THE USE OF CORPORATE DERIVATIVES: EFFECTS ON FIRM VALUE IN THE ITALIAN MARKET

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Abstract

It is an empirical question whether the use of derivatives hedging among firms actually contributes to enhancing firm performances. Despite the increasing use of derivatives by non-financial firms, existing literature still debates about their effect, especially in countries with peculiar corporate governance mechanisms. By using a sample of non-financial Italian firms listed from 2007 to 2018, this paper investigates if the use of several types (currency, interest rate, and commodity) of financial derivatives can affect the value of a company. For measuring the impact of the derivatives and in order to address any possible endogeneity problem, besides using the conventional methodologies applied by previous literature (fixed-effect regression models and system GMM estimators), we run a random forest model, a machine learning technique not yet applied before in this field, and calculate the relative importance of each independent and control variable. Differently from other European countries, findings show that the use of derivatives does not affect the firm value in the Italian market. Therefore, our results confirm the role of corporate governance mechanisms on the relationship between firm value and the use of derivatives and that their impact is country-specific.

Keywords: Derivatives, Hedging, Financial Risk Management, Corporate Decisions, Firm Value

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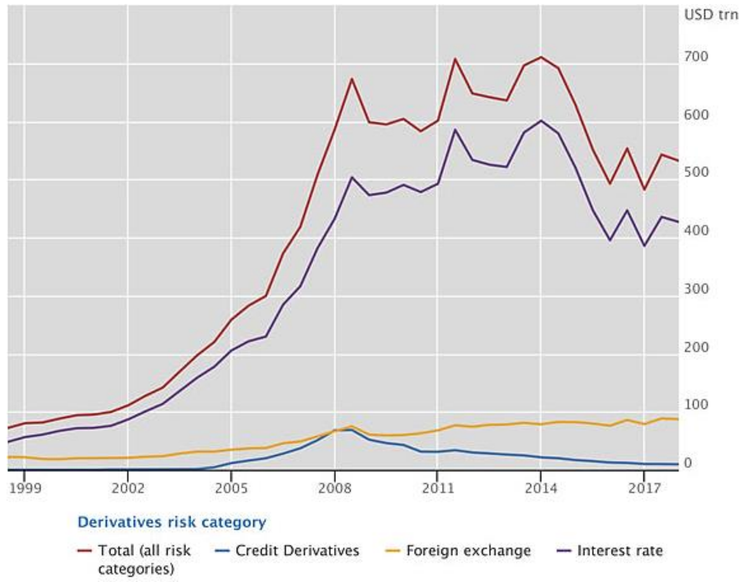
1. INTRODUCTION

Derivatives have a relevant role in corporate decisions: they are the typical financial instruments used by the management of a company for managing financial risks. Therefore, since these tools can reduce the volatility of cash flows, they can have a primary role inside a company, as a consequence, it is fundamental to develop analytics able to predict their effects on firm performances.

During the last decades, the use of derivatives, despite the increasing complexity, has become widespread in the risk management of the companies (Min & Yang, 2019), also among SMEs. As shown in Figure 1, the total notional amount of global derivatives has increased from $72 trillion in 1998 to more than $500 trillion in 2019.

Figure 1. Over-the-counter (OTC) derivatives notional amount outstanding by risk category



Source: https://www.bis.org/statistics/about_derivatives_stats.htm?m=6%7C32%7C639.

As a result, the researcher's interest in the role and the effects of the derivatives has increased significantly. The primary scope of these financial instruments is (or at least should be) to mitigate the consequences of undesirable risks that a firm can face, and, therefore, they could impact the valuation of a company. Despite the classic Modigliani and Miller's (1958) paradigm, according to which risk management is irrelevant to the firm, more recent theories (e.g., Smith & Stulz, 1985; Bessembinder, 1991; Froot, Scharfstein, & Stein, 1993; Leland, 1998) suggest that hedging can create value for a firm. However, despite the relevant number of studies on the use of derivatives and their relationship with the firm value, the results are still contradictory and mixed (Campbell, Mauler, & Pierce, 2019; Bachiller, Boubaker, & Mefteh-Wali, 2021), therefore not useful for developing the appropriate analytics for corporate decisions. For example, some authors (Allayannis & Weston, 2001; Graham & Rogers, 2002; Rountree, Weston, & Allayannis, 2008; Pérez-González & Yun, 2013) found that the firm value is positively correlated with the use of derivatives. On the contrary, other researchers (Guay & Kothari, 2003; Jin & Jorion, 2006; Khediri & Folus, 2010) did not find any significant relationship between these two variables.

As highlighted by Campbell et al. (2019), due to the increasing use of derivatives by non-financial firms and their practical consequences, future research needs to revisit and answer the question about the effects of these financial instruments on firm value. Therefore, the objective of this research is to verify the relationship between firm value, measured as Tobin Q, and the use of derivatives, measured both through a dummy variable, their notional value, and their fair value.

Moreover, despite the relevant number of studies in this field, previous researches have not deeply analyzed the relationship between the use of derivatives and firm value in countries with peculiar and corporate governance features (Bachiller et al., 2021). Top executives can use derivatives in order to reach and maximize their own utility rather than increasing firm value (Smith & Stulz, 1985), thus, an analysis of the country corporate governance practices is required since their absence, or their poor application, can lead to higher agency costs and, thus, affect the firm performances and value. However, existing literature still debates about the possibility of a premium (Allayannis, Lel, & Miller, 2012) or a discount (Khediri & Folus, 2010) for hedgers in countries with a not completely developed corporate governance structure that can impact the risk disclosure of the companies (Fernandes, Bornia, & Nakamura, 2019; Li & Qian, 2020) differently from the US case. These differences are even more perceptible in the Italian framework, the target country of this paper since it is characterized by the presence of poor corporate governance practices (Owen, Kirchmaier, & Grant, 2006; Cortesi, Tettamanzi, & Corno, 2009) and dominant shareholders, which can distort the way derivatives are used by managers (Scafarto, Ricci, Della Corte, & De Luca, 2017). Therefore, this paper can contribute by expanding literature in this field by analyzing a sample of Italian companies, where companies tend to have concentrated ownership, and by also introducing a corporate governance variable, a factor not used in previous researches but with a crucial role (Allayannis et al., 2012).

Thus, the aim of our study is to answer the following questions:

RQ1: Does the use of derivatives for hedging purposes impact the value of a company?

RQ2: Do the corporate governance variables affect the relationship between the use of derivatives and firm value?

