are calculated using information from the financial statements of listed financial firms. On the following page is a table illustrating the independent variables which will be calculated for each hypothesis and the mnemonic used going forward.

Table 1: Table of Independent Variables

HYPOTHESIS	INDEPENDANT VARIABLE	MNEMONIC
Hypothesis1: ExchangeRate Exposure	Foreign Net Income/Total Sales	ForNetInc/TotalSales
	Foreign Sales /Total Sales	ForSales/TotalSales
	Foreign Assets/Total Assets	ForAssets/TotalAssets
Hypothesis 2: Managerial Ownership	Log of the market value of common share beneficially owned by managers and directors as a group.	LogMVMang
Hypothesis 3: Firm Size	Book Value of Debt + Market Value of Equity	BVDebt+MVEquity
	Total Assets	TotalAssets
	Total Sales	TotalSales
Hypothesis 4: Bankruptcy	Interest Cover Ratio	IntCovRatio
	Debt Ratio	DebtRatio
	Book Value of Debt + Market Value of Equity	BVDebt+MVEquity
	Total Assets	TotalAssets
	Total Sales	TotalSales
Hypothesis 5: Underinvestment	Research and Development Expenses / Sales	R&DExpenses/ Sales
	Capital Expenditure on Property, Plant and Equipment / BVDebt + MVEquity	CapExPPE/BVDebt+MV Equity

The t-test determines the mean value of each of these independent variables comparing the values of firms that hedge with currency derivatives and those firms that do not hedge, to establish whether there is a significant difference between the two.

All the tests are done at a 5% significance level. The 5% significance level is used due to convention.

If the assumption of a normal distribution is not met then the nonparametric Mann-Whitney U test is done, to establish whether the null hypothesis for each independent variable should be accepted or rejected. This is consistent throughout all the variables tested below. As the sample of firms that do not hedge is < 30, the results of the Mann-Whitney U Test are always reviewed.

3.2 Research Design

This research uses direct data sources for observation of fact (Creswell 2003). The data is drawn from archival sources of financial statements obtained on the websites of listed companies (Creswell 2003).

The data obtained, is then statistically reviewed to determine whether each hypothesis holds at a 5% significance level.

Although previous studies used surveys, due to response bias and other problems associated with questionnaires, the mathematical t-test laid out produces stronger results. As stated in literature this design prevents researcher influence on the variables (Falconer and Mackay 1999). As laid out by the international accounting standards all South African firms must report these figures in the same manner, which creates consistency (www.iasb.org).

The scope of this research is statistical and uses a convenience sample (Falconer and Mackay 1999). Due to the manner in which the information and data is collected the perceptions of the respondents' are not relevant as the standards are set out and opinions were not included this prevents human bias in the results. (Creswell 2003) . As the information is publically published, it is not necessary to contact the firms regarding the research.

The study uses hypothesis testing of parametric statistics, to begin variables are identified for each theory, and these variables are then related to hypotheses and tested to verify the theories for using currency derivatives to hedge foreign exchange exposure.

The non-obtrusive manner of this research leads to consistent results for this research.

3.3 Population and sample

3.3.1 Population

The population for this research consists of all South African nonfinancial firms.

3.3.2 Sample and sampling method

The sample frame for this research consists of South African non-financial firms listed on the main board of the JSE. This sampling frame is chosen for convenience. Additionally it is a requirement of all listed firms to provide audited financial statements where the information for the research is acquired.

As per the delimitations the research uses only nonfinancial firms as financial firms have other incentives to use currency derivatives other than hedging against foreign exchange exposure (Allayannis and Ofek 2001). Therefore all banks, investment companies and insurance brokers are removed from the list.

Several of the firms on the JSE main board had been suspended at the time of review; these firms are removed from the sample to keep the sample constant.

Firms that had non-functioning websites or no clear financial data are excluded from the sample.

Firms undergoing corporate actions which will affect the structure of the company and policy decisions are removed.

Firms where the geographic segmentation of required financials are not clearly divided are excluded from the sample.

Finally any firms who did not have clear shareholder analysis or director share information are removed from the sample.

The removal of these firms from the sample does not create bias as the firms that have been removed range in size and industry.

The result is a list of 109 nonfinancial firms on the main board of the JSE to be analysed. (www.JSE Securities Exchange.co.za). It is decided to only use the main board of the stock exchange as this results in a consistency of firms as all firms must meet certain requirements to be listed.

This is not a random sample but a convenience sample as a listed company has public financial statements, which are accessible. These financial statements are often not made public by private companies, due to privacy reasons. Therefore, by choosing public companies the information is easily obtainable.

The main board of the stock exchange represents a wide array of industries and with regards to diversity is an unbiased representation of the population. The listing requirements for the JSE main board mean that only certain firms can list, this will affect the bias of the sample size as it does not consist of firms that are unable to meet the listing requirements. However the wide scope of the JSE main board means that the results are applicable.

3.4 The research instrument

The research instrument used was the statistically modelled t-test, to determine whether firms that do not hedge have different means for each independent variable than firms that hedge. This test has the advantage that was easy to use and interpret, additionally it allowed for the testing of each individual variable.

As the sample was composed of 109 firms this t-test was applicable (Albright, Winston and Zappe 2006). After the variables were calculated they were each tested individually. The tests were done with the statistical program NCSS. The results

were then reviewed to look at difference in means and the expected difference in variance when (Hedge=No) – (Hedge = Yes). The expected difference in variance was determined by the theory presented in literature. This was a disadvantage of this tool as it allows for human error if the expected error is incorrectly calculated.

Before the null hypothesis was rejected or accepted, it was necessary to look at whether the assumption of normality is met (Albright et al 2006). The lack of meeting the assumption of normality in addition to the sample of firms that do not hedge being less than 24 required the results of the Mann-Whitney U tests to determine whether a null hypothesis was rejected or accepted.

This test was nonparametric and was run to determine if two samples are drawn from the same population, in the below research whether the firms that are do not hedge are drawn from the same population as firms that hedge (Hanke and Reitsch 1994).

For the Mann-Whitney U test the acceptance of the null hypothesis was therefore that there was no difference between the means of the two populations. If the results from the NCSS test show that the null hypothesis was rejected this indicates a significant difference between Firms that do not hedge and firms that hedge.

3.5 Procedure for data collection

In order to collect the data, financial statements for all 109 firms are collected. As these are public firms, the information is available through investor relations on the firm's websites once the figures are collected the variables are calculated.

Due to the public nature of the company, data collection is straightforward.

3.6 Data analysis and interpretation

The figures are collected from financial statements and calculated into the necessary variables. The variable data is then copied into the NCSS program where a two-sided t-test is run at the 5% significance level.

Each variable is analysed by the same process. First the descriptive statistics primarily the means are compared and interpreted as to whether there is a difference between the means for the independent variables of firms that do not hedge and firms that hedge. Additionally this difference is interpreted to see if it is compatible with the theory presented in the literature on the relative independent variable.

The second part of the analysis is to determine what if the theory for each variable, described in the literature, is correct what would the difference be between Firms that do not hedge – and firms that hedge. For example, the literature states that larger firms are more likely to hedge. Therefore the result of the equation for a variable relating to firm size e.g. Total Sales is < 0 as firms that do not hedge is expected to have a lower value than firms that hedge. The form of the equation is found under the Equal-Variance T-Test Section and calculated for each variable individually.

The next step is to confirm if the assumption of normality is met. If this is not met it is necessary to look at the results of the nonparametric Mann-Whitney-U test result. As the sample of firms that do not hedge is < 30 it is necessary to look at the Mann-Whitney-U test for all the independent variables.

