From Fair Value to Market Value: The Role of Financial Derivatives in Non-Financial European Firms
Tomás Matos
UMinho | 2026

University of Minho
School of Economics, Management and Political Science

Tomás Matos

From Fair Value to Market Value: The Role of Financial Derivatives in Non-Financial European Firms

April, 2026

University of Minho
School of Economics, Management and
Political Science

Tomás Matos

From Fair Value to Market Value: The Role of Financial Derivatives in European Non-Financial Firms

Master's Dissertation
Master In Management – General Management

Work conducted under the supervision of:
Professor António Cunha
Professor Sónia Silva

April 2026

DIREITOS DE AUTOR E CONDIÇÕES DE UTILIZAÇÃO DO TRABALHO POR TERCEIROS

Este é um trabalho académico que pode ser utilizado por terceiros desde que respeitadas as regras e boas práticas internacionalmente aceites, no que concerne aos direitos de autor e direitos conexos.

Assim, o presente trabalho pode ser utilizado nos termos previstos na licença abaixo indicada.

Caso necessite de permissão para poder fazer um uso do trabalho em condições não previstas no licenciamento indicado, deverá contactar o autor, através do RepositóriUM da Universidade do Minho.



Atribuição-NãoComercial-SemDerivações
CC BY-NC-ND

https://creativecommons.org/licences/by-nc-nd/4.0/

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

DECLARATION ON THE USE OF ARTIFICIAL INTELLIGENCE (AI) TOOLS

I hereby declare having acted this academic work with integrity and confirm that I have not resorted to any form of undue use of AI tools, nor to the falsification or omission of information, sources, data, results or processes in any of the stages leading to its elaboration.

I further declare that any use of AI tools was done in a transparent and responsible manner, being duly noted in the work, and that I critically verified the accuracy of the content produced with support, assuming full responsibility for what I submit.

I further declare that I have full acknowledged the Code of Ethical Conduct of the University of Minho, as well as the applicable standards of academic integrity and data protection.

RESUMO

Esta dissertação investiga a associação da utilização de derivados financeiros no valor de mercado das empresas, medido através do Tobin's Q, focando-se no mercado acionista europeu de elite através dos constituintes do índice EURO STOXX 50. Historicamente, a literatura financeira tem-se dividido entre a teoria da irrelevância de Modigliani e Miller e as teorias de imperfeição de mercado, como a hipótese dos custos de falência de Smith e Stulz. Adicionalmente, grande parte da evidência empírica prévia sofre de severos vieses de seleção e endogeneidade.

Para colmatar estas falhas estruturais, este estudo aplica um algoritmo de Propensity Score Matching para mitigar o viés de seleção e criar um painel pseudo-aleatório comparável. De seguida, com o objetivo de isolar o efeito da transição para a adoção de uma política de hedging, implementou-se o estimador Difference-in-Differences de Callaway e Sant'Anna. Por fim, o impacto contínuo da intensidade do hedging foi analisado com recurso a um modelo de regressão de painel de Efeitos Fixos.

Os resultados empíricos não revelam evidência estatística significativa da existência de um prémio de valorização estático, bem como a ocorrência de uma recalibração dinâmica de valor aquando da adoção do programa de hedging. Estas conclusões reafirmam a teoria de Modigliani e Miller e conclui que para as grandes europeias caracterizadas por elevada liquidez e risco de falência praticamente nulo, a gestão sintética de risco corporativo é percecionada pelos investidores como uma operação redundante e neutra em termos de valor. Além disso, a análise da exposição bruta sugere uma relação marginalmente negativa entre o volume total de derivados e o valor da empresa. Isto sugere que portefólios de derivados podem ativar custos de agência e assimetria de informação, levando os investidores a penalizar a complexidade financeira. Conclui-se que nas empresas europeias de topo os derivados podem ser vistos como ferramentas operacionais de tesouraria e não catalisadores estratégicos de criação de riqueza acionista.

Palavras-Chave: Derivados Financeiros, Risco Financeiro, Valor da empresa, Tobin's Q, Empresa não financeira

ABSTRACT

This dissertation investigates the association of financial derivative utilization on firm market value, measured by Tobin's Q, focusing on the European elite equity market through the constituents of the EURO STOXX 50 index. Historically, corporate finance literature has been fragmented between the Modigliani and Miller irrelevance theorem and market imperfection theories, such as the bankruptcy cost hypothesis proposed by Smith and Stulz. Furthermore, much of the prior empirical evidence suffers from selection bias and endogeneity.

To address these structural flaws, this study deploys a three-stage econometric design. First, a Propensity Score Matching protocol was utilized to mitigate selection bias and construct a pseudo-randomized, comparable panel. Subsequently, with the goal to isolate the true causal and dynamic effect of transitioning into a hedging regime, the Callaway and Sant'Anna Difference-in-Differences estimator was implemented. Finally, the continuous impact of hedging intensity was evaluated using a Two-Way Fixed Effects panel regression.

The empirical findings do not provide evidence of the existence of a static cross-sectional valuation premium, as well as any dynamic, value-accretive recalibration upon the initiation of a hedging program. These results reaffirm the Modigliani-Miller paradigm and suggest that for European large companies characterized by high liquidity and near-zero bankruptcy risk, corporate synthetic risk management is perceived by investors as a redundant, value-neutral operational procedure. Furthermore, the analysis of gross exposure indicates a marginally significant negative relationship between massive total derivative volumes and firm value. This finding suggests that excessively large and opaque derivative portfolios trigger agency costs and information asymmetry, leading investors to penalize financial complexity. The study concludes that, within top-tier European firms, derivatives can be viewed as operational treasury tools rather than strategic catalysts for shareholder wealth creation.

Keywords: Financial Derivatives, Financial Risk, Firm Value, Tobin's Q, Non-Financial Firm

INDEX

1. Introduction 1

2. Literature Review 4

2.1 Corporate Risk Management 4

2.2 Financial Derivatives 6

2.3 Relation between derivatives and risk management 7

2.4 Country context and agency costs 9

2.5 Hedging impact theories 12

2.6 Firm size and access to capital markets 13

2.7 European Context 14

2.8 Empirical Methods 15

3. Empirical Methodology 18

3.1 Hypotheses 18

3.2 Data and Sample Selection 19

3.3 Variables Description 22

3.3.1 Control Variables 22

3.4 Methodology 23

3.5 Descriptive Statistics 28

4. Results 33

4.1 Hypothesis 1 33

4.2 Hypothesis 2 34

4.3 Hypothesis 3 36

5. Conclusions 39

Appendix 46

LIST OF ACRONYMS

OTC – Over the Counter

MNC – Multinational Corporation

FX – Foreign Exchange

US – United States

EU – European Union

EMIR – European Market Infrastructure Regulation

ISDA – International Swaps and Derivatives Association

PSM – Propensity Score Matching

DiD – Difference-in-Differences

IFRS – International Financial Reporting Standards

SIC – Standard Industrial Classification

OLS – Ordinary Least Squares

ATT – Average Treatment Effects on the Treated

FIGURE INDEX

Figure 1 - OTC derivatives notional amounts (trillions of dollars). Source: BIS OTC derivatives statistics 2

Figure 2 - Covariate balance plot for the absolute standardized mean difference 26

Figure 3 - Tobin's Q value depending on the Hedge Intensity for studied companies (measured in thousand €) 31

Figure 4 - Event time study output 35

TABLE INDEX

Table 1 - Main Variables Statistics After Winsordization 22

Table 2 - Chow Test and Hausman Test Output 24

Table 3 - Firm main characteristics by treated and non-treated groups 25

Table 4 - PSM Algorithm output per treated and non-treated groups 26

Table 5 – Average Tobin's Q per sample country, by treated and non-treated groups 29

Table 6 – Average Tobin's Q per sample Industry, by treated and non-treated groups 29

Table 7 – Average Tobin's Q per sample year, by treated and non-treated groups 30

Table 8 - Average Total Assets (measure by thousand €) per studied Industry by treated and non-treated groups 31

Table 9 - Average Total yearly Revenue (measured in thousand €) per studied industry by treated and non-treated groups 31

Table 10 - Hypotheses 1 output 33

Table 11 - Hypotheses 2 output 34

Table 12 - Hypotheses 3 output 37

1. Introduction

After decades of research in corporate finance, the risk management paradox remains a central topic, since managers face persistent incentives to mitigate the volatility of cash flows and reported earnings by using complex financial instruments in a global economic environment characterized by uncertainty in exchange rates, interest rates and commodity prices. Nevertheless, classical financial theory suggests that under perfect market conditions such activities should not add value to the firm. Building on these theories, this dissertation investigates whether non-financial firms included in the EURO STOXX 50 index increase their market value using financial derivatives, disentangling whether the market rewards risk protection, penalizes, or is indifferent to the potential speculation or opacity associated with these instruments.

Under classical line of reasoning, the primary objective of a firm is the maximization of shareholder value. If capital markets operated under the assumptions of perfection described by Modigliani and Miller (1958), corporate risk management policy would be irrelevant, because investors could rather costlessly diversify idiosyncratic risks on their own, rendering managerial intervention redundant. However, the presence of real-word market frictions, such as financial distress costs, progressive taxation, and information asymmetries creates a theoretical rationale for corporate risk management. The pressure to stabilize operating cash flows and secure internal financing capacity provides managers with a rational incentive to employ derivatives.

Financial derivatives are contracts whose value derives from the performance of and underlying asset, reference rate or index. According to financial taxonomy, these instruments include forwards, futures, options and swaps. While forwards, futures and swaps allow firms to lock in future prices or rates and thereby eliminating linear uncertainty, options provide protection by granting the right, but not the obligation, to transact the underlying asset. The use of these instruments has grown exponentially over recent decades, evolving from a treasury function into a strategic tool of corporate governance.

Contemporary financial landscape is characterized by derivatives market whose scale significantly dwarfs the underlying real economy. According to data from the Bank of International Settlements (2023), notional amounts outstanding in the Over the Counter (OTC) market have reached levels

exceeding hundreds of trillions of dollars, primarily dominated by interest rate contracts, with foreign exchange contracts representing the second-largest category.

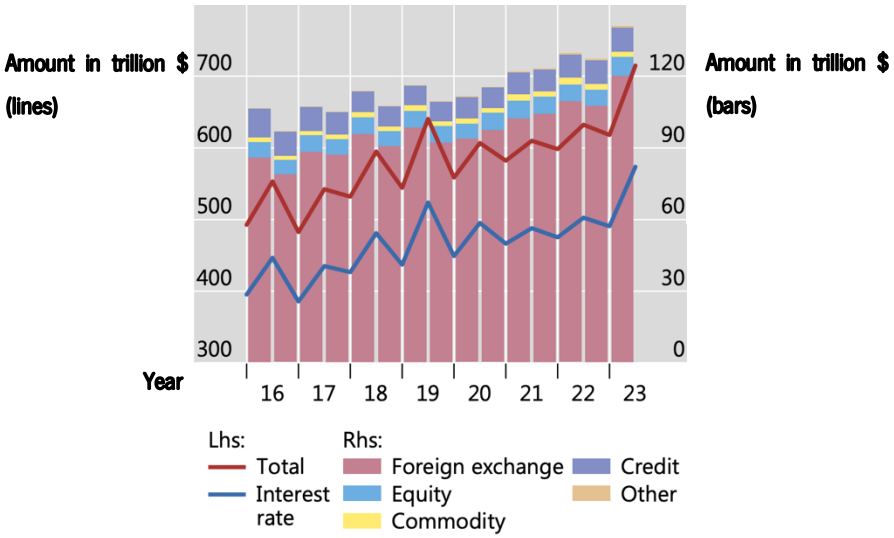


Figure 1 - OTC derivatives notional amounts (trillions of dollars). Source: BIS OTC derivatives statistics

The Bank of International Settlements indicates, despite fluctuations in gross market values and credit exposures, that the total notional amount of these instruments rose to nearly $700 trillion by 2023 (Figure 1). This persistent growth reinforces the need for further investigation into how derivative usage influences firm transparency and market valuation.

