LUND UNIVERSITY

SCHOOL OF ECONOMICS AND MANAGEMENT

Foreign Exchange Rate Derivatives and Firm Value

A quantitative study on the effect of exchange rate derivatives employed by firms listed on Nasdaq Stockholm

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Abstract

Using Tobin's Q as an approximation of firm value, this paper aims to examine the effect of foreign exchange rate derivatives on firm value. Risk management is viewed by many as one of the most vital aspects of corporate- and business strategy. On the topic of risk, foreign exchange rate exposure is a distinctive form of risk confronted by numerous internationally operating firms. The mitigation of such risk is commonly pursued by trading various forms of currency derivatives. Therefore, how and if this category of derivatives succeed in providing value to the firm should be of notable interest to any international manager. To meet the objective of this research, a sample of 75 multinational, non-financial firms listed on Nasdaq Stockholm, with a market capitalization equal to or exceeding 1 billion SEK, was gathered. Results from multivariate regression analysis showed no significant relationship between the use of foreign exchange rate derivatives and firm value. Thus, obtained results indicate that large Swedish firms may not achieve an increase in firm value by the trade of foreign exchange rate derivatives.

Keywords: derivative, hedging, exchange rate exposure, firm value, Tobin's Q

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1 Introduction

1.1 Background

Throughout the past 10 years, the Swedish krona (SEK) has continuously depreciated against a multitude of currencies. For instance, the relative value of the SEK towards the Euro (EUR) has fallen, which is a noteworthy strategic factor for Swedish multinational firms that trade frequently within the European Union (European Central Bank, 2023). Some scholars argue that a depreciating domestic currency presents opportunities for managers of multinational firms, including increased operating cash flows translated from foreign currencies and growing export competitiveness (Bartov & Bodnar, 1994; Froot, Scharfstein & Stein, 1993; Glaum, Brunner & Himmel, 2000; Leuhrman, 1991). Others present limitations, for instance, increasing payments of foreign debt and account payables, larger costs of imported material and overall complications in location decisions (Froot, Scharfstein & Stein, 1993; Hodder & Jucker, 1985; Park, 1984; Shapiro, 1975; Sternitzke, 1979). Nonetheless, said literature provides evidence that currency fluctuations constitute a strategically important element for multinational firms, whether it be in the form of opportunities or threats.

Risk identification and management is a highly crucial aspect for developing global strategy (Dymsza, 1984). A common practice to limit financial risk is termed hedging. Folta and Sakhartov (2018) describe hedging strategy as a decision by management that minimises a firm's financial exposure to external shocks. Moreover, the practice of foreign exchange rate (FX) hedging can be broadly summarised as: "...hedging locks in the ability to carry out a predetermined (as of period zero) investment plan, where that plan is based on the expected future exchange rate" (Froot, Scharfstein & Stein, 1993, p.1645). In a series of surveys on US non-financial firms' derivative usage, mitigating foreign exchange rate risk proved to be the most frequent motive for hedging (Bodnar, Hayt & Marston, 1998; Bodnar, Hayt, Marston & Smithson, 1995).

A method to practise FX hedging is to trade various derivative contracts, including currency swaps, forwards, futures and options (Geczy, Minton & Schrand, 1997). In Sweden, the market for FX derivatives has grown to become increasingly large. As of 2020, the market was approximately twice the size of the Swedish Gross Domestic Product (Bertsch, 2022). Moreover, FX derivatives made up 13 per cent of the entire Swedish derivatives market in 2020.

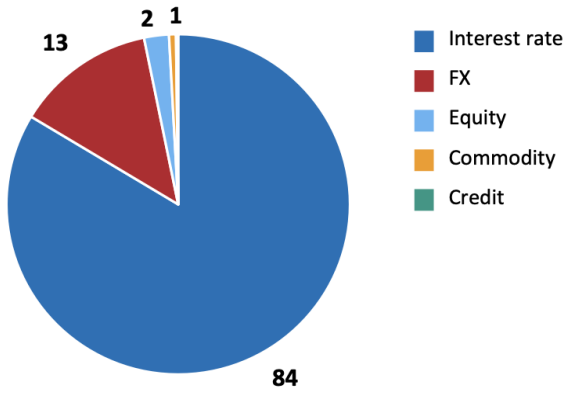

Figure 1.1: The size of the Swedish derivative market by submarket (per cent, 2020).
Source: The Swedish derivative market (Levander, Rosenvinge, & Sternbeck Fryxell, 2021).

Furthermore, as shown in Figure 1.2., the most frequent currencies traded in the Swedish derivative market were the US Dollar and the Euro, constituting 27 and 21 per cent of all trade in 2020 (Levander, Rosenvinge, & Sternbeck Fryxell, 2021).

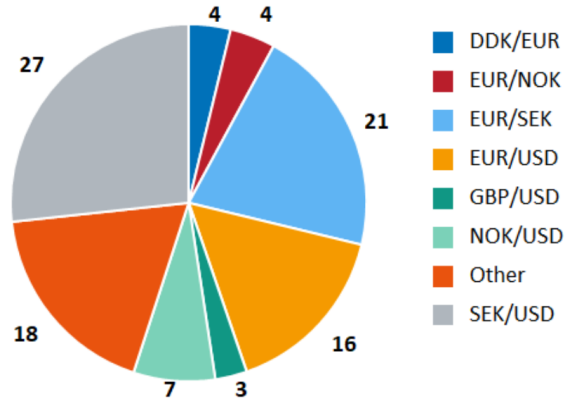

Figure 1.2: Foreign exchange derivatives on the Swedish market - currency pairs.
Source: The Swedish derivative market (Levander, Rosenvinge, & Sternbeck Fryxell, 2021).

1.2 Aim & Objective

The aim of this bachelor thesis is to investigate if there is a relationship between the use of foreign exchange rate derivatives and firm value in a sample of Swedish firms. Namely, the objective is to categorise firms listed on the Nasdaq Stockholm stock exchange according to whether they use FX derivatives or not, and test if said financial instrument correlates with firm value as proxied by Tobin's Q. By controlling for alternative independent variables, the aim is to substantiate the effect of FX derivatives on firm value. The use of foreign exchange rate derivatives will exclusively be studied. Therefore, FX hedging will henceforth be used to denote a strategy of derivatives trading, excluding any alternative method to hedge against exchange rate risk. Drawing upon said aim and objective, our research question is formulated as follows.

How does the use of foreign exchange rate derivatives affect the value of Swedish firms?

1.3 Research Purpose

The purpose of this research is to provide strategic insights for executives and managers of Swedish multinational firms. More specifically, if the purchase of foreign exchange rate derivatives is fruitful to stabilise or increase firm value. By having a relatively small domestic market, Sweden is highly dependent on exports (Hedlund, 1984). Moreover, economies with a higher degree of openness, Sweden included, have been proven more exposed to exchange rate fluctuations (Friberg & Nydahl, 1999; Hutson & Stevenson, 2010). However, since there is no clear consensus by theorists on how or if exchange rate volatility directly affects firm value, managers may not be aware of the risk profile of their international operations (Jorion, 1990; Amihud, 1994; Bodnar & Gentry, 1993). Therefore, although FX hedging is a common phenomenon, the rationale behind it is quite enigmatic. Thus, the purpose of this thesis is to add reasoning to FX hedging, by exploring if FX derivatives do, in fact, affect firm value. In the same vein, this research wishes to provide further contributions to the field of international financial management.

1.4 Delimitations

First of all, the scope of the study was reduced to include only Swedish firms. Since the effects of exchange rate volatility is proven to differ across different types of economies, it may be too complicated to find conclusive results in a sample of firms from various countries (Hutson and Stevenson, 2010; Nydahl, 1999). This reasoning is consistent with previous studies seen so far, which all focus on firms within one single nation (see for example Allayannis & Weston, 2001; Carter, Rogers & Simkins, 2006; Jankensgård, 2015; Jin & Jorion, 2006). Therefore, the research is conducted exclusively on Swedish firms. Moreover, to better gather the sample data, and as the hypothesis is partly built on theories relating to the shareholder informational effects of FX hedging, the study is limited to publicly listed companies.

Smith and Stulz (1985) explain that, apart from derivatives trading, foreign exchange rate hedging can include the altering of real operating decisions. Operational hedging, if not explicitly spoken of, is hard to detect. Moreover, a firm's change in operations or strategy is highly contingent on individual circumstances, as opposed to the quite standardised practice of trading derivatives. Contingency theory was mainly used to arrive at this delimitation (see Luthans & Stewart, 1977). Therefore, the relationship between operational FX hedging and firm value for Swedish firms will not be investigated in this study.

1.5 Thesis Outline

Subsequent parts of this paper will begin, in section two, with a review of prior literature relating to foreign exchange rate hedging and firm value. Thereafter, section two will proceed into hypothesis development, which is based on the previous knowledge put forth in the literature review. In section three, the chosen methodology will be delineated, providing a basis for the forthcoming demonstration and interpretation of results in section four. In section five, said results will be discussed and analysed in relation to previous theory and research. Lastly, chapter six will conclude this research and provide its limitations as well as proposals for future research.

2 Litterature & Theoretical Review

This segment presents relevant economic theory and previous empirical research on the topic of foreign exchange rate hedging. The literature review begins with theory on exchange rate exposure and the benefits provided by various derivative contracts. Thereafter, the section proceeds into theoretical explanations as to why hedging provides firm value. Said explanations concern topics including imperfect markets, underinvestment, bankruptcy cost, taxes and agency relationships. Furthermore, empirical studies that investigate the relationship between FX hedging and firm value are presented. Ultimately, the purpose of reviewing mentioned literature is to arrive at testable hypotheses.

2.1 Foreign Exchange Rate Hedging

2.1.1 Foreign Exchange Rate Exposure

According to Soenen (1979), exchange rate exposure is an important aspect for managers of multinational firms when considering the different risks inherent to international business operations. Changes in the exchange rates of international firms' assets and liabilities held in different currencies can negatively affect reported profits and nominal net worth. Foreign exchange rate exposure can be divided into two categories: accounting exposure and economic exposure. Accounting exposure, often referred to as translation exposure, stems from the need to translate assets and liabilities in foreign currencies into domestic currency for financial statement preparation and stockholder reporting (Soenen, 1979). Although these are merely accounting losses, Soenen (1979) argues that they can affect multinational firms' consolidated financial statements and thus impact investors' attitudes toward their stock. Economic exposure examines the future effect of exchange rate movements on firms' investment or profit streams, rather than transitory accounting effects. Martin and Mauer (2003) extend the concept of economic exposure by highlighting how this can arise from changes in sales prices, volumes, or costs of inputs for a firm or its competitors due to fluctuations in exchange rates.

Miller (1998) discusses the need for managers to be concerned about economic exposure. Estimating the economic exposure of a firm helps equip managers with tools for assessing the firm's strategic position with respect to its environment. Hence, the assessment of economic exposure has analytical value in understanding the position of a firm and its competitors. Despite having a strategic and analytical value, it can be unclear whether hedging economic exposure is advantageous, since the effects of the exposure are often prolonged and indirect (Martin & Mauer, 2003). A further aspect of exchange rate exposure brought up by Martin and Mauer (2003) is transaction exposure. This segment of exchange rate exposure refers to the impact of exchange rate fluctuations on cash flows of specific transactions denominated in foreign currencies. This consequently emerges from the possible difference in the value of a foreign currency between when a transaction is contracted and its actual settlement. In contrast to economic exposure, transaction exposure can more easily be hedged, since the transactions are relatively determined.

Bartram and Bodnar (2007) submit that many previous studies have failed to find a significant relationship between stock prices and exchange rates, which presents weak evidence of any exchange rate exposure faced by multinational firms. In a study of 287 U.S. multinational firms, Jorion (1990) failed to find a significant relationship between stock returns and exchange rate risk. Although the sample contained firms with a high degree of international activities, only 5.2% of the studied firms had a significant exchange rate exposure at a 5 per cent level of significance. One shortcoming of previous literature on exchange rate exposure, as Williamson (2001) postulates, is how the majority applies a trade-weighted exchange rate to measure said exposure. According to Williamson (2001), the results of these studies lack power if a firm is only exposed to a small number of currencies.

Batram and Bodnar (2007) move away from methodological issues such as selectivity of the studied firms, level of analysis, geographic coverage and model construction when aiming to explain the weak previous evidence for exchange rate exposure. Instead, the low measured number of exposed firms could be ascribed to the failure to acknowledge the internal exposure reducing activities of firms with considerable underlying exchange rate exposures. Firms can implement financial hedging instruments, which reduces short-term volatility, but also

operational hedging strategies via the structuring and modifying of operations in response to currency movements, which reduces the long-term impact of exchange rate changes on firm value (Batram and Bodnar, 2007). Using a sample of Swedish firms, Hagelin and Pramborg (2004) found that the use of financial hedges is effective in reducing firms' foreign exchange exposure. Part of their results was that there are risk-reducing effects from transaction exposure hedges as well as from translation exposure hedges. Clark and Mefteh (2004) studied the use of foreign currency derivatives and firm value of 176 large French firms. By dividing their sample into subsamples based on exposure levels, it was found that the effect of derivatives use on firm value was 1.5 times higher and significant for firms with larger exposures, while it was not significant for firms with lower exposures. Hence, their results indicate that the use of derivatives is more effective for firms with greater exposures.

Chan, Hang & Zeng (2016) further touch upon the subject of exchange rate exposure, hedging strategies and firm performance, focusing on cross-border mergers and acquisitions. Their paper elucidates how conducting cross-border M&A inevitably involves several financial risks, one of them being the transaction risk stemming from currency fluctuations. Studying 1369 cross-border M&A deals announced by Standard & Poor's (S&P) 1500 firms between 2000 and 2014, it was found that derivative users had a better performance, both short- and long-term, compared to non-users. Moreover, by separating their sample period into a low exchange rate regime and a high exchange rate regime, it was concluded that hedging-related acquirer performance enhancement was more marked during a high currency volatility regime than during a low currency volatility regime. This adds to the notion that hedging benefits firms through reduced risk exposures.

2.1.2 Derivative Contracts

As Froot, Scharfstein and Stein (1993) explain, multinational firms engage in FX hedging to lock in a given quantity of investment in a foreign location, ensuring that a plan of investment at time zero holds true, since it is based on a predetermined future exchange rate. Moreover, Froot, Scharfstein and Stein (1993) submit that the same reasoning holds true in the case of foreign streams of revenue. According to Garber and Spencer (1995), when a firm holds a position in a

certain foreign currency, they are exposed to that currency's market and the potential for encountering exchange rate losses. Furthermore, firms that hold either expected receivables or payables in a foreign currency can mitigate their exposure through a multitude of derivative contracts. Smith and Stulz (1985) argue that a firm can hedge by trading in a particular futures, forwards, swaps or options market. The following section offers a brief explanation of five means by which a firm can hedge a foreign currency position through derivatives.

A forward contract is an arrangement between two parties, agreeing to buy or sell a predetermined amount of currency at an agreed-upon exchange rate at a specified future date (Islam and Chakraborti, 2015). At the time of which a forward contract is initiated, there is no exchange of capital. Moreover, counterparty risk arises because of the bilateral nature of a forward contract. Namely, the risk of default relates to either side of the contract as the long position agrees to purchase the specific asset in the future, whereas the short position agrees to sell and deliver that asset at the specified price (Islam and Chakraborti, 2015). Islam and Chakraborti (2015) describe that the primary objective of forward contracts is to manage foreign exchange rate risk. The contract can be modified to suit the specific time period that a firm is subject to FX exposure, as well as the size of said exposure, making it effective in stabilising specific cash flows. Essentially, all forward contracts are tailor-made and traded over-the-counter (OTC).