With the exception of the theory of managerial ownership, there is more than one variable that is examined for each theory relating to currency hedging policy. Therefore only when all the variable results are compared is a final conclusion for each theory reached.

3.7 Limitations of the study

- The sample consists of only those nonfinancial firms listed on the main board of the JSE.
- Other South African nonfinancial firms are not included in the sample.
- There is no attempt to select a random sample of firms from the entire population.
- There is no attempt to collect data from any other source other than websites.

3.8 Validity and reliability

The concept of validity in quantitative research involves to what extent the instrument chosen for the research measures what it is intended to measure. (Golafshani 2003).

The concept of reliability refers to the consistency of the research results over time in addition to whether the results can be construed as an accurate representation of the total population under study (Golafshani 2003).

The below sections discuss each of these terms relative to the research on identifying the firm specific characteristics of South African firms that partake in foreign exchange hedging.

3.8.1 External validity

External validity looked at whether this research is relevant to the entire proposed population (Golafshani 2003).

For this research a broad range of industries is included as the main board of the JSE encompasses many different firms and industries this increases external validity as more of the population is represented making the research relevant to a greater component of the population.

In addition the variables used are figures that any firm is able to calculate from their own financial statements, all firms in the population are able to calculate the necessary variables with the relevant financial data, increasing external validity.

However, as the listing requirements for the main board of the JSE are stringent this implies that only a certain type of firm is analysed. This reduces the external validity of the research as smaller firms could show different hedging policy patterns.

3.8.2 Internal validity

Internal validity focuses on the set of hypothesis determining which data is analysed i.e. which independent variables are tested. (Golafshani 2003).

Within this research, the only independent variables studied, as firm specific characteristics of foreign exchange hedging, are the variables laid out in the hypothesis interpreted from the literature. This does not account for any characteristics, which may be important but are excluded from the literature, as they have not been tested for. In order to counter this, a review of a large portion of literature on the topic is assessed to ensure that as many variables as possible are included.

Whether this instrument is useful in the future will depend on the development of the derivative market , as the derivative market develops there could be additional determinants such as ease of use and lowering of costs, which will change the use of this research.

3.8.3 Reliability

As the information is obtained directly from audited financial statements, the reliability of the research is high. The results obtained are consistent over time and there is no error introduced by human investigators or response bias (Creswell 2003).

The only change is as the financial statements change on a yearly basis the individual numeric variables will change however; this does not affect the reliability of the mathematical model.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

The results of this research are presented through tables illustrating statistical results with explanations of the results following. Within each characteristic there are variables tested; the results of each variable are presented individually. This is followed by a discussion and comparison of all the variables relating to each characteristic and a final overall conclusion for each theory.

4.2 Demographic profile of firms

The sample used in the research is a convenience sample due to the ease of access to the financial statements of firms listed on the JSE main board.

This resulted in a total of 109 firms to be used in the sample. With regards to diversification this sample is a good representation of the population as the firms represent a range of industries across South Africa.

Due to the stringent listing requirements such as size the sample only represents firms that meet these requirements. This will effect it's representation of the population.

4.3 Results: Hypotheses on Exchange Rate Exposure

4.3.1 Foreign Net Income/Total Sales

Below Table 2 shows the summary statistics for the independent variable Foreign Net Income to Total Sales. Table 2 indicates that of the total 109 firms included in the sample, 24 Firms do not hedge their foreign exchange risk with currency derivatives and 85 firms hedge their foreign exchange risk. This proportion hedging and not hedging is consistent for each hypothesis.

Table 2: Foreign Net Income /TotalSales,

Independent variable: ForNetInc/TotalSales						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	0.0059	0.2602	0.0531	-0.1038	0.1158
Hedge=YES	85	0.1050	0.2514	0.0272	0.0508	0.1592
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	-1.6912	0.0468	Reject H ₀	0.5142		
Difference: (Hedge=NO) – (Hedge=YES)						
TESTS OF ASSUMPTIONS						
Assumption			Decision (5%)			
Skewness Normality(Hedge= NO)			Cannot reject normality			
Kurtosis Normality (Hedge= NO)			Reject normality			
Omnibus Normality (Hedge = NO)			Reject normality			
Skewness Normality(Hedge=YES)			Reject normality			
Kurtosis Normality (Hedge= YES)			Reject normality			
Omnibus Normality (Hedge=YES)			Reject normality			
MANN-WHITNEY U TEST						
Alternative Hypothesis			Approximation Without Correction			
		Z-Value	Prop Level	Decision (5%)		
Difference < 0		-1.8772	0.0302	Reject H ₀		

The mean value of Foreign Net Income to Total Sales for firms that do not hedge is smaller than for firms that hedge. This is as expected as firms that hedge, will have greater components of income and costs coming from abroad i.e. greater foreign exchange exposure and therefore a greater pressure to hedge this foreign exchange risk.

Table 2 further shows the results of the equal variance t-test. The important section of the table is highlighted. It is expected that the Foreign Net Income to Total Sales value for firms that hedge will on average be numerically greater than firms that do not hedge as firms that hedge have greater foreign exchange exposure. Therefore the implied difference between the two is < 0 in the below equation.

Before the null hypothesis is accepted or rejected it is important to examine the assumptions for the condition of normality. The results of the normality test are displayed in Table 2.

The tests of assumption show that the assumption for normality is not met; the equal variance test results in Table 2 cannot be used to accept or reject the null hypothesis. It is therefore necessary to look at the results illustrated under the Mann-Whitney U Test Results.

The Mann-Whitney U test is a nonparametric test which is used when the assumption of normality is not met or when the sample size is less than 30. Throughout the research the sample size of firms that do not hedge < 30 therefore the Mann Whitney U test results are used these results state that when the difference is < 0 , H_0 is rejected.

The rejection of the null hypothesis implies that as expected there is a significant difference between the mean value of Foreign Net Income Total Sales, for firms that hedge and firms that do not hedge. Firms with higher Foreign Net Income to Total Sales are more likely to use currency derivatives to hedge foreign exchange risk as they are exposed to more risk.

4.3.2 Foreign Sales/Total Sales

The second independent variable tested in Table 3 under the foreign exposure hypothesis is Foreign Sales to Total Sales. As with the above independent variable, Foreign Net Income to Total Sales, the mean value of Foreign Sales to Total Sales for firms that do not hedge is smaller than for firms that hedge. This is as expected as firms with a larger portion of foreign sales have greater foreign exposure.

Table 3: Foreign Sales/Total Sales, Descriptive Statistics Section

Independent Variable: ForSales/Total Sales						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	0.1216	0.3091	0.0630	-0.088	0.2522
Hedge=YES	85	0.2081	0.2912	0.0315	0.1453	0.1592
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	-1.2676	0.1038	Accept H ₀	0.3500		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption				Decision (5%)		
Skewness Normality (Hedge= NO)				Reject normality		
Kurtosis Normality (Hedge= NO)				Reject normality		
Omnibus Normality (Hedge = NO)				Reject normality		
Skewness Normality(Hedge=YES)				Reject normality		
Kurtosis Normality (Hedge= YES)				Reject normality		
Omnibus Normality (Hedge=YES)				Reject normality		
MANN-WHITNEY U TEST						

Alternative Hypothesis	Approximation Without Correction		
Z-Value	Prop Level	Decision (5%)	
Difference < 0	-3.0276	0.0012	Reject H₀

In the equal-variance t-test section illustrated in Table 3 above, the result of the highlighted equation if firms with higher foreign exchange exposure hedge is that the difference is < 0 . Firms which hedge will have a greater mean value on average of Foreign Sales to Total Sales.