By answering these questions, we can contribute to the current literature by better analyzing the linkage between firm value and the use of derivatives and if the country's corporate governance practices can affect the results.

Another contribution of this paper is represented by its methodology. Firstly, in order to try to capture over the long term the effect of these instruments, the time horizon covered is about 12 years which is longer than the one of previous studies, which has never overcome 7 years (Ayturk, Gurbuz, & Yanik, 2016). Furthermore, existing research has measured the use of derivatives through mainly a dummy variable, which "does not capture the actual economic effect of derivative use on firms" (Campbell et al., 2019, p. 30), while in this paper, also the notional and the fair value of the derivatives is collected in order to measure more precisely the impacts of a derivative. Finally, despite using the classic methodologies applied by previous literature (fixed-effect regression models and system GMM estimators), we also run a random forest model, a machine learning technique not yet applied in this field.

Final results, confirmed by various robustness controls, show that no statistically significant relationship exists between firm value and hedging. This has a high impact from an academic and practical perspective: if the use of derivatives does not impact the firm value, this confirms the classic Modigliani and Miller's (1958) paradigm, according to which risk management is irrelevant to the firm. Moreover, for the accounting foundations, results confirm the necessity of a clearer disclosure in the balance sheet of the companies linked to the possible consequences and effects related to the use of the derivatives. Given the inability of users to understand companies' off-balance-sheet risk, it is a necessity for companies to improve their disclosure of material economic risks. Moreover, the final results confirm that country-specific corporate governance features can affect the impact of the use of derivatives on firm value.

The remainder of this paper is structured into four sections. The second section reports a review of the literature on the impact of the use of derivatives on firms' value, followed by the third section which describes the methodology employed in the study. The fourth section reports the results, while in the last section, the paper concludes with a discussion of the findings and the implications for future research.

2. LITERATURE REVIEW

Scholars still share different opposite views about the possible impacts of the use of risk management practices on firm value. Several authors showed that there are various benefits linked to the use of derivatives, like the possibility to raise debt capacity and interest deductions thanks to tax benefits (Graham & Rogers, 2002). Furthermore, the use of derivatives as a risk management tool is appreciated by investors since these instruments can lead to a decrease of the cash flow's volatility and, thus, of a firm's risk (Rountree et al., 2008).

On the contrary, some researchers think that the use of derivatives should negatively impact firm value since 1) they can be used by managers for self-purpose rather than in the interest of the firm (Knopf, Nam, & Thornton, 2002); 2) companies use these financial tools mainly for speculative reasons (Adam, Fernando, & Salas, 2017). However, other authors think that risk management policies should not impact the firm value (Modigliani & Miller, 1958).

Therefore, from the 2000s, a stream of research started to directly examine the impact of the use of derivatives on firm value, however, despite the richness of papers in this field, the results are still contradictory and concentrated in just a few countries (Campbell et al., 2019).

The first researches were focused only on the US market covering only a small period and finding in general a positive impact between the use of derivatives and firm value (Allayannis & Weston, 2001). However, as mentioned before, results are mixed and several authors, also in the US market, (Guay & Kothari, 2003; Jin & Jorion, 2006; Magee, 2013) did not find any relationship between the use of derivatives and firm value.

Other groups of studies investigated the value relevance of derivatives by focusing on specific industries like banks (Bischof, 2009; Broccardo, Mazzuca, & Yaldiz, 2014; Huan & Parbonetti, 2019), the airline sector (Carter, Rogers, & Simkins, 2006) and the oil industry (Lookman, 2004; Jim & Jorion, 2006; Mackay & Moeller, 2007; Phan, Nguyen, & Faff, 2014) or on the use of specific derivatives like weather derivatives (Pérez-González & Yun, 2013). From 2010, literature started to consider also other countries, finding also in this case either a positive (Clark & Mefteh-Wali, 2010; Bartram, Brown, & Conrad, 2011; Allayannis et al., 2012), a negative impact (Khediri & Folus, 2010; Wen, Kang, Qin, & Kennedy, 2021) or a negligible effect on firm value (Belghitar, Clark, & Mefteh, 2013; Ayturk et al., 2016).

Therefore, the difference in results among scholars could be, also, explained by the country-specific characteristics of the sample used in the analysis. As highlighted by Bachiller et al. (2021), these contradictions are more evident between US and European markets due to the application of different corporate governance practices. In particular, the ownership concentration can affect the relationship between firm value and use of derivatives and, thus, is considered to be one of the most significant corporate governance variables in this field (Khediri & Folus, 2010). However, authors still debate about the linkage between ownership concentration and firm value (Scafarto et al., 2017). Ownership concentration can be considered an efficient tool for controlling and managing agency costs and, thus, enhancing the firm performance (Carney & Gedajlovic, 2001). On the contrary, ownership concentration can even result in more relevant agency costs since the presence of dominant shareholders could undermine the quality of the business choices of the top executives of a company (La Porta, Lopez-de-Silanes, & Shleifer, 1999). In this sense, Khediri and Folus (2010), using only French data, found that "hedgers" have lower firm value. According to their opinion, their results are due to the high ownership concentration and weak investor protection in France, whose features are similar to the Italian case. Similarly, Allayannis et al. (2012), by using an international sample of firms from thirty-nine countries with significant exchange-rate exposure, found that a significant premium exists for users only for firms with strong corporate governance. However, further research is needed on the possible existence of a premium or a discount for hedgers in countries with peculiar corporate governance mechanisms (Bachiller et al., 2021).

Therefore, from the review of current literature, it is clear that findings are still mixed (Campbell et al., 2019; Bachiller et al., 2021) and the linkage between the use of derivatives and firm value remains unclear with both positive and negative evidence. As highlighted by several authors (Aretz & Bartram, 2010; Campbell et al., 2019; Bachiller et al., 2021), it is a necessity to expand current literature by covering more recent and longer periods and including new countries with peculiar corporate governance practices, which is the aim of this paper. In particular, the Italian case has unique features since the majority of companies are owned by large and dominant shareholders and tend to have inadequate corporate governance practices (Cortesi et al., 2009), all features that can affect the impact of the use of derivatives (Bachiller et al., 2021).

Furthermore, from a methodological point of view, the majority of the past authors has used only a few variables for capturing the actual economic effect of derivative use on firms (predominantly a dummy variable for "hedgers") (Campbell et al., 2019), while in this paper also the notional, the fair value and the type of the derivatives are collected. Moreover, past research mainly focused on the use of fixed-effect regression models without considering the risk of endogeneity between a firm's value and hedging (Jin & Jorion, 2006; Magee, 2013; Ayturk et al., 2016). Thus, the introduction of new methodologies, like machine learning techniques, the methodology applied in this paper, could have a significant impact on the use of derivatives.