This phenomenon underscores the financialization of the economy, a process where non-financial corporations find their input and output prices increasingly dictated by highly liquid, global derivatives markets rather than traditional supply-demand dynamics (Krippner, 2005).

While organized exchange markets provide high levels of transparency and centralized credit risk mitigation, the OTC market is characterized by significant opacity (Bank for International Settlements, 2023). For major firms, such as those listed in the EURO STOXX 50, the OTC market offers the necessary flexibility to tailor hedging instruments to specific risks. However, this lack of transparency fosters information asymmetry between corporate managers and external investors.

The academic debate remains divided whether the market can accurately value the use of these complex financial instruments and research suggests that the opacity inherent in OTC transactions may hinder the investor's ability to assess the effectiveness of a firm's risk management strategy (Bartram et al.,2009). The European context, and specifically firms within the EURO STOXX 50, offers a unique laboratory for this analysis, due to, unlike studies focused on Anglo-Saxon markets,

European firms operating in an environment characterized by regulatory pressure and significant foreign exposure due to the export-oriented nature of the Eurozone economy. Moreover, the mandatory implementation of IFRS 9 in 2018 introduced a new analytical dimension by requiring the derivatives to be recognized at their Fair Value on the balance sheet. This raises a critical question within the market, distinguishing between derivatives recorded as assets and those recorded as liabilities and how does this distinction can affect the firm.

Overall, the mixed results in literature, to be further detailed, often refer to the use of this instruments as the "Hedging Speculation Valuation Puzzle". While some studies, such as Allayannis and Weston (2001), will document a value premium associated with the usage of this instruments, other, such as Guay and Kothari (2003), suggest neutral or even value-destroying effects. The mixed results can be associated with different methodologies and different data, indicating that some factors like the country or industry can have a big role in this study.

This dissertation's rationale is based on the premise that if the hedging creates value, such value should be reflected and observed through a premium in the Tobin's Q of firms that consistently employ the instruments. In order to provide evidence, a sample of non-financial EURO STOXX 50 will be used containing data over a period of encompassing multiple economic cycles, from 2005 to 2024. This is an important topic in corporate finance, given the trillions of euros in notional derivatives outstanding and their systematic implications. The remainder of this dissertation is organized into four main sections. A literature review will follow this introduction to further in the foundational studies on derivatives, the theoretical explanations for corporate hedging and the empirical evidence on value creation. After the review is analyzed, the focus will rely on the EURO STOXX 50 sample, including the variable construction and the econometric methodology employed. Section four will present the empirical analysis and discusses the findings in light of the stated hypotheses. The final conclusions will summarize the key results, managerial and investor implication, and the limitations of the dissertation.

2. Literature Review

In recent decades, financial risk management has transcended the traditional function of operational treasury to situate itself at the epicenter of corporate strategy and corporate governance. In a global economic environment characterized by the volatility of interest rates, exchange rates, and commodity prices, a firm's ability to manage uncertainty has become a critical determinant of its prosperity and, crucially, of its valuation by the capital markets. At the core of risk management lies the use of financial derivative. This literature review aims to dissect the complex and often ambiguous relationship between the use of these instruments and firm value, with a particular focus on the reality of European large caps represented in the EURO STOXX 50 index.

2.1 Corporate Risk Management

In the landscape of international finance, the management of financial risks is a central determinant of a Multinational Corporation's (MNC) stability and value. Among these risks, foreign exchange (FX) exposure remains paramount, though it is frequently accompanied by interest rate and commodity price volatilities that necessitate the use of financial derivatives. The literature traditionally categorizes FX risks into three distinct types, being these transaction, translation, and economic exposure (Madura, 2020).

Transaction exposure is considered the most visible form of currency risk, referring to the potential change in the value of outstanding financial obligations entered prior to a change in exchange rates but not yet settled. Shapiro (1975) early identified this as a primary concern for MNCs, as it directly impacts short-term cash flows. An early study by Allayannis and Ofek (2001) found evidence that firms who use currency derivatives for hedging significantly reduced the exchange-rate exposure. It was also found that while the decision to use of the derivatives depended on factors like foreign trades, size or R&D expenditures, the level of derivatives used depended only on a firm's exposure through foreign sales and trade.

Translation exposure, or accounting exposure, arises from the need to convert the financial statements of foreign subsidiaries into the parent company's reporting currency. The academic view exposure is mixed. Bartram (2007) notes that because translation adjustments are often non-

cash paper gains or losses they should be ignored. However, behavioral finance and agency theory offers a counterpoint. Hagelin and Pramborg (2004) found that managers often hedge translation exposure to smooth reported earnings and protect debt covenants, implying that accounting figures, even if non-cash, have consequences for managerial compensation and credit ratings. Consequently, it was argued that the translation exposure hedge also reduces overall firm exposure, since the translation exposure approximates the exposed value of future cash flows from operations in foreign subsidiaries.

The third and arguably the most complex category is economic, or operating, exposure, which was defined as the sensitivity of the firm's value to random variations in exchange rates by Adler and Dumas (1983). Unlike transaction risk, which deals with specific contracts, the economic exposure affects the firm's long-term competitive position and present value of future cash flows. Bodnar, Marston and Hayt (1998) highlight a paradox in risk management, arguing that while economic exposure poses the greatest threat to long-term sustainability, it is the most difficult to hedge using standard financial derivatives due to uncertainty regarding the volume and timing of future sales. Consequently, firms often resort to operational hedging, such as diversifying production facilities, rather than relying solely on financial instruments.

While the FX risk is important, the literature indicates that the decision to use derivatives is often driven by a broader spectrum of financial exposures, primarily interest rate risk and commodity price risk. The interest risk is frequently the largest source of volatility for non-financial firms with significant leverage. Faulkender (2005) argues that the use of interest rate swaps is not merely about speculation but about altering firm's debt profile to match the interest rate sensitivity of the firm's assets. This ensures that interest expenses do not spike during periods when the firm's cash flows might be constrained, thereby avoiding liquidity crisis. Similarly, commodity price risk drives derivative usage in specific sectors like manufacturing, agriculture or mining. Tufano (1996) found that risk management practices were significantly influenced by managerial risk aversion and the firm's ownership structure. Using futures and options to lock in output prices or input costs, firms can stabilize their margins, ensuring that operations remain profitable regardless of exogenous supply shocks in the commodities market.

While some literature, such as Guay and Kothari (2003), assumes that risk management decisions are driven by the objective of maximizing shareholder value through the reduction of financial distress costs, other highlights the critical role of managerial pshycology and discretion. The

decision to hedge is rarely a purely mechanical application of mathematical models, but rather influenced by risk preferences, market views and psychological biases of corporate decision-makers. A central concept in this domain is the theory of selective hedging. Stulz (1996) posits that managers frequently adjust their hedge ratios based on their subjective views of the future market movements. When managers engage in selective hedging without superior information, they are effectively using shareholder capital to bet on market directions, a function that the investor could perform themselves. When investor detect that a firm's risk profile is being driven by the manager's speculative views rather than operational necessities the perceived risk of the firm increases.

2.2 Financial Derivatives

A financial derivative is defined as a bilateral contract whose value is contingent upon, or derives from, the price evolution of an underlying variable (Hull, 2018). This underlying variable may encompass a physical asset such as oil, a financial asset, like a stock or bond or a benchmark rate like Euribor or a market index. Unlike traditional productive assets, these instruments don't possess intrinsic value in the conventional sense, rather their value resides in their capacity to transfer risk among economic agents, thereby enabling the separation of risk exposure from the physical ownership of the underlying asset (Smith & Stulz, 1985). Derivatives can be taxonomically classified into four fundamental categories (forwards, futures, options and swaps), each bearing distinct implication for risk management and the firm's capital structure.

The forward contracts represent the most basic commitment to buy or sell an asset at a future date for a price agreed upon preset time. As non-standardized contracts traded in OTC markets, they allow for a high degree of customization to the firm's specific exposure needs but introduces counterparty risk (Duffie & Huang, 1996). These contracts are particularly used to manage foreign exchange exposure and MNC use them to reduce uncertainty surrounding future cash flows (Madura, 2020).

Future contracts are functionally like forwards, being distinguished by their standardization and trading on organized exchanges. These contracts, because they are traded in open market are more accessible to smaller companies that can't afford tailored made forwards with commercial banks (Madura, 2020).

Options contracts are instruments that introduce non-linearity into the risk profile by conferring the right, but not the obligation, to transact the underlying asset. This way, options function as a financial insurance. The buyer pays a premium to eliminate downside risk while retaining upside potential (Madura, 2020). Currency options allow firms to hedge against adverse exchange rate movements while still benefiting from favorable movements.

Swap deals constitute agreements to exchange future cash flow based on a pre-defined formula. Interest rate swaps, exchanging fixed for floating rates, and currency swaps are the dominant instruments in long-term corporate debt management, allowing firms to synthetically alter the nature of their liabilities without renegotiating the underlying debt with creditors. The nature of this contracts enables firms to exchange cash flows in a way that better matches their exposure to interest rate or currency risk (Madura, 2020).

2.3 Relation between derivatives and risk management

The central question posed by financial theory resides in why a firm should expend resources to manage risks that its shareholders could, theoretically, manage themselves. To answer this, it's necessary to revisit the fundamental theorems of corporate finance and their real-world application.

The theoretical starting point is the irrelevance theorem of Modigliani and Miller (1958). In a perfect capital market, characterized by absence of taxes, transaction costs, bankruptcy costs and information asymmetries, risk management policy is irrelevant to firm value. The underlying logic is that of home-made hedging, implying that shareholders, through portfolio diversification, can eliminate unsystematic risk at virtually no cost. Thus, if a firm uses resources to hedge risks that shareholders can diversify anyway, it's not creating value. Conversely, if hedging involves costs, it rather destroys value. Under this prism, the volatility of the firm's cash flows affects neither its cost of capital nor its Net Present Value, provided that investment decisions remain unchanged. However, the practical realities of financial markets deviate substantially from this idealized model. The reality is that firms face significant imperfections and it's precisely within these imperfections that the potential for hedging creating value emerges. Corporate risk management theory, led by Smith and Stulz (1985) and Froot, Scharfstein, and Stein (1993) is grounded in the relaxation of Modigliani-Miller's assumption. It argues that in the presence of market friction, risk management can increase the firm value by influencing expected future cash flows or the cost of capital.

According to Stulz (1985) it enables firms to exploit their comparative advantages, secure financing at lower costs and to pursue growth opportunities that would otherwise be inaccessible under high volatility environments. This rethinking underscored that risk management is not exclusively defensive and it can be offensive in nature, supporting competitive positioning and corporate strategy. This body of theory established a critical foundation that while hedging may be irrelevant in a world of perfect markets, in reality, it may play a pivotal role in enabling firms to navigate the complexities of financial frictions, ultimately supporting long-term value creation. The three main identified frictions in the literature are taxes, financial distress costs and agency costs. Smith and Stulz (1985) demonstrated that if a firm's tax function is convex, being that if the tax rate increases with taxable income, earnings volatility raises the expected tax liability and by reducing earning volatility through derivatives, the firm can reduce the present value of tax payments. This argument is particularly relevant in jurisdictions with progressive tax rates or limitations on tax loss carry-forwards (Graham & Smith, 1999). Cash flow volatility increases the probability of the firm incurring financial distress. This distress entails direct costs, legal and administrative costs of bankruptcy or restructuring and, more significantly, indirect costs. Indirect costs include the loss of confidence from customers and suppliers, talent drain and the inability to operate efficiently (Altman, 1984). For highly leveraged firms, hedging enhances their debt capacity by reducing the probability of bankruptcy, being able to support higher levels of debt and thereby benefit from the interest tax shield which increases firm value according to the trade-off theory of capital structure. Leland (1998) formalized this argument by showing that hedging allows a more aggressive capital structure without increasing default risk. Froot, Scharfstein and Stein (1993) established a link between risk management and the investment policy, arguing that due to capital market imperfections, such as information asymmetry, external financing is more costly than internal financing. If internal cash flows are volatile and uncorrelated with investment opportunities, the firm may face a liquidity shortage precisely when positive Net Present Value projects arise. In such situations, the firm may be forced to forego these projects resulting in underinvestment, or resort to costly external financing, destroying value for current shareholders. Hedging aligns the availability of internal funds with capital needs, ensuring the firm has the financial capacity to execute growth strategy regardless of market fluctuations.