Under the test of assumptions the normality assumption is rejected for Foreign Sales to Total Sales therefore it is necessary to look at the Mann-Whitney U test results illustrated in Table 3.

As per the above table, H_0 is rejected when the difference is < 0 . This implies a significant difference between the value of Foreign Sales to Total Sales for firms that hedge and firms that do not hedge.

4.3.3 Foreign Assets/Total Assets

The final independent variable pertaining to the characteristic of foreign exposure is Foreign Assets to Total Assets. Table 4 below illustrates that consistent with the previous two independent variables the mean value of Foreign Assets to Total Assets for firms that do not hedge is smaller than for firms that hedge.

Table 4: Foreign Assets/Total Assets, Descriptive Statistics Section

Independent variable: ForAssets/TotalAssets						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	0.1160	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	0.1301	0.2255	0.0244	0.0814	0.1787

EQUAL-VARIANCE T-TEST				
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power ($\alpha =.05$)
Difference < 0	-0.2533	0.4002	Accept H ₀	0.0817
Difference: (Hedge=NO) – (Hedge=YES)				
TEST OF ASSUMPTIONS				
Assumption			Decision (5%)	
Skewness Normality (Hedge= NO)			Reject normality	
Kurtosis Normality (Hedge= NO)			Reject normality	
Omnibus Normality (Hedge = NO)			Reject normality	
Skewness Normality(Hedge=YES)			Reject normality	
Kurtosis Normality (Hedge= YES)			Reject normality	
Omnibus Normality (Hedge=YES)			Reject normality	
MANN-WHITNEY U TEST				
Alternative Hypothesis		Approximation Without Correction		
		Z-Value	Prop Level	Decision (5%)
Difference < 0		-2.0629	0.0195	Reject H₀

Firms that hedge will have a larger component of Foreign Assets to Total Assets which results in greater foreign exposure. Consequently the result of the equation highlighted under the equal-variance t-test is that the difference will be < 0.

As with the other independent variables tested under the characteristic of level of foreign exposure, Foreign Assets to Total Assets does not pass the normality assumption. The Mann Whitney results are therefore reviewed.

The Mann-Whitney U results for the variable Foreign Assets to Total Assets reject the null hypothesis implying that there is a significant difference between the mean

value of Foreign Assets to Total Assets for firms that hedge and those that do not hedge.

4.3.4 Overall results – Foreign Exchange Exposure

In conclusion all three independent variables relating to the characteristic of foreign exchange exposure; Foreign Net Income to Total Sales, Foreign Sales to Total Sales and Foreign Assets to Total Assets, reject the null hypotheses that there is no significant difference in means for all independent variables between firms that hedge and those that do not hedge.

The rejection of the null hypothesis when the difference is < 0 indicates that on average firms with higher foreign exchange exposure ,as measured through the independent variables, are more likely to hedge. These results indicate that it is a characteristic of firms that hedge to have higher foreign exchange exposure.

4.4 Results: Hypothesis on Managerial Ownership

The singular independent variable for the characteristic of managerial ownership is Log Market Value Managerial Ownership. Below is the table showing the results of the t-tests for this variable.

Table 5 shows the summary statistics of the independent variable Log Market Value Managerial ownership. The alternative hypothesis supports the principle that the larger the ownership by management the more likely the firm is to hedge in order to maintain consistent cashflow. It follows that the mean value of Log Market Value Managerial ownership for firms that do not hedge is lower than firms that hedge, this is the case below however the difference between the means is small further testing will determine if the difference is significant.

Table 5: Log Market Value Managerial Ownership

Independent Variable: LOGMVMANG
DESCRIPTIVE STATISTICS

Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	7.5676	1.1292	0.2354	7.0793	8.0559
Hedge=YES	85	7.6606	1.1093	0.1210	7.4199	7.901
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)		Power (α =.05)	
Difference < 0	-0.3552	0.3615	Accept H ₀		0.0918	
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption			Decision (5%)			
Skewness Normality (Hedge= NO)			Cannot reject normality			
Kurtosis Normality (Hedge= NO)			Cannot reject normality			
Omnibus Normality (Hedge = NO)			Cannot reject normality			
SkewnessNormality(Hedge=YES)			Cannot reject normality			
Kurtosis Normality (Hedge= YES)			Cannot reject normality			
Omnibus Normality (Hedge=YES)			Cannot reject normality			
MANN-WHITNEY U TEST						
Alternative Hypothesis				Approximation Without Correction		
Z-Value		Prop Level		Decision (5%)		
Difference < 0		-0.1820		0.4277		Accept H ₀

Above Table 5 shows the results for the independent variable Log Market Value Managerial ownership, for the equal variance t-test section. The first step determined the results for the highlighted equation in Table 5. As previously stated it is expected that the mean value of Log Market Value Managerial ownership of firms that do not

hedge is less than the mean value of Log Market Value Managerial ownership of firms that hedge and therefore the difference is < 0 .

Before the null hypothesis is rejected or accepted it is necessary to look at the assumption of normality. The test of assumptions shows that normality cannot be rejected. However because the sample of firms that do not hedge is < 30 the results of the Mann-Whitney test are still used.

The acceptance of the null hypothesis implies that there is not a significant difference between the mean values of the Log of the Market Value of Managerial ownership for firms that do not hedge and the mean values of the Log of the Market Value of Managerial ownership for firms that hedge.

Therefore as per the above results a high level of managerial ownership in a firm is not a characteristic of a firm that hedges.

4.5 Results: Hypotheses on Firm Size

Due to economies of scale, firms which are larger are more likely to use currency derivatives to hedge their foreign exchange exposure. The independent variables relating to firm size are: Book Value of Debt+ Market Value of Equity, Total Assets and Total Sales, the results of the t-tests on these variables are laid out in the tables below.

4.5.1 Book Value Debt+ Market Value Equity

The first independent variable tested to indicate firm size is Book Value Debt + Market Value Equity. Table 6 shows the summary statistics for this variable.

Table 6: Book Value Debt + Market Value Equity

Independent Variable: BVDebt+MVEquity						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean

Hedge=NO	24	5,180,342,000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	27,863,870,000	0.2255	0.0244	0.0814	0.1787

EQUAL-VARIANCE T-TEST

Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power ($\alpha = .05$)
Difference < 0	-1.2080	0.1148	Accept H_0	0.3283

Difference: (Hedge=NO) – (Hedge=YES)

TEST OF ASSUMPTIONS

Assumption	Decision (5%)
Skewness Normality (Hedge= NO)	Reject normality
Kurtosis Normality (Hedge= NO)	Reject normality
Omnibus Normality (Hedge = NO)	Reject normality
SkewnessNormality (Hedge=YES)	Reject normality
Kurtosis Normality (Hedge= YES)	Reject normality
Omnibus Normality (Hedge=YES)	Reject normality

MANN-WHITNEY U TEST

Alternative Hypothesis	Approximation Without Correction		
Z-Value	Prop Level	Decision (5%)	
Difference < 0	-3.2176	0.0006	Reject H_0

The mean value of Book Value Debt + Market Value Equity for firms that hedge is larger than firms that do not hedge.

The firms with larger values for Book Value Debt+ Market Value Equity are larger firms and will hedge their foreign exchange as these firms will be able to take advantage of economies of scale with regards to hedging programmes and policy. Therefore the result of the equation calculating the difference in means for Book Value Debt+ Market Value Equity between firms that do not hedge and firms that hedge in Table 6 is that the difference is < 0.