3. RESEARCH FRAMEWORK

The sample includes 190 publicly traded stocks of non-financial firms listed on the Italian Stock Exchange (*Borsa Italiana*), precisely from the MTA market. We collect the data between 2007 and 2018 from Datastream Thomson Reuters for a total of 1922 observations. We choose not to include the AIM market, which is characterized by a great variety of small companies (e.g., companies with revenues under €10 million), since we prefer to include firms listed on the main Italian market which are typical of a larger size and tend to disclose more information. Moreover, companies listed on the AIM market can apply the ITA GAAP, which have some peculiarities, in comparison with the IAS/IFRS, in the valuation of derivatives (Tron & Inserra, 2018). Thus, their inclusion would have created a relevant heterogeneity in the sample which could have affected the findings.

The characteristics (industry and year distribution) of the sample are shown in Table 1.

Table 1. Industry and year distribution

Year	*Observations*	*Industry*	*Observations*
2007	146	Utilities	183
2008	147	Telecommunication	56
2009	147	Real Estate	98
2010	148	Consumer Discretion	580
2011	151	Industrials	522
2012	153	Health Care	87
2013	156	Basic Materials	74
2014	159	Consumer Staples	104
2015	168	Technology	159
2016	175	Energy	59
2017	185		
2018	187		

Note: The table reports the number of observations for each year and industry.

The data are collected from 2007 since this is the effective date of application of IFRS 7 which requires companies to disclose more information about the nature and extent of risks arising from the use of financial instruments (such as nominal value, maturity, type, and purpose of derivatives use). According to the IFRS 7, this rule must be applied by all entities to all types of financial instruments, with some exceptions such as insurance contracts. Management should, therefore, disclose for each type of risk (credit risk, liquidity risk, and market risk, for other details, see PwC, 2010, or EY, 2017)) arising from financial instruments:

- *Qualitative disclosure:* The risk the company is exposed to and what are the procedures used for measuring and controlling it (IFRS 7 paragraph 33).
- *Quantitative disclosure:* A summary of various quantitative data about risk exposure (IFRS 7 paragraph 34).

Derivatives data are hand-collected by the analysis of the financial statements of the companies (downloaded from their website in the section "Investor Relation"). Similarly to Panaretou (2014) and Ayturk et al. (2016), in order to collect the data, we search the following words: "derivative", "hedge", "forward", "swap", "option", "futures", "interest rate risk", "exchange rate risk" and "financial risk" in the financial statements.

3.1. Dependent variable

In the empirical model, the firm value is measured using the Tobin's Q ratio, since, as shown by Wernerfelt and Montgomery (1988), it is forward-looking and less susceptible to accounting practices. To check the robustness of our results, we employ two alternative measures for Tobin's Q ratio. Firstly, Tobin's Q ratio is defined as (Chung & Pruitt, 1994; Allayannis & Weston, 2001; Jin & Jorion, 2006; Bartram et al., 2011; Panaretou, 2014; Ayturk et al., 2016):

$$Tobin's\ Q\ 1 = (Market\ value\ of\ equity + Book\ value\ of\ preferred\ stocks + Book\ value\ of\ debt) / Total\ assets \quad (1)$$

As suggested by Hirsch and Seaks (1993), it is preferable to use the natural logarithm transformation of Tobin's Q ratio due to its statistical properties. For the calculation of the book value of preferred stocks, we collect the data from Datastream.

Secondly, Tobin's Q ratio can be also defined as (Allayannis et al., 2012; Panaretou, 2014):

$$Tobin's\ Q\ 2 = (Market\ value\ of\ equity + Total\ assets - Book\ valure\ of\ equity)/\ Total\ assets \quad (2)$$

3.2. Independent variables

We use six different measures as indicators of financial derivatives.

- *DERIVATIVE USER:* A dummy variable that is equal to 1 when a company uses a derivative.
- *NOTIONAL:* The ratio of the total notional value of derivative instruments to the book value of total assets.
- *FAIR VALUE:* The ratio of the fair value of derivative instruments to the book value of total assets.
- *CURRENCY:* A dummy variable that is equal to 1 when a company uses a currency derivative.
- *INTEREST RATE:* A dummy variable that is equal to 1 when a company uses an interest rate derivative.
- *COMMODITY:* A dummy variable that is equal to 1 when a company uses a commodity derivative.

3.3. Control variables

Based on existing literature, we employ the following control variables:

- *SIZE:* It is the natural logarithm of total assets. Various authors have shown that size affects value (Peltzman, 1977; Mueller, 1987; Lang & Stulz, 1994) although results are ambiguous (Jin & Jorion, 2006). We expect that larger firms tend to hedge more than small firms.
- *ROA:* This variable is calculated using net income divided by total assets. We expect a positive coefficient for this variable (Allayannis & Weston, 2001; Jin & Jorion, 2006; Panaretou, 2014).
- *OWNERSHIP:* This variable was included in order to consider the particular characteristics of an Italian sample. This variable measures the level of concentration of ownership, and it is measured as the ratio of shares held by the majority shareholder to the total shares outstanding.
- *ACCESS TO FINANCIAL MARKETS:* A dummy variable that is equal to one if the firm paid a dividend in the current year and 0 otherwise. If the firm has limited access to financial markets, then Tobin's Q should be high since it employs capital only in high net present value (NPV) investments. We expect the variable to have a negative coefficient (Allayannis & Weston, 2001; Jin & Jorion, 2006; Panaretou, 2014).
- *LEVERAGE:* The book value of long-term debt over the market value of common equity. This variable should capture the possible effects of capital structure (Jin & Jorion, 2006; Panaretou, 2014).
- *INVESTMENT GROWTH:* The ratio of capital expenditures to total sales (Capex/Sales). Since investment opportunities can affect firm value, we expect the variable to be positively related to Tobin's Q (Allayannis & Weston, 2001; Jin & Jorion, 2006; Panaretou, 2014).
- *TIME EFFECT:* We control for time effects by using year dummies.
- *GEOGRAPHIC DIVERSIFICATION:* Several studies (Morck & Yeung, 1991; Bodnar, Weintrop, & Tang, 1999; Doukas & Travlos, 1988) showed that internalization is positively correlated with value. To capture this effect, we use the ratio of foreign sales to total sales.
- *LIQUIDITY:* The ratio of cash and cash equivalents to current liabilities.
- *INDUSTRY EFFECT:* Wernerfelt and Montgomery (1988) suggested that Tobin's Q is affected by the firm's industry. For capturing this effect, we use industry dummies and Industry adjusted Tobin's Q ratio. Industry-adjusted Tobin s Q ratio is calculated as the difference between the natural logarithm of a firm's Q-ratio and the industry median of log-transformed Tobin's Q ratio (Panaretou, 2014).