2.4 Country context and agency costs

Empirical investigations into the link between hedging and firm value began to proliferate in the late 1990s and early 2000s. A relevant contribution in this field is Allayannis and Weston (2001), who examined a sample of United States (US) firms and reported that the use of foreign currency derivatives was associated with statistically significant premium in Tobin's Q, suggesting that hedging practices could indeed enhance the firm valuation. Using a large sample of non-financial US firms, they found out that firms employing foreign currency derivatives exhibited, on average, 4,87% higher Tobin's Q than firms that did not hedge. This positive relationship persisted even after controlling for firm size, growth opportunities and industry effects. The study suggested that hedging may mitigate financial distress costs, reduce underinvestment problems and allow firms to exploit tax convexity, ultimately increasing value. The strong influence of this finding established a foundation for subsequent empirical inquiries and set a methodological standard for value-based studies on hedging.

Nevertheless, subsequent studies painted a more nuanced and at times contradictory picture. For instance, Jin and Jorion (2006) investigated the oil and gas industry in the US, where exposure to commodity price risk is relatively transparent and derivative usage can be directly linked to underlying exposures and found no robust evidence that hedging activities improved firm value. Contrary to Allaynnis and Weston (2001), they found no significant relationship between hedging and firm value. The authors attributed this result to potential measurement errors in Tobin's Q, sample selection bias and possibility that hedging benefits may be offset by managerial inefficiencies or speculative behaviors. Their finding underscored that the value relevance of hedging may depend heavily on industry characteristics and the transparency of the firm's risk exposures.

While early studies on corporate hedging and firm value were largely US centric, subsequent research increasingly recognized that the effectiveness and valuation of hedging practices are deeply embedded in the institutional and regulatory environment of each country. The global expansion of derivative markets, coupled with improved firm-level data availability enabled cross-country analysis that revealed considerable heterogeneity in both the prevalence of hedging and its value implications. Bartram, Brown, and Conrad (2011), in an expansive cross-country analysis, concluded that while the use of derivatives effectively reduced firm's exposure to various risks, its

link to firm value was inconsistent across contexts. The study broadened the analysis to a global context, examining a sample of more than 6000 non-financial firms from 47 different countries. Nevertheless, firms in countries with strong investor protection and developed financial markets tended to capture more pronounced value benefits from derivative usage. This highlighted the role of institutional quality and governance as mediating factors in the hedging value nexus. The authors also cautioned that the heterogeneity in derivative reporting standards and disclosure quality across jurisdictions could partly explain the mixed results in cross-country studies. These conflicting outcomes stimulated an ongoing debate in the literature regarding If hedging is always value-enhancing, or if its benefits are conditional upon firm-specific and country-specific factors.

Ahmed, Fairchild and Guney (2020) provided a perspective, arguing both that hedging may be beneficial under particular configurations of firm risk exposures and market frictions but can be value-destroying when managers pursue hedging for private benefits or when derivative positions are poorly governed. From a United Kingdom perspective, this study conducted both theoretical and empirical analysis to test whether corporate hedging always leads to value creation. They concluded that while hedging generally reduces volatility and financial distress costs, its effectiveness in enhancing firm value depends on the alignment between hedging policies and firm's specific financial characteristics. In particular, firms with higher leverage or greater exposure to exchange rate fluctuations tended to benefit more. Their work reinforced a nonlinear prespective, arguing that the relationship between hedging and firm value is context dependent and potentially asymmetric.

Empirical cross-country studies (Allayannis, Lel, & Miller, 2012) corroborate that the average effect observed in pooled samples masks substantial heterogeneity. Expanding on the governance dimension, they analyzed firms from 39 countries to assess how corporate governance interacts in determining firm value. Their findings were consistent with agency theory predictions, meaning that the positive association between the use of foreign currency derivatives and Tobin's Q was stronger in firms with higher governance quality, including those with more independent boards, stronger shareholder rights and greater transparency. This suggested that hedging can enhance value only when implemented as a part of sound managerial practices rather than as a tool for managerial entrenchment or speculative behavior. The implication is that the benefits of hedging are conditional upon the institutional environment and firm-level governance mechanisms.

More recent studies have also examined the post crisis (2007-2008) and emerging market contexts where the value implications of hedging may differ. The European context offers an intermediate case between mature and emerging markets. According to Šimaitė, G., Keliuotytė-Staniulėnienė, G. (2022), the value implications of hedging across European firms depend on both regulatory harmonization and disclosure standards introduced by EU directives. Firms that provide transparent hedging disclosures and employ derivatives consistent with their operational exposures tend to experience a positive market response. However, discrepancies persist between western and eastern European firms, with the later often constrained by less developed financial markets and weaker enforcement mechanism. This intra-regional variation supports the broader argument that institutional quality operates along a continuum, influencing not just whether firms hedge, but also how effectively they do and how the markets interpret such practices. Moreover, the study indicated that market perception plays a critical role, since investors reward transparent and well communicated hedging policies, suggesting that the disclosure quality mediates the market's valuation of hedging practices. Beyond governance, another crucial dimension of institutional influence involves financial market development and accessibility. In countries where derivative instruments are widely available, standardized and actively traded, firms can tailor risk management strategies more precisely to their exposure. This flexibility enhanced the ability of hedging to stabilize cash flows and improve capital budgeting decisions. Conversly, in developing economies, derivative markets often remain shallow and fragmented.

To sum up, in some subsamples the association between derivatives usage and Tobin's Q is positive and economically meaningful, whereas in others it's weak or indistinguishable from zero. Thus, the contemporary consensus isn't a binary dichotomy, but instead a conditional paradigm. If hedging's benefits are conditional, corporate practitioners and policy makers should avoid one-size-fits-all prescriptions. For firms, the decision to hedge should emerge from a clear assessment of the relevant frictions, such as financial constraints, tax convexity or bankruptcy risk, and the firm's governance capacity to implement and supervise hedging strategies. For regulators and market designers, improving disclosure standards for frameworks can enhance the value-capturing potential of hedging since institutional asymmetries influence the perceived credibility of hedging disclosures. Overall, the cross-country literature reveals that the value impact of hedging is not purely a function of financial instruments or exposure levels, but also the institutional architecture that governs corporate behavior. Strong institutions enhance the credibility, transparency and alignment of hedging activities with shareholders' interests. Weak institutions, on the other hand,

can distort incentives and limit the capacity of hedging to generate value, thereby explaining the wide dispersion of empirical results across countries. As such, institutional context serves as both facilitator and a constraint in translating theoretical hedging benefits into observable firm value.

2.5 Hedging impact theories

In the context of corporate risk management, the extent to which financial derivatives mitigate total firm risk remains a subject of debate. Guay and Kothari (2003) provide insights into the actual magnitude of derivative usage among non-financial firms and questions the traditional mechanical relationship between hedging activities and total risk reduction. In order to reach their conclusions, the firm's total risk is divided into two primary components, being systematic (macroeconomic) risk and idiosyncratic (firm-specific) risk. While macroeconomic risk encompasses broad market fluctuations, such as variations in interest rates, foreign exchange rates or commodity prices, firm-specific risk is driven by internal operational factors including product development, management turnover or industry-specific competitive dynamics.

Financial derivatives are inherently designed to hedge systematic risk exposures and thus, consequently, they are structurally incapable of mitigating firm-specific risk, which typically constitutes the largest proportion of total risk for non-financial corporations. Furthermore, Guay and Kothari (2003) demonstrate that the median non-financial firm holds derivative portfolios that are remarkably small relative to their overall risk exposures. The authors find that even under extreme variations in interest or exchange rates, the cash flows generated by these derivative positions are generally insufficient to significantly offset the firm's operational volatility. Thus, the scale of corporate derivative usage is often too economically negligible to substantially reduce a firm's total risk, or even to fully cover its macroeconomic risk. This empirical evidence presents a theoretical paradox, asking that if the magnitude of derivative usage is too marginal to drastically reduce overall risk, what drives the positive hedging premium observed in prior literature, such as Allayannis and Weston (2001). Drawing on the implications of Guay and Kothari (2003), it can be argued that the value-enhancing effect of derivatives is not exclusively derived from the mechanical stabilization of cash flows, but instead, the decision to hedge may act as a powerful market signal. The implementation of a derivative based hedging program indicates to investors that the firm possesses a highly sophisticated management team, strong corporate governance mechanisms

and the proactive capacity to identify and manage marginal risks, thereby reducing expected bankruptcy costs. Consequently, it is plausible that investors reward this underlying managerial sophistication signaled through the very use of derivatives with a higher market valuation, rather than merely valuing the isolated financial payoffs of the derivative contracts themselves.

Building upon the signaling perspective, whereby derivative usage signals a strong management team capable of proactive risk assessment, Aretz and Bartram (2010) provide a framework detailing the specific economic channels through which this strength translates into shareholder value. According to the study, if a derivative portfolio is small in relation to the total firm risk, its strategic deployment targets the extreme risks of cash flow distributions. By doing so, managers use derivatives to reduce the expected costs of financial distress and bankruptcy, mitigating agency costs, particularly the underinvestment problem, and optimizing tax liabilities in the presence of convex tax schedules.

Consequently, the hedging premium awarded by investors is not merely a reaction to a mechanical reduction in total risk. Instead, as the combined insights of Guay and Kothari (2003) and Aretz and Bartram (2010) suggests, the market assigns a higher valuation to hedging firms because these instruments act as a targeted and strategic tool, identifying robust corporate governance and effectively neutralizing costly market frictions, thereby preserving capital for growth and shielding the firm from deadweight costs, regardless of the portfolio's limited absolute size.

2.6 Firm size and access to capital markets

Firm's characteristics such as size, access to capital markets and the degree of financial constraint modulate hedging's value relevance. Smaller firms or those with limited access to external finance may derive greater utility from hedging because smoothing cash flows reduces the probability of costly financing frictions and enables more investment paths.

While theoretical frameworks suggest that smaller firms should exhibit a higher propensity to hedge due to more severe underinvestment problems and higher expected costs of financial distress (Bessembinder, 1991), empirical evidence presents a contrasting reality. Bodnar et al. (2019) demonstrate that corporate hedging is subject to significant economies of scale. Large firms dominate the use of financial derivatives because they can easily absorb the high fixed costs

associated with specialized treasury departments, information technology systems and complex International Swaps and Derivatives Association (ISDA) credit requirements. In contrast, smaller firms face substantial barriers to entry in derivative markets. Despite theoretically benefiting the most from cash flow stabilization to protect their growth options, the high setup costs and margin requirements often render financial hedging economically unviable for them. Furthermore, Bodnar et al. (2019) highlight that while large multinationals effectively use financial and operational hedging as complementary strategies, smaller firms often lack the global footprint to utilize operational hedging, thus leaving them disproportionately exposed to macroeconomic shocks.

2.7 European Context

While the majority of seminal literature on corporate hedging focuses on US firms, extrapolating these findings to the European market requires caution due to fundamental structural differences. As highlighted by Bats and Houben (2020), the European financial architecture is predominantly bank-based, in contrast to the market-based system of the United States. This heavy reliance on bank financing has significant implications for corporate risk management strategies. In the European context, the decision to engage in derivative usage is often intrinsically linked to the firm's lending relationships. European banks frequently require non-financial firms to enter into hedging contracts (such as interest rate or currency swaps) as loan covenants to mitigate the creditor's default risk exposure. Consequently, corporate hedging in Europe may not always represent a purely proactive, value-maximizing signal driven by a sophisticated management team, but rather a compliance mechanism induced by the banking sector. Therefore, investigating the hedging premium within this bank-centric European landscape contributes to a more nuanced understanding of how institutional environments shape the relationship between derivatives and firm value.

In the specific context of the European Union, decision-making regarding corporate hedging strategies was fundamentally altered in the aftermath of the 2008 global financial crisis.