The table further shows that the assumption of normality for the independent variable Book Value Debt+ Market Value Equity is not met; therefore it is necessary to look at the results of the Mann-Whitney U test.

Table 6 shows that the null hypothesis is rejected implying the difference in the mean values of Book Value Debt+ Market Value Equity between firms that do not hedge and firms that hedge is significant. Larger firms are more likely to hedge their foreign exchange exposure.

4.5.2 Total Assets

Total Assets is the second independent variable examined in relation to the characteristic of firm size. Table 7 illustrates the summary statistics where as with the previous independent variable the mean value of Total Assets for firms that hedge is larger than firms that do not hedge.

Table 7: Total Assets, Descriptive Statistics Section

Independent Variable TotalAssets						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	3,953,875,000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	21,693,030,000	0.2255	0.0244	0.0814	0.1787
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	-1.0449	0.1492	Accept H ₀	0.2720		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						

Assumption	Decision (5%)
Skewness Normality (Hedge= NO)	Reject normality
Kurtosis Normality (Hedge= NO)	Reject normality
Omnibus Normality (Hedge = NO)	Reject normality
SkewnessNormality (Hedge=YES)	Reject normality
Kurtosis Normality (Hedge= YES)	Reject normality
Omnibus Normality (Hedge=YES)	Reject normality

MANN-WHITNEY U TEST			
Alternative Hypothesis		Approximation Without Correction	
	Z-Value	Prop Level	Decision (5%)
Difference < 0	-3.4150	0.0003	Reject H₀

The value of the Total Assets of firms that hedge is larger than those of firms that do not hedge therefore the outcome for the highlighted equation above is that the difference is < 0.

For the variable Total Assets the assumption of normality is not met as seen in the table below, therefore the decision to accept or reject the null hypothesis is made by looking at the results for the Mann – Whitney U test in Table 7.

The null hypothesis is rejected this supports the theory that firms that hedge have significantly greater total assets and are therefore larger.

4.5.3 Total Sales

The final independent variable analysed for the characteristic of firm size is Total Sales. The summary statistics below show that the mean value of Total Sales for firms that hedge is larger than the mean value of Total Sales for firms that do not hedge.

Table 8: Total Sales, Descriptive Statistics Section

Independent variable: TotalSales						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	2,109,274,000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	17,152,020,000	0.2255	0.0244	0.0814	0.1787
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	-1.3994	0.1645	Accept H ₀	0.1154		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption			Decision (5%)			
Skewness Normality (Hedge= NO)			Reject normality			
Kurtosis Normality (Hedge= NO)			Reject normality			
Omnibus Normality (Hedge = NO)			Reject normality			
SkewnessNormality (Hedge=YES)			Reject normality			
Kurtosis Normality (Hedge= YES)			Reject normality			
Omnibus Normality (Hedge=YES)			Reject normality			
MANN-WHITNEY U TEST						
Alternative Hypothesis			Approximation Without Correction			
		Z-Value	Prop Level	Decision (5%)		
Difference < 0		-4.6728	0.0000	Reject H ₀		

Similarly to the independent variable Total Assets, the expected outcome of the highlighted equation above if the null hypothesis is rejected is that the difference is < 0 as firms that hedge have greater Total Sales as they are larger.

The rejection of the normality assumption denotes that the results of the Mann-Whitney U test determine the rejection or acceptance of the null hypothesis.

From the above results the null hypothesis is rejected and this implies that the difference between the means of firms that hedge and firms that do not hedge is significant. This confirms the theory that firms that hedge have larger Total Sales than firms that do not hedge.

4.5.4 Overall results – Firm Size

In conclusion all three of the independent variables representing firm size rejected the null hypotheses. This supports the theory that firms that are larger are more likely to use hedging as a policy for addressing foreign exchange risk. Their large size enables them to take advantage of the cost advantages of economies of scale.

4.6 Results: Hypotheses on Bankruptcy Costs

As previously discussed there are two theories associated with the characteristic of bankruptcy costs and the propensity of a firm to hedge its foreign exchange exposure. The first is firm size and the same variables are tested as above, Book Value Debt+ Market Value Equity, Total Assets, Total Sales however in this case the smaller firms will hedge in order to prevent financial distress and avoid inconsistent cash flows. Therefore the difference in the equation under the equal variance t-test section for each variable is > 0 for the null hypothesis to be rejected.

The second theory relates to the ability of a firm to pay its debt and is discussed through the testing of two further independent variables, Interest Cover Ratio and Debt Ratio.

4.6.1 Book Value Debt + Market Value Equity

The first independent variable tested for firm size is Book Value Debt+ Market Value Equity.

Table 9: Book Value Debt + Market Value Equity

Independent variable: BVDebt + MVEquity						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	5,180,342,000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	27,863,870,000	0.2255	0.0244	0.0814	0.1787
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference > 0	-1.2080	0.8851	Accept H ₀	0.0022		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption				Decision (5%)		
Skewness Normality (Hedge= NO)				Reject normality		
Kurtosis Normality (Hedge= NO)				Reject normality		
Omnibus Normality (Hedge = NO)				Reject normality		
SkewnessNormality (Hedge=YES)				Reject normality		
Kurtosis Normality (Hedge= YES)				Reject normality		
Omnibus Normality (Hedge=YES)				Reject normality		
MANN-WHITNEY U TEST						
Alternative Hypothesis				Approximation Without Correction		

	Z-Value	Prop Level	Decision (5%)
Difference > 0	-3.2176	0.9993	Accept H₀

The smaller mean value of firms that do not hedge in the above table does not support the theory that smaller firms are more likely to hedge to create consistent cashflow and avoid bankruptcy.

As stated in the introduction to the bankruptcy costs characteristic section, the theory purports that smaller firms are more likely to hedge; therefore the result of the above highlighted equation if the theory is correct is a difference of > 0. The rejection of the normality assumption requires the examination of the results of the nonparametric Mann Whitney U test.

Table 9 indicates that the null hypothesis is accepted and the difference is not significant, this refutes the theory that smaller firms are more likely to hedge.

4.6.2 Total Assets

As with the variable Book Value Debt + Market Value of Equity, the smaller mean value of the independent variable Total Assets for firms that do not hedge does not support the theory that smaller firms are more likely to hedge.

Table 10: Total Assets

Independent Variable : TotalAssets						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	3,953,875,000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	21,693,030,000	0.2255	0.0244	0.0814	0.1787
EQUAL-VARIANCE T-TEST						

Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power ($\alpha = .05$)
Difference > 0	-1.0449	0.8507	Accept H_0	0.0036

Difference: (Hedge=NO) – (Hedge=YES)

TEST OF ASSUMPTIONS

Assumption	Decision (5%)
Skewness Normality (Hedge= NO)	Reject normality
Kurtosis Normality (Hedge= NO)	Reject normality
Omnibus Normality (Hedge = NO)	Reject normality
SkewnessNormality (Hedge=YES)	Reject normality
Kurtosis Normality (Hedge= YES)	Reject normality
Omnibus Normality (Hedge=YES)	Reject normality

MANN-WHITNEY U TEST

Alternative Hypothesis	Approximation Without Correction		
	Z-Value	Prop Level	Decision (5%)
Difference > 0	-3.4150	0.9996	Accept H_0

The difference when (Hedge=NO)-(Hedge=YES) in Table 10 is > 0 as smaller firms will hedge under the bankruptcy costs theory. The assumption of normality is rejected and the Mann-Whitney U test results are reviewed.

The results accept the null hypothesis and consequently do not support the theory that smaller firms are more likely to hedge.