Conversely, a futures contract is an arrangement similar to a forward contract. However, a futures contract is traded on an exchange and therefore specified to standardised metrics. According to Islam and Chakraborti (2015), since currency futures are standardised, it is easier to find a willing counterparty as opposed to trading forward contracts.

A currency option is an agreement between two parties giving the option holder the right, but not the obligation, to purchase or sell a specified amount of currency at a predetermined future date and at a specified exchange rate. The beneficial aspect of an option is that it can hedge against unfavourable exchange rate developments, but it is not obliged to be exercised in scenarios where exchange rate movements develop in a favourable direction. Moreover, the options market can be divided in two halves, the market for options traded openly on an exchange, and those

traded OTC (Garber and Spencer, 1995). According to Hull (2012), currency options are traded mainly OTC, thus carrying benefits similar to those of a forward contract.

Currency swaps are oftentimes obtained in scenarios where firms must borrow funds in a foreign currency. A currency swap is the exchange of principal and interest payments in one currency, for that of another currency. At the time of initiation, the principal amounts are their equivalent value in each currency, determined by the current exchange rate. However, at the end of a currency swap's lifetime, the principals are 'reversed', and depending on the development of each currency, the values can vary greatly. (Hull, 2012).

Cross-hedging is not a derivative form in itself, but rather a distinct strategy to trade various types of FX derivatives. A cross-hedge is beneficial in a scenario where a firm has exposure to a foreign currency, but there is no existing derivatives market between the firm's domestic currency and the foreign. In trading derivatives, embracing a cross-hedge strategy commonly includes shorting a currency that closely correlates with another currency in which a firm presently holds or expects to be holding significant funds (Garber and Spencer, 1995). By trading contracts in a so-called third or indirect currency that highly correlates to the primary foreign currency, a firm can indirectly hedge its exposure (Chang and Wong, 2003). Moreover, trading derivatives through a cross-hedge strategy can be advantageous if better liquidity circumstances or interest rate premiums are attributed to the indirect currency (Garber and Spencer, 1995).

Common to the illustrated derivative contracts is their ability to stabilise cash flows, since they lock in future exchange rates and as a result allow for less exchange rate variability. As will be elaborated on in later sections, the stabilisation of cash flows is a central, but not exclusive, channel for which FX derivatives create value. The ways in which stable cash flow allows for greater value has been developed primarily by Myers (1977) theory on underinvestment, extended by Froot, Scharfstein and Stein (1993), as well as Smith and Stulz (1985) theory on the role of taxes and bankruptcy costs.

2.2 Economic and Managerial Theory

2.2.1 In a World of Perfect Markets

The Modigliani-Miller (M&M) Theorem is a pivotal theory within corporate finance that specifies certain conditions under which financing decisions are irrelevant to firm value. (Modigliani & Miller, 1958). Although the theorem was initially developed to identify the optimum financing choice between debt and equity, it can be extended to, amongst others, hedging choices (Titman, 2002). According to DeMarzo (1988), the argument by Modigliani and Miller holds in a world of perfect or incomplete markets, where firms have no incentives to trade securities. The central argument of Modigliani and Miller (1958) is that hedging policies cannot alter a firm's value, since a private investor, if they wish to mitigate risk, can trade derivative contracts themselves. Shapiro and Rutenberg (1976) extend this reasoning by asserting that, in a world of perfect markets, large hedging costs by multinational firms would be futile, since prices will accurately incorporate exchange rate fluctuations and investors could diversify risk on their own.

Nevertheless, do markets without imperfections truly exist? Said imperfections include, for instance, transaction costs, agency costs, cost of financial distress and taxes (Lee & Kwok, 1988). Since the development of Modigliani and Miller's proposition, many studies have proven the existence of such imperfections (Anderson & Gatignon, 1986; Fatemi, 1988; Kim, 1978; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2002; Levy, 1985; Masten, 1984; Rugman & Verbeke, 1992; Walker & Weber, 1984). Another relevant market imperfection advocated by Shapiro and Rutenberg (1976) is that currency hedging by private investors often proves to be more expensive than for corporations. Moreover, Dufey and Srinivasulu (1983) maintain that information on a firm's exchange rate exposure is asymmetrically distributed between managers of said firm and its potential investors. Therefore, in contrast to Modigliani and Miller's assertion, individual investors cannot make as optimal hedging decisions as a well-informed manager, which is also supported by DeMarzo and Duffie (1991).

This section has introduced the Modigliani-Miller Theorem, which is fundamental to the argument that hedging does not provide firm value. However, the existence of market

imperfections acts to disprove their rudimentary school of thought. Geczy, Minton and Schrand (1997) argue that optimal hedging stems from numerous market imperfections. Therefore, theories on how these imperfections create opportunities for value increase through the use of FX derivatives will be explained in the successive sections.

2.2.2 Cost of External Financing and the Underinvestment Problem

Because any given firm faces a downward sloping demand curve, their stock price ought to decline in value as additional equity is issued (Scholes, 1972). Moreover, Myers (1977) maintains that marginal costs arise from the issuance of both new stock and debt. Therefore, external financing has an increasing marginal cost. From this notion that external financing is more costly than internally generated funds, Froot, Scharfstein and Stein (1993) developed their underinvestment hypothesis.

For the multinational firm, exchange rate fluctuations can limit or destabilise cash flow from foreign operations (Reeb, Kwok & Baek, 1998). In absence of internal funds, managers must, therefore, either resort to costly external financing or decrease levels of investment (Froot, Scharfstein and Stein, 1993). In a world of perfect markets, managers would meet a decrease in cash flow with a proportional increase in external financing. However, as there is a marginal cost to external financing, shortfalls in cash can lead to both increased external financing *and* lower investment, resulting in lower valuation. Hedging, on the other hand, is a tool able to reduce cash flow variability, preventing a possible decrease in investment (Froot, Scharfstein and Stein, 1993). According to Stulz (1990), the value accruing to shareholders by expanding management's resources is inversely related to cash flow variability. Hence, according to theory on underinvestment, to the degree that hedging decisions result in lower cash flow variability, it allows for improved firm value.

Geczy, Minton and Schrand (1997), in their study of motives for currency derivatives, concluded FX hedging to be positively related to enhanced growth opportunities under financial constraints. Findings are thus consistent with the presumption that derivative usage reduces cash flow instability that otherwise would prohibit investment opportunities. Moreover, Gilje and Taillard

(2017) empirically investigated the underinvestment hypothesis by Froot, Scharfstein and Stein (1993). In their natural experiment, they found that hedging provides value to the firm by mitigating underinvestment. The hypothesis has been subject to further empirical examination. Multiple studies have found that firms engaged in hedging are less sensitive to cash flow variability and that, in the event of relatively limited cash flow, hedging enhances investment opportunities (Altuntas et al., 2017; Barton, 2001; Gay & Nam, 1998).

2.2.3 Cost of Financial Distress

Smith and Stulz (1985) has contributed with extensive theory on the determinants of hedging policy, which has paved the way for considerable subsequent research on hedging and firm value. According to Modligliani and Miller (1958), financial distress is costless. Therefore, reducing the probability of bankruptcy does not affect firm value. Conversely, in relation to cost of financial distress or bankruptcy, Smith and Stulz (1985) assert that by alleviating the transaction costs of financial distress, hedging provides value to the firm. Furthermore, as shareholders and creditors face real costs in the event of bankruptcy, reducing the likelihood of bankruptcy through hedging provides direct value to them (Smith & Stulz, 1985). In addition, according to Stulz (1996), the present value of shareholders' expected future bankruptcy costs will be reflected in the firm's market value *today*. Thus, by reducing expected probability of bankruptcy and its associated costs, firms can maintain a healthy value.

Magee (2013) studied the relationship between foreign exchange rate hedging and the probability of financial distress of 401 large, nonfinancial firms. Using Merton's (1974) model of structural default to approximate their probability of financial distress, Magee (2013) found a positive relationship between firms' foreign exchange rate hedging strategy and distance to default. This indicates that currency derivatives can contribute to the reduction of a firm's probability of financial distress. Furthermore, research by Gilje and Taillard (2017) came to the conclusion that reducing costs of financial distress is a channel through which hedging provides firm value.

2.2.4 Taxes

On top of bankruptcy costs, Smith and Stulz (1985) explain the role of taxes in relation to the value provided by corporate hedging. According to them, the value of the firm post taxation is a convex function of its value prior to taxation. By this reasoning, greater volatility in gross income suggests a higher rate of taxation, as opposed to incomes of greater stability. Because of the convex tax function, the firm faces an optimal range of taxable income (Stulz, 1996). Therefore, by keeping the gross value of a firm steady, and restricting taxable income within the optimal range, hedging allows for reduced tax liability and greater firm value net of taxes. Furthermore, by gathering survey data on 169 firms, Nance, Smith and Smithson (1993) found that firms engaged in hedging had a greater tax credit than those that do not hedge, with an average of 7.22 and 1.54 million respectively. Tax credits generally favour any firm since they offset income taxes payable (Nance, Smith and Smithson, 1993).

In a study of 543 firms, Mian (1996) tested the theory developed by Smith and Stulz (1985) and found that the taxation effect of hedging can influence firms' present value. More specifically, Mian (1996) found that, similar to Nance, Smith and Smithson (1993), firms engaged in hedging had greater tax credits than those that did not hedge. Moreover, Graham and Rogers (2002) found further evidence for a tax motivation in a firm's choice to employ financial hedging. By studying 442 firms, their results suggest that the incentive for companies to utilise financial hedging to increase their debt capacity is positively related to the corporate marginal tax rate. Thus, as the tax rate increases, firms' motivation to use hedges to expand debt capacity increases as well. A further finding was that the expansion of debt capacity and leverage linked to hedging improves firm value by an average of 1.1% (Graham & Rogers, 2002).

2.2.5 Agency Costs

Agency Theory is a broad theory applicable to many fields within and outside of management. The fundament of Agency Theory is the agency problem. Namely, how information asymmetry and goal incongruence between an agent and its principal makes it difficult or expensive to monitor the agent's behaviour (Eisenhardt, 1989). A further issue arises when principals and agents have contrasting risk preferences, which may lead to different views on preferred action

(Eisenhardt, 1989). Jensen and Meckling (1976) created the concept of agency costs. Namely, the costs of monitoring and bonding between the two parties, which can have adverse effects on shareholder value. A central question within agency theory is whether managers' compensation should be tied to outcome, which in many respects can induce the agent to act in the interest of shareholders (Eisenhardt, 1989; Fama & Jensen, 1983; Gomez-Mejia, 1992; Roth & O'Donnell, 1996). In relation to foreign exchange rates, Burgman (1996) found that multinational firms experience higher agency costs. More specifically, Jacque and Vaaler (2001) argue that the agency problem is amplified by fluctuations in exchange rates between the parent and subsidiary currencies, and assert that both goal incongruence and information asymmetry increase.

If the performance of a firm is highly affected by factors outside the control of the manager, aligning the goals between the principal and agent through outcome-based contracts becomes more expensive (Eisenhardt, 1989). In such settings, the value-maximising strategy may not be preferred by agents due to the associated risks they must bear. Stulz (1984) found that managers with their income tied to firm value are incentivized to actively engage in hedging. Moreover, Aretz, Bartram and Dufey (2007) posit that hedging can increase the effectiveness of management incentive structures. The authors argue that managers with compensation tied to performance are reluctant to take on riskier projects, ultimately reducing firm value. However, as hedging reduces the overall risk borne by the agent, they dare to take on riskier, value-enhancing strategies. Hence, by mitigating the risk aversion of an agent, hedging has a positive effect on firm value.

Demarzo and Duffie (1995) find that hedging reduces information asymmetry and that the quality of the information received by shareholders increases. Moreover, they assert that disclosure of hedging increases managers' incentives to make optimal investment decisions. Hence, hedging improves the principal-agent relationship between managers and shareholders and improves managers' ability to act in the interest of shareholders (Demarzo and Duffie, 1995).

Another perspective of Agency Theory and hedging relates to managerial ownership. Knopf, Nam and Thornton (2002) explored the volatility and price sensitivity of managerial stock option portfolios in relation to corporate hedging. First, Knopf, Nam and Thornton (2002) found that firms tend to hedge to a greater extent in scenarios where managers' stocks and stock option portfolios are closely related to the stock price of the firm. Secondly, Knopf, Nam and Thornton. (2002) concluded that firms tend to hedge to a lesser extent when managerial stock option portfolios are tied to stock return volatility. The explanatory factor behind the second finding is that managerial stock options priced using the Black-Scholes formula generally benefit from greater volatility. As a consequence, the value of managers' option portfolios increases as the degree of hedging decreases, since hedging aims to provide more stabilised cash flows. (Knopf, Nam & Thornton, 2002). Thus, the ability of hedging to resolve agency problems is at times contingent on the details of managers' compensation schemes.

Lastly, agency costs do not exclusively appear in the relationship between managers and shareholders, but also between the aforementioned and its creditors. Smith and Stulz (1985) elaborate further on costs of financial distress through disadvantageous bond covenants. Their argument, which incorporates agency costs and underinvestment, claims that bond covenants constrain managers to actions outside of their optimal investment strategy. In an empirical study, Malitz (1986) found evidence that restrictive bond covenants curtail investment incentives, ultimately reducing firm value and shareholder wealth. Moreover, Chava, Kumar and Warga (2010) investigate the effects of managerial agency risk. They found that the higher the perceived managerial risk, the greater the use of limiting covenants. Similarly, Campello, Lin, Ma and Zou (2011) found that hedgers pay less spread on interest and face fewer restricting bond covenants, easing their access to capital and allowing for improved investment abilities. Therefore, as Smith and Stulz (1985) theorise, to the extent that FX derivatives reduce the perceived riskiness of operations, firms can improve the agency relationship between bondholders and managers, thereby reducing costly monitoring devices and the associated loss of value.

2.3 Hypothesis Development

Allayannis and Weston (2001) used Tobin's Q as a proxy for firm value and identified a positive relationship between firm value and the use of foreign exchange rate derivatives. Within their sample of 720 companies, firms using currency derivatives conveyed consistently higher mean and median values. Additionally, in a study spanning 47 countries, Brown and Conrad (2011) concluded that derivatives yielded higher firm values, abnormal returns, and larger profits during the economic turmoil of 2001-2002. Similarly, in a more recent study, Das and Kumar (2023) found that FX derivatives increase firm value in a sample of 97 Indian multinational firms, whereas no increase in value was associated with operational hedging. Similar results are found in the Malaysian market by Hadian and Adaoglu (2020). Finally, the hypothesis development was highly motivated by Jankensgård (2015), who found significant results of a hedging premium associated with currency derivatives for Swedish, publicly listed firms.

Furthermore, studies have proved a positive relationship between derivative usage and growth opportunities (Altuntas et al., 2017; Gay & Nam, 1998; Geczy, Minton & Schrand, 1997; Gilje and Taillard, 2017; Nance, Smith & Smithson, 1996). Said studies empirically prove FX derivatives as a solution to the underinvestment problem established by Myers (1977), leading to improved growth in the face of financial constraints, ultimately increasing firm value.