Table 2 presents the descriptive statistics of the panel data. Derivative users tend to be more profitable, larger in size, and have a higher foreign sales/sales ratio. They also have higher leverage and are more likely to pay dividends. On the other hand, hedgers have lower capital expenditures/sales ratio and lower Tobin's Q values.

We also compare Tobin's Q values between Users and Not Users across 2007–2018. Not Users have systematically outperformed Users.

Correlations are reported in Table 3. We also performed the VIF test, without having any signs of serious multicollinearity requiring correction.

Table 2. Descriptive statistics

Variable	*N*	*Mean*	*Std. Dev.*	*P1*	*P50*	*P99*
			All firms			
Tobin's Q 1	1922	0.97	0.78	0.21	0.75	4.35
Ln Tobin's Q 1	1922	-0.22	0.60	-1.57	0.08	1.47
Tobin's Q 2	1922	1.32	0.78	0.43	1.09	4.60
Ln Tobin's Q 2	1922	0.17	0.42	-0.84	0.09	1.53
INDUSTRY EFFECT	1922	0.03	0.56	-1.30	0.00	1.60
			Users			
Tobin's Q 1	1364	0.92	0.70	0.24	1.01	4.23
Ln Tobin's Q 1	1364	-0.25	0.54	-1.44	-0.30	1.44
Tobin's Q 2	1364	1.26	0.68	0.60	1.07	4.55
Ln Tobin's Q 2	1364	0.14	0.38	-0.52	0.07	1.44
OWNERSHIP	1364	0.45	0.20	0.05	0.50	0.74
INDUSTRY EFFECT	1364	0.03	0.49	-1.13	0.00	1.57
NOTIONAL	1152	0.18	0.18	0.00	0.13	0.77
FAIR VALUE	1335	-0.01	0.07	-0.07	-0.00	0.04
ROA	1364	0.02	0.07	-0.24	0.22	0.18
ACC. FIN. MKT.	1364	0.66	0.47	0.00	1.00	1.00
INVESTMENT GROWTH	1361	0.21	2.47	0.00	0.36	1.83
LEVERAGE	1360	1.21	5.51	0.00	0.41	12.72
GEOGRAPHIC DIVERSIFICATION	1363	0.38	0.36	0.00	0.33	1.00
Ln SIZE	1364	13.78	1.83	10.3	13.54	18.71
LIQUIDITY	1308	0.26	0.35	0.00	0.16	1.52
			Not Users			
Tobin's Q 1	558	1.08	0.94	0.18	0.82	5.08
Ln Tobin's Q 1	558	-0.17	0.72	-1.70	-0.20	1.62
Tobin's Q 2	558	1.46	0.96	0.38	1.22	5.47
Ln Tobin's Q 2	558	0.24	0.51	-0.96	0.20	1.70
OWNERSHIP	559	0.46	0.24	0.05	0.51	0.80
INDUSTRY EFFECT	558	0.03	0.69	-1.48	0.05	1.71
ROA	558	-0.02	0.22	-0.63	0.00	0.37
ACC. FIN. MKT.	559	0.36	0.48	0.00	0.00	1.00
INVESTMENT GROWTH	556	0.31	3.18	0.00	0.02	3.12
LEVERAGE	553	0.44	0.94	0.00	0.13	4.25
GEOGRAPHIC DIVERSIFICATION	559	0.17	0.29	0.00	0.00	0.91
Ln SIZE	558	11.76	1.19	9.08	11.84	14.39
LIQUIDITY	526	0.28	0.63	0.00	0.06	3.11

Notes: Descriptive statistics for "Users" (user of derivatives) and "Not Users" (no user of derivatives). Tobin's Q 1 is Tobin's Q calculated with the first methodology, while Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1. Tobin's Q 2 is Tobin's Q calculated with the second methodology, while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets.