4.6.3 Total Sales

The final independent variable tested for firm size is Total Sales, as with the previous two variables the smaller mean value for firms that do not hedge does not support the theory that smaller firms are more likely to hedge .

Table 11: Total Sales,

Independent variable : TotalSales						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	2109274000	0.2837	0.0579	-0.0037	0.2359
Hedge=YES	85	17,152,020,000	0.2255	0.0244	0.0814	0.1787
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference > 0	-1.3994	0.0822	Accept H ₀	0.3996		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption			Decision (5%)			
Skewness Normality (Hedge= NO)			Reject normality			
Kurtosis Normality (Hedge= NO)			Reject normality			
Omnibus Normality (Hedge = NO)			Reject normality			
SkewnessNormality (Hedge=YES)			Reject normality			
Kurtosis Normality (Hedge= YES)			Reject normality			
Omnibus Normality (Hedge=YES)			Reject normality			
MANN-WHITNEY U TEST						
Alternative Hypothesis			Approximation Without Correction			
Z-Value			Prop Level		Decision (5%)	
Difference > 0			-4.6728		0.9999	
					Accept H ₀	

The outcome for the highlighted equation in Table 11 is that the difference is > 0 if the null hypothesis is rejected. Table 11 shows that the normality assumption is not met.

Consistent with the previous variables studied concerning firm size, the results for Total Sales accept the null hypothesis reiterating that smaller firms are not more likely to hedge in order to create consistent cash flows to avoid financial distress.

4.6.4 Interest Cover Ratio

Interest Cover Ratio is the first independent variable tested in correlation with the theory that a firm's debt level and ability to pay debt, effects the decision of a firm to use currency derivatives to hedge foreign exchange exposure. As previously stated ceteris paribus, the lower the Interest Cover Ratio the more likely a firm will face bankruptcy and the more likely the firm will hedge.

Table 12: Interest Cover Ratio,

Independent Variable: IntCovRatio						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	-409.646	1949.261	406.449	-1252.57	433.2776
Hedge=YES	85	703.7942	6786.643	740.4835	-768.9977	2176.586
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference > 0	-0.7757	0.7801	Accept H ₀	0.0078		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption			Decision (5%)			

Skewness Normality (Hedge= NO)	Reject normality
Kurtosis Normality (Hedge= NO)	Reject normality
Omnibus Normality (Hedge = NO)	Reject normality
SkewnessNormality (Hedge=YES)	Reject normality
Kurtosis Normality (Hedge= YES)	Reject normality
Omnibus Normality (Hedge=YES)	Reject normality

MANN-WHITNEY U TEST

Alternative Hypothesis	Approximation Without Correction		
	Z-Value	Prop Level	Decision (5%)
Difference > 0	2.0248	0.0214	Reject H₀

Table 12 shows the descriptive statistics for the independent variable Interest Cover Ratio. Here the mean value of Interest Cover Ratio for firms that (Hedge =NO) is much lower than that of firms that hedge. This does not support the above theory that firms with lower interest cover ratios will hedge to create consistent cash flows and therefore prevent bankruptcy.

As the Interest Cover Ratio of firms that do not hedge is predicted to be larger than firms that hedge the difference in the above highlighted equation is > 0 .

Above Table 12 rejects the assumption of normality for the two populations being compared and the nonparametric Mann-Whitney U Test is run for the independent variable.

The Mann-Whitney U test result rejects the null hypothesis, this implies that there is a difference in the level of Interest Cover Ratio between firms that do not hedge and firms that hedge. Although the means do not support the bankruptcy hypothesis, this rejection of the null hypothesis shows that there is a significant difference between the interest cover ratio between firms that hedge and firms that do not hedge.

4.6.5 Debt Ratio

The second independent variable tested under the bankruptcy costs theory relating to ability to pay debt is the Debt Ratio. The higher the Debt Ratio the harder it will be for a company to pay back the debt and the greater chance of bankruptcy, which will result in a firm choosing a policy to hedge with currency derivatives. Table 13 shows the comparison of mean value for Debt Ratio and supports this theory as firms that hedge have a higher mean value than the firms that do not hedge.

Table 13: Debt Ratio,

Independent Variable : Debt Ratio						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	0.4974	0.5453	0.1113	0.2672	0.7277
Hedge=YES	85	0.5404	0.3428	0.0371	0.4665	0.6144
EQUAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	-0.4706	0.3194	Accept H ₀	0.1195		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption				Decision (5%)		
Skewness Normality (Hedge= NO)				Reject normality		
Kurtosis Normality (Hedge= NO)				Reject normality		
Omnibus Normality (Hedge = NO)				Reject normality		
SkewnessNormality (Hedge=YES)				Reject normality		

Kurtosis Normality (Hedge= YES)	Reject normality		
Omnibus Normality (Hedge=YES)	Reject normality		
MANN-WHITNEY U TEST			
Alternative Hypothesis	Approximation Without Correction		
Z-Value	Prop Level	Decision (5%)	
Difference < 0	-1.4845	0.0688	Accept H₀

Contrary to the previous variable for bankruptcy costs, Interest Cover Ratio, the difference in means for Debt Ratio is < 0 as the mean of firms that hedge will have a greater value than firms that do not hedge.

Table 13 shows that the assumption of normality is rejected and therefore the decision is made from the Mann-Whitney U results.

The results below show that the null hypothesis is accepted and there is not a significant difference regarding the independent variable Debt Ratio.

4.6.5 Overall results - Bankruptcy Costs

The first three independent variables tested under the bankruptcy costs theory relate to firm size. The smaller means of firms that do not hedge and the acceptance of the null hypothesis for all three variables rejects the idea that smaller firms are more likely to hedge foreign exchange exposure to prevent bankruptcy.

The second two independent variables tested under the bankruptcy costs theory relate to the ability of an organisation to pay off its debt. These variables have conflicting results. The descriptive statistics for interest cover ratio does not support the bankruptcy costs theory however the null hypothesis is rejected indicating a significant difference between the two populations.

With the variable debt ratio, the opposite occurred with the descriptive statistics supporting the bankruptcy costs theory and the null hypothesis being accepted indicating no difference in the two populations.

The results for a company's ability to pay its debt effecting a firms decision to hedge or not hedge is therefore inconclusive in the South African context. Further research is needed to explore which of the variables interest cover ratio or debt ratio have greater effect on a companies' ability to pay debt or choose hedging policy, this is outside the parameters of this research.

4.7 Results: Hypotheses on Underinvestment costs

The theory of underinvestment costs in relation to the choice to hedge foreign exchange exposure states that the need for capital investment in development projects incentivises firms to hedge their currency exposure to create consistent cash flows for investment. The two independent variables tested in relation to underinvestment costs are Research and Development Expenses to Sales and Capital Expenditure on Property Plant Equipment to Firm Size.

4.7.1 R&D Expenses / Sales

Firms that hedge have a higher ratio of Research and Development Expenses to Sales than those that do not hedge as they require constant cashflows to attract investment for capital outlays for research and development. Table 14 shows that the descriptive statistics for the independent variable Research and Development Expenses to Sales supports this as the mean value of firms that do not hedge is lower than that of firms that do hedge.