Jin & Jorion (2006) and Tufano (1996) both failed to establish a significant relationship between hedging and firm value. However, their studies concern an alternative type of hedging, namely, commodity hedging. Conversely, Perez-Gonazales and Yun (2013) found a significant positive effect of commodity derivatives on firm value. Other studies have shown a positive relationship between derivatives and firm value, but on top of FX hedging, include commodity and interest rate hedging (Bartram, Brown & Conrad, 2011; Carter, Rogers & Simkins, 2006). Therefore, we wish to isolate FX hedging, in order to provide insights for multinational firms not particularly interested in hedging commodities or interest rates. For this reason, we are intrigued to provide further evidence of a positive relationship between FX hedging and firm value.

Furthermore, much previous research on FX hedging originated from an ambition to disprove the Modigliani and Miller theorem. In a similar fashion, the objective of this research is to provide further contradicting evidence. Namely, FX hedging decisions are not irrelevant to firm value. This objective, together with previous empirical research, incentivised us to test the direct relationship between FX hedging and firm value. Through a comprehensive review of the literature, we find only modest arguments for a negative relationship. Therefore, we arrive at the following hypothesis:

H1: *Foreign exchange rate derivatives has a positive effect on firm value*

3 Methodology

3.1 Research Approach

As highlighted by Bryman and Bell (2011), the research approach explains the relationship between theory and research. The following section outlines the research approach utilised when performing this study. The choice of research approach was based on the deductive and quantitative methods exclusively used in previous literature and studies within the domain.

3.1.1 Deductive Approach to Research

This study is conducted on the basis of the deductive approach to research. Bryman and Bell (2011) define the deductive research approach as developing hypotheses based on previous theory within a specific domain and subsequently testing the hypotheses based on a collected set of data. This is in sharp contrast to the inductive approach, where theory is an outcome of research (Bryman and Bell, 2011). Seeing as the topic of hedging concerns aspects included in much economic and managerial theory, such as risk management, capital structure, investment, taxes and agency relationships, we found much theory to explain or be complemented by the phenomena. Therefore, the aim was not to develop new theory from our observations, ruling out the inductive method.

Thus far, this study has investigated what is already known about the effects of hedging on firm value. Said knowledge encompasses seminal economic theory, including the Modligiani-Miller theorem and Agency Theory. Moreover, empirical studies directly or indirectly testing the relationship between hedging and firm value were displayed. Building on previous theory and empirical findings, hypotheses are developed to substantiate and validate said economic theories.

3.1.2. Quantitative Strategy

One fundamental difference between quantitative and qualitative research strategy is how quantitative generally concerns testing of theory, while qualitative concerns the generation of theory. Furthermore, quantitative research seeks to understand causal relationships between variables through hypothesis testing, whereas qualitative research aims to understand phenomena through observations and interviews (Bryman and Bell, 2011). Therefore, a qualitative study would be better suited if the motivations of managers when devising hedging strategies were studied. However, studies of a similar kind have, too, been conducted quantitatively (see Brown & Toft, 2002; Batra, Donnenfeld & Hadar, 1982). Nonetheless, the purpose of this study was to observe the direct relationship between firms' hedging activities and Tobin's Q. To test this causal relationship, a quantitative research strategy ought to be adopted. Furthermore, a quantitative research strategy was adopted as this is the strategy exclusively used in similar empirical research (see Allayannis & Weston, 2001; Geczy, Minton & Schrand, 1997; Gilje and Taillard, 2017; Jankensgård, 2015).

3.2 Research Design

Bryman and Bell (2011) describe the importance of adopting a research design that reflects the aim and objective of a study. Based on the framework of this research paper and the nature of its research question, a cross-sectional research design is an appropriate choice. The following section will describe the research design in greater detail.

3.2.1 Cross-Sectional Research Design

By adhering to the cross-sectional design described by Bryman and Bell (2011), the aim is to collect data on multiple cases at a single point in time. Therefore, the objective of this paper will be realised by collecting data from the annual reports of firms listed on Nasdaq Stockholm in 2021. In order to establish variation between cases, it is important to obtain quantitative or quantifiable data (Bryman & Bell, 2011). Therefore, all data extracted from the reports are either

quantitative to begin with, or coded into quantitative measurements. Moreover, the primary intent of cross-sectional research is to examine relationships between variables (Bryman & Bell, 2011). Seeing as the aim of this paper is to identify a relationship between FX derivatives and firm value, and since the data concerns one single period of time, a cross-sectional design was the given approach. Many similar studies have embraced a longitudinal approach (see for example Allayannis & Weston, 2001; Jin & Jorion, 2006), which entails the studying of data across multiple periods of time (Bryman & Bell, 2011). Although this can validate results across varying economic conditions, we chose to focus on one period of time due to the limited time devoted to manual gathering of data. Moreover, a cross-sectional design is also frequently used in this field (see for example Jankensgård, 2015; Nance, Smith & Smithson, 1996).

3.3 Data Collection Method

This section will begin by introducing the digital sources selected to retrieve the sample data. Furthermore, the key characteristics and exclusion criteria for firms belonging to or being excluded from the studied population will be explained. Said characteristics and criteria are integral to identifying the sampling frame. Lastly, the procedure to assemble a simple random sample is presented.

3.3.1 Information Sources

The initial source of information is the Nasdaq Stockholm stock exchange, which is where we identify the population of publicly listed, internationally operating, private and non-financial Swedish firms. An important note, though, is that not all firms listed on Nasdaq Stockholm operate internationally and are thus not subject to exchange rate exposure. Moreover, public and financial firms are too included on the exchange. Hence, the Nasdaq Stockholm, in whole, does not constitute the population. Therefore, to isolate the population, some sorting is available in Orbis, whereas other exclusions involve manual sorting at a later stage. Moreover, since firms' derivative instruments are not accessible in any database of our knowledge, this information was

obtained manually. Therefore, the second source of information is the individual annual reports of the final sampled firms. Said reports concern the operating year of 2021.

3.3.2 Sampling

The units qualified for this study include multinational, private and non-financial firms domiciled in Sweden and listed on Nasdaq Stockholm with a minimum market capitalization of 1 billion SEK during the year 2021. As Jankensgård (2015) asserts, financial firms such as banks, hedge funds, private equity- and venture capital firms may be market makers in derivatives, and their motives for using such instruments may differ significantly. Hence, we follow common practice and exclude financial firms from the final sample (see Allayannis & Weston; Jin & Jorion, 2006). Moreover, we further exclude alternative entities that face significant regulation, including insurance companies, pension funds and public authorities. Finally, to ensure that we are exclusively studying Swedish firms, the Nomenclature of Territorial Units for Statistics (NUTS) was applied.

Concerning the choice of only including firms with a market capitalization equal to, or greater than 1 billion SEK, Setiyono, Prapanca, and Pramudita (2021) found a positive relationship between firm size and hedging activities. This is explained by the notion that large firms generally have extensive operations both domestically and abroad, which presents risks less inherent to smaller businesses. To shield against these risks, larger firms have a greater propensity to utilise hedging strategies (Geczy, Minton & Schrand, 1997; Setiyono, Prapanca, & Pramudita, 2021). By filtering the search in Orbis according to our selected market capitalization, we arrive at a sampling frame totalling 282 firms out of the original 759 firms listed on XSTO (Nasdaq Stockholm) as their main exchange.

In the final sample, we also wish to exclude firms that do not face notable exchange rate exposure. Therefore, we employ the method explained by Geczy, Minton and Schrand (1997), including firms that report foreign net income or sales, foreign denominated debt, foreign tax liabilities or that qualitatively disclose foreign operations in their annual report. First of all, theoretically, firms whose value is not affected by exchange rate fluctuations should not

experience increased value from hedging. For instance, firms receiving no foreign cash flows should not benefit from FX hedging as suggested by Froot, Scharfstein, & Stein (1993). Moreover, studies testing the relationship between FX hedging and firm value show insignificant results for samples of firms without exposure (see Allayannis & Weston, 2001; Clark & Mefteh, 2004). Given all that has been said, we believe better results are attained when including only firms with exchange rate exposure.

After applying the exclusion criterias, Orbis generated a sampling frame of 282 firms, from which Orbis also drew a simple random sample. According to Bryman and Bell (2011), a simple random sample is a form of probability sample. Said sample form eliminates the risk of researcher subjectivity inherent to manually choosing firms. For instance, subconsciously choosing firms we recognise. Moreover, Bryman and Bell (2011) explain that probability samples are more likely to be representative and keep sampling error to a minimum. By applying the database's random sampling function, we arrived at a sample of 100 firms. However, seeing as firms without exchange rate exposure could not be eliminated in Orbis, we excluded these from the preliminary sample of 100 firms. The result yielded 85 firms with observed exchange rate exposure from engaging in international operations. Moreover, 10 firms had incomplete financial reporting and were also excluded from the final sample. In summary, the regression analysis was conducted on the remaining 75 firms. To maintain a simple random sample, we did not consider extending the sample size at this stage.

SAMPLING PROCESS	**N**
OBSERVATIONS FROM START	100
NO OBSERVED EXCHANGE RATE EXPOSURE	(15)
INCOMPLETE DATA	(10)
FINAL SAMPLE	**75**

Table 3.1: The sample selection process

3.4 Research Procedure

This section will explain the method used when creating variables, analysing the gathered data, as well as developing and validating a linear regression model.

3.4.1 Dependent Variable

In measuring firm value, Tobin's Q was estimated for all firms within the sample. Carter et al. (2017) explain that Tobin's Q is the most extensively used measure of firm value, defined as the value of assets divided by the replacement costs of those assets:

$$Q\ ratio\ = \frac{Market\ value\ of\ assets}{Replacement\ cost\ of\ assets}$$

Equation 3.1: Tobin's Q (Lindenberg and Ross, 1981).

Moreover, Allayannis and Weston (2001) emphasise that one advantage of utilising Tobin's Q is that it makes cross-comparisons between firms easier, as opposed to other measures, for example, stock returns. By adhering to a simplistic approach aiming to minimise computational errors, we take a straightforward, simplified approach to calculating Tobin's Q, also defined as an alternative approach by Allayannis and Weston (2001). Furthermore, Allayannis and Weston (2001) found their results to be indifferent, regardless of the approach taken to calculate Tobin's Q. Thus, the following formula was employed when making our calculations:

$$Q\ ratio\ = \frac{Firm\ market\ value}{Book\ value\ of\ assets}$$

Equation 3.2: Simplified Tobin's Q (Allayannis & Weston, 2001).

Where firm market value denotes the firm's market capitalization and book value of assets are those disclosed in the firm's year end 2021 annual report (Allayannis & Weston, 2001).

3.4.2 Independent Variable

In this research, FX hedging denotes the trade of foreign exchange rate derivatives. Thus, a firm that uses alternative methods to mitigate risk will not be classified as a hedger. Batram and Bodnar (2007) distinguishes between financial hedging through derivatives instruments and operational hedging through non-financial instruments. This study will focus on the former, and firms will thus be classified as hedgers solely by their use of financial derivatives, by collecting data on firms' reported currency derivatives. Thus, hedging will be treated as a dichotomous variable, taking on a value of 1 for firms engaged in hedging and 0 for those that do not hedge. Therefore, no regard will be given to the extent that firms perform hedging strategies, namely, the reported value of foreign exchange derivatives. Geczy, Minton and Schrand (1997) motivate a dichotomous hedging variable by arguing that information on assets or liabilities excluded from the balance sheet are oftentimes inconsistent or fully absent. For this reason, numerical variables are less reliable. Moreover, both Allayannis and Weston (2001) and Geczy, Minton and Schrand (1997) claim that using numerical values to measure derivative usage significantly reduces the sample, as a result of information shortage.

3.4.3 Control Variables

There are a large number of other factors apart from currency derivatives that provide value to the firm. Owing to this, we need to control for other explanatory variables before any inference on the relationship between FX hedging and firm value can be made. The use of control variables is drawn mainly upon Allayannis and Weston (2001) and Jankensgård (2015). Said variables and their respective theoretical motivations are presented below.

a. *Dividends:* The effect of dividend policy on firm value is highly puzzling to economic scholars. Modigliani and Miller (1958) contend that dividend policy is irrelevant to firm value. Moreover, Black and Scholes (1974) assert that not even the best empirical methods can prove a relationship between dividend policy and firm value. Nevertheless, Allayannis and Weston (2001) argue that firms paying dividends are less likely to be capital constrained and therefore exhibit lower Q's.

b. *Firm size*: Zhang (2005) attempts to resolve the value puzzle by asserting that there is a value premium attributed to firms with greater amounts of assets in place. Moreover, since larger firms, according to Setiyono, Prapanca, and Pramudita (2021), are more inclined to hedge, we measure total sales to control for possible effects of firm size, to see if our results are consistent across varying sizes. Seeing as our simplified calculation of Tobin's Q extensively incorporates assets, we chose not to proxy *Firm Size* through total assets. Nevertheless, according to Allayannis and Weston (2001), results were indifferent to the use of total assets, sales or capital expenditures as a measure of firm size.
c. *Number of industries (diversification)*: Some studies have found that industry diversification reduces firm value (see for example Lamont & Polk, 2001; Rajan, Servaes & Zingales, 2000). Moreover, Lang & Stulz (1994) found a negative relationship between diversification and Tobin's Q. On the other hand, Villalonga (2004) found evidence of a diversification premium. Lastly, Loyd and Jaheira (1994) found no evidence of a relationship between diversification and Tobin's Q. Although findings are inconsistent, we will introduce a dummy variable to control for diversification effects on firm value.
d. *Profitability*: Profitable firms are more likely to trade at a premium larger than less profitable firms (Allayannis & Weston, 2001; Gharaibeh & Qader, 2017; Myers, 1984). Consequently, these firms are more likely to exhibit a higher Tobin's Q. Therefore, we will use Return On Assets to control for the effects of a firm's profitability.
e. *Leverage*: Although Modigliani and Miller (1958) argue for the irrelevance of capital structure to firm value, Aggarwal and Zhao (2007) found evidence that leverage is negatively associated with firm value. Therefore, we will control for the possibility that hedging provides more or less value to firms depending on their capital structure. To achieve this, we include a leverage variable, namely, the debt-to-equity ratio.
f. *Industry effect:* If the sampled firms engaged in FX hedging mainly belong to high Q industries, hedgers will naturally convey Tobin's Q than non-hedgers. In this scenario, we cannot contend that higher Q's are a result of trading FX derivatives. Therefore, we will calculate industry-adjusted Q's, to see if we attain similar results as when drawing a regression with unadjusted Q's. We use Allayannis and Weston (2001) simplified method, seeing as it gave similar results as using the alternative measure. Their simplified method

of deriving industry-adjusted Q's entails subtracting the median Q of each firm's primary industry.