As detailed by Constâncio, Cabral, and Detken (2021), the implementation of a new financial stability architecture in the EU embodied by the creation of the Banking Union and the introduction

of stringent macroprudential regulations, such as the European Market Infrastructure Regulation (EMIR), structurally transformed the derivatives market. Aimed at mitigating systemic risk, these new European directives imposed strict capital requirements and central clearing obligations on financial institutions. Consequently, European banks, which act as the primary counterparties in OTC markets, have largely transferred these increased compliance and capital allocation costs to their corporate clients.

This regulatory reality exacerbates the market frictions previously identified in the literature. Although corporate hedging is theoretically vital to mitigate expected bankruptcy costs and underinvestment problems (Aretz & Bartram, 2010), the new European financial architecture has substantially elevated the fixed and transactional costs associated with derivative usage. In line with the findings of Bodnar, Giambona, Graham, and Harvey (2019) regarding economies of scale, the increased cost of derivative instruments in Europe disproportionately penalizes smaller firms. These smaller entities frequently lack the financial flexibility to withstand the stringent margin calls and collateral requirements imposed by the new macroprudential regime Furthermore, when coupled with the inherently bank-based nature of the European financial system (Bats & Houben, 2020), the current regulatory framework (Constâncio et al., 2021) suggests that corporate derivative usage in contemporary Europe is not merely a reflection of proactive, value-maximizing risk management. Instead, it is often a constrained response to the rigorous demands of a highly regulated banking sector. Thus, any expected hedging premium is typically measured by an increase in Tobin's Q within the European market and must be interpreted in light of this strict institutional ecosystem. Under these conditions, it's likely that only firms with superior financial sophistication and substantial cost-absorption capacity are able to extract net positive value from their risk-hedging operations.

2.8 Empirical Methods

Early empirical work, including Allayannis and Weston (2001) and Bartram, Brown and Conrad (2011), primarily relied on cross-sectional regressions of Tobin's Q on indicators of derivative usage, controlling for observable firm characteristics. Although these studies provided valuable insights, their reliance on Ordinary Least Squares estimations implied that the estimated relationship might reflect self-selection bias, meaning that firms with inherently higher growth

prospects or better governance may be more likely to hedge in the first place. This would inflate the apparent value effect of hedging if these characteristics were not fully observable or controlled.

The recognition of this limitations motivated researchers to adopt methods designed to better account for unobserved heterogeneity and potential endogeneity between hedging and firm value. In empirical corporate finance, assessing the impact of derivative usage on firm value (Tobin's Q) is inherently plagued by selection bias. Because the decision to implement a corporate hedging program is endogenous and not randomly assigned, treated firms systematically differ from control firms across several observable characteristics, such as firm size, leverage and profitability. Consequently, direct estimations using ordinary least squares (OLS) on the raw sample would yield biased and inconsistent estimates of the hedging premium. To mitigate this confounding bias, Rubin (1973) developed a framework by where we would be pairing each hedging firm with a non-hedging statistical twin in order to ensure they share highly similar pre-treatment characteristics and thus, artificially, construct a balanced pseudo-randomized sample. This non-parametric preprocessing step guarantees that any subsequent differences in Tobin's Q between the treated and control groups can be more robustly attributed to the use of financial derivatives, rather than to underlying structural discrepancies in firm characteristics. This approach, used in finance by studies such as Ahmed et al. (2020) allows for the comparison of firms that differ primarily in their hedging status while minimizing covariates.

While the matching procedure eliminates a large portion of the selection bias associated with observable characteristics, the decision to initiate a corporate hedging program may still be driven by unobservable, time-invariant heterogeneity, such as corporate culture or the management team's risk aversion. To isolate the causal effect of derivative usage on firm value and mitigate remaining endogeneity concerns, the Difference-in-Differences (DiD) methodology is widely recommended in empirical corporate finance literature (Roberts & Whited, 2013).

The traditional DiD approach estimates the treatment effect by comparing the temporal evolution of the dependent variable between the treated and control groups. By subtracting the pre and post treatment variation of non-hedging firms from the variation of hedging firms, the DiD estimator efficiently eliminates the influence of cross-sectional macroeconomic shocks and unobservable firm characteristics that remain constant over time (Roberts & Whited, 2013). Nevertheless, in the context of derivative usage, firms initiate their hedging programs at different points in time. Nevertheless, the presence of staggered adoption and heterogeneous treatment effects over time,

the traditional Two-Way Fixed Effects (TWFE) estimator can produce severely biased results (Callaway & Sant'Anna, 2021). To overcome this methodological limitation, the estimator proposed by Callaway and Sant'Anna (2021) calculates group-time specific average treatment effects on the for cohorts defined by the year of derivative adoption. Subsequently, these effects are aggregated, ensuring that already treated firms are not improperly used as control groups for newly treated firms. This procedure ensures internal validity and precision in estimating the hedging premium within the European market.

Together, these methodological advancements demonstrate a clear evolution from correlation based analyzes to causally oriented econometric frameworks, which can significantly enhance the reliability of empirical evidence on value implications of corporate hedging.

3. Empirical Methodology

During this chapter, the methodology and data will be presented, in order to achieve the results for the proposed hypotheses, based on the literature review presented in the previous chapter.

3.1 Hypotheses

The primary objective of this empirical investigation is to examine whether the deployment of financial derivatives by European non-financial corporations translates into tangible shareholder value creation and to further explore how this valuation effect fluctuates conditionally upon the fair-value positioning of their derivative portfolios. To achieve this, the present study delineates three central hypotheses, rooted in the theoretical frameworks of corporate risk management.

Departing from the foundational paradigm established by the Modigliani and Miller (1958) irrelevance theorem, which posits that in frictionless and perfect capital markets, risk management practices do not augment firm value, this research aligns with the market imperfection theories. Following the seminal work of Smith and Stulz (1985), the theoretical consensus suggests that derivative instruments can effectively enhance firm value by mitigating cash flow volatility, alleviating the deadweight costs associated with financial distress and resolving underinvestment problems inherent in agency conflicts. Under this theoretical premise, corporations that strategically engage in financial hedging should present a structural operational and financial advantage, leading to a valuation premium observable in the capital markets. Consequently, the first hypothesis is formulated to test the cross-sectional value divergence between hedgers and non-hedgers.

- Hypothesis 1 (H1): *Firms engaging in derivative hedging exhibit higher firm value, as measured by Tobin's Q, relative to comparable non-hedging firms.*

While cross-sectional analyses yield critical insights into the valuation premium linked to derivative usage, they are often susceptible to endogeneity and time-invariant unobservable firm characteristics. To robustly isolate the dynamic impact of risk management adoption, it's important to analyze the temporal evolution of a firm's market value upon its transition from a non-hedger to

a hedger. If the theoretical benefits of hedging, such as the stabilization of internal cash flows and the optimization of debt capacity, are inherently value-accretive, the strategic initiation of derivative usage should trigger a positive recalibration of the firm's equity value in the market. Therefore, to capture this dynamic capitalization of hedging benefits, the second hypothesis is proposed:

- Hypothesis 2 (H2): *Firms experience an increase in their Tobin's Q when they start to use derivative instruments.*

Moving beyond the traditional binary paradigm of derivative utilization (hedger against non-hedger), there is a critical importance to the net position of derivative portfolios. In accordance with International Financial Reporting Standards (IFRS), derivatives must be reported at their fair value and thereby provide a continuous, albeit volatile, accounting proxy for hedging activity and intensity. A proxy for the hedging intensity is establish as the sum of the total derivative liabilities and assets, measured in absolute values. To capture the effect of the weight of the hedging portfolio within the firm value, the final hypothesis is established:

- Hypothesis 3 (H3): *The impact of hedging in the company value depends on the total derivative intensity.*

3.2 Data and Sample Selection

To empirically investigate the established hypotheses, this study relies on a longitudinal dataset of European non-financial corporations. The source for the extraction of all firm-level financial, accounting, and market data is the LSEG (former Refinitiv) database. The target population is exclusively composed of the constituent firms of the EURO STOXX 50 index. The selection of this specific index is strategically motivated, as it represents the 50 largest, most highly capitalized and most liquid companies operating within the Eurozone. Focusing on this elite cohort ensures that the firms under analysis generally possess strong corporate governance structures, widespread international operations and relatively unhindered access to global capital markets. The temporal scope of the analysis spans a two-decade period, specifically encompassing the fiscal years from 2005 to 2024. This 20-year timeframe encapsulates multiple economic cycles, including periods of systemic macroeconomic instability, which provides a context for analyzing corporate risk management behavior. The initial raw data extraction, bounded by 50 companies over 20 years,

yielded a theoretical maximum of 1,000 firm-year observations. To ensure the integrity and econometric validity of the dataset, a data cleaning and filtering methodology was subsequently implemented using the R programming language. The variables are identified in Appendix A.

The first stage of the data refinement process involved the handling of missing information. Observations lacking for Total Assets, Total Debt, Market Cap and Revenue were removed from the panel. This step primarily accounted for structural changes in the index constituents over the two decades, eliminating firm-year observations for companies that were either not publicly listed during the early years of the study period or had not yet been incorporated. Following this initial attrition, the dataset was reduced to 949 valid observations.

The second filter pertained to the industry classification of the firms. Consistent with standard empirical practices in corporate finance literature, financial institutions and utility companies with strictly regulated financial structures were deliberately excluded. Specifically, entities operating with Standard Industrial Classification (SIC) codes ranging from 6000 to 6999 were removed. The rationale for this exclusion is rooted in the fundamentally divergent nature of their derivative usage since financial institutions deploy derivative instruments not merely for hedging corporate risk, but predominantly for trading, market-making and as an intrinsic component of their core operational business models. Consequently, incorporating them would introduce structural bias into the analysis.

To control for sector-specific idiosyncrasies, structural market dynamics and unobservable industry-level heterogeneity, the sampled firms were systematically categorized into distinct industrial cohorts based on their historical SIC codes. To achieve a balanced, objective and economically meaningful grouping, this study adopted an adapted framework based on the broad Fama and French industry classifications, specifically aligning with a seven-sector taxonomy.

Following the exclusion of Financial Firms, the remaining non-financial constituent firms were systematically allocated into the six classifications, these being Consumer Durables, Consumer Non-Durables, Energy, Telecommunications, Wholesale/Retail, and a residual Others category. The final Others category encompasses highly specialized or diversified operations that do not strictly align with the primary groupings but are essential to retain to maintain the statistical robustness of the sample. The division throughout the categories can be consulted in Appendix B.

The next step was to calculate the variables needed to proceed the study, according to the literature review previously made, such as Allayannis and Weston (2001), and (Allayannis, Lel, & Miller, 2012).

$$Total\ Gross\ Derivatives = Total\ Derivative\ Assets + Total\ Derivative\ Liabilities$$

$$Tobin's\ Q = (Market\ Cap + Total\ Debt)/\ Total\ Assets$$

$$Hedge\ Intensity = |Total\ Gross\ Derivatives|\ /\ Total\ Assets$$

$$Size = \log(Total\ Assets)$$

$$Profitability = Net\ Income\ /\ Total\ Assets$$

$$Leverage = Total\ Debt\ /\ Total\ Assets$$

$$Liquidity = Cash\ Equivalents\ /\ Total\ Assets$$

$$Investment = CAPEX/\ Total\ Assets$$

The total gross derivatives, aims to proxy how much the company is hedging, serving as a intermediate variable in order to calculate the hedge intensity, whose goal is to understand the weight of hedging the company. On the other hand, the Tobin's Q will be the proxy to company intrinsic value, whose relationship with hedging will be studied. The other variables, aim to give a better distinction between firms, reducing eventual bias in the study.

Furthermore, to mitigate the potentially distortionary impact of extreme outliers and alleviate concerns regarding heteroscedasticity, a winsorization protocol was applied to all continuous variables. Specifically, the data points falling below the 1st percentile and above the 99th percentile were not deleted, but rather replaced by the values observed at those respective percentiles.

The culmination of the data selection process resulted in a final, balanced panel dataset composed by approximately 696 valid firm-year observations, which form the empirical foundation for the subsequent statistical estimations and propensity score matching procedures. All data manipulation, descriptive statistics and econometric modeling were conducted utilizing the R programming language within the RStudio environment. Table 1, captures the main statistic for the treated variables.