Table 14: R&D Expenses/Sales, Descriptive Statistics Section

Independent Variables: R&D Expenses/Sales						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	-0.0587	0.1775	0.0362	-0.1336	0.0162
Hedge=YES	85	-0.0227	0.1363	0.0147	0.0516	0.0071

EQUAL-VARIANCE T-TEST				
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power ($\alpha = .05$)
Difference < 0	-1.0784	0.1416	Accept H_0	0.2832
Difference: (Hedge=NO) – (Hedge=YES)				

TEST OF ASSUMPTIONS	
Assumption	Decision (5%)
Skewness Normality (Hedge= NO)	Reject normality
Kurtosis Normality (Hedge= NO)	Reject normality
Omnibus Normality (Hedge = NO)	Reject normality
SkewnessNormality (Hedge=YES)	Reject normality
Kurtosis Normality (Hedge= YES)	Reject normality
Omnibus Normality (Hedge=YES)	Reject normality

MANN-WHITNEY U TEST			
Alternative Hypothesis		Approximation Without Correction	
	Z-Value	Prop Level	Decision (5%)
Difference < 0	-0.1648	0.4345	Accept H_0

Under the underinvestment theory firms that do not hedge have a lower mean value of Research and Development Expenses to Sales than firms that hedge the result of the below highlighted equation will be < 0 in Table 14. Table 14 illustrates that the normality assumption is rejected and therefore the results from the Mann-Whitney U are reviewed.

Table 14 accepts the null hypothesis as the difference between firms that do not hedge and firms that do hedge is not significant for the variable Research and Development to Expenses to Sales. This implies that the level of Research and Development in a firm does not affect its decision to hedge. Before a conclusion on the underinvestment costs theory can be reached there is a further independent variable to be tested.

4.7.2 Capital Expenditure PPE / Book Value Debt + Market Value Equity

Along with expenditure on Research and Development, firms require capital for expenditure on property, plant and equipment, for expansion or modernisation projects. Therefore the theory follows that in order to create consistent cashflows for this expenditure firms with higher Capital Expenditure on Plant Property and Equipment to Book Value Debt+ Market Value Equity are more like hedge their foreign exchange exposure.

Table 15: Capital Expenditure PPE/ Book Value Debt+Market Value Equity,

Independent Variable: CapExPPE/BVDebt+MVEquity						
DESCRIPTIVE STATISTICS						
Variable	Count	Mean	Standard Deviation	Standard Error	95% LCL of Mean	95% UCL of Mean
Hedge=NO	24	-0.0459	0.0500	0.0102	-0.0670	-0.0248
Hedge=YES	85	-0.0590	0.0869	0.0094	-0.0778	-0.0403
EQIAL-VARIANCE T-TEST						
Alternative Hypothesis	T-Value	Probability Level	Decision (5%)	Power (α =.05)		
Difference < 0	0.7086	0.7599	Accept H ₀	0.0094		
Difference: (Hedge=NO) – (Hedge=YES)						
TEST OF ASSUMPTIONS						
Assumption				Decision (5%)		
Skewness Normality (Hedge= NO)				Reject normality		
Kurtosis Normality (Hedge= NO)				Reject normality		
Omnibus Normality (Hedge = NO)				Reject normality		
SkewnessNormality (Hedge=YES)				Reject normality		

Kurtosis Normality (Hedge= YES)	Reject normality		
Omnibus Normality (Hedge=YES)	Reject normality		
MANN-WHITNEY U TEST			
Alternative Hypothesis	Approximation Without Correction		
Z-Value	Prop Level	Decision (5%)	
Difference < 0	1.0603	0.8555	Accept H ₀

As with the variable Research and Development Expenses to Sales, the mean value of Capital Expenditure on Property Plant and Equipment to Book Value Debt+ Market Value Equity is expected to be larger for firms that hedge their foreign exchange exposure. Therefore the difference between the means in the below equation will be < 0 .

Table 15 shows the results of the tests for the normality assumptions, these assumptions have not been met and normality is rejected. The results of the non-parametric Mann-Whitney-U test are reviewed.

Table 15 shows that as with the variable Research and Development Expenses to Total Sales the null hypothesis is accepted and there is not a significant difference for Capital Expenditure on Property Plant and Equipment to Book Value Debt + Market Value Equity. Therefore firms with larger ratios of Capital Expenditure on Property Plant and Equipment to Book Value Debt +Market Value Equity are not more likely to use currency derivatives to hedge foreign exposure in order to create consistent cash flows.

4.7.3 Overall results – Underinvestment costs theory

For both independent variables, Research and Development Expenses to Total Sales and Capital Expenditure Property Plant and Equipment to Book Value Debt+ Market Value Equity tested in the underinvestment costs theory the null hypothesis is accepted. This means that there is not a significant difference for these independent variables between the two sample populations those that do not hedge and those

that hedge. This infers that level of investment and ability to raise capital is not a characteristic of firms that hedge their foreign exposure.

4.8 Summary of Results

In summation, Chapter Four laid out and described the results of the t-tests performed on each independent variable, tested under each of the five characteristics, relating to a firm's decision to hedge foreign exchange.

The following chapter discusses with particular relevance to previous literature, the results of the t-tests and the relevance to the South African environment.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter discusses the findings of the t-tests run on the independent variables in chapter 4. The discussion focuses on the variables and the characteristics that they relate to particularity in terms of previous literature.

Each characteristic is discussed, showing similarities and differences between the international literature and the South African results as well as offering explanations and logical arguments.

Finally a conclusion is made for each characteristic and its relationship to a firm's choice to hedge their foreign exchange risk.

5.2 Demographic profile of firms

The sample of firms used for the research is a convenience sample. The demographic profile of the firms is a fair representation of the diversity of industry within the population of South African firms. As previously stated there are limitations in the sample representing the population due to the stringent requirements of listing on the JSE main board.

5.3 Foreign Exchange Exposure.

Three independent variables are tested as a measurement of the level of foreign exchange exposure, Foreign Net Income to Total Sales, Foreign Sales to Total Sales and Foreign Assets to Total Assets. The literature states that firms with higher foreign exchange exposure are more likely to hedge their foreign exchange exposure with currency derivatives (Allayannis and Ofek 2001; Bartram et al. 2006; Geczy et al. 1996; PramBorg 2005).

The results, for the South African sample of firms, in chapter four endorse the opinion of the literature. For all three variables, firms that hedged their foreign exchange exposure have a higher average value of the independent variable tested than firms that did not hedge their foreign exchange risk.

When a firm has a large amount of foreign assets relative to its total assets a large amount of the firms value is denominated in a foreign currency (Allayannis and Ofek 2001). When an exchange rate fluctuates it can adversely or beneficially affect the value of the asset and in turn the value of the firm. Exchange rate fluctuations are beyond a firms control and can be due to many factors such as political strife (PramBorg 2005). Although some fluctuations in exchange rates can be beneficial it is the unknown risk that incentivises firms to use currency derivatives to protect themselves from foreign exchange risk. Often firms purchase foreign exchange options, this protects the firm from an adverse exchange rate change but allows a firm to take advantage of a beneficial change in exchange rate.

The positive relationship between higher foreign exchange exposure and the increased probability of hedging is logical as foreign exchange exposure is the underlying reason for foreign exchange risk. If a firm does not have foreign exchange exposure then there is no foreign exchange risk.

In conclusion when a firm has a high level of foreign net income, foreign assets and foreign sales relative to its total sales and total assets it implies that the firm hedges its foreign exchange exposure with currency derivatives. The results of the research indicate a high level of foreign exchange exposure is a characteristic of South African firms that hedge with currency derivatives.

5.4 Managerial Ownership

The discussion on managerial ownership centres on a single independent variable which is tested, the log of the market value of shares owned by executives and management.