Figure 2. Tobin's Q of Users and Not Users between 2007 and 2018

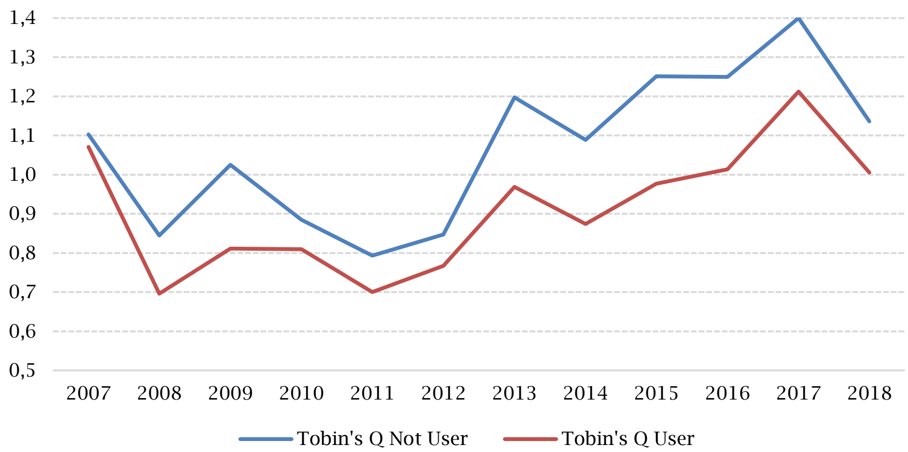


Table 3. Correlation

	Ln Tobin's Q 1	*Ln Tobin's Q 2*	*DERIVATIVE USER*	*CURRENCY*	*INTEREST RATE*	*COMMODITY*	*NOTIONAL*	*FAIR VALUE*	*OWNERSHIP*	*ROA*	*ACC. FIN. MKT.*	*INVESTMENT GROWTH*	*LEVERAGE*	*GEOGRAPHIC DIVERSIFICATION*	*Ln SIZE*	*LIQUIDITY*
Ln Tobin's Q 1	1.00															
Ln Tobin's Q 2	0.8823***	1.00														
DERIVATIVE USER	-0.0604***	-0.1026***	1.00													
CURRENCY	0.0095	0.0253	0.5826***	1.00												
INTEREST RATE	-0.1065***	-0.1311***	0.8264***	0.3894***	1.00											
COMMODITY	-0.1510***	-0.1500***	0.2464***	0.3073***	0.1921***	1.00										
NOTIONAL	-0.0042	-0.0322	0.4768***	0.3985***	0.4278***	0.2278***	1.00									
FAIR VALUE	0.0259	0.0347	-0.0464**	0.0720***	-0.0555**	0.0096	0.0173	1.00								
OWNERSHIP	0.0540**	0.0554**	-0.0273	-0.0146	-0.0661***	-0.0899***	-0.0204	-0.0345	1.00							
ROA	0.1608***	0.1473***	0.1169***	0.1419***	0.0743***	0.0297	0.0514**	0.0056	0.0592***	1.00						
ACC. FIN. MKT.	0.1306***	0.0855***	0.2785***	0.3064***	0.2129***	0.1634***	0.1519***	-0.0213	0.0334	0.2756 ***	1.00					
INVESTMENT GROWTH	0.0313	0.0045	-0.0173	-0.0589***	-0.0048	-0.0249	0.0066	-0.0048	0.0325	-0.0194	-0.0677***	1.00				
LEVERAGE	-0.0631***	-0.1120***	0.0745***	-0.0431*	0.0967***	-0.0054	0.0396	-0.0086	-0.0059	-0.0876***	-0.0856***	0.0034	1.00			
GEOGRAPHIC DIVERSIFICATION	0.1112***	0.1221***	0.2751***	0.4237***	0.1560***	0.1251***	0.1841***	0.0492**	-0.0086	0.0951***	0.1831***	-0.0629***	-0.0565**	1.00		
Ln SIZE	-0.1300***	-0.1390***	0.4818***	0.5018***	0.4691***	0.3844***	0.3978***	-0.0071	-0.0793***	0.1401***	0.3703***	-0.0427*	0.0751***	0.2855***	1.00	
LIQUIDITY	0.1625***	0.0919***	-0.0205	0.0136	-0.0509**	-0.0307	-0.0172	0.0028	0.0581**	0.0920***	0.0784***	-0.0186	-0.0178	0.0240	0.0087	1.00

*Notes: ***, **, and * indicates statistically significant levels of 1%, 5%, and 10%, respectively.*
Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1 while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets. The variable GEOGRAPHIC DIVERSIFICATION reports the variable geographic diversification.

As a first method, we develop an OLS model using time and industry-fixed effects by clustering standard errors in order to deal with both heteroskedasticity and autocorrelation (Petersen, 2009). In order to choose between the random effect and the fixed-effect model, we performed the Hausman test, which is statistically significant confirming the choice of the fixed-effect model.

$$Y_{it} = \alpha + \beta * DERIVATIVE\ USER + \delta * X_{it} + u_{it}$$
$$Y_{it} = \alpha + \beta * NOTIONAL + \delta * X_{it} + u_{it} \quad (3)$$
$$Y_{it} = \alpha + \beta * FAIR\ VALUE + \delta * X_{it} + u_{it}$$

where, Y_{it} is the natural logarithm of Tobin's Q. As mentioned before, in order to run also robustness check analysis, different definitions of Tobin's Q were used: Tobin's Q 1, Tobin's Q 2, and Industry adjusted Tobin's Q ratio. X_{it} is the series of control variables.

4. RESULTS

Firstly, using the panel data, we estimate the coefficients using a fixed effect regression model for a total of 9 models (see Table 4).

Table 4. The estimation of coefficients using a fixed effect regression model

Dependent variable	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry effect*	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry Effect*	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry effect*
Models	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***	***(9)***
Independent variables									
DERIVATIVE USER	-0.040	-0.057	-0.040						
	(0.053)	(0.038)	(0.051)						
NOTIONAL				-0.018	0.030	-0.002			
				(0.074)	(0.082)	(0.073)			
FAIR VALUE							-0.030	-0.073*	0.051
							(0.084)	(0.037)	(0.085)
OWNERSHIP	0.007	-0.051	0.014	0.042	-0.046	0.050	0.009	-0.051	0.020
	(0.286)	(0.213)	(0.281)	(0.302)	(0.228)	(0.290)	(0.287)	(0.213)	(0.282)
ROA	0.432***	0.306***	0.400***	0.407***	0.292***	0.384***	0.435***	0.310***	0.403***
	(0.145)	(0.076)	(0.139)	(0.139)	(0.075)	(0.137)	(0.147)	(0.079)	(0.141)
ACC. FIN. MKT.	0.103***	0.053***	0.090***	0.115***	0.062***	0.105***	0.103***	0.054***	0.090***
	(0.027)	(0.020)	(0.024)	(0.027)	(0.020)	(0.024)	(0.027)	(0.020)	(0.025)
INVESTMENT GROWTH	0.011***	0.007***	0.008***	0.010***	0.007***	0.008***	0.011***	0.007***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
LEVERAGE	0.006	0.004	0.005	0.006	0.004	0.005	0.006	0.003	0.004
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GEOGRAPHIC DIVERSIFICATION	0.038	0.043	0.021	0.049	0.049	0.031	0.039	0.041	0.022
	(0.066)	(0.051)	(0.064)	(0.072)	(0.054)	(0.069)	(0.067)	(0.052)	(0.065)
Ln SIZE	-0.075	-0.068	-0.073*	-0.102**	-0.092*	-0.098**	-0.082*	-0.078*	-0.080*
	(0.046)	(0.044)	(0.044)	(0.049)	(0.049)	(0.047)	(0.048)	(0.046)	(0.046)
LIQUIDITY	-0.010	-0.066**	-0.014	-0.023	-0.075**	-0.027	-0.009	-0.064*	-0.012
	(0.043)	(0.033)	(0.042)	(0.042)	(0.032)	(0.041)	(0.042)	(0.033)	(0.041)
Constant	0.944	1.273**	1.043*	1.241**	1.533**	1.318**	1.010	1.361**	1.116*
	(0.599)	(0.586)	(0.573)	(0.628)	(0.632)	(0.610)	(0.617)	(0.605)	(0.589)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No	No	No	No	No
Observations	1,819	1,819	1,819	1,609	1,609	1,609	1,809	1,809	1,809
R-squared	0.245	0.235	0.083	0.245	0.242	0.093	0.245	0.234	0.083

*Notes: ***, **, and * indicates statistically significant levels of 1%, 5%, and 10%, respectively. Models 1–3 use as independent variable the DERIVATIVE USER. Models 4–6 use as independent variable the variable NOTIONAL. Models 7–9 use as independent variable the variable FAIR VALUE. Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1 while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets.*

The number of observations is significantly lower where the independent variable *NOTIONAL VALUE* is used since many companies did not report in their financial statements any information about this indicator. Except for Model 8, where the coefficient of the variable *FAIR VALUE* is positive, all derivatives coefficients are not statistically significant. The coefficient is -0.073, suggesting the possible existence of a hedging discount. This discount could be explained by the fact that in many cases information about derivatives is not clearly reported. This could cause a series of drawbacks: limited knowledge of derivatives counterparty and credit risk, underestimation of leverage due to the use of derivatives, and limited ability to evaluate hedge effectiveness. Therefore, this missing data could hurt valuations carried out by investors.