Table 1 - Main Variables Statistics After Winsorization

Statistic	N	Mean	St. Dev.	Min	Max
Tobin's Q	696	1,754	1,725	0,308	9,415
Hedge_Intensity	696	0,017	0,024	0,000	0,139
Hedge_Net_Pos	696	-0,002	0,015	-0,093	0,027
Leverage	696	0,247	0,133	0,0003	0,523
Profitability	696	0,055	0,054	-0,140	0,200
Liquidity	696	0,141	0,142	0,023	0,882
Investment	696	0,041	0,027	0,001	0,141

3.3 Variables Description

The primary dependent variable utilized to proxy firm value is Tobin's Q. In alignment with established theoretical frameworks, it is calculated as the ratio of the market value of the firm to the replacement cost of its total assets.

$$Tobin's\ Q_{i,t} = \frac{Market\ Capitalization_{i,t} + Total\ Debt_{i,t}}{Total\ Assets_{i,t}}$$

Total debt is utilized as a standard proxy for the market value of debt. A ratio exceeding 1 indicates that the firm's market valuation surpasses its book assets, signifying that management is actively creating shareholder value.

To test the hypotheses, hedging must be quantified both as a binary choice, being the variable "Derivative Usage" 1 if any derivative asset or liability is recorded or 0 in contrary, and a continuous exposure, measured by the hedging intensity. While a binary indicator is used to differentiate hedgers from non-hedgers in the Propensity Score Match (PSM), the core continuous measure is the Hedging Intensity based on fair value. Since IFRS mandates that derivatives be reported at fair value, accounting data provides a proxy for hedging intensity. This continuous metric captures the relative exposure and the asymmetric net position of the derivative portfolio, allowing for cross-sectional comparison across firms of disparate sizes.

3.3.1 Control Variables

To isolate the marginal effect of derivatives, the models incorporate a vector of control variables, justified by foundational theories:

- **Firm Size:** As seen in the literature review, larger firms often benefit from economies of scale in risk management but may face higher bureaucratic costs.
- **Leverage:** This variable controls for the firm's financial risk profile. According to Smith and Stulz (1985), derivatives enhance firm value primarily by reducing cash flow volatility, thereby minimizing the expected costs of financial distress associated with high leverage.
- **Investment Opportunities:** The underinvestment hypothesis postulates that unhedged volatility can force firms to abandon positive net present value projects. Controlling for capital expenditures isolates the valuation premium of growth trajectories from the hedging premium.

3.4 Methodology

The methodological framework integrates PSM, introduced by Rubin, D. B. (1973) and Difference-in-Differences (DiD) estimators by Callaway, B., & Sant'Anna, P. H. C. (2021) to test H1 and H2, followed by fixed-effects panel regressions to test H3.

To justify the econometric estimators chosen for the empirical analysis, specifically the Two-Way Fixed Effects regression for continuous intensity and the conceptual foundation for the DiD, a specification test was conducted to diagnose the presence and nature of unobserved heterogeneity. The Chow Test evaluated the appropriateness of a simple Pooled Ordinary Least Squares (OLS) estimation. The F-test yielded an F-statistic of 72.464 with a highly significant p-value ($p < 0.001$). This result rejects the null hypothesis that unobserved individual-specific effects are equal to zero. It confirms that European corporations possess deeply entrenched, time-invariant structural heterogeneities. Consequently, Pooled OLS is structurally biased, mathematically mandating methodologies that can isolate and control for these firm-specific effects.

Having established the presence of unobserved heterogeneity, the Hausman (1978) Specification Test was executed to adjudicate between Random Effects (RE) and Fixed Effects (FE) models. The RE model assumes that unobserved firm-specific effects are strictly uncorrelated with the explanatory variables. The empirical test yielded a Chi-square value of 316.877 and a p-value of 0 ($p < 0.001$).This highly significant result firmly rejects the null hypothesis, providing conclusive statistical proof that the unobserved characteristics of the firms are deeply correlated with their

observable endogenous decisions, such as leverage and hedging intensity. Therefore, relying on Random Effects would introduce severe endogeneity and yield inconsistent estimates.

The combination of these test results provides econometric validation for the empirical strategy. To analyze continuous hedging intensity, the rejection of both Pooled OLS and Random Effects dictates the use of a Two-Way Fixed Effects regression. Firm Fixed Effects must be deployed to sweep out the time-invariant corporate heterogeneity, while Year Fixed Effects absorb global macroeconomic shocks. The proven existence of endogenous, unobserved firm-specific effects also invalidates any direct cross-sectional comparison between hedgers and non-hedgers. The DiD framework fundamentally operates as a fixed-effects estimator. By calculating the difference of the differences, it eliminates the exact time-invariant heterogeneity proven by the F-test. Thus, the specification tests formally and empirically validate the use of the DiD estimator to isolate the true causal effect of derivative adoption. The test results are presented in Table 2.

Table 2 - Chow Test and Hausman Test Output

Model Specification	Chow Test (F-Stat)	p-value	Hausman Test (Chi2)	p-value
Model 1: Total Derivative Exposure	72.464	0.000	316.877	0.000

The decision to implement a corporate hedging program is non-random, leading to inherent selection bias. Initial univariate analysis revealed that derivative users are structurally different, typically larger, more highly leveraged, and possessing less liquidity than non-users. Direct unadjusted comparisons would yield spurious estimates. To construct a randomized experiment environment, a PSM protocol was employed to balance the sample. The propensity score was estimated via a logistic regression incorporating Size, Leverage and Investment. A nearest-neighbor matching algorithm was strictly enforced using a caliper restriction of 0.2 standard deviations. The use of a caliper in nearest-neighbor matching restricts matches to observations that are sufficiently similar, thereby preventing poor-quality matches and reducing bias, as argued by Cochran, W. G., & Rubin, D. B. (1973). A threshold of 0.2 standard deviations is commonly used as it provides a balance between bias reduction and sample retention, making it a widely accepted in the literature. The matching is conducted without replacement, meaning that each control firm is used only once.

This approach is adopted to prevent the repeated use of the same control observations, which could otherwise overweight specific firms and distort the composition of the control group. By enforcing unique matches, the procedure preserves the diversity and representativeness of the sample, leading to more conservative estimates. Although matching without replacement may slightly reduce match quality compared to matching with replacement, the caliper restriction mitigates this issue by ensuring that only sufficiently similar pairs are retained.

Table 3 - Firm main characteristics by treated and non-treated groups

	Overall	Derivative Non-User	Derivative User	
Variable	**N=696** [1]	**N=124** [1]	**N=572** [1]	**p-value** [2]
Tobin's Q	1,754 (1,725)	2,172 (1,663)	1,663 (1,726)	0,002
Size	17,502 (1,328)	16,688 (1,491)	17,678 (1,222)	<0,001
Leverage	0,247 (0,133)	0,196 (0,142)	0,0258 (0,129)	>0,001
Investment	0,041 (0,027)	0,051 (0,036)	0,039 (0,024)	>0,001

1 Mean (SD)

2 Welch Two Sample t-test

Table 3 presents the unadjusted univariate comparison of fundamental firm characteristics between derivative users and non-users prior to any econometric matching procedure. The analysis reveals statistically significant structural imbalances between the two cohorts, confirming that the decision to engage in corporate hedging is a highly non-random event. Specifically, the data demonstrates that derivative users are systematically and significantly larger than non-users. Because the control group in this specific sample is inherently composed of smaller, significantly less indebted and hyper-liquid firms, their higher baseline valuation is likely driven by these fundamental structural characteristics rather than the pure absence of a risk management program. Since these pre-existing disparities inherently drive both a firm's propensity to hedge and its market capitalization, any direct Ordinary Least Squares (OLS) or cross-sectional comparison would yield heavily biased and spurious causal estimates. This endogeneity provides the definitive empirical justification for implementing a PSM algorithm.

Table 4 - PSM Algorithm output per treated and non-treated groups

	Control	Treated
All	124	572
Matched	101	101
Unmatched	23	471
Discarded	0	0

As detailed in Table 4, the initial unmatched sample comprised a highly asymmetrical distribution of 657 firm-year observations, with 537 belonging to derivative users and 120 belonging to non-users. To enforce strict comparability, a nearest-neighbor matching algorithm was implemented.

This procedure successfully yielded a balanced cohort of 101 matched pairs. Consequently, 471 treated entities and 23 control entities were categorized as "Unmatched" and subsequently discarded from this specific analysis. While this attrition reduces the sheer volume of data, it's a deliberate econometric trade-off designed to prioritize structural identicality and eliminate noise from incomparable observations.

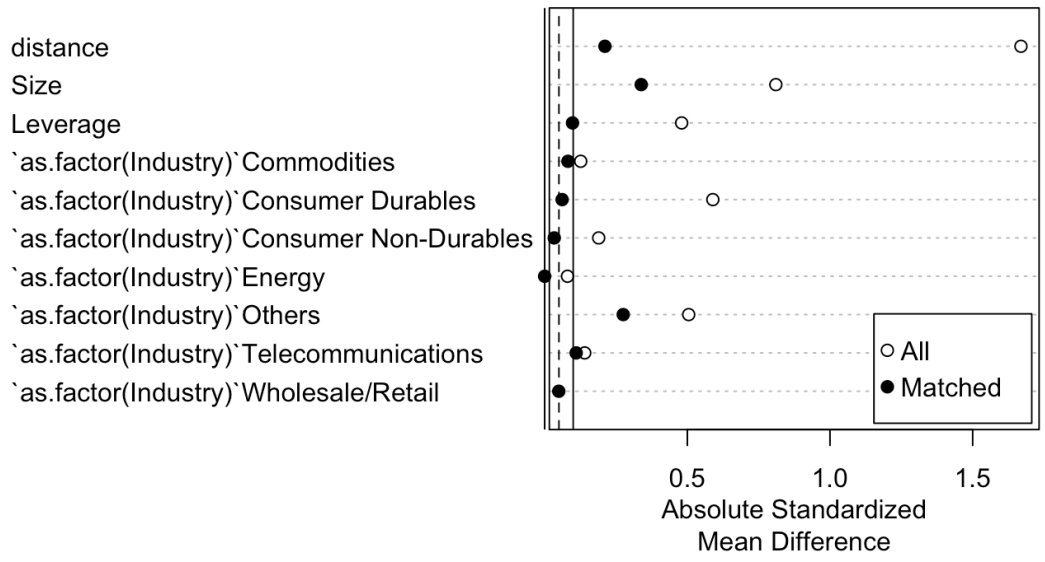


Figure 2 - Covariate balance plot for the absolute standardized mean difference

The graphical representation in Figure 2 illustrates the paradigm shift induced by the PSM framework. The open circles, which represent the unmatched sample are positioned far to the right of the vertical acceptance threshold, visibly confirming the extreme pre-existing biases across covariates. In stark contrast, the solid black dots representing the "Matched" cohort display a

dramatic systemic shift to the left, tightly clustering near the zero line. This visual convergence confirms that the covariates were successfully balanced.

To evaluate the valuation impact of corporate hedging program, directly addressing Hypotheses 1 and 2, this study implements a DiD econometric framework on the PSM-balanced sample. The fundamental premise of the DiD approach is to isolate the causal treatment effect by comparing the pre and post-adoption trajectory of Tobin's Q for the hedgers (the treated group) against the simultaneous trajectory of the matched non-hedgers (the control group). This methodology effectively differences out both constant unobservable differences between the groups and overarching temporal trends that affect all firms similarly. This research deploys the Callaway and Sant'Anna (2021) estimator. This DiD architecture computes group-time specific Average Treatment Effects on the Treated (ATT) by strictly matching cohorts based on their exact timing of derivative adoption. By utilizing "never-treated" or "not-yet-treated" firms as the exclusive control groups, the Callaway and Sant'Anna estimator guarantees that the calculated ATT accurately captures the true, unbiased temporal effect of transitioning into a hedging regime.