The literature has conflicting views, (Smith and Stulz 1985) found a positive relationship between direct managerial ownership and the choice of a firm to hedge its foreign exchange exposure i.e. the higher the amount of direct managerial ownership the more likely a firm would use currency derivatives. The argument being that manager's want consistent cashflow so that the value of their shares remains unchanged or increases and is not adversely effected by unfavourable fluctuations in the exchange rate (Smith and Stulz 1985). (Geczy 1996) does not support this finding, in his research he found that the level of direct managerial ownership does not impact a firm's decision to use currency derivatives to hedge its foreign exchange exposure.

First examination of the research results show that the mean, for the independent variable for managerial ownership, of firms that use currency derivatives to hedge their foreign exchange risk is slightly larger than firms that that do not. This supports (Smith and Stulz 1985) and shows a positive relationship between the level of ownership of shares by managers and directors and a firm's choice to hedge its foreign exchange.

Further examination of the results shows a different conclusion. The null hypothesis is accepted this indicates that there is no significant difference between the two populations. These results support (Geczy 1996) that higher managerial ownership does not result in the decision to hedge foreign exchange.

The reason for the difference in results between (Smith and Stulz 1985) and (Geczy 1996) could be attributed to the time between the two studies. To begin the size of firms will have grown over the ten year period; this may have diluted the managerial ownership and decreased its significance in the choice of a firm to hedge foreign exchange risk.

Furthermore in the period 1985 – 1996 continuing globalisation will have increased the level of foreign exchange exposure across firms as firms operations are spread over larger areas, making other characteristics such as level of exposure more relevant than managerial ownership.

With regards to the South African results, although the first results show a difference between the two populations the difference is not significant enough for the null hypothesis to be accepted. Therefore increased ownership in a firm of managers and directors is not seen as a characteristic of firms that use currency derivatives in the South African context.

5.5 Firm Size

A large proportion of the literature supports the theory, that the larger a firm the more likely it is to hedge its foreign exchange, this is due to the economic principle of economies of scale (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Brown 2001; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006).

As with the above literature three independent variables are tested in relation to firm size for the South African sample the larger these variables the larger the firm. The independent variables tested in relation to firm size are book value of debt added to the market value of equity, total sales and total assets.

The results are consistent across the three independent variables the value of the mean for firms that hedge foreign exchange exposure is higher for all the variables tested. The null hypothesis for each variable is rejected supporting the literature that larger firms are more likely to hedge their foreign exchange risk with currency derivatives.

Hedging programs entail large costs, there is the initial capital to purchase the financial instruments e.g. forwards, brokerage fees, the need to employ people with the knowledge to use these instruments and purchase the correct ones. As with many industries economies of scale allows firms to decrease the cost per purchase of currency derivatives. As firms become larger they require greater amounts of

hedges to cover increasing values and cashflows denominated in foreign currency. The size of the firm makes hedging cheaper than for smaller companies who cannot decrease the fixed cost of hedging by spreading it over an increased amount of hedges.

In conclusion it can be said that large firm size is a characteristic of firms that use currency derivatives to hedge foreign exchange risk within the South African context.

5.6 Bankruptcy Costs

The discussion for the hypotheses on the subject of bankruptcy costs is discussed in two sections followed by an overall conclusion.

To begin firm size is discussed, the literature explores whether smaller firms, which are more likely to face bankruptcy or financial distress, will hedge their foreign exchange exposure to help prevent bankruptcy and create consistent cashflows throughout their operations (Mian 1996; Carroll et al.1997).

The idea of smaller firms being more likely to hedge foreign exchange risk is in conflict with the hypothesis presented under 5.5 where larger firms are proved to be more likely to use currency derivatives due to economies of scale. The literature comments on this conflict and states that it is dependent on the dominant characteristic, i.e. is a firm more likely to choose a hedging policy based on its ability to use cost effective measures due to size or to prevent bankruptcy or financial distress (Mian 1996 ;Carroll et al.1997).

All three independent variables used previously are tested again for the characteristic of firm size, book value of debt plus the market value of equity, total sales, and total assets. Although the same variables are tested, here the alternative hypothesis is that firms that do not hedge their foreign exchange are larger than firms that do as smaller firms hedge to prevent bankruptcy (Mian 1996; Carroll et al.1997).

The results of the research accepts the null hypothesis this implies that there is not a significant difference between the two populations and that it is not more probable for smaller firms to use currency derivative to hedge foreign exchange exposure. It

follows that firm size and not threat of bankruptcy is the dominant characteristic for the South African sample of firms when choosing a firm's hedging policy. This is consistent with the research by (Carroll et al.1997) where the dominant effect in choosing to use currency derivatives is firm size due to economies of scales.

Firm size relative to threat of bankruptcy does not contribute to a South African firm's decision to hedge foreign exchange exposure.

The second component of the characteristic of bankruptcy costs examines the ability of a firm to cover its debt and interest payments. The literature states that firms with high interest payments relative to earnings before tax and high total debt to total assets hedge their foreign exchange exposure to create consistent cashflows and prevent bankruptcy (Smith and Stulz 1985; Geczy et al. 1996;). The results of the literature found that the firms that use currency derivatives to hedge foreign exchange risk do not have lower interest cover ratios or higher debt ratios than firms that do not hedge foreign exchange exposure (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997). The literature therefore does not support that firms that face bankruptcy due to high debt and interest payments are more likely to hedge foreign exchange risk.

The South African sample does not follow the international trend exactly. The null hypothesis for the independent variable, debt ratio is accepted, this follows the literature implying that the difference in debt ratio's between firms that hedge foreign exchange exposure and firms that do not is not significant.

However the interest cover ratio results for the South African sample conflicts this result as the null hypothesis is rejected indicating a difference in interest cover between the firms that do not hedge their foreign exchange risk and firms that use currency derivatives to hedge foreign exchange exposure.

Further investigation into the reasons behind this difference is beyond the scope of this research, but could result from differences across countries of interest rates etc.

Hedging is an expensive operation; if a company is threatened with bankruptcy then it may not have access to the funds to partake in a policy of hedging foreign

exchange exposure. Therefore there is weak support in the South African context that firms will hedge their foreign exchange exposure to avoid bankruptcy costs.

5.7 Underinvestment Costs

The literature states that opportunities for growth and the ability to raise capital can affect the decision of a firm to hedge foreign exchange exposure, as this will create consistent cashflows, which could be a consideration when raising external capital for investment (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006).

There are two variables, tested for the characteristic of underinvestment, which represent growth opportunities within a firm. The higher the level of R&D expenses relative to Total Sales and the higher the level of capital expenditure on property, plant and equipment relative to firm size the more growth opportunities facing the firm.(Allayannis and Ofek 2001; Hagelin and Pramborg 2006).

This growth is funded through different means, in order to obtain external capital for growth a firm will need to show consistent cashflows in order to repay debt and interest on the capital, however fluctuating exchange rates can create inconsistency and negatively affect an outside investors decision (Geczy et al. 1996,Allayannis and Ofek 2001; Hagelin and Pramborg 2006).

The literature finds that the difference for both these independent variables is significant between firms that hedge their foreign exchange exposure and firms that do not (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and Pramborg 2006). This implies that underinvestment costs are a characteristic of firms that hedge with currency derivatives.

The South African sample does not find the same result. For the South African firms the null hypothesis is accepted for both variables tested. This implies that there is not a significant difference between the populations for the independent variables. Firms that hedge with currency derivatives are not more likely to have higher growth opportunities than firms that do not hedge their foreign exchange exposure.

This break from the literature could indicate that all South African firms are investing in Research and Development and capital expenditure in property, plant and equipment across the board regardless of hedging policy. Further investigation into the investment environment in South Africa could explain why this result is different to international trends. Perhaps in South Africa firms that do not hedge their foreign exchange exposure to create consistent cash flows can source capital regardless or from alternative avenues. The investment environment in South Africa could affect the results of this test.