However, except for one coefficient, the results are not statistically significant. As a consequence, these first models raise the evidence of no relationship between the use of derivatives and the values of companies. These results are similar to the ones of Jin and Jorion (2006) and Belghitar et al. (2013). These results could be explained by the fact the size of the fair value, which can be considered the most reliable indicator in measuring the possible economic and financial impact due to the use of a derivative, is relatively small on average (minus than 1% of the value of the asset of a company).

Therefore, the effects of the derivatives are not sufficiently large to affect the performances of the company contained in the sample.

Moreover, the results suggest that some control variables can explain the firm value. *ROA* is statistically significant at 1% with a strong positive coefficient in all models. The payment of dividends, contrary to our expectations, and the variable *INVESTMENT GROWTH* (capex over sales ratio) are statistically significant at 1% with a positive coefficient in all models. Despite the features of the Italian sample, the variable *OWNERSHIP* is not statistically significant.

Therefore, these results, in line with all Chen, Cheung, Stouraitis, and Wong (2005) and Claessens and Djankov (1999), show that concentrated ownership is not significantly linked with higher firm valuation. As suggested by Chen et al. (2005), this could be explained by the existence of moderate levels of family ownership or agency costs. Moreover, probably, the firm performance and, thus, the firm value are more affected by the type of owner (e.g., family, fund) (Claessens & Djankov, 1999). Secondly, we estimate the impact of various derivatives (currency, interest rate, and commodity) on the value of a company (see Table 5).

Table 5. The impact of various derivatives (currency, interest rate, and commodity) on the value of a company

Dependent variable	***Ln Tobin's Q 1***	***Ln Tobin's Q 2***	***Industry effect***	***Ln Tobin's Q 1***	***Ln Tobin's Q 2***	***Industry effect***	***Ln Tobin's Q 1***	***Ln Tobin's Q 2***	***Industry effect***
Models	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***	***(7)***	***(8)***	***(9)***
Independent variables									
DERIVATIVE USER (Currency)	-0.015	-0.000	-0.005						
	(0.057)	(0.045)	(0.057)						
DERIVATIVE USER (Interest rate)				-0.005	-0.012	-0.006			
				(0.047)	(0.038)	(0.045)			
DERIVATIVE USER (Commodity)							-0.015	0.086	-0.018
							(0.080)	(0.143)	(0.073)
OWNERSHIP	0.011	-0.044	0.019	0.012	-0.049	0.017	0.012	-0.034	0.018
	(0.284)	(0.210)	(0.279)	(0.280)	(0.209)	(0.276)	(0.286)	(0.200)	(0.281)
ROA	0.432***	0.308***	0.401***	0.432***	0.308***	0.401***	0.432***	0.308***	0.401***
	(0.145)	(0.078)	(0.140)	(0.145)	(0.077)	(0.139)	(0.145)	(0.078)	(0.140)
ACC. FIN. MKT.	0.100***	0.051***	0.087***	0.099***	0.050**	0.087***	0.100***	0.050***	0.087***
	(0.026)	(0.019)	(0.024)	(0.026)	(0.019)	(0.024)	(0.026)	(0.019)	(0.024)
INVESTMENT GROWTH	0.011***	0.007***	0.008***	0.011***	0.007***	0.008***	0.011***	0.007***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
LEVERAGE	0.006	0.003	0.004	0.006	0.003	0.004	0.006	0.003	0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GEOGRAPHIC DIVERSIFICATION	0.046	0.048	0.028	0.045	0.048	0.028	0.046	0.046	0.028
	(0.066)	(0.050)	(0.064)	(0.066)	(0.051)	(0.064)	(0.066)	(0.049)	(0.064)
Ln SIZE	-0.081*	-0.078*	-0.080*	-0.082*	-0.077*	-0.079*	-0.083*	-0.079*	-0.080*
	(0.047)	(0.045)	(0.045)	(0.047)	(0.046)	(0.045)	(0.048)	(0.046)	(0.046)
LIQUIDITY	-0.012	-0.066**	-0.016	-0.012	-0.066**	-0.016	-0.012	-0.064**	-0.016
	(0.043)	(0.033)	(0.042)	(0.043)	(0.033)	(0.042)	(0.043)	(0.032)	(0.042)
Constant	1.004	1.366**	1.111*	1.012	1.355**	1.110*	1.018	1.356**	1.117*
	(0.611)	(0.598)	(0.586)	(0.617)	(0.608)	(0.591)	(0.618)	(0.607)	(0.592)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No	No	No	No	No
Observations	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816
R-squared	0.244	0.235	0.082	0.244	0.235	0.082	0.244	0.236	0.082

*Notes: ***, **, and * indicates statistically significant levels of 1%, 5%, and 10%, respectively. Models 1–3 use as independent variable the variable DERIVATIVE (Currency) USER. Models 4–6 use as independent variable the variable DERIVATIVE (Interest rate) USER. Models 7–9 use as independent variable the variable DERIVATIVE (Commodity) USER. Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1 while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the Industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets.*

Following the same methodology, we use a fixed-effect model using as independent variables a dummy for users of the currency, interest rate, and commodity derivatives. In Table 5 results are shown. As in the previous case, the results show no statistically significant relationship between firm value and hedging.

4.1. Robustness checks

As a first robustness check, we employed a pooled OLS model. Results are reported in Table 6.