While the PSM-DiD framework is specifically tailored to assess the binary, dynamic decision of initiating a hedging program (Hypotheses 1 and 2), testing Hypothesis 3 requires a fundamentally different econometric approach. Hypothesis 3 aims to evaluate the total impact of the derivative portfolio's value, combining net asset (gains) and net liability (losses) positions in absolute values. To capture this intensity, a multivariate longitudinal panel data regression model is specified. This approach allows for the examination of how the magnitude of derivative exposure marginally impacts firm value over time, while systematically controlling for observable firm-level characteristics (Size, Leverage, and Investment).

To sum up, the test hypotheses will be calculated as follow:

Hypotheses 1:

$$ATT^{PSM} = E[Tobin's\ Q_I(1)|\ D_1 = 1, P(X_1)] - E[Tobin's\ Q_i(0)|D_i = 1, P(X_I)]$$

Where:

- $Tobin's\ Q_I(1)|\ D_1$ = Value of companies that adopted hedging (treated firms).
- $Tobin's\ Q_i(0)$ = Value of companies that didn't adopted hedging (non-treated firms).
- $P(X_I)$ = Propensity score that guarantees that we are using comparable companies.

Hypotheses 2:

$$ATT\ (g,t) = E\left[Tobin's\ Q_{i,t}(g) - Tobin's\ Q_{i,t}(0) | G_i = g\right]$$

Where:

- $ATT\ (g,t) =$ Medium Effect of companies that adopted hedging in year g, measured in year t.
- $G_i = g\ =$ Group of companies that adopted hedging in the same year g.
- $Tobin's\ Q_{i,t}(g)$ = Value in year t, knowing that the adoption was in year g.
- $Tobin's\ Q_{i,t}(0)$ = Value of the company, if never adopted hedging.

Hypotheses 3:

$$Tobin's\ Q_{i,t} = \beta_0 + \beta_1 Hedge\ Intensity_{i,t} + \sum_{k=1}^{n} \gamma_k Control_{k,i,t} + u_i + \lambda_t + \epsilon_i$$

Where:

- $Tobin's\ Q_{i,t}$ = Value of company i at the year t.
- β_0 = Interception Constant.
- β_1 = Coefficient for the value depending on the hedge intensity.
- $\sum_{k=1}^{n} \gamma_k Control_{k,i,t}$ = Summatory of the effect of Size, Leverage and Investment.
- u_i = Company fixed effects.
- λ_t = Year fixed effects.
- ϵ_i = Residual error.

3.5 Descriptive Statistics

Before executing the inferential models, it's essential to comprehend the underlying distributional characteristics of the dataset.

Table 5 – Average Tobin's Q per sample country, by treated and non-treated groups

Average Tobin's Q Country	Derivative Non-User	Derivative User
Belgium	4,02	1,24
France	1,33	1,88
Germany	1,30	1,11
Italy	1,22	2,65
Netherlands	2,12	2,86
Spain	4,03	
Total Average	**2,12**	**1,73**

Firstly, analyzing the average Tobin's Q per country studied (Table 5) divided into derivative users and non-users, we can account for significant differences between them. Even though all the countries are members of the EU, their values are not similar, which can be associated with country effects, a small sample or even a low significance for the hypotheses to be studied. In addition, there is also not a linearity between the derivative users and a higher Tobin's Q.

Table 6 – Average Tobin's Q per sample Industry, by treated and non-treated groups

Average Tobin's Q Industry	Derivative Non-User	Derivative User
Consumer Durables	1,32	1,83
Consumer Non-Durables	1,61	1,50
Energy	1,22	0,67
Others	2,74	2,23
Telecommunications	0,85	0,86
Wholesale/Retail	2,60	0,92
Total Average	**2,12**	**1,73**

When accessing the Tobin's Q for the studied Industries (Table 6), non-derivative users appear to have a higher Tobin's Q in every industry with the exception of consumer durables. Nevertheless, it's important to notice that the consumer durables have, by far, the most observations for the study (Appendix B).

Table 7 – Average Tobin's Q per sample year, by treated and non-treated groups

Average Tobin's Q		
Year	Derivative Non-User	Derivative User
2005	1,58	1,02
2006	1,57	1,52
2007	2,20	1,46
2008	1,83	1,07
2009	2,49	1,27
2010	3,52	1,30
2011	1,84	1,25
2012	1,47	1,43
2013	3,13	1,49
2014	2,78	1,41
2015	3,46	1,46
2016	2,60	1,62
2017	2,45	1,75
2018	2,31	1,76
2019	1,93	2,11
2020	2,23	2,59
2021	2,63	2,79
2022	2,15	2,06
2023	2,13	2,40
2024	3,48	2,29
Total Average	**2,12**	**1,73**

Analyzing the Tobin's Q through the years (Table 7), it's noticeable that most of the years, derivatives non-users present higher Tobin's Q, contrasting the hypothesis and some of the studies in the literature. Nevertheless, it's important to notice that in this phase, we are only looking at raw averages that don't considerate all the other factors that also seem to have an impact in the result, further justifying the methodology presented.

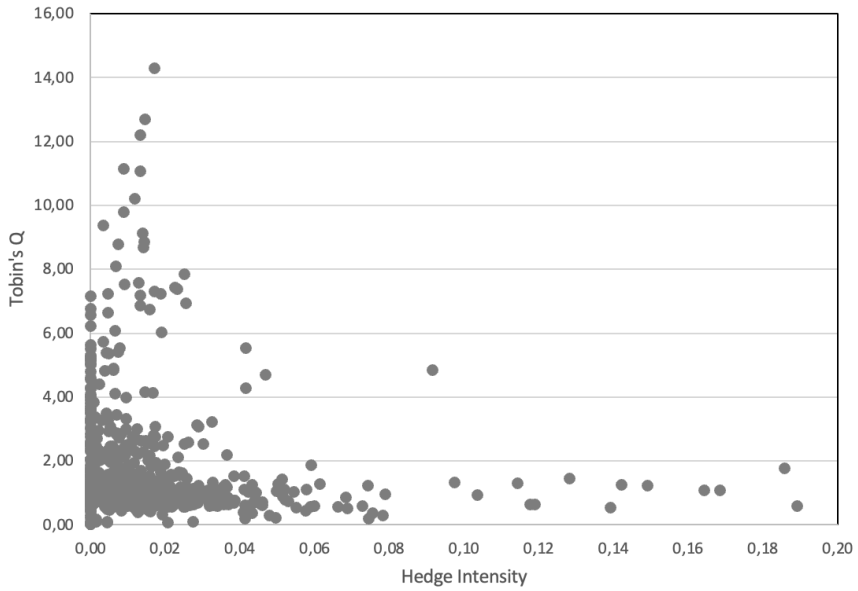


Figure 3 - Tobin's Q value depending on the Hedge Intensity for studied companies (measured in thousand €)

Furthermore, in Figure 3 we can observe the effect that the hedging intensity appears to have on the Tobin's Q. Looking at the figure it's unclear if there is a significant correlation, so no further conclusions can be made. Regarding the sample, we can notice that most of the sample presents both lower Tobin's Q and Hedge Intensity values.

Table 8 - Average Total Assets (measure by thousand €) per studied Industry by treated and non-treated groups

Industry	Derivative Non-User	Derivative User
Consumer Durables	39 196 042,14	84 705 179,31
Consumer Non-Durables	22 066 600,00	83 886 422,27
Energy	84 288 000,00	125 739 666,67
Others	33 190 132,51	44 159 026,79
Telecommunications	121 208 000,00	167 949 526,32
Wholesale/Retail	27 965 426,31	32 203 000,00
Total Average Assets	**34 876 264,83**	**81 273 139,90**

Table 9 - Average Total yearly Revenue (measured in thousand €) per studied industry by treated and non-treated groups

Industry	Derivative Non-User	Derivative User
Consumer Durables	1 280 093 662,00	18 630 300 916,00
Consumer Non-Durables	65 439 000,00	1 852 665 995,00
Energy	159 636 000,00	1 609 239 000,00
Others	1 036 041 857,00	1 601 811 199,00
Telecommunications	61 347 000,00	1 475 644 000,00
Wholesale/Retail	1 089 531 940,00	1 146 180 000,00
Total Average Net Revenue	**3 692 089 459,00**	**26 315 841 110,00**

Finally, as speculated before, we can confirm that for the sample in study, derivative user companies are larger. As seem in the descriptive Table 8 and Table 9, derivatives users are nearly 2,5 times larger when comparing total assets and 7,2 times compared by net revenue. This tendency is recurrent when compared through other indicators, such as total debt.

Summing up, after a prepared sample, methodology and descriptive analysis, the next step will be to analyze the results of the study.

4. Results

This chapter presents the empirical findings of the study bridging the theoretical frameworks established in the literature review with the econometric methodologies delineated in the previous chapter. The primary objective is to systematically decode the causal relationship between financial derivative utilization and corporate valuation within the European market (EURO STOXX 50).

4.1 Hypothesis 1

Hypothesis 1 posits that firms engaging in derivative hedging exhibit a higher market value, proxied by Tobin's Q, relative to comparable non-hedging firms. To empirically test this cross-sectional valuation premium while neutralizing the endogeneity and selection bias identified in the raw sample, the Callaway and Sant'Anna (2021) estimator was deployed on the PSM-balanced panel.

The first analytical step assesses the overall Average Treatment Effect on the Treated (ATT), aggregated across all post-treatment periods. The ATT is the average effect of the treatment on those units that actually received it, comparing their observed outcomes with their estimated counterfactual outcomes had they not been treated. The empirical estimations yield coefficients that closely hover around zero (0.1598). Crucially, the standard errors associated with these estimates are substantial (0.354), resulting in a 95% Confidence Interval that heavily crosses the zero threshold ([-0.534, 0.8535]), but more importantly have no statistical significance.

Table 10 - Hypotheses 1 output

ATT	Std. Error	[95%	Conf. Int.]
0,1598	0,354	-0,534	0,8535

Statistically, these metrics indicate a failure to reject the null hypothesis. The data reveals that, after matching firms based on their ex-ante probability to hedge and controlling for unobserved time-invariant characteristics, firms actively utilizing financial derivatives don't command a statistically significant valuation premium over their non-hedging peers. Consequently, Hypothesis 1 is formally rejected since there is no statistical significance.

This absence of a hedging premium can be contextualized within the foundational paradigms of corporate finance. Primarily, these results resurrect the Modigliani and Miller (1958) Irrelevance Theorem. In highly developed, liquid, and transparent capital markets, such as the ecosystem inhabited by the EURO STOXX 50 constituents, investors can effectively and cheaply construct their own risk-optimized portfolios (home-made hedging). Therefore, rational shareholders don't apply a valuation premium for corporate-level synthetic risk management, viewing it as a redundant transaction that they can replicate privately without incurring the firm's administrative costs.

Furthermore, this result suggests a critical re-evaluation of market imperfection theories, specifically the financial distress hypothesis proposed by Smith and Stulz (1985). This framework suggests that hedging creates value by reducing the probability and expected deadweight costs of bankruptcy. However, the sampled cohort consists of Europe's 50 largest, most structurally critical blue-chip behemoths. These corporations possess internal liquidity buffers, unparalleled access to global credit markets, and investment grade ratings. For these specific entities, the baseline probability of catastrophic financial distress is already marginally close to zero. Thus, the incremental value generated by deploying derivatives to further mitigate this virtually non-existent distress risk is economically negligible.

4.2 Hypothesis 2

While Hypothesis 1 established the absence of an overarching, static valuation premium, Hypothesis 2, investigates the dynamic temporal trajectory of a firm's market value upon its transition from a non-hedger to an active derivative user. To capture this potential market recalibration, the Callaway and Sant'Anna estimator was utilized in its event-study specification. This approach computes the Average Treatment Effect on the Treated (ATT) at specific event times relative to the adoption year, comparing newly treated firms against "never-treated" or "not-yet-treated" matched controls.