VARIABLE	DEFINITION	SOURCE
Tobin's Q	Firm market value ÷ Book value of assets	Database
FX Hedging	Dummy variable: value = 1 for firms engaged in FX hedging, value = 0 for non-hedgers	Annual Report
Firm Size	Total sales	Database
Profitability	Return on assets (pre-taxation)	Database
Dividends	Dummy variable, value = 1 for firms that paid out dividends in 2021, value = 0 if no dividend was paid	Database
Diversification	Dummy variable: value = 1 if the company operates in two or more industries, otherwise value = 0	Database
Leverage	Debt-to-Equity ratio	Database
Industry Adjusted Q	Tobin's Q - Industry Median	Database

Table 3.2: Summary of variables and respective data sources

3.4.4 Statistical Test

The effect of FX hedging on Tobin's Q will be analysed through multivariate tests, controlling for firm size, profitability, dividends, diversification and leverage. According to Berenson, Levine, Szabat and Stephan (2019), multiple regression models are those that employ two or more independent variables in order to predict the value of a dependent variable. Similar studies have used the Ordinary Least Square (OLS) regression model to investigate the hedging premium (see for example Allayannis & Weston, 2001; Jankensgård, 2015). The least-squares method determines regression coefficients that minimise the sum of squared differences (Berenson et al., 2019). Four assumptions must be met when developing an OLS regression

model. The assumptions are linearity, independence of errors, normality of errors and equal variance (Berenson et al., 2019). However, since this study is of cross-sectional nature with data from one single period of time, the independence of errors is not necessary to test. Moreover, when using more than one independent variable, one must check for collinearity (Berenson et al., 2019). These assumptions are assessed with residual analysis or alternative tests, which will be elaborated on further below.

The assumption of linearity implies that the relationship between variables are linear (Berenson et al., 2019). To assess linearity, we plot the residuals on the vertical axis to the X*i* variables of the independent variable on the horizontal axis. If there is no apparent pattern in the residual plot, the model is appropriate (Berenson et al., 2019). Linearity, however, is not assessed for the dichotomous variables.

Normality of errors requires that the errors are normally distributed at each value of X (Berenson et al., 2019). As long as the distribution of errors at each level of X does not dramatically depart from normality, inferences can be drawn about the regression coefficients (Berenson et al., 2019). To evaluate the assumption of normality, we build a normal P-P plot of the standardised residuals.

Equal variance or homoscedasticity requires that the variance of errors is constant for all values of X (Berenson et al., 2019). To evaluate the assumption of equal variance, we make a scatter plot of the residuals with each independent variable. The desired result is to observe an equal amount of variation at each value of X.

When using more than one independent variable, one must investigate collinearity, which implies that two or more independent variables are highly correlated (Berenson et al., 2019). Therefore, we determine the Variance Inflationary Factor (VIF) for each variable. OLS regression is an appropriate method to perform if VIF does not exceed the value five (Berenson et al., 2019).

3.4.5 OLS Regression Model

The empirical model applied to investigate the hedging-premium hypothesis is presented below.

$$\text{TOBIN'S Q} = \beta 0 + \beta 1 * \text{FX HEDGING} + \beta 2 * \text{FIRM SIZE} + \beta 3 * \text{PROFITABILITY} + \beta 4 * \text{DIVIDENDS} + \beta 5 * \text{DIVERSIFICATION} + \beta 6 * \text{LEVERAGE} + \varepsilon$$

Equation 3.3: OLS regression model

3.5 Reliability and Validity

The following sections will review the reliability and validity of this research. Namely, the soundness, replicability and accuracy of its results.

3.5.1 Reliability

Reliability relates to the replicability of a study (Bryman & Bell, 2011). The first aspect of reliability, namely, stability, refers to the stableness of a measure over time (Bryman & Bell, 2011). By using data from annual reports, that is, a source which in practice should not be altered, future researchers could access our exact data and perform the same study. Therefore, stability is significantly high. Although accounting practices between firms may differ, all firms listed on Nasdaq Stockholm are required to employ the same IFRS accounting standards (IFRS, 2016). Due to this regulation, accounting practices of the studied firms cannot change dramatically across periods of time, which strengthens reliability if similar research is conducted for a different period of time.

Moreover, inter-observer consistency is challenged when subjective judgement is needed to translate data into categories (Bryman & Bell, 2011). First of all, the quantitative approach overall limits the researchers' subjectivity and strengthens the reliability of this research. Furthermore, the recording of hedging activity is not threatened by much subjectivity as it is

easily distinguished if a firm reports use of derivatives. However, excluding firms from the sample based on the absence of exchange rate exposure requires some more interpretation. However, by clearly spelling out Geczy, Minton and Schrand (1997) criterions for determining exchange rate exposure, future researchers would use them in a similar manner and exclude the same firms. After all, exchange rate exposure was, too, based on information disclosed in the annual reports. Future researchers must simply be careful not to miss any information, which remains a threat to inter-observer consistency.

Lastly, the use of software to analyse quantitative data minimises errors more likely in qualitative interpretations of data. Furthermore, the use of hypothesis testing and potential rejection based on P-values is also free from subjectivity and incurs a high degree of reliability.

3.5.2 Validity

Validity in research refers to the accuracy of a chosen variable in measuring a concept. (Bryman and Bell, 2011). One concern for this study's validity is the choice of performance indicator in the operationalisation of our research question. Bryman and Bell (2011) describe the concept of construct validity, whether a or not a measure devised of a concept truly reflects that concept. The most appropriate measurement of firm value has been subject to much debate. Bacidore, Boquist, Milbourn and Thakor (1997) argue that stock price is not a fair measure, since it is driven by many factors outside of management's control. First of all, the frequent use of Tobin's Q in studies on firm value strengthens the credibility that it accurately measures value (see for example Allayannis & Weston, 2001; Jankensgård, 2015; Tufano, 1996). Additionally, Tobin's Q is often considered a superior measure of firm value since it incorporates tangible assets as well as an estimation of intangible assets (Perfect and Wiles, 1994). Lastly, the use of industry adjusted Q's validates that Tobin's Q accurately represents the value of the individual firm, and not the value contributed from its industry, which has been found to play a dominant role (Schmalensee, 1985; Wernerfelt & Montgomery, 1988).

Internal validity is concerned with the matter of causality. The question it poses is whether the observed results in fact represent the studied population (Bryman and Bell, 2011). To enhance

internal validity and reduce research bias, we first control for several variables which could affect the results of the study. To further strengthen causality and ensure a linear relationship, we will validate the OLS regression model by evaluating its necessary assumptions. Yet, we maintain that although actions have been made to substantiate any evidence of a relationship between FX hedging and firm value, as no experimental design has been employed, we cannot be confident of the direction of such a relationship (Bryman & Bell, 2011). Thus, we cannot rule out the possibility of reverse causality, that firm value is what affects the use of FX derivatives.

3.6 Limitations of Research

Since this study is based on data collected from one year, the results are more sensitive to a number of macroeconomic conditions, as compared to if data from several years had been included. Allayannis and Weston (2001) tested their hypothesis across various years, including years of both dollar depreciation and appreciation. They found evidence of a larger hedging premium during appreciation, which is consistent with the literature on currency appreciation and decreased competitiveness (Leuhrman, 1991). This study, however, merely concerns one operating year, in which the Swedish krona has depreciated. Therefore, findings are not generalisable to periods of a significantly higher valued SEK.

We maintain that firm value is not solely based on whether a firm engages in FX hedging or not. Due to limited time, we are unable to exhaust all possible independent variables. However, our objective is to include all relevant control variables possible given the limited time and information at our disposal. For example, Jankensgård (2015) surveyed additional variables when studying FX hedging and firm value, which we ruled out as infeasible. Therefore, we are restricted to information available through annual reports and datastreams. Moreover, Jankensgård (2015) found the variables *Net Position* and *Foreign,* defined as the net position of each currency and the ratio of foreign sales to total sales respectively, to have a significant effect on firm value. This is because both *Net Position* and *Foreign* relate to exchange rate risk (Jankensgård, 2015). We maintain that internal validity could have been improved through more sophisticated use of variables.

4 Data Results and Analysis

This section will present the results of the study. It will begin by validating the OLS regression by presenting results from testing the necessary model assumptions. Thereafter, descriptive statistics will be presented, which build the foundation for subsequent regression analysis. Lastly, the significance of the OLS model coefficients will be exhibited, which will determine if the use of FX derivatives has a true effect on firm value.

4.1 Model Assumptions

In Appendix A., the results of the model validation are presented. First of all, scatter plots of the independent scale variables showed no apparent pattern. Hence, the assumption of linearity holds. However, the assumption of normality was found violated. After reporting this finding, the dependent variable was given a logarithmic transformation. That is, we derived the natural logarithm of each firm's Tobin's Q. When comparing the P-P plots for the unadjusted Q with that of the logarithmic Q, (see Appendix A., table A4-A5), we observe a significant departure towards normality. Furthermore, we will review descriptive statistics of individual variables in the coming section and adjust any additional skewed variables to establish normality. Moreover, residual analysis showed that the variance of errors is seemingly constant across different values of X*i*. Thus, the assumption of equal variance was not found violated. Lastly, concerning collinearity, no independent variable showed a VIF exceeding five. Thus, there is no significant amount of collinearity between variables that the OLS model cannot tolerate. In summary, after adjusting for some deviation from normality, the OLS model is deemed appropriate.

4.1 Descriptive statistics

Table 4.1. Presents how frequent the use of FX derivatives is for the sample firms. Although Friberg and Nydahl (1999) argue that Swedish firms have a relatively high exposure to currency fluctuations, no trade of FX derivatives proved to be the most approached strategy for the sampled firms.

	FX HEDGERS	**NON-HEDGERS**
NUMBER	29	46

Table 4.1: Frequency of FX hedging as defined by the use of FX derivatives

Furthermore, Table 4.2. presents the summary statistics of this study. Viewing the proxy for firm value, the mean Tobin's Q of 3.21 indicates that the firms are valued on average 3.21 times their book value of assets. Furthermore, the median Tobin's Q of 1.74 hints that there are extreme values in the sample, which the maximum value of 33.71 further points at. This is also observed in the firm size, profitability, and leverage statistics, all with different means and medians, as well as standard deviations exceeding 1. This implies that the sample is skewed and needs to be altered in order to enhance normality. To treat this skewness and increase normality, the natural logarithm will be applied to the Tobin's Q and firm size variables. Treating the variables leads to a trade-off between the increased linearity and validity of the model, and the complexity of its interpretation.

Furthermore, as highlighted by Brooks (2008), logarithms of a variable cannot be derived when variables can take on zero or negative values. Thus, the natural logarithm cannot be applied to all variables included in this study. Moreover, Brooks (2008) discusses the possibility of removing outliers in order to minimise the skewness of the data. Although, one issue with this process is how removed data points could represent useful pieces of information (Brooks, 2008). Since we have collected data on firms of different industries, sizes, and perhaps at different stages of maturity, the presence of extreme values is highly natural. Consequently, removing outliers could lead to research bias. Therefore, outliers were not removed.

VARIABLE	NUMBER	MIN	MAX	MEDIAN	MEAN	ST. DEV
Tobin's Q	75	0.13	33.71	1.74	3.21	4.81
FX Hedging	75	0	1	0	0.39	0.49
Firm Size	75	276	31206277	218157	1764251	4947777
Profitability	75	-54.12%	35.73%	5.64%	3.83%	12.61
Dividends	75	0	1	1	0.53	0.50
Diversification	75	0	1	0	0.21	0.41
Leverage	75	0.50%	481.80%	35.6%	54.74%	69.71

Table 4.2: Descriptive statistics with unadjusted variables

After adjusting variables for skewness, the results presented in Table 4.3 are obtained. Moreover, the variable LN(*Firm Size*) approaches normality, as opposed to raw size. This method is also used by Jankensgård (2015) and Allayannis (2001). By transforming the variables, extreme values are mitigated. The adjusted variables will be applied in the final OLS regression model.

VARIABLE	NUMBER	MIN	MAX	MEDIAN	MEAN	ST. DEV
LN(*Tobin's Q*)	75	-2.04	3.52	0.55	0.58	1.05
FX Hedging	75	0	1	0	0.39	0.49
LN(*Firm Size*)	75	5.62	17.26	12.29	12.36	2.17
Profitability	75	-54.12%	35.73%	5.64%	3.83%	12.61
Dividends	75	0	1	1	0.53	0.50
Diversification	75	0	1	0	0.21	0.41
Leverage	75	0.50%	481.80%	35.6%	54.74%	69.71

Table 4.3: Descriptive statistics with transformed variables *LN(Tobin's Q) and LN(Firm Size).*

4.3 Regression

Table 4.4. presents the results from the ordinary least squares regression. We include the expected sign of the regression coefficient for each variable, which is based on theory and previous research presented in section 3.4.3. Some variables have an expected coefficient sign denoted as *positive / negative*, either because no relationship has yet been proven, or that previous research has identified both positive and negative relationships.

VARIABLE	EXPECTED SIGN	COEFFICIENT	ST. ERROR	T-STAT	PROBABILITY
Constant		4.179	0.805	5.189	< 0.001*
FX Hedging	Positive	-0.068	0.236	-0.288	0.774
Firm size	Positive / Negative	-0.294	0.074	-3.996	< 0.001*
Profitability	Positive	0.019	0.011	1.732	0.088
Dividends	Negative	0.368	0.275	1.341	0.184
Diversification	Positive / Negative	0.314	0.285	1.104	0.273
Leverage	Negative	-0.005	0.002	-3.151	0.002*

Table 4.4: Results from OLS regression where * denotes significance at a 95% level of confidence.

In regards to the model's fitness, we find a R-squared of 0.315 and an adjusted R-squared of 0.254. A R-squared of 0.315 suggests that 31.5% of the variation in the dependent variable can be explained by variation in the independent variables (Berenson et al., 2019). Moreover, since a model including a greater number of variables always conveys a larger R-squared, Berenson et al. (2019) suggest that the R-squared should be adjusted for the number of independent variables,

as well the sample size. Therefore, we focus on the adjusted R-squared of 0.254 and conclude that 25.4% of the variation in Tobin's Q can be explained by the independent variables. Our model has a significantly lower explanatory power than Allayannis and Weston (2001), who present an R squared of 0.73. However, their model included several more variables, which the R-squared does not seem to have been adjusted for.

The variables that proved significant at a 95% level of confidence were *Firm Size* and *Leverage. Firm Size* and *Leverage* showed regression coefficients of -0.29 and -0.005 respectively, meaning that there is a negative relationship between the two variables and Tobin's Q. All of *FX Hedging, Profitability, Dividends* and *Diversification* were found not significant after constructing the regression model. In contrast to what has been hypothesised in this research, there was a negative regression coefficient of -0.068 associated with the use of FX derivatives. However, as mentioned, this coefficient is not statistically supported at a 95% level of confidence.

Finally, equal findings are made when applying industry adjusted Tobin's Q for the dependent variable (see Appendix B.), with the expectation of *Profitability*, which has a significant, positive effect on industry adjusted Q's and a corresponding regression coefficient of 0.13.

4.4 Hypothesis Test

H1: *Foreign exchange rate derivatives has a positive effect on firm value*

Our hypothesis relates to the regression coefficient of the variable *FX Hedging.* Seeing as we expected FX derivatives to have a positive effect on firm value, we anticipated a positive regression coefficient. The coefficient proved to be negative, and most importantly, insignificant at a confidence level of 95%. Thus, we cannot reject the null hypothesis and conclude that there is no significant relationship between FX derivatives and firm value. The same conclusions are drawn when using an industry adjusted Tobin's Q as the dependent variable.

5 Discussion and Interpretation

The following sections evaluate and discuss the findings presented in prior chapters. Moreover, it explores connections between the results of this study's OLS regression model findings and previous empirical research, as well as established models and theories within the fields of economics and management.