This could also indicate that at the level of the JSE main board firms invest similar proportions in Research and Development and Capital Expenditure on Property Plant and Equipment and there is therefore no difference between the firms. Further investigation on this split from previous literature is left for alternative research.

In the South African context increased growth opportunities are not a characteristic of firms that use currency derivatives.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The final chapter begins by discussing the conclusions reached from the research undertaken on the characteristics of South African firms that hedge against foreign exchange risk.

It discusses the outcomes with reference to the context of this research and in relation to the literature studied. Next recommendations to the stakeholders as laid out in chapter 1 are made. Finally any recommendations for further research which has arisen during the research process is included.

6.2 Conclusion of the Study

Of the 109 firms tested in the South African sample, 85 use currency derivatives to hedge against foreign exchange risk in contrast to the 24 who do not hedge their foreign exchange exposure with currency derivatives. This highlights the increasing use of hedging instruments in South African coinciding with the trend occurring across the globe.

The increasing exposure of firms to foreign exchange risk resulted in studies to determine what characteristics a firm that hedges will have the propensity to show (Smith and Stulz 1985; Nance et al. 1993; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; PramBorg 2005; Hagelin and Pramborg 2006; Bartram et al. 2006). This study looked at South African nonfinancial firms to establish whether South African firms are in line with international trends.

The characteristics that were tested relate to firm size, bankruptcy, underinvestment, managerial ownership and foreign exchange exposure.

South Africa differs from international trends in relation to the theory of underinvestment costs, internationally the presence of growth opportunities is seen as a characteristic of firms that hedge foreign exchange exposure (Smith and Stulz 1985; Geczy et al. 1996; Carroll et al. 1997; Allayannis and Ofek 2001; Hagelin and

Pramborg 2006). The South African research does not see growth opportunities as a significant characteristic of a firm's decision to hedge foreign exchange exposure.

The literature found that firms that hedge their foreign exchange exposure do not have higher managerial ownership (Geczy 1996). Similarly to the literature the South African research did not find that high managerial ownership is a characteristic of South African firms that hedge.

Further the South African research did not confirm the high probability of bankruptcy as a characteristic of firms that use currency derivatives to hedge foreign exchange exposure this is in line with the international literature which equally does not see high probability of bankruptcy as a characteristic of firms that hedge foreign exchange exposure (Mian 1996; Carroll et al.1997).

The two characteristics in the South African research which influence the choice of a firm to hedge foreign exchange exposure with currency derivatives are firm size and level of foreign exchange exposure. The literature states that firms that are larger and with greater foreign exchange exposure will choose to hedge their foreign exchange exposure with currency derivatives (Geczy et al. 1996; Allayannis and Ofek 2001; PramBorg 2005; Bartram et al. 2006).

Consistent with the literature South African firms that choose to hedge with currency derivatives can be described as larger and as having greater currency exposure.

In conclusion this research has begun to study why certain nonfinancial firms in South Africa are more likely to hedge their foreign exchange risk. As globalisation continues and with it the increased use of hedging instruments further studies into the detailed area of hedging will result.

6.3 Recommendations

The first stakeholders to benefit from this information are the financial policy decision makers in a company. From this research these stakeholders see that hedging is becoming a common practise with 85/109 firms choosing to hedge.

Additionally if these firms are considering starting a hedging program, they should first consider if their level of foreign exchange exposure warrants the need for a hedging program. Should the financial decision makers in a company decide to pursue a hedging policy they should ensure that the hedging program or size of the firm is big enough to support the costs of the hedging policy and create value through economies of scale.

The second group of stakeholders that can use this information are financial institutions that sell currency derivatives. When targeting which firms are more likely to buy hedging instruments, the financial institutions can focus on firms which are larger and have greater foreign exchange exposure as these are more likely to purchase them.

This creates a smaller target market to focus selling strategy on.

6.4 Suggestions for further research

What are the advantages/disadvantages of using foreign denominated debt used as an alternative to currency derivatives to hedge foreign exchange risk?

While researching the background literature for this study there were methods discussed other than currency derivatives as a way for a company to hedge their foreign exchange exposure (Mathur and Knowles 1985; Bodnar and Gentry 1993; Allayannis and Ofek 2001). One of the methods cited is the use of foreign denominated debt (Bodnar and Gentry 1993; Allayannis and Ofek 2001). Foreign denominated debt can be used to balance currency cashflow by off-setting foreign denominated assets or earnings (Allayannis and Ofek 2001).

The questions which arose are whether foreign denominated debt and currency derivatives are complementary or substitutes as hedging policy choices? What determines whether foreign denominated debt or currency derivatives will be used or a combination of both? What are the advantages or disadvantages of either policy choice?

Which specific derivatives are more popular and for what use within the South African market?

Once the decision to use currency derivatives has been made by a firm there are various different options of derivative instruments to use this includes swaps, forward contracts and options (Mathur and Knowles 1985; Bartram, Brown, and Fehle 2006). International research points to the forward contract being the most popular (Mathur and Knowles 1985). Does South Africa show any particular trends in what type of derivative instrument is used? Why are some derivative instruments more popular?

Additionally currency exchange risk is not the only form of financial risk faced by firms which use financial instruments for example there are interest rate swaps for covering interest rate risk (Hagelin and Pramborg 2006). Does the type of financial risk being faced determine what derivative instrument will be used?

Investigate the different hedging strategies followed by South African firms and their relative success.

Once a firm has made the decision to use currency derivatives there is not a single strategy that can be followed but a choice of strategy to be made (Mathur and Knowles 1985; Glaum 1990; Soenen and Madura 1991; Morey and Simpson 2001). It is uncommon for a firm to hedge 100% of its foreign exchange exposure (Soenen and Madura 1991). What is the average percentage of exposure that is hedged, are South African trends in line with international trends?

Firms may use different derivative instruments to diversify their strategy, (Glaum 1990). Is this common practise?

Some firms may only hedge certain foreign currency based on how risky its fluctuations are to the firm and the effect on the value of the firm due to appreciation and depreciation of said currency (Morey and Simpson 2001). Is this common practise to hedge primarily unstable currencies or logically the currencies with the greatest exposure?

Finally further research can explore the success, advantages and disadvantages of each of these strategies or a combination of both.

Investigate the use of derivatives for speculative purposes.

Many of the financial statements make clear that derivatives will not be used for speculative purposes. A forward contract whether for speculative or hedging reasons sets a price of a product, here the price of currency, at a future date (Firer et al. 2004) . There is therefore incentive to take large risks by predicting the future in the hope of a large reward.

Are derivatives used speculatively in hedging policies? What is the prevalence of speculative derivative practise in South Africa? What is the success of speculative derivative practise in South Africa?

Investigate the use of derivatives by financial firms

Financial firms were not used in the study as it is felt that financial firms will have alternative reasons for using currency derivatives. These firms may buy derivatives as an investment strategy. Furthermore as the sellers of derivatives some of these firms will have additional derivative and hedging programs.

There is a wide scope of research that can be done on financial firms and there use of currency derivatives in South Africa.

Investigate the use of currency derivatives by firms not listed on the JSE main board

The sample for this research only included firms that were listed on the JSE main board, this is due to the convenience of obtaining financial statements. There is scope to explore if firms not on the JSE main board show different characteristics when determining hedging policy.

There is such a wide variety of businesses in South Africa , that the sample would have to be clearly defined. Individual companies will need to be approached to determine whether they would provide the information as

stated before financial decisions can be a large part of strategy and companies may not want this information made public.

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