Table 11 - Hypotheses 2 output

Event Time	Estimate	Std. Error	[95% Simult.	Conf. Band.]
-1	0,2216	1,0215	-2,0415	2,4847
0	0,2990	0,4247	-0,6419	1,2399
1	-0,4250	0,7702	-2,1313	1,2812

The foundational prerequisite for any valid Difference-in-Differences estimation is the Parallel Trends Assumption, which dictates that, in the absence of treatment, both the treated and control groups would have followed the same valuation trajectory. The empirical output for the pre-treatment period (t = -1) validates this assumption. The ATT estimate for the year prior to hedging adoption is 0.2216. Crucially, the substantial standard error (1.0215) yields a 95% Confidence Interval of [-2.0415, 2.4847], which heavily crosses the zero line and shows a lack of statistical significance. This strict lack of statistical significance prior to the adoption indicates that the Propensity Score Matching algorithm successfully neutralized endogeneity, since before the initiation of the hedging program, the valuation trajectories of the future hedgers and the permanent non-hedgers were statistically indistinguishable.

Having established a counterfactual, the analysis proceeds to the year of derivative adoption (t = 0). In the exact year the hedging program is initiated, the model registers a marginal positive coefficient (ATT = 0.2990). However, the corresponding confidence interval [-0.6419, 1.2399] confirms that this minor upward shift is entirely indistinguishable from random market noise. The equity market doesn't appear to demonstrate a statistically significant positive reaction to the implementation of the risk management program. Furthermore, analyzing the sustained effect in the subsequent post-treatment year (t = 1), the coefficient turns negative (-0.4250), yet remains highly insignificant [-2.1313, 1.2812]. The dynamic event-study confirms that the confidence bands tightly bisect the zero threshold across all observable timeframes. Consequently, Hypothesis 2 is rejected. The strategic transition into derivative usage does not trigger a dynamic, value-accretive recalibration of the firm's Tobin's Q.

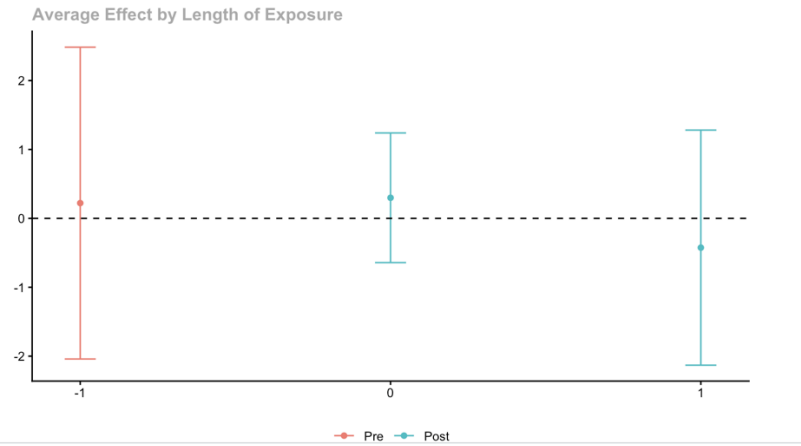


Figure 4 - Event time study output

The absence of a market reaction upon the initiation of a hedging program can be theoretically reconciled through the lens of the Efficient Market Hypothesis and the nature of the sampled cohort. For the constituent firms of the EURO STOXX 50, Europe's most scrutinized and capitalized corporations, the initiation of a standard financial derivative program is largely viewed by institutional investors as a routine operational procedure rather than a strategic paradigm shift. Unlike a major technological acquisition or a disruptive product launch, implementing a currency or interest rate swap does not signal a fundamentally new avenue for organic growth or competitive advantage. Additionally, because these big firms already operate with sophisticated treasury departments, high credit ratings and vast internal cash reserves, the markets don't perceive the formal transition into derivative usage as a rescue mechanism from imminent financial distress. Therefore, investors seamlessly absorb this operational decision without demanding a structural re-rating of the firm's equity premium, reinforcing the conclusion that corporate hedging in highly developed markets is a value-neutral risk management tool.

4.3 Hypothesis 3

While the dynamic DiD framework specifically evaluates the binary, strategic decision to initiate a risk management program, Hypothesis 3 shifts the focus to the continuous magnitude and accounting nature of the derivative portfolio. The objective is to test whether the intensity of derivative usage, measured as a proportion of total assets, systematically drives the firm's market valuation. To investigate this, a Two-Way Fixed Effects panel regression was estimated, controlling for unobservable time-invariant corporate characteristics and observable fundamental drivers.

.

Table 12 - Hypotheses 3 output

Variable	Coeficient	Std. Error	t-value	p-value
Gross_Exposure	-2,6495	1,6035	-1,6523	0,0989
Size	0,04689	0,055	8,5278	<0,0001
Leverage	-1,1836	0,4971	-2,381	0,0176
Investment	5,9538	1,6964	3,5097	0,0005

Metric	Value
Observations (N)	696
Groups (n)	38
R-Squared	0,10382
Adj. R-Squared	0,04764
F-statistic	18,9404
p-value (F)	<0,00001

The baseline output for the Gross Exposure (also presented as Hedge Intensity) model reveals a coefficient of -2.649. This suggests an inverse directional relationship, meaning higher total volumes of financial derivatives are associated with lower firm valuations. Crucially, yielding a p-value of 0.0989, this result is statistically significant at the 10% level. This marginally significant, negative coefficient introduces a compelling theoretical nuance. It strongly signals the emergence of agency costs and information asymmetry associated with hyper-complex risk management. When blue-chip corporations build excessively massive derivative portfolios relative to their asset base, the market begins to actively penalize the firm. Institutional investors may interpret high gross exposure as a red flag for severe financial opacity and heightened administrative friction. Furthermore, excessive derivative volumes often blur the line between pure operational hedging and speculative trading by the corporate treasury. Consequently, the market discounts the firm's equity to account for the risk of managerial overreach and the inherent opacity of sprawling off-balance-sheet or complex synthetic instruments.

The behavior of the fundamental control variables within this Fixed Effects framework strongly confirms the structural validity of the econometric model, aligning perfectly with established financial theory.

Firm Size is highly positive and significant (Estimate = 0.4689; $p < 0.001$). This points toward the scale hypothesis that larger European corporations inherently command a substantial valuation premium due to market dominance and economies of scale.

Capital Investment is also highly positive and significant (Estimate = 5.9538; $p < 0.001$). This validates the growth-opportunity premium, that the market aggressively rewards firms that reinvest

free cash flow into tangible, positive-NPV operational projects rather than excessive financial engineering.

Leverage exhibits a statistically significant negative coefficient (Estimate = -1.1835; p = 0.017). This is consistent of the financial distress paradigm. Even within the elite EURO STOXX 50 cohort, incrementally higher structural debt burdens suppress the market premium, reinforcing that capital structure discipline remains paramount for shareholder value creation.

Based on the empirical evidence, Hypothesis 3 is rejected. In fact, the data points marginally in the opposite direction. The intensity of derivative usage does not incrementally create shareholder value. Instead, massive gross derivative exposures marginally suppress Tobin's Q. Ultimately, the European equity market values these blue-chip constituents based on their organic scale, tangible investment trajectories, and strict capital structure discipline, while penalizing the opacity and potential agency costs associated with excessively large synthetic hedging portfolios.

5. Conclusions

This dissertation set out to empirically investigate a enduring debate in corporate finance, whether the active utilization of financial derivatives inherently creates shareholder value. Specifically, it sought to decode the pricing of synthetic risk management within the elite ecosystem of the European equity market, focusing on the highly capitalized constituents of the EURO STOXX 50 index.

Historically, the academic literature has been deeply fragmented. Proponents of the market imperfection paradigm, heavily anchored by the Smith and Stulz (1985) financial distress hypothesis, have long argued that hedging is a value-accretive strategy. Conversely, purists leaning on the Modigliani and Miller (1958) Irrelevance Theorem have maintained that, in frictionless markets, corporate-level risk management is redundant. Compounding this theoretical divide is the persistent methodological flaw in early empirical literature, the failure to adequately control for the profound endogeneity and selection bias that inherently pollute the decision to hedge.

This research bridged that gap by deploying a multi-layered econometric framework. By initially recognizing that derivative users are systematically larger, more leveraged, and structurally different from non-users, this study utilized a strict Propensity Score Matching algorithm to construct a pseudo-randomized, highly comparable counterfactual panel. Furthermore, rather than relying on static regressions, the deployment of the Callaway and Sant'Anna (2021) Difference-in-Differences estimator allowed for the dynamic isolation of the true causal valuation effect, neutralizing unobservable time-invariant corporate DNA.

The empirical findings of this study ultimately point towards the Modigliani-Miller paradigm within the context of modern European mega-caps. The testing of Hypotheses 1 and 2 suggested that the implementation of a derivative hedging program yields no statistically significant valuation premium, nor does it trigger a dynamic, value-accretive market recalibration upon its adoption. The rationale for this effect is tied to the structural reality of the sampled cohort. For the massive, highly liquid, and globally diversified corporations that comprise the EURO STOXX 50, the baseline probability of catastrophic bankruptcy is virtually negligible. Consequently, the incremental benefit of deploying derivatives to further mitigate financial distress costs is economically immaterial. Institutional investors operating in the highly efficient European market view standard corporate

hedging not as a strategic engine for value creation, but rather as a routine zero-NPV transaction that they could efficiently replicate within their own privately diversified portfolios.

Furthermore, the continuous analysis conducted under Hypothesis 3 provided a warning regarding the intensity of risk management. By employing a Two-Way Fixed Effects regression to analyze Gross Exposure, the results indicated a marginally significant negative relationship between massive derivative volumes and firm value. This finding fundamentally shifts toward the theoretical discussion toward the realm of agency costs and information asymmetry. It suggests that when a big corporations build an excessively complex and massive synthetic portfolio, the market begins to actively discount its equity. Investors can penalize the inherent opacity, the heightened administrative frictions and the potential hazard that management has crossed the boundary between operational hedging and speculative financial engineering.

Ultimately, this dissertation argues that while derivatives remain important tools for treasury liquidity management and cash flow stabilization, they are not structural catalysts for shareholder wealth. In the upper echelons of the European corporate landscape, market capitalization is overwhelmingly driven by organic scale, tangible investment trajectories, and capital structure discipline, while excessive synthetic complexity is viewed with systemic skepticism.

Nevertheless, this study acknowledges certain contextual and methodological limitations that provide relevant guidelines for future research.

Firstly, the empirical scope is deliberately confined to the EURO STOXX 50 constituents. Because this cohort exclusively comprises elite, highly capitalized, and heavily liquid European mega-corporations with baseline financial distress risks, the rejection of the hedging valuation premium cannot be universally extrapolated. It's highly plausible that the Smith and Stulz (1985) hypothesis holds true for smaller firms where the threat of bankruptcy is a tangible reality. Therefore, future research should apply this exact PSM-DiD methodology to broader, more diverse equity indices to investigate whether a causal valuation premium materializes in cohorts where bankruptcy costs are significant.

Secondly, while the reliance on the Hedge Intensity successfully captured the aggregate scale and complexity of the derivative portfolios, standardized corporate financial statements often lack the granularity required to perfectly differentiate between strict operational cash-flow hedges and

potentially speculative trading positions. The inherent opacity of off-balance-sheet disclosures restricts the ability to fully untangle the specific drivers of the observed agency costs.

Finally, while this study focuses exclusively on firm market value via Tobin's Q, future research could expand the dependent variable spectrum. Investigating how massive gross derivative exposures directly influence a firm's idiosyncratic stock volatility, its weighted average cost of capital or its specific credit spread would further illuminate exactly how the equity and debt markets independently price synthetic financial complexity.