5.1 The Hedging Premium

In contrast to, for instance, Allayannis and Weston (2001) and Jankensgård (2015), this research failed to reject the null hypothesis of foreign exchange rate derivatives having zero effect on firm value. As opposed to the anticipated positive effect, we observed a negative relationship between FX derivatives and Tobin's Q, which also proved to be statistically insignificant.

As previously highlighted, in 2021, which is the timeframe this study is based on, the SEK saw a depreciation towards both the Euro and the US Dollar (European Central Bank, 2023; Yahoo Finance, 2023). As argued by Luehrman (1991) and Glaum, Blummer and Himmel (2000), a depreciated currency has positive strategic implications for firms, including increased competitiveness at home and abroad, as well as greater translated cash flows. On the other hand, if one party gains from currency depreciation, another must fall short. Therefore, while sales and inflows of cash are positively affected by currency depreciation, outflows of cash, mainly costs of imports and foreign debt, increases (Shapiro, 1975; Sternitzke, 1979). This research has not investigated the direction of foreign cash flows for the sampled firms. Thus, there is ambiguity in whether a depreciated currency is to the benefit or detriment of the sampled firms. In line with the reasoning by Leuhrman (1991) and Glaum, Blummer and Himmel (2000), if the majority of the sampled firms are net exporters, they are positively exposed to foreign currencies through relatively lower market prices abroad, as well as a higher relative value of incomes translated to SEK. If this holds true, although this knowledge is not available for firms ex-ante, locking in a favourable exchange rate is not necessary.

Similarly, Allayannis and Weston (2001) argue that the benefits of hedging should be most pronounced during times of currency appreciation. Therefore, given the depreciated SEK in 2021, Swedish net exporters that use FX derivatives experience the same increase in foreign cash flows as those that do not trade derivatives. However, the costs associated with derivatives are subtracted from the value of the aforementioned, which could explain the negative relationship between firm value and FX derivatives presented in our results. According to Geczy, Minton and Schrand (1997), the costs of currency derivatives include liquidity costs, transaction costs and costs of default. Furthermore, Allayannis and Weston (2001) argue that, during periods of a depreciating domestic currency, firms that are not hedged experience an unexpected gain in value, as opposed to those that do hedge. This is confirmed by Allayannis and Weston's (2001) empirical finding that the hedging premium is much larger, and only significant during appreciation. Hence, the contrast between the findings of this study and that of Jankensgård (2015) and Allayannis and Weston (2001) could potentially originate from the sensitivity of the hedging premium towards the depreciation of a domestic currency, in combination with the net position of the sampled firms.

Additionally, Aretz, Bartram and Dufey (2007) made the remark that financial derivatives in particular may only have a minor effect on the overall risk borne by a firm. Moreover, Aretz, Bartram and Dufey (2007) suggest that alternative means, foreign currency denominated debt for example, could be more efficient in managing currency exposure. Furthermore, in a comparative study of firms that hedge through derivatives as opposed to those that use operational hedging, Petersen and Thiagarajan (2000) found that the choice between financial instrument hedging or operational hedging is contingent on different abilities to adjust operating costs and varying need for investment capital. Although there is mixed evidence for the value provided by operational hedging (see Das and Kumar, 2023; Hadian and Adaoglu, 2020), a negative, insignificant hedging premium could have been the result of exclusively studying the use of derivatives, when many sample firms may derive notable value from alternative forms of FX hedging. The choice of not including operational hedging was, as explained, motivated by contingency theory (Luthans & Stewart, 1977). The finding by Petersen and Thiagarajan (2000) is highly conforming to the thoughts of contingency theory. Early in the research, we made the assumption that operational hedging is more contingent upon individual firm characteristics, and takes on

highly varying forms. As a consequence, we also assumed that operational hedging would be harder to operationalise into measurable, accurate variables, as opposed to the use of derivatives. Therefore, we assumed improved analysis and more valid results would be obtained from purely focusing on the more uniform practice of trading derivatives. However, arguments presented by Aretz, Bartram and Dufey (2007) and Petersen and Thiagarajan (2000) argue in favour of including operational hedging in the study, as this could have had an effect on firm value.

The Resource Based View maintains that for a resource to provide value, it must be valuable, rare, imperfectly imitable and non-substitutable (Barney, 1991). The theory states that if a valuable firm resource is held by many, that resource cannot be a source of competitive or sustained competitive advantage. The same argument applies if a resource is easily imitated (Barney, 1991). As this study includes only large firms with market capitalizations equal to, or greater than, 1 billion SEK, it can be expected that all studied firms have the capacity and ability to enter into derivatives contracts. Therefore, utilising standardised foreign exchange derivatives may not yield a sustained competitive advantage, since these strategies are not rare, and they are easily imitated. Additionally, by merely categorising firms as hedgers based on their use of currency derivatives, the benefits of operational hedging may not be captured in this study. As previously presented in the text, operational FX hedging is the adjustment of strategies and the structuring of resources and processes to reduce or eliminate future foreign exchange risk exposure (Batram and Bodnar, 2007). Thus, operational FX hedging may align more closely with the theory of dynamic capabilities, which Teece (2014) describes as an organisation's ability to integrate, construct, and reconfigure its internal and external resources to adapt and respond effectively to changing market conditions, technological developments, and competitive forces (Teece, 2014). Moreover, several previous studies have found that operational and financial hedging are complements rather than substitutes, and that the combination of these strategies increases firm value. For instance, while financial hedging is efficient in reducing short-term currency risk, operational hedging has been proven to mitigate the long term volatility stemming from international operations (Kim, Mathur & Nam, 2006; Allayannis, Ihrig & Weston, 2001). Consequently, the absence of a positive relationship between use of currency derivatives and firm value in this study may be attributed to the limitations of said hedging instruments in providing real, long-term value to the firm.

5.2 Control Variables

Concerning the independent control variables, we find significance for *Fim Size* and *Leverage* when drawing a regression of unadjusted Q's. Conversely, similar to Jankensgård (2015), we establish no significant effect of *Dividends* or *Diversification* on firm value.

The coefficient relating to Firm Size equals -0.294, indicating that for a one-unit increase in *Firm Size*, Tobin's Q decreases by 0.294 units. Allayannis and Weston (2001), Gay and Nam (1998), Jankensgård (2015) and Perez-Gonzales and Yun (2013) all established a negative relationship between firm size and value. The negative relationship between firm size and Tobin's Q is consistent with studies using alternative measures of firm value (Hirdinis, 2019; Niresh & Velnampy, 2014). Theoretical explanations to the relationship between firm size and firm value relate to the value premium and costly reversibility, explaining that, historically, higher returns accrue to firms with greater amounts of assets in place (Zhang, 2005). In addition, firms with fewer assets in place receive lower valuation during periods when the stock market performs well (Abel & Eberly, 1996). Contrariwise, since there is a high cost of downscaling assets when the market performs poorly, firms with fewer assets perform better and receive higher valuation relative to larger firms (Abel & Eberly, 1996). If said theory holds, as the stock market saw a significant increase in 2021 (see Appendix C), firms of greater size should receive relatively higher valuation, which is inconsistent with the observed negative coefficient for *Firm Size.* Important to note, though, is that our model proxies firm size with sales and not assets, which could motivate why results deviate from Abel and Eberly (1996) and Zhang (2005). Similarly, said theory appraises firm value through stock returns, whereas this model employs Tobin's Q.

In terms of *Leverage*, we find that the coefficient equals -0.005, indicating that, for a one-unit increase in Leverage, the respective Tobin's Q decreases by 0.005 units, holding all other variables constant. The same negative relationship was also found by Aggarwal and Zhao (2007). Financial theory argues that, since interest is tax deductible, a larger proportion of debt should result in higher firm value (Wrightsman, 1978). If this theory proves to be factual, we would observe a positive relationship between *Leverage* and firm value. However, said theory does not consider the risk associated with debt, which is why research has failed to prove that

value is maximised as the percentage of debt approaches 100 (Wrightsman, 1978). Nonetheless, as we find a significant negative relationship between amount of debt and firm value, we reject Modigliani and Miller's (1958) seminal argument that capital structure is irrelevant to firm value.

Furthermore, a negative relationship between *Leverage* and firm value was anticipated by theory on financial distress costs (Smith & Stultz, 1985). Additionally, in line with Stulz (1996) argument, the present value of future bankruptcy costs associated with higher levels of debt could be reflected in Tobin's Q today. That is, in 2021 when the data was gathered. Thus, the negative sign associated with *Leverage* and firm value reflects the shareholders anticipated future bankruptcy costs of a given amount of leverage. In the study by Gilje and Taillard (2017), reducing costs of financial distress proved to be a means by which firms can increase value. Therefore, since a greater debt-to-equity ratio introduces larger costs of financial distress, firm value decreases as the debt-to-equity ratio of a firm increases.

Moreover, by applying Q's adjusted for each industry's median Q, as displayed in Table B1., we find the variable *Profitability* significant, with a regression coefficient of 1.131. Thus we are able to conclude that with a one-unit increase in profitability, the industry-adjusted Q increases by 1.131 units. This is consistent with previous empirical research, which states that more profitable firms trade at a premium (see Gharaibeh & Qader, 2017; Allayannis & Weston, 2001). Some authors imply that investor preference for profitable firms in specific industries can be an explanation for the correlation with increased firm valuation. For example, Novy-Marx (2013) emphasises that profitable firms are better positioned to handle exogenous sources of distress, generally have lower proportions of operating leverage as well as greater cash flow durations, all of which are factors which potentially explain their higher valuation.

In the same vein, a positive relationship between *Profitability* and firm value is consistent with Myers (1984) pecking order theory. Pecking order theory builds on Myers (1977) previously introduced argument, submitting that external financing is more costly than internally generated funds. Namely, retained earnings are preferred over both equity and debt (Myers, 1984). Since profitable firms have greater internal funds to finance investment opportunities, and as a result, have less need to source funds in external markets, profitability ultimately resolves underinvestment and increases firm value (Froot, Scharf & Scharfstein, 1993; Myers, 1984).

6 Conclusion

This concluding section will begin by revisiting our aims and objectives. In addition, the section will propose guidance and suggestions to those pursuing future research on the topic of foreign exchange rate derivatives and explore determinants of firm value.

6.1 Research Aim and Objectives

The aim of this study has been to investigate the relationship between the use of foreign exchange rate derivatives and firm value. More specifically, if trading foreign exchange rate derivatives has a positive effect on firm value, as proxied by Tobin's Q. As explained in the results section, to not exploit FX derivatives is the most common strategy among the sampled firms. Moreover, by creating an ordinary least squares regression model, we find that the relationship between FX derivatives and Tobin's Q is negative. Though, this result was not statistically significant at a 95% level of confidence. Regarding alternative influences on firm value, the control variables firm size as defined by sales, leverage as defined by debt-to-equity ratio and profitability as measured by Return on Assets, were found to have a significant effect on firm value. Consequently, during periods of a weakened SEK, financial managers of Swedish international firms should note that FX derivatives may not enhance firm value, as revealed by the findings of this study.

Prior studies have found far more significant relationships between firm value and FX derivatives, but also between firm value and the various control variables included in this research. Given the plentiful use of variables in this model, the sample saw a 25% decrease during the sampling process. This occurred because firm's with a missing value on any given variable were excluded from the final sample. Moreover, many exclusions were made for firms with no significant exposure to foreign currencies. Therefore, having a greater initial sample could have ensured a larger size of the final studied sample, which could have yielded fewer insignificant results. In hindsight, a greater proportion of time could have been allocated to

screening annual reports for derivatives usage, which would have allowed for a larger sample size.

6.2 Future Research

As introduced in the previous section, in retrospect, a greater sample size could have been gathered. Therefore, if the same population is studied, we recommend future researchers to gather a larger initial sample from the sampling frame of the 282 firms with market capitalizations equal to, or greater than 1 billion SEK listed on Nasdaq Stockholm.

Regarding the theoretical framework of this paper, agency Theory is a large bulk of ideas used to explain the hypothesised positive relationship between FX derivatives and firm value. However, much of the explanations derived from Agency Theory are contingent on certain schemes for agent compensation and incentive alignment (Aretz, Bartram & Dufey, 2007; Demarzo & Duffie, 1995; Knopf, Nam & Thornton, 2002; Smith & Stulz, 1985; Stulz, 1984). Although Agency Theory was employed to build the hypothesis that FX derivatives increase firm value, it does not receive any treatment in the multiple regression analysis. Therefore, to better include Agency Theory in empirical results, future researchers could consider including variables that measure certain forms of agency contracts or managerial compensation schemes. This operationalisation was perceived as neither attainable nor pragmatic given the time at our disposal, as it would require more extensive manual gathering of data.

Similarly, mitigating volatility of cash flows is also central in theories on how FX hedging increases firm values. Decreasing volatility of cash flows is predominant in theories on the role of avoiding tax liabilities and resolving the underinvestment problem (Froot, Scharfstein & Stein, 1993; Myers, 1977; Smith & Stulz, 1985; Stulz, 1990). For this reason, greater empirical investigation of said theories could have been achieved by including a measure of cash flow volatility in the regression model, to see if stable cash flows do in fact increase firm value.

Lastly, we can merely confirm that a relationship exists between the study's significant variables and firm value. Since the performed study is not characterised by an experimental design, we

cannot infer the direction of said relationships. Therefore, there exists a possibility that firms with a certain level of Tobin's Q are more or less inclined to hedge, for example, due to higher levels of foreign investment and growth opportunities, sales or assets in place. Although the relationship between *FX Hedging* and firm value was not significant in this study, future studies could apply an alternative research design, to investigate if there is a reverse causality between FX derivatives and firms value, as opposed to the causality explicitly assumed in this paper. For instance, the frequently mentioned study by Allayannis and Weston (2001) introduced a quasi-experimental research design, namely, an event study, to more confidently warrant that hedging has a positive effect on firm value.