Table 6. Pooled OLS

Dependent variable	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry effect*	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry effect*	*Ln Tobin's Q 1*	*Ln Tobin's Q 2*	*Industry effect*
Models	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Independent variables									
DERIVATIVE USER	-0.043	-0.060*	-0.042						
	(0.050)	(0.036)	(0.048)						
NOTIONAL				-0.012	0.030	0.011			
				(0.068)	(0.069)	(0.067)			
FAIR VALUE							-0.006	-0.051	0.065
							(0.081)	(0.035)	(0.086)
OWNERSHIP	0.073	0.023	0.130	0.105	0.029	0.151	0.073	0.022	0.131
	(0.147)	(0.106)	(0.148)	(0.151)	(0.113)	(0.153)	(0.149)	(0.108)	(0.150)
ROA	0.462***	0.330***	0.438***	0.433***	0.312***	0.418***	0.464***	0.333***	0.439***
	(0.147)	(0.077)	(0.142)	(0.139)	(0.074)	(0.137)	(0.149)	(0.080)	(0.144)
ACC. FIN. MKT.	0.110***	0.057***	0.097***	0.120***	0.063***	0.109***	0.109***	0.057***	0.097***
	(0.026)	(0.019)	(0.024)	(0.026)	(0.019)	(0.023)	(0.026)	(0.020)	(0.024)
INVESTMENT GROWTH	0.009***	0.005***	0.007**	0.009***	0.005**	0.007**	0.009***	0.005**	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LEVERAGE	0.005	0.002	0.003	0.005	0.002	0.003	0.004	0.002	0.003
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GEOGRAPHIC DIVERSIFICATION	0.091	0.079*	0.082	0.091	0.074	0.081	0.089	0.075	0.080
	(0.059)	(0.045)	(0.058)	(0.063)	(0.048)	(0.061)	(0.060)	(0.046)	(0.059)
Ln SIZE	-0.069***	-0.052**	-0.056**	-0.082***	-0.066***	-0.069***	-0.075***	-0.060***	-0.062***
	(0.023)	(0.021)	(0.022)	(0.024)	(0.024)	(0.024)	(0.025)	(0.023)	(0.024)
LIQUIDITY	0.004	-0.056*	-0.004	-0.006	-0.064**	-0.014	0.006	-0.054*	-0.002
	(0.042)	(0.032)	(0.042)	(0.042)	(0.031)	(0.041)	(0.042)	(0.032)	(0.041)
Constant	0.849***	1.032**	0.784***	0.971***	1.175***	0.907***	0.908***	1.109***	0.845***
	(0.309)	(0.290)	(0.301)	(0.324)	(0.317)	(0.322)	(0.326)	(0.310)	(0.318)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No	No	No	No	No
Observations	1,819	1,819	1,819	1,609	1,609	1,609	1,809	1,809	1,809
R-squared	0-244	0.238	0.080	0.243	0.239	0.089	0.243	0.232	0.080

Notes: ***, **, and * indicates statistically significant levels of 1%, 5%, and 10%, respectively.
Models 1–3 use as independent variable the DERIVATIVE USER. Models 4–6 use as independent variable the variable NOTIONAL. Models 7–9 use as independent variable the variable FAIR VALUE.
Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1 while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets.

Results also, in this case, are confirmed and show in general a no statistically significant relationship between firm value and hedging.

Secondly, if hedging impacts the firm value, we should note all the companies operating the same. This could lead to endogeneity problems as suggested by Magee (2013). Therefore, there are two main approaches for testing the relevance of derivatives use. The first method assumes that hedging is a dependent variable and its determinants are treated as explanatory variables. On the contrary, in the other method, which is the one that was chosen for this paper, derivatives' parameters are treated as independent variables while firm value, often measured as Tobin's Q, as a dependent variable. Several papers have dealt with this issue in various ways, such as simultaneous equations models (Bartram, Brown, & Fehle, 2009; Graham & Rogers, 2002), or sample selection (Jin & Jorion, 2006; Guay, 1999). Magee (2013) suggested overcoming the problem by using a dynamic panel with system GMM estimators developed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). Following its approach and as robustness checks, we run a dynamic model with system GMM estimators using the first lag of dependent variable (natural logarithm of Tobin's Q ratio), derivative user, notional/fair value over total assets, the natural logarithm of total assets, ROA and leverage as endogenous, while all other variables as exogenous.

Table 7 presents the analysis of the results for system GMM estimators. Also, in this case, the results are similar to the ones of previous models, showing in general no statistically significant relationship between firm value and hedging. Therefore, our results present no evidence of hedging premium for Italian companies.

Finally, as an innovative approach, we run a random forest model in order to verify the relative variable importance (RVI) of each variable. The random forest model, created by Breiman (2001), randomly selects a subset of characteristics from each node of the tree, following a bagging technique. This technique is robust to outliers and to missing data. Moreover, different from other machine learning techniques, it allows identifying the importance of each variable in the classification results (Yeh, Chi, & Lin, 2014), the RVI's. The RVI reports the number of times that on average a variable is used in the decision trees of the model (Hastie, Tibshirani, & Friedman, 2009). A RVI bigger than 0.5 implies that the variable is employed by the majority of decision trees and, therefore, contributes to improving the prediction capabilities of the model itself.

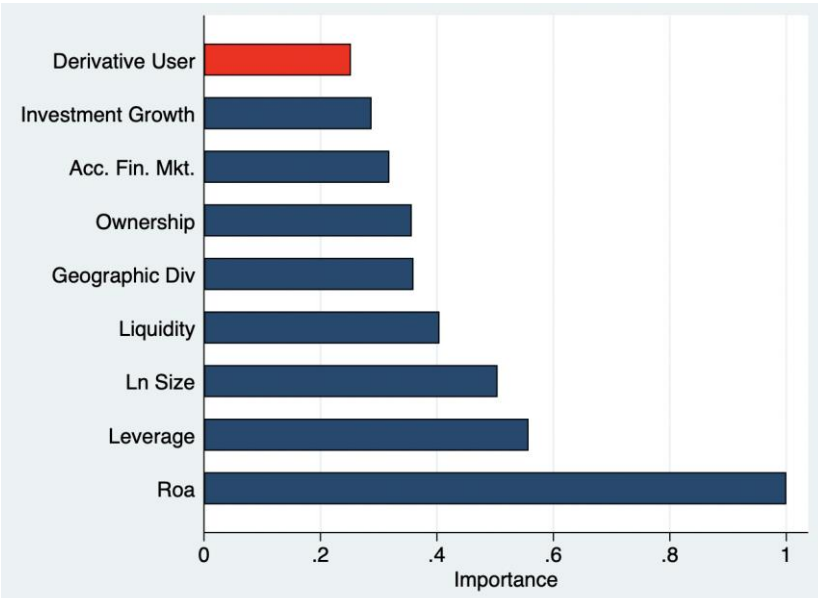
RVIs are reported in Figure 3.