References

Adler, M., & Dumas, B. (1983). International portfolio choice and corporation finance: A synthesis. The Journal of Finance, 38(3), 925–984. https://doi.org/10.1111/j.1540-6261.1983.tb02511.x

Ahmed, H., Fairchild, R., & Guney, Y. (2020). Is corporate hedging always beneficial? A theoretical and empirical analysis. The European Journal of Finance, 26(17), 1746–1780. https://doi.org/10.1080/1351847X.2020.1785909

Allayannis, G., Lel, U., & Miller, D. P. (2012). The use of foreign currency derivatives, corporate governance, and firm value around the world. Journal of International Economics, 87(1), 65–79. https://doi.org/10.1016/j.jinteco.2011.12.003

Allayannis, G., & Ofek, E. (2001). Exchange rate exposure, hedging, and the use of foreign currency derivatives. Journal of International Money and Finance, 20(2), 273–296. https://doi.org/10.1016/S0261-5606(00)00050-4

Allayannis, G., & Weston, J. P. (2001). The use of foreign currency derivatives and firm market value. The Review of Financial Studies, 14(1), 243–276. https://doi.org/10.1093/rfs/14.1.243

Altman, E. I. (1984). A further empirical investigation of the bankruptcy cost question. The Journal of Finance, 39(4), 1067–1089. https://doi.org/10.1111/j.1540-6261.1984.tb03893.x

Aretz, K., & Bartram, S. M. (2010). Corporate hedging and shareholder value. The Journal of Financial Research, 33(4), 317–371. https://doi.org/10.1111/j.1475-6803.2010.01278.x

Bank for International Settlements. (2023). OTC derivatives statistics at end-June 2023. BIS. https://www.bis.org/publ/otc_hy2311.htm

Bartram, S. M. (2007). Corporate hedging: Taking stock of the theory and evidence. International Review of Financial Analysis, 16(2), 113–140. https://doi.org/10.1016/j.irfa.2006.03.001

Bartram, S. M., Brown, G. W., & Conrad, J. S. (2011). The effects of derivatives on firm risk and value. Journal of Financial and Quantitative Analysis, 46(4), 967–999. https://doi.org/10.1017/S002210901100027X

Bartram, S. M., Brown, G. W., & Fehle, F. R. (2009). International evidence on financial derivatives usage. Financial Management, 38(1), 185–206. https://doi.org/10.1111/j.1755-053X.2009.01033.x

Bats, J., & Houben, A. (2020). Bank-based versus market-based financing: Implications for systemic risk. Journal of Banking & Finance, 114, Artigo 105776. https://doi.org/10.1016/j.jbankfin.2020.105776

Bessembinder, H. (1991). Forward Contracts and Firm Value: Investment Incentive and Contracting Effects. Journal of Financial and Quantitative Analysis, 26(4), 519–532. doi:10.2307/2331409

Bodnar, G. M., Giambona, E., Graham, J. R., & Harvey, C. R. (2019). A comparison of financial and operational hedging: Evidence from the field. Journal of Corporate Finance, 54, 88–108. https://doi.org/10.1016/j.jcorpfin.2018.11.006

Bodnar, G. M., Marston, R. C., & Hayt, G. S. (1998). 1998 Wharton survey of financial risk management by US non-financial firms. Financial Management, 27(4), 70–91. https://doi.org/10.2307/3666057

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. Journal of Econometrics, 225(2), 200–230. https://doi.org/10.1016/j.jeconom.2020.12.001

Cochran, W. G., & Rubin, D. B. (1973). Controlling bias in observational studies: A review. Sankhyā: The Indian Journal of Statistics, Series A, 35(4), 417-446.

Constâncio, V., Cabral, I., & Detken, C. (2021). The new financial stability architecture in the EU. In The Palgrave Handbook of European Banking (pp. 533–565). Palgrave Macmillan.

Duffie, D., & Huang, M. (1996). Swap rates and credit quality. The Journal of Finance, 51(3), 921–949. https://doi.org/10.1111/j.1540-6261.1996.tb02712.x

Faulkender, M. (2005). Hedging or market timing? Selecting the interest rate exposure of corporate debt. The Journal of Finance, 60(2), 931–962. https://doi.org/10.1111/j.1540-6261.2005.00751.x

Froot, K. A., Scharfstein, D. S., & Stein, J. C. (1993). Risk management: Coordinating corporate investment and financing policies. The Journal of Finance, 48(5), 1629–1658. https://doi.org/10.1111/j.1540-6261.1993.tb05123.x

Graham, J. R., & Smith, C. W. (1999). Tax incentives to hedge. The Journal of Finance, 54(6), 2241–2262. https://doi.org/10.1111/0022-1082.00187

Guay, W., & Kothari, S. P. (2003). How much do firms hedge with derivatives? Journal of Financial Economics, 70(3), 423–461. https://doi.org/10.1016/S0304-405X(03)00177-6

Hagelin, N., & Pramborg, B. (2004). Hedging foreign exchange exposure: Risk reduction from transaction and translation hedging. Journal of International Financial Management & Accounting, 15(1), 1–20. https://doi.org/10.1111/j.1467-646X.2004.00101.x

Hausman, J. A. (1978). Specification tests in econometrics. Econometrica, 46(6), 1251–1271. https://doi.org/10.2307/1913827

Hull, J. C. (2018). Options, futures, and other derivatives (10th ed.). Pearson.

Jin, Y., & Jorion, P. (2006). Firm value and hedging: Evidence from U.S. oil and gas producers. The Journal of Finance, 61(2), 893–919. https://doi.org/10.1111/j.1540-6261.2006.00858.x

Krippner, G. R. (2005). The financialization of the American economy. Socio-Economic Review, 3(2), 173–208. https://doi.org/10.1093/SER/mwi008

Leland, H. E. (1998). Agency costs, risk management, and capital structure. The Journal of Finance, 53(4), 1213–1243. https://doi.org/10.1111/0022-1082.00051

Madura, J. (2020). International financial management (14th ed.). Cengage Learning.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. The American Economic Review, 48(3), 261–297.

Roberts, M. R., & Whited, T. M. (2013). Endogeneity in empirical corporate finance. In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), Handbook of the Economics of Finance (Vol. 2, Part A, pp. 493–572). Elsevier. https://doi.org/10.1016/B978-0-44-453594-8.00007-0

Rubin, D. B. (1973). Matching to remove bias in observational studies. Biometrics, 29(1), 159–183. https://doi.org/10.2307/2529684

Shapiro, A. C. (1975). Exchange rate changes, inflation, and the value of the multinational corporation. The Journal of Finance, 30(2), 485–502. https://doi.org/10.1111/j.1540-6261.1975.tb01824.x

Šimaitė, G., & Keliuotytė-Staniulėnienė, G. (2022). Assessment of the impact of the usage of derivatives on the company's value. Financial Markets, Institutions and Risks, 6(4), 60–69. https://doi.org/10.21272/fmir.6(4).60-69.2022

Smith, C. W., & Stulz, R. M. (1985). The determinants of firms' hedging policies. Journal of Financial and Quantitative Analysis, 20(4), 391–405. https://doi.org/10.2307/2330757

Stulz, R. M. (1996). Rethinking risk management. Journal of Applied Corporate Finance, 9(3), 8–25. https://doi.org/10.1111/j.1745-6622.1996.tb00295.x

Tufano, P. (1996). Who manages risk? An empirical examination of risk management practices in the gold mining industry. The Journal of Finance, 51(4), 1097–1137. https://doi.org/10.1111/j.1540-6261.1996.tb04064.x

Appendices

Appendix A - Variables

Worldscope Database

The necessary information gathered from this database was:

- WC01001, Net Sales Or Revenues, Net sales or total revenues of the company;
- WC01151, Depreciation, Depletion And Amortization, Depreciation, depletion, and amortization of assets;
- WC01751, Net Income Available To Common, Net income available to common shareholders;
- WC02005, Cash & Equivalents Generic, Cash and cash equivalents (cash on hand and short-term investments);
- WC02051, Receivables (Net), Accounts receivable (net of allowance for doubtful accounts);
- WC02101, Inventories Total, Total inventories held by the company;
- WC02201, Current Assets Total, Total current assets (short-term assets);
- WC02999, Total Assets, Total assets of the company;
- WC03040, Accounts Payable, Accounts payable (short-term operational liabilities);
- WC03101, Current Liabilities Total, Total current liabilities (short-term debts and obligations);
- WC03255, Total Debt, Total debt of the company (short and long term);
- WC03995, Total Shareholders Equity, Total shareholders' equity;
- WC04601, Capital Expenditures (Additions To Fixed Assets), Capital expenditures (investments in fixed assets);
- WC04860, Net Cash Flow Operating Activities, Net cash flow from operating activities;

- WC08001, Market Capitalization, Market capitalization (total market value of the company's shares);
- WC18191, Earnings Before Interest and Taxes (EBIT), Earnings before interest and taxes (operating result);

- WC18286, Derivative Liabilities Non-Current, Non-current derivative liabilities (payable in the long term);
- WC18287, Derivative Liabilities Current, Current derivative liabilities (payable in the short term);
- WC18408, Derivative Assets Non-Current, Non-current derivative assets (realizable in the long term);
- WC18409, Derivative Assets Current, Current derivative assets (realizable in the short term);

The database currency values are expressed in thousand Euros (1000€).

Appendix B – Distribution throughout the company classification

Industry	Commodities		Consumer Durables		Consumer Non-Durables		Energy		Others		Telecommunications		Wholesale/Retail		Total geral	
Year	Derivative User	Total	Derivative User	Total	Derivative User	Total	Derivative User	Total	Derivative User	Total	Derivative User	Total	Derivative User	Total	Derivative User	Total
2005	0	2	5	19	0	3	0	1	1	4	1	1	0	3	7	32
2006	0	2	8	19	2	3	0	1	1	4	0	1	0	3	11	32
2007	2	2	17	19	2	3	1	1	4	4	1	1	1	3	28	33
2008	2	2	19	19	3	3	1	1	4	4	1	1	1	3	31	33
2009	2	2	19	19	3	3	1	1	4	4	1	1	2	3	32	33
2010	2	2	19	19	3	3	1	1	4	4	1	1	2	3	32	33
2011	2	2	19	19	3	3	1	1	4	5	1	1	2	3	32	33
2012	2	2	18	19	3	3	1	1	3	5	1	1	2	3	30	33
2013	2	2	20	20	3	3	1	1	3	4	1	1	2	3	32	34
2014	2	2	20	20	3	3	1	1	3	5	1	1	2	3	32	34
2015	2	2	20	20	3	3	1	1	3	5	1	1	2	3	32	34
2016	2	2	19	20	3	3	1	1	3	5	1	1	1	3	30	34
2017	2	2	19	21	3	3	1	1	4	6	1	1	1	3	31	37
2018	2	2	19	21	3	3	1	1	5	7	1	1	1	3	32	38
2019	2	2	19	21	3	3	1	1	5	7	1	1	1	3	32	38
2020	2	2	19	21	3	3	1	1	4	7	1	1	0	3	30	37
2021	2	2	19	21	3	3	1	1	4	7	1	1	1	3	31	37
2022	2	2	19	21	3	3	1	1	4	7	1	1	1	3	31	37
2023	2	2	19	21	3	3	1	1	4	7	1	1	1	3	31	37
2024	2	2	20	21	3	3	1	1	4	7	1	1	1	3	32	37
Totals	36	40	356	400	55	60	18	20	71	108	19	20	24	60	579	696

Industry	Name	SIC CODE
Consumer Durables	ADIDAS (XET)	3149
	AIRBUS	3721
	ASML HOLDING	3559
	BASF (XET)	2821
	BAYER (XET)	2834
	BMW (XET)	3711
	ESSILORLUXOTTICA	3851
	FERRARI (MIL)	3711
	HERMES INTL.	3199
	INFINEON TECHS. (XET)	3674
	L AIR LQE.SC.ANYME. POUR L ETUDE ET L EPXTN.	2813
	L'OREAL	2844
	MERCEDES-BENZ GROUP(XET) N	3711
	RHEINMETALL (XET)	3714
	SAFRAN	3724
	SANOFI	2834
	SCHNEIDER ELECTRIC	3643
	SIEMENS (XET)	3699
	SIEMENS ENERGY N (XET)	3511
	TOTALENERGIES	2911
	VOLKSWAGEN PREF. (XET)	3711
Consumer Non-Durables	ANHEUSER-BUSCH INBEV	2082
	DANONE	2023
	LVMH	2329
Energy	ENI	1311
Others	ADYEN	7372
	ARGENX	8731
	DEUTSCHE POST (XET)	4311
	PROSUS N	7375
	SAP (XET)	7372
	VINCI	1611
	WOLTERS KLUWER	7372
Telecommunications	DEUTSCHE TELEKOM (XET)	4812
Wholesale/Retail	INDITEX	5651
	KONINKLIJKE AHOLD DELHAIZE	5411
	SAINT GOBAIN	5039