Bibliography

Abel, A.B., & Eberly, J.C. (1996). Optimal Investment with Costly Reversibility, *The Review of Economic Studies*, vol. 63, no. 4, pp. 581-593

Aggarwal, R., & Zhao, X. (2007). The Leverage–Value Relationship Puzzle: an Industry Effects Resolution, *Journal of Economics and Business*, vol. 59, no. 4, pp. 286–97

Allayannis, G., & Weston, P. J. (2001). The Use of Foreign Currency Derivatives and Firm Market Value, *The Review of Financial Studie*s, vol. 14, no.1, pp. 243- 276

Allayannis, G., Ihrig, J., & Weston, P.J. (2001). Exchange-Rate Hedging: Financial versus Operational Strategies, *American Economic Review,* vol. 91, no. 2, pp. 391-395

Altuntas, M., Liebenberg, A.P, Watson, E.D., & Yildiz, S. (2017). Hedging, Cash Flows, and Firm Value: Evidence of an Indirect Effect, *Journal of Insurance Issues*, vol. 40, no. 1, pp. 1-22

Amihud, Y. (1994). Exchange rates and the valuation of equity shares, in Amihud, Y. and Levich, R.M. (Eds.), Exchange Rates and Corporate Performance, Irwin, New York, NY, pp. 49-59

Anderson, E., & Gatignon, H. (1986). Modes of Foreign Entry: A Transaction Cost Analysis and Propositions, *Journal of International Business Studies*, vol. 17, no. 3, pp. 1–26

Aretz, K., Bartram, S.M., & Dufey, G. (2007). Why hedge? Rationales for corporate hedging and value implications, *The Journal of Risk Finance*, vol. 8, no.5, pp. 434-449

Bacidore, J.M., Boquist, J.A., Milbourn, T.T., & Thakor, A.V. (1997). The Search for the Best Financial Performance Measure, *Financial Analyst Journa*l, vol. 53, no. 3, pp. 11-20

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage, *Journal of Management*, vol. 17, no. 1, pp. 99–120

Barton, J. (2001). Does the Use of Financial Derivatives Affect Earnings Management Decisions? *The Accounting Review,* vol, 76, no. 1, pp. 1-26

Bartov, E., & Bodnar, M. (1994). Firm Valuation, Earnings Expectations, and the Exchange-Rate Exposure Effect, *The Journal of Finance*, vol. 49, no. 5, pp. 1755-1785

Bartram, S.M., & Bodnar, G.M. (2007). The Exchange Rate Exposure Puzzle, *Managerial Finance,* vol. 33, no. 9, pp. 642-666

Bartram, S.M., Brown, G.W., & Conrad, J. (2011). The Effects of Derivatives on Firm Risk and Value, *The Journal of Financial and Quantitative Analysis*, vol. 46, no. 4, pp. 967-999

Batra, R.N., Donnenfeld, S., & Hadar, J. (1982). Hedging Behavior by Multinational Firms, *Journal of International Business Studies*, vol. 13, no. 3, pp. 59-70

Bell, E., & Bryman, A. (2011). Business Research Methods, 3rd ed., New York: Oxford University Press

Berenson, M.L., Levine, D.M., Szabat, K.A., & Stephan, D.F. (2019). Basic Business Statistics: Concepts and Application, 14th ed., Pearson

Bertsch, C. (2022). Hedging Against Exchange Rate Risk - Maturity Choice and Roll-Over Risk. https://www.riksbank.se/globalassets/media/rapporter/pov/artiklar/svenska/2022/220314/2022_1-hedging-against-exchange-rate-risk---maturity-choice-and-roll-over-risk_sv.pdf

Black, F., & Scholes, M. (1974). The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns, *Journal of Financial Economics,* vol. 1, no. 1, pp. 1-22

Bodnar, G.M., & Gentry, W.M. (1993). “Exchange rate exposure and industry characteristics: evidence from Canada, Japan, and the USA”, *Journal of International Money and Finance*, vol. 12, no. 1, pp. 29-45

Bodnar, G.M., Hayt, G.S., & Marston, R.C. (1998). Wharton Survey of Financial Risk Management by US Non-Financial Firms, *Financial Management*, vol. 27, no. 4, pp. 70-91

Bodnar, G.M., Hayt, G.S., Marston, R.C., & Smithson, C.W. (1995). Wharton Survey of Derivatives Usage by U.S. Non-Financial Firms, *Financial Management*, vol. 24, no. 2, pp. 104-114

Brooks, C. (2008). Introductory Econometrics for Finance: Second Edition, New York: Cambridge University Press

Brown, G.W., & Bjerre, K. (2002). How Firms Should Hedge, *The Review of Financial Studies*, vol. 15, no. 4, pp. 1283-1324

Burgman, T.A. (1996). An Empirical Examination of Multinational Corporate Capital Structure, *Journal of International Business Studies*, vol. 27, no. 3, pp. 553-570

Calderon-Rossell, J.R. (1979). Covering Foreign Exchange Risks of Single Transactions: A Framework for Analysis, *Financial Management*, vol. 8, no. 3, p.78-85

Campello, M., Lin, C., Ma, Y., & Zou, H. (2011) The Real and Financial Implications of Corporate Hedging, *The Journal of Finance*, vol. 66, no. 5, pp. 1615-1647

Capital IQ. (2023). S&P Global Market Intelligence Capital IQ, Available Online: https://www.capitaliq.com/CIQDotNet/Charting4/ModernBuilder.aspx [Accessed 16 May 2023]

Carter, D.A., Rogers, D.A., & Simkins, B.J. (2006). Does Hedging Affect Firm Value? Evidence from the US Airline Industry, *Financial Management*, vol. 35, no. 1, pp. 53-86

Carter, D.A., Rogers, D.A., Simkins, B.J., & Treanor, S.D. (2017). A review of the literature on commodity risk management, *Journal of Commodity Markets*, vol. 8, pp.1–17

Chang, E.C., & Wong, K.P. (2003). Cross-Hedging with Currency Options and Futures, *The Journal of Financial and Quantitative Analysis*, vol. 38, no. 3, pp. 555-574

Chava, S., Praveen, K., & Warga, A. (2010). Managerial Agency and Bond Covenants, *Review of Financial Studies,* vol. 23, no. 3, pp. 1120-1148

Chen, Z., Han, B., & Zeng, Y. (2017). Financial Hedging and Firm Performance: Evidence from Cross-Border Mergers and Acquisitions, *European Financial Management*, vol. 23, no. 3, pp. 415–458

Choi, J.J., & Prasad, M. (1995). Exchange Risk Sensitivity and its Determinants: A Firm and Industry Analysis of U.S. Multinationals, *Financial Management*, vol. 24, no. 3, pp. 77-88

Clark, E., & Mefteh, S. (2010). Foreign Currency Derivatives Use, Firm Value and the Effect of the Exposure Profile: Evidence from France, *International Journal of Business*, vol. 15, no. 2, pp. 184-196

Das, J.P., & Kumar, S. (2023). Impact of Corporate Hedging Practices on Firm's Value: an Empirical Evidence from Indian MNCs, *Risk Management*, vol. 25, no. 10, pp. 1-35

DeMarzo, P. (1988). An Extension of the Modigliani-Miller Theorem to Stochastic Economies with Incomplete Markets and Interdependent Securities, *Journal of Economic Theory*, vol. 45, no. 2, pp. 353-369

DeMarzo, P., & Duffie, D. (1991). Corporate Financial Hedging with Proprietary Information, *Journal of Economic Theory*, vol. 53, no. 2, pp. 261-286

DeMarzo, P., & Duffie. (1995). Corporate Incentives for Hedging and Hedge Accounting, *The Review of Financial Studies*, vol. 8, no. 3, pp. 743–771

Dufey, G., & Srinivasulu, S.L. (1983). The Case for Corporate Management of Foreign Exchange Risk, *Financial Management*, vol. 12, no. 4, pp. 54-62

Dymsza, W.A. (1984). Global Strategic Planning: A Model and Recent Developments, *Journal of International Business Studies,* vol. 15, no. 2, pp. 169-183

European Central Bank. (2023). Swedish Krona (SEK). Available Online: https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-sek.sv.html [Accessed May 11 2023]

Fama, E.F., & Jensen, M.C. (1983). Agency Problems and Residual Claims, *The Journal of Law & Economics*, vol. 26, no. 2, pp. 327-349

Fatemi, A.M. (1988). The Effect of International Diversification on Corporate Financing Policy, J*ournal of Business Research*, vol. 16, no. 1, pp. 17-30

Fauver, L., & Naranjo, A. (2010). Derivative Usage and Firm Value: The influence of Agency Costs and Monitoring Problems, *Journal of Corporate Finance*, vol. 16, no. 5, pp. 719-735

Fisher, L. (1975). Using Modern Portfolio Theory to Maintain an Efficiently Diversified Portfolio, *Financial Analyst Journal*, vol. 31, no. 3, pp. 73-85

Folta, T.B., & Sakhartov, A.V. (2018). Hedging Strategies. In: Augier, M., Teece, D.J. (eds) The Palgrave Encyclopedia of Strategic Management. Palgrave Macmillan, London

Friberg, R., & S. Nydahl, (1999). Openness and the Exchange Rate Exposure of National Stock Markets, *International Journal of Finance & Economics*, vol. 4, no. 1, pp. 55-62

Froot, K., Scharfstein, D.S., & Stein, J.C. (1993). Risk Management: Coordinating Corporate Investment and Financing Policies, *The Journal of Finance*, vol. 48, no. 5, pp. 1629-1658

Garber, P.M., & Spencer, M.G. (1995). Foreign Exchange Hedging and the Interest Rate Defense, *IMF Staff Papers*, vol. 42, no. 3, pp. 490-516

Gay, G.D., & Nam, J. (1998). The Underinvestment Problem and Corporate Derivatives Use, *Financial Management,* vol. 27, no. 4, pp. 53-69

Geczy, C., Minton, B.A., & Schrand, C. (1997). Why Firms Use Currency Derivatives, *The Journal of Finance*, vol. 52, no. 4, pp. 1323-1354

Gharaibeh, A.M.O., & Qader, A.A.A.A. (2017). Factors Influencing Firm Value as Measured by the Tobin's Q: Empirical Evidence from the Saudi Stock Exchange (TADAWUL), *International Journal of Applied Business and Economic Research,* vol. 15, no. 6, pp. 333-358

Gilje, E.P., & Taillard, J.P. (2017). Does Hedging Affect Firm Value? Evidence from a Natural Experiment, *The Review of Financial Studies,* vol. 30, no. 12, pp. 4083-4132

Glaum, M., Brunner, M., & Himmel, H. (2000). The DAX and the Dollar: The Economic Exchange Rate Exposure of German Corporations, *Journal of International Business Studies*, vol. 31, no. 4, pp. 715-724

Gomez-Meija, L.R. (1992). Structure and Process of Diversification, Compensation Strategy, and Firm Performance, *Strategic Management Journal*, vol. 13, no. 5, pp. 381-397

Graham, J.R., & Rogers, D.A. (2002). Do Firms Hedge in Response to Tax Incentives?, *Journal of Finance,* vol. 57, no 2, pp. 815-839

Hadian, A., & Adaoglu, C. (2020). The Effects of Financial and Operational Hedging on Company Value: the Case of Malaysian Multinationals, *Journal of Asian Economics*, vol. 70, pp. 1-66

Hagelin, N. (2003). Why firms hedge with currency derivatives: An examination of transaction and translation exposure, *Applied Financial Economics*, vol. 13, no. 1, pp. 55-69

Hagelin, N., & Pramborg, B. (2004). Hedging Foreign Exchange Exposure: Risk Reduction from Transaction and Translation Hedging, *Journal of International Financial Management and Accounting*, vol. 15, no. 1, pp. 1-20

Hedlund, G. (1984). Organization In-Between: The Evolution of the Mother-Daughter Structure of Managing Foreign Subsidiaries in Swedish MNCS, *Journal of International Business Studies*, vol. 15, no. 2, pp. 109-123

Hirdinis, M. (2019). Capital Structure and Firm Size on Firm Value Moderated by Profitability, *International Journal of Economic and Business Administration*, vol. 7, no. 1, pp. 174-191

Hodder, J.E., & Jucker, J.V. (1985). International Plant Location Under Price and Exchange Rate Uncertainty, *Engineering Costs and Production Economics*, vol. 9, no. 1-3, pp. 225-29

Hull, J.C. (2012). Options, Futures and Other Derivatives. 8th Edition, Prentice-Hall, Upper Saddle River

Huston, E., & Stevenson, S. (2010). Openness, Hedging Incentives and Foreign Exchange Exposure: A Firm-Level MultiCountry Study, *Journal of International Business Studies*, vol. 41, no. 1, pp. 105-122

Islam, M., & Chakraborti, J. (2015). Futures and Forward Contracts as a Route of Hedging the Risk, *Risk Governance and Control: Financial Markets & Institutions*, vol. 5, no. 4, pp. 68-79

Jacque, L.L., & Vaaler, P.M (2001). The International Control Conundrum with Exchange Risk: An EVA Framework, *Journal of International Business Studies*, vol. 32, no. 4, pp. 813-832

Jankensgård, H. (2015). Does Centralisation of FX Derivative Usage Impact Firm Value? *European Financial Management*, vol. 21, no. 2, pp. 309-332

Jin, Y., & Jorion, P. (2006). Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers, *The Journal of Finance*, vol. 61, no. 2, pp. 893-919

Jorion, P. (1990). The Exchange-Rate Exposure of U.S. Multinationals, *Journal of Business*, vol. 63, no. 3, pp. 331-345

Kathleen, M. (1989). Agency Theory: An Assessment and Review, *The Academy of Management Review*, vol. 14, no. 1, pp. 57-74

Kim, E.H. (1978). A Mean-Variance Theory of Optimal Capital Structure and Corporate Debt Capacity, *The Journal of Finance*, vol. 33, no. 1, pp. 45-63

Kim, Y.S., Mathur, I., & Nam, J. (2006). Is Operational Hedging a Substitute for or a Complement to Financial Hedging?, *Journal of Corporate Finance,* vol. 12, no.4, pp. 834-853

Knopf, J.D., Nam, J., & Thornton, J.H. (2002). The Volatility and Price Sensitivities of Managerial Stock Option Portfolios and Corporate Hedging, *The Journal of Finance*, vol. 57, no. 2, pp. 801–813

Kumar, R. (2014). Stock Markets, Derivatives Markets, and Foreign Exchange Markets. Strategies of Banks and Other Financial Institutions, pp. 125–164

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (2002). Investor Protection and Corporate Valuation, *Journal of Finance*, vol. 57, no. 3, pp. 1147-1170

Lamont, O., & Polk, C. (2001). Does diversification destroy value? Evidence from industry shocks, *Journal of Financial Economics,* vol. 63, no. 1, pp. 51-77

Lang, L., & Stulz, R.M. (1994). Tobin's Q, Corporate Diversification, and Firm Performance, *Journal of Political Economy,* vol. 102, no. 6, pp. 1248-1280

Lee, K.C., & Kwok, C.C.Y (1988). Multinational Corporations vs. Domestic Corporations: International Environmental Factors and Determinants of Capital Structure, *Journal of International Business Studies*, vol. 19, no. 2, pp. 195-217

Leuhrman, T.A. (1991). Exchange Rate Changes and the Distribution of Industry Value, *Journal of International Business Studies*, vol. 22, no. 4, pp. 619-649

Levander, M., Rosenvinge, C.-J., & Sternbeck Fryxell, V. (2021). Staff memo - The Swedish derivative market [pdf]. Available at: https://www.riksbank.se/globalassets/media/rapporter/staff-memo/engelska/2021/the-swedish-derivative-market.pdf

Levy, D.T. (1985). The Transactions Cost Approach to Vertical Integration: An Empirical Examination, *The Review of Economics and Statistics*, vol. 67, no. 3, pp. 438-445

Lindenberg, E.B., & Ross, S.A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business*, vol. 54, no. 1, pp.1–32

Lintner, J. (1965). Security Prices, Risk and Maximal Gains from Diversification, *Journal of Finance,* vol. 20, no. 4, pp. 587–615

Lintner, J. (1965b). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets, *The Review of Economics and Statistics,* vol. 47, no. 1, pp. 13-37

Loyd, W.P., & Jahera, J.S. (1994). Firm-diversification Effect on Performance as Measured by Tobin's Q, *Managerial and Decision Economics*, vol. 15, no. 3, pp. 259-266

Luthans, F., & Stewart, T. (1977). A General Contingency Theory of Management, *The Academy of Management Review,* vol. 2, no. 2, pp. 181-195

Magee, S. (2013). The Effect of Foreign Currency Hedging on the Probability of Financial Distress, *Accounting and Finance*, vol. 53, no. 4, pp. 1107-1127

Malitz, I. (1986). Our Financial Contracting: The Determinants of Bond Covenants, *Financial Management,* vol. 15, no. 2, pp. 18-25

Markowitz, H. (1952). Portfolio Selection, *The Journal of Finance,* Vol. 7, No. 1, pp. 77-91