Table 7. System GMM

Dependent variable	Ln Tobin's Q 1	Ln Tobin's Q 2	Ln Tobin's Q 1	Ln Tobin's Q 2	Ln Tobin's Q 1	Ln Tobin's Q 2
Models	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Independent variables						
Lag dependent variable	0.149	0.384***	0.143	0.448***	0.160	0.419***
	(0.124)	(0.100)	(0.186)	(0.090)	(0.141)	(0.099)
DERIVATIVE USER	-0.037	-0.041				
	(0.101)	(0.057)				
NOTIONAL			0.053	0.168**		
			(0.223)	(0.084)		
FAIR VALUE					-0.139	-0.079
					(0.129)	(0.113)
OWNERSHIP	-0.499	-1153	1251	0.547	-0.833	-1.026
	(-1.702)	(-1.184)	(-2.401)	(-1.118)	(-1.732)	(-1.098)
ROA	0.134	0.025	0.131	0.075	0.169	0.059
	(0.195)	(0.108)	(0.229)	(0.128)	(0.192)	(0.132)
ACC. FIN. MKT.	0.507	0.207	0.393	0.238	0.543**	0.260
	(0.323)	(0.152)	-1093	(0.426)	(0.252)	(0.206)
INVESTMENT GROWTH	0.011	0.009	0.016	0.012	0.025	0.014
	(0.022)	(0.009)	(0.028)	(0.009)	(0.018)	(0.013)
LEVERAGE	0.009***	0.006***	0.008***	0.005***	0.008***	0.005***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)
GEOGRAPHIC DIVERSIFICATION	0.317	0.283	-0.175	0.064	0.273	0.361
	(0.647)	(0.229)	(0.785)	(0.229)	(0.410)	(0.271)
Ln SIZE	-0.158	-0.187***	-0.118	-0.073	-0.132	-0.170**
	(0.100)	(0.050)	(0.205)	(0.082)	(0.105)	(0.066)
LIQUIDITY	-0.120	-0.147**	-0.086	-0.091	-0.219	-0.174**
	(0.120)	(0.069)	(0.158)	(0.070)	(0.162)	(0.083)
Constant	0.989	2.660	-4.100	-0.368	2.164	3.568
	(-3.809)	(-1.812)	(-9.282)	(-4.067)	(-4.012)	(-2.995)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,646	1,647	1,457	1,457	1,638	1,639
AR (1)	-2.50***	-3.93***	-2.42**	-3.31***	-2.70***	-3.67***
AR (2)	-1.18	-0.10	-0.44	-0.45	-1.38	-0.26
Hansen's test statistic	57.37	49.87	58.49	52.92	56.34	52.48

*Notes: ***, **, and * indicates statistically significant levels of 1%, 5%, and 10%, respectively.*
Models 1–2 use as independent variable the DERIVATIVE USER. Models 3–4 use as independent variable the variable NOTIONAL. Models 5–6 use as independent variable the variable FAIR VALUE.
Ln Tobin's Q 1 is the natural logarithm of Tobin's Q 1 while Ln Tobin's Q 2 is the natural logarithm of Tobin's Q 2. INDUSTRY EFFECT is the industry adjusted Tobin's Q ratio. The variable ACC. FIN. MKT. reports the variable access to financial markets.

Figure 3. RVI's of the random forest model



Also, in this case, previous results are confirmed. Among all variables, the use/not use of derivatives by the company is the least important variable with a score lower than 0.25. Therefore, also the random forest model confirms the minimum impact of the use of derivatives on firm value.

5. CONCLUSION

Considering the increasing use of derivatives by the majority of the companies worldwide, the analyses of their possible effects on a firm's value is mandatory. However, current literature is mainly focused on few countries with mixed results (Campbell et al., 2019; Bachiller et al., 2021).

Overall, our results imply that the use of financial derivatives, in almost all cases, does not affect firms' value in the Italian market (*RQ1*); thus contributing to the existing literature on corporate hedging in countries with peculiar corporate governance mechanisms. Therefore, our results are contrary to the ones of Khediri and Folus (2010), which found a discount for hedgers in France, a country similar to Italy in terms of corporate governance, and of Allayannis et al. (2012). However, final results of this research confirm that a country specific corporate governance features can affect the impact of the use of derivatives on firm's value (*RQ2*) (Bachiller et al., 2021).

There could be a series of explanations for this finding, already suggested by existing literature. Firstly, as highlighted by Guay and Kothari (2003) and Aretz and Bartram (2010), a company could use various methods for hedging, therefore a derivative is just one of the available risk management tools and they represent a small piece of non-financial firms' overall risk profile. Secondly, the fair value of the derivatives is relatively small and, thus, could not significantly affect the performances of the company contained in the sample.

Moreover, it is necessary to remark that more than 10% of the Italian companies did not report the notional value of derivatives, and, especially for commodity derivatives, the notional value was in several cases not clearly measurable. As a consequence, since according to IFRS 7, an average investor should be able to evaluate the nature and extent of risks arising from financial instruments to which the entity is exposed, probably, it is still complex to incorporate this information in an investment decision process. Therefore, since investors are not able to capture the leverage of these instruments and the hedge effectiveness (Salvi & Tron, 2019), they may not reward hedging with higher market values. As a consequence, the empirical findings regarding the relationship between derivative use and firm have practical implications for accounting foundations. As suggested by CFA Institute (2013) and Bean and Irvine (2015), the material economic risk exposure disclosure (such as notional value, long and short positions), and the communication of the possible impacts due to the use of derivatives should be radically improved.

Finally, another contribution of this paper is represented by its methodology. Besides applying the classic methodologies applied by previous literature (fixed-effect regression models and system GMM estimators), we also run a random forest model and calculate the relative variable importance for each feature. To our knowledge, scholars have not yet examined the impact of the use of derivatives on a firm's value using new machine learning models.

However, this research suffers from several limitations. A limitation (but also a contribution) of this research is its focus only on Italian companies; therefore, our results are not applicable to other countries. Moreover, in this research, we use only the ownership concentration for analysing the impact of corporate governance practices on derivatives. Other several indicators, like the type of ownership or board independence, could affect the results. Furthermore, our paper considers only listed firms, however, the corporate governance policies, especially in the Italian case (Cortesi et al., 2009), are radically different with non-listed firms and, thus, this could create a further bias of our results.

Therefore, future research could expand the analysis of the role of corporate governance mechanisms on the relationship between firm value and the use of derivatives, by also including a more comprehensive sample of corporate governance variables and extending the sample also to non-listed firms. Furthermore, scholar could develop the methodology examined in this paper, by applying machine learning techniques combined with the SHAP values. Finally, future works should also consider the perception of investors regarding financial risk management policies, by also conducting an analysis of the motivations provided by managers for using these financial risk management tools.

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