Martin, A.D., & Mauer, L.J. (2003). Transaction versus economic exposure: which has greater cash flow consequences?, *International Review of Economics & Finance*, vol. 12, no. 4, pp. 437-449

Masten, S.E. (1984). The Organization of Production: Evidence from the Aerospace Industry, *Journal of Law and Economics*, vol. 27, no. 2, pp. 403-417

Merton, R.C. (1974). On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *The Journal of Finance,* vol. 29, no. 2, pp. 449-470

Mian, S.L. (1996). Evidence on Corporate Hedging Policy, *The Journal of Financial and Quantitative Analysis*, vol. 31, no. 3, pp. 419-439

Miller, K.D. (1998). Economic Exposure and Integrated Risk Management, *Strategic Management Journal*, vol. 19, no. 5, pp. 497-514

Modigliani, F., & Miller, M.H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment, *The American Economic Review*, vol. 48, no. 3, pp. 261- 297

Mossin, J. (1966). Equilibrium in a Capital Asset Market, *Econometrica*, vol. 34, no. 4, pp. 768–83

Myers, S.C. (1977). Determinants of Corporate Borrowing, *Journal of Financial Economics*, vol. 5, no. 2, pp. 147-175

Myers, S.C. (1984). The Capital Structure Puzzle, *Journal of Finance*, vol. 39, no. 3, pp. 575-592

Nance, D.R., Smith, C.W., & Smithson, C.W. (1993). On the Determinants of Corporate Hedging, *The Journal of Finance*, vol. 48, no. 1, pp. 267-284

Niresh, J.A., & Velnampy, T. (2014). Firm Size and Profitability: A Study of Listed Manufacturing Firms in Sri Lanka, *International Journal of Business and Management*, vol. 9, no. 4, pp. 57-64

Novy-Marx, R. (2013). The Other Side of Value: The Gross Profitability Premium. *Journal of Financial Economics*, vol. 108, no. 1, pp. 1-28

Nydahl, S. (1999). Exchange Rate Exposure, Foreign Involvement and Currency Hedging of Firms: Some Swedish Evidence, *European Financial Management*, vol. 5, no. 2, pp. 241-257

Park, Y.S. (1984). Currency Swaps as a Long-Term International Financing Technique, *Journal of International Business Studies*, vol. 15, no. 3, pp. 47-54

Perez-Gonzales, F., & Yun, H. (2013). Risk Management and Firm Value: Evidence from Weather Derivatives, *The Journal of Finance*, vol. 68, no. 5, pp. 2143-2176

Perfect, S.B. and Wiles, K.W. (1994). Alternative constructions of Tobin's q: An empirical comparison, *Journal of Empirical Finance*, vol. 1, no. 3, pp.313–341

Perold, A.F. (2004). The Capital Asset Pricing Model, *The Journal of Economic Perspectives*, vol. 18, no. 3, pp. 3–24

Petersen, M.A., & Thiagarajan, S.R. (2000). Risk Measurement and Hedging: With and Without Derivatives, *Financial Management*, vol. 29, no. 4, pp. 5-29

Rajan, R.G., Servaes, H., & Zingales, L. (2000). The cost of diversity: The diversification discount and inefficient investment, *Journal of Finance,* vol. 55, no. 1, pp. 35-80

Reeb, D.M., Kwok, C.C.Y., & Baek, H.Y. (1998). Systematic Risk of the Multinational Corporation, *Journal of International Business Studies,* vol. 29, no. 2, pp. 263-279

Roth, K., & O'Donnell, S. (1996). Foreign Subsidiary Compensation Strategy: an Agency Theory Perspective, *Academy of Management Journal*, vol. 39, no. 3, pp. 678-703

Rugman, A.M., & Verbeke, A. (1992). A Note on the Transnational Solution and the Transaction Cost Theory of Multinational Strategic Management, *Journal of International Business Studies*, vol. 23, no. 4, pp. 761-771

Schmalensee, R. (1985). Do Markets Differ Much?, *The American Economic Review*, vol. 75, no. 3, pp. 341-351

Scholes, M. (1972). The marker for securities: Substitution versus price and the effects of information of share prices, *Journal of Business*, vol. 45, no. 2, pp. 179-211

Setiyono, W., Pramudita, N.A., & Prapanca, D. (2021). Do the Firm Size, Debt Level, and Liquidity Impact the Hedging Decisions, *Advances in Economics*, *Business and Management Research*, vol. 175, pp. 233-241

Shapiro, A.C. (1975). Evaluating Financing Costs for Multinational Subsidiaries, *Journal of International Business Studies*, vol. 6, no. 2, pp. 25-32

Shapiro, A.C., & Rutenberg, D.P. (1976). Managing Exchange Risks in a Floating World, *Financial Management*, vol. 5, no. 2, pp. 48-58

Sharpe, W.F. (1964). Capital Asset Prices: a Theory of Market Equilibrium Under Conditions of Risk, *Journal of Finance*, vol. 19, no. 3, pp. 425-442

Smith, C.W. and Stulz, R.M. (1985). The Determinants of Firms' Hedging Policies, *The Journal of Financial and Quantitative Analysi*s, vol. 20, no. 4, pp. 391-405

Soenen, L. A. (1979). Foreign Exchange Exposure Management, *Management International Review*, vol. 19, no. 2, pp. 31–38

Sternitzke, D.L (1979). The Great American Competitive Disadvantage: Fact or Fiction?, *Journal of International Business Studies*, vol. 10, no. 2, pp. 25-36

Stulz, R.M. (1984). Optimal Hedging Policies, *The Journal of Financial and Quantitative Analysis*, vol. 19, no. 2, pp. 127-140

Stulz, R.M. (1990). Managerial Discretion and Optimal Financing Policies, *Journal of Financial Economics,* vol. 20, no. 1, pp. 3-27

Stulz, R.M. (1996). Rethinking Risk Management, *Journal of Applied Corporate Finance,* vol. 9, no. 3, pp. 8-25

Teece, D.J. (2014). A Dynamic Capabilities-Based Entrepreneurial Theory of the Multinational Enterprise, *Journal of International Business Studies,* vol. 45, no. 1, pp. 8-37

Thomas, L.R. (1988). Currency Risks in International Equity Portfolios, *Financial Analysts Journal*, vol. 44, no. 2, pp. 68–71

Timan, S. (2002). The Modigliani and Miller Theorem and the Integration of Financial Markets, *Financial Management*, vol. 31, no. 1, pp. 101-115

Tufano, P. (1996). Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry, *Journal of Finance*, vol. 51, no. 4, pp. 1097-1137

Villalonga, B. (2004). Diversification Discount or Premium? New Evidence from the Business Information Tracking Series, *The Journal of Finance*, vol. 59, no. 2, pp. 479-506

Walker, G., & Weber, D. (1984). A Transaction Cost Approach to Make-or-Buy Decisions, *Administrative Science Quarterly*, vol. 29, no. 3, pp. 373-391

Wei, D.K., & Starks, L.T. (2013). Foreign Exchange Exposure Elasticity and Financial Distress, *Financial Management*, vol. 42, no. 4, pp. 709-735

Wernerfelt, B., & Montgomery, C.A. (1988). Tobin's Q and the Importance of Focus in Firm Performance, *The American Economic Review*, vol. 78, no. 1, pp. 246-250

Williamson, R. (2001). Exchange Rate Exposure and Competition: Evidence from the World Automotive Industry, *Journal of Financial Economics*, vol. 59, no. 3, pp. 441-475

Wrightsman, D. (1978). Tax Shield Valuation and the Capital Structure Decision, *The Journal of Finance*, vol. 33, no. 2, pp. 650-656

www.ifrs.org. (2016). IFRS Jurisdiction - Sweden, Available Online: https://www.ifrs.org/use-around-the-world/use-of-ifrs-standards-by-jurisdiction/view-jurisdiction/sweden/ [Accessed May 11 2023]

Yahoo Finance. (2023). USD/SEK, Available online: https://finance.yahoo.com/chart/USDSEK [Accessed May 15 2023]

Zhang, L. (2005). The Value Premium, *The Journal of Finance*, vol. 60, no. 1, pp. 67-103

Appendix A

This section of the Appendix presents the tests of the necessary assumptions to fulfil when using an ordinary least squares regression model. It presents charts and tables created in SPSS to assess linearity, normality, equal variances (homoscedasticity) and collinearity.

Linearity

By application of IBM SPSS we test for the linearity assumption between the dependent variable Tobin's Q and each of our independent scale variables; Firm size, Firm profitability and Firm leverage. The following three figures indicate that there is no apparent pattern between the variables, and thus suggests that a linear regression model is appropriate.

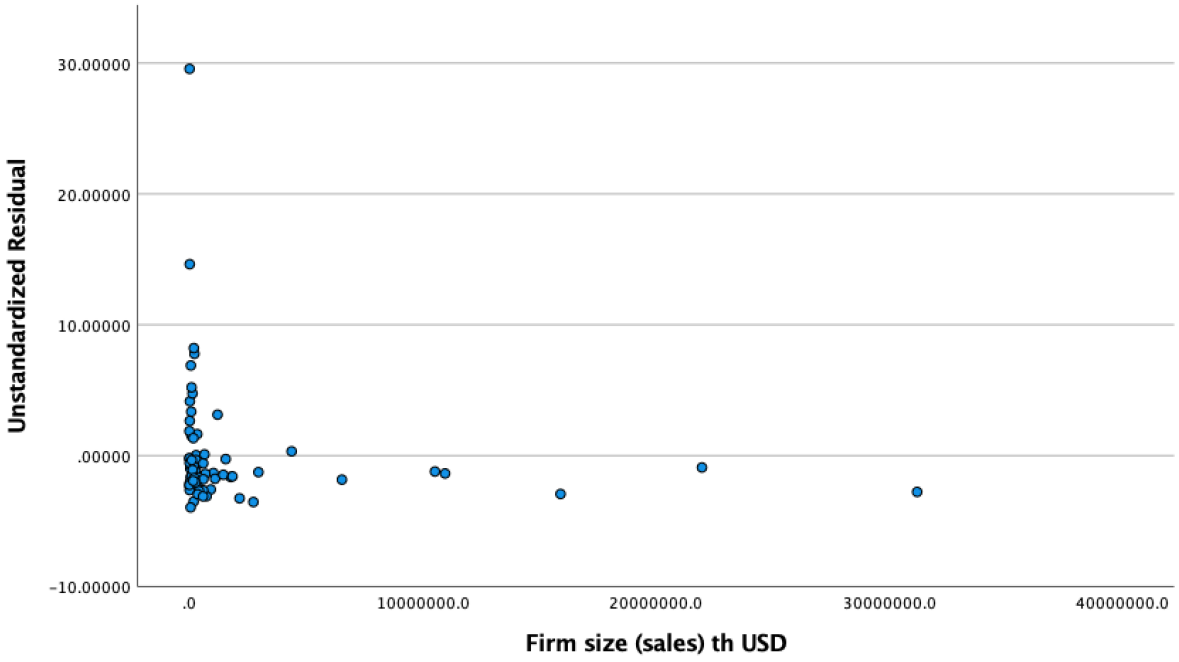

Figure A1: Scatter plot of unstandardized residuals of *Tobin's Q* against *Firm Size* defined as sales in USD thousand

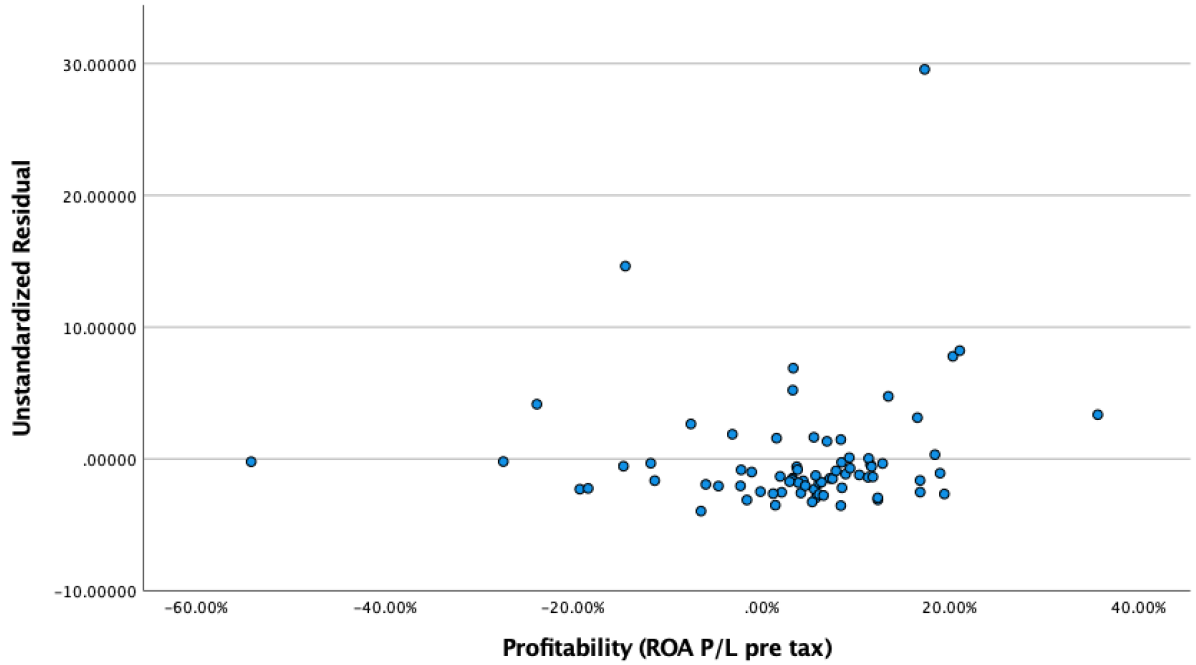

Figure A2: Scatter plot of unstandardized residuals of *Tobin's Q* against *Profitability*, defined as return on assets prior to taxation

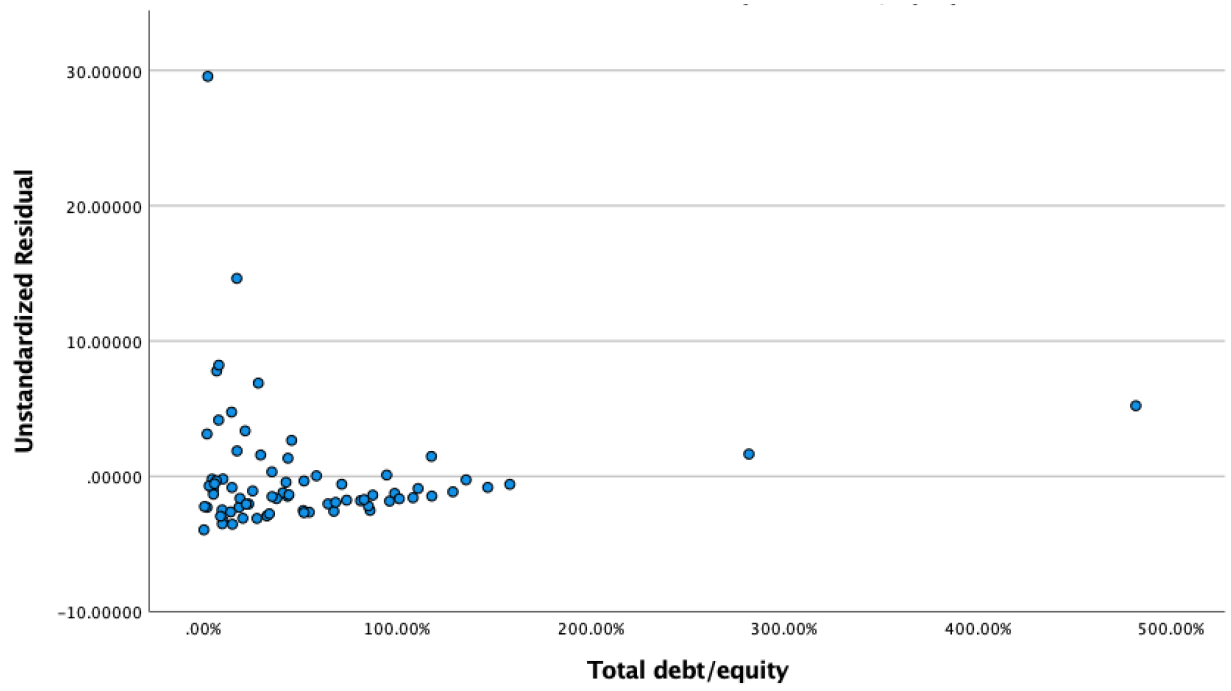

Figure A3: Scatter plot of unstandardized residuals of *Tobin's Q* against *Leverage*, defined as total debt divided by total equity

Normal distribution of residuals

The following graphs were created with the use of IBM SPSS. Figure A4 indicates that the distribution of the error terms is not normally distributed. Therefore, we conduct a natural logarithmic transformation of the dependent variable and arrive at an approximately normal distribution of the error terms as displayed in Figure A5. The logarithmic transformed Tobin's Q was utilised in the regression analysis.

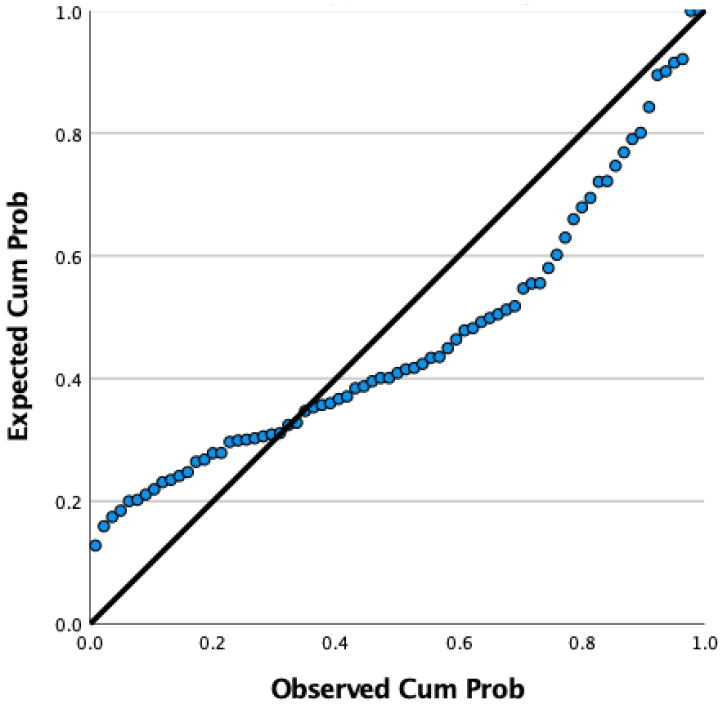

Figure A4: Normal P-P plot of regression standardised residuals, dependent variable *Tobin's Q*

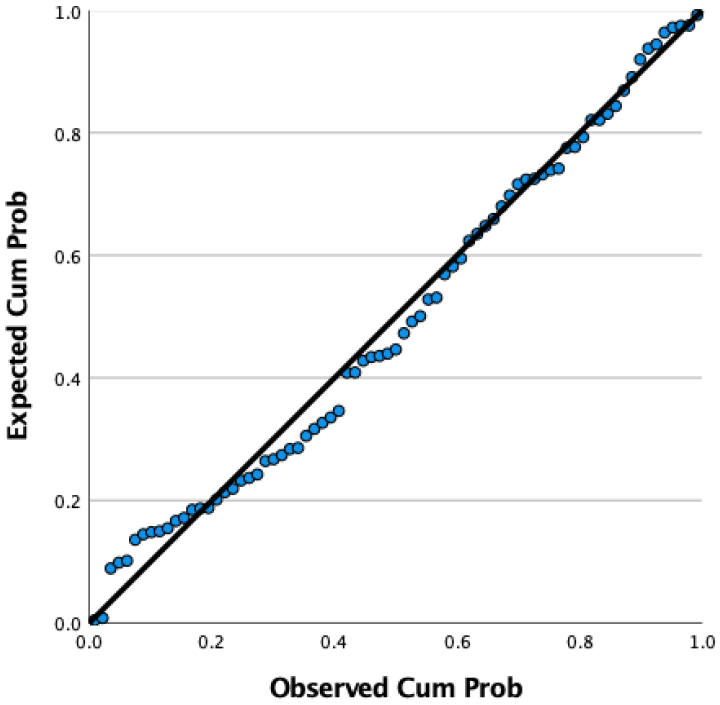

Figure A5: Normal P-P plot of regression standardised residuals using a natural logarithmic transformation of the dependent variable *Tobin's Q*

Homoscedasticity

The figures presented below illustrate the residual plots used for evaluating the assumption of homoscedasticity. The figures were created in SPSS, where we plotted the standardised residuals against the dependent variable (Tobin's Q). The results in figures A6 - A8 do not suggest any violation of the homoscedasticity assumption.

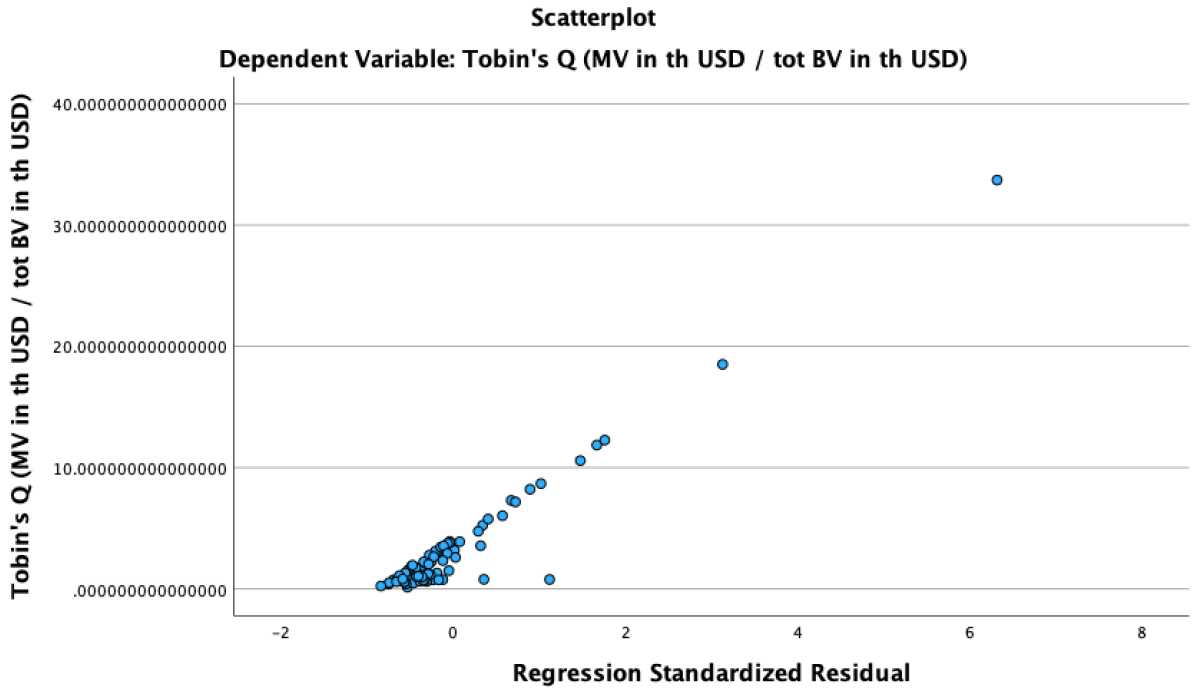

Figure A6. Residual plot for variable *Leverage*

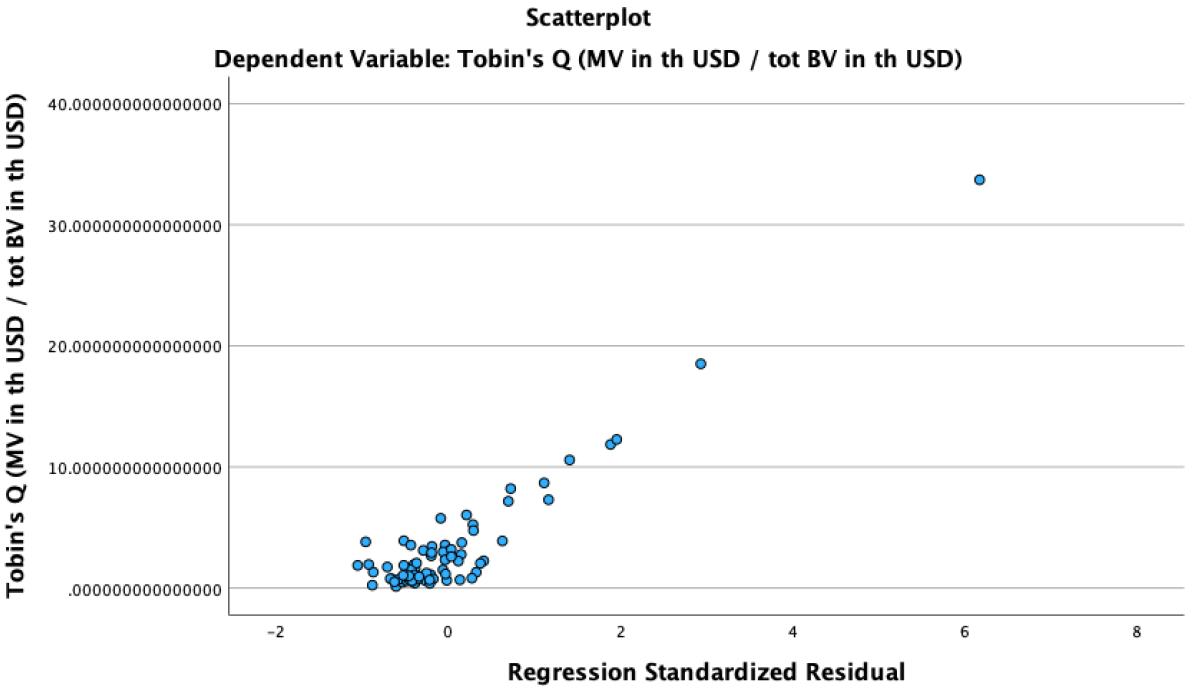

Figure A7. Residual plot for variable *Firm Size*

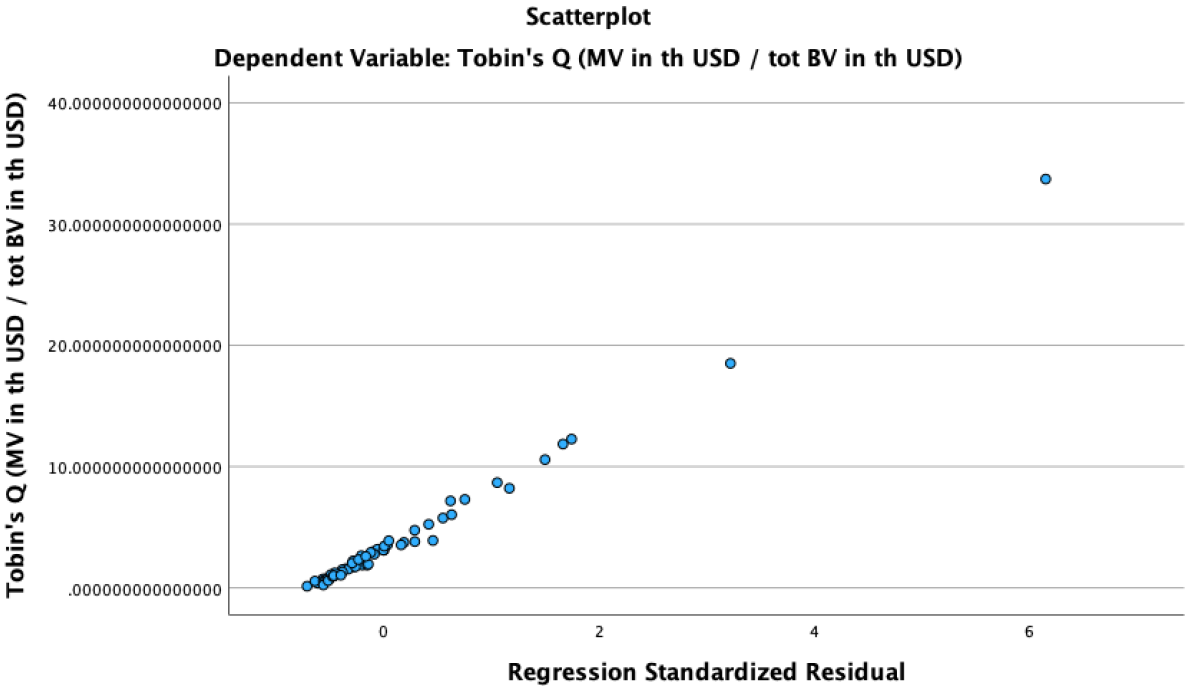

Figure A8. Residual plot for variable *Profitability*

Collinearity

The following table presents the variance inflationary factors of the independent variables. The VIF values were generated through a regression analysis in IBM SPSS. A value of 1 indicates no significant correlation between the independent variables. A value of between 1 and 5 indicates a moderate correlation. As the VIF values are close to 1, we can assume that collinearity will not be an issue in the regression model.

Variable	**Collinearity Tolerance**	**VIF**
FX Hedging	0.824	1.214
Firm Size	0.725	1.379
Profitability	0.739	1.353
Dividends	0.656	1.524
Diversification	0.819	1.221
Leverage	0.876	1.141

Table A9. VIF values for the independent variables *FX Hedging, Firm Size, Profitability, Dividends, Diversification* and *Leverage*

Appendix B

This part of the appendix presents the model statistics of drawing a linear regression with industry adjusted Tobin's Q as the dependent variable

VARIABLE	EXPECTED SIGN	COEFFICIENT	ST. ERROR	T-STAT	PROBABILITY
Constant		16.575	3.728	4.446	< 0.001*
FX Hedging	Positive	-0.267	1.094	-0.244	0.808
Firm size	Positive / Negative	-1.267	0.341	-3.718	< 0.001*
Profitability	Positive	0.131	0.05	2.621	0.011*
Dividends	Negative	1.054	1.272	0.828	0.410
Diversification	Positive / Negative	0.961	1.318	0.73	0.468
Leverage	Negative	-0.16	0.07	-2.156	0.035*

Table B1. Results from OLS regression (industry adjusted Tobin's Q) where * denotes significance at a 95% level of confidence.

Appendix C

This section of the appendix gives an overview of the stock market performance in the year 2021, which is the year from which financial information has been gathered.

Chart C1. OMX Stockholm All-Share Index, January 1st 2021 to December 31st 2021. Total yearly index increase: 34.98%.

Source: S&P Global Market Intelligence Capital IQ