The Derivative Use of the Italian Listed non-Financial Firms: A Theoretical Perspective

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Abstract

We propose an analysis of the determinants of the use of derivatives for a sample of Italian non-financial companies. The results of an univariate and multivariate analysis suggest that different factors have a different impact on the use of derivatives. The probability of using derivatives is influenced by short-term factors (tax shields), long-term factors (agency costs, commodity risks) and permanent ones (financial distress, size, foreign and regulatory risks). Furthermore, the idea that derivatives show their positive effects with different intensity over time suggests that companies that do not use such instruments face managerial cognitive barriers that focus their economic expectations only on short-term horizons, maybe for a positive or negative excess of confidence. Moreover, the fact that diversification does not represent a determinant, unlike being a manufacturing or industrial enterprise and so potentially subjected to many regulations, suggests that ESG variables could contribute to explaining the use of derivatives.

Keywords: Risk Management, Market Efficiency, Behavioural Finance, Accounting, Regulation, ESG factors.

JEL: G32, G14, G41, M41, M48, M14.

1. Introduction

Over the past thirty years, the category of derivatives has experienced the greatest growth among all the asset classes of financial instruments traded on regulated markets or over-the-counter (OTC). This growth reflects the wide heterogeneity of the characteristics (purposes) of the derivatives and therefore the consistent operational flexibility they offer to their users; especially for the firms that can use these instruments to manage (hedge or amplify) the risks. From a market perspective, the use of derivatives by companies is still a widely discussed issue in public and individual terms.

However, between financial and academic communities it is certainly a widespread opinion that this growth also generates important and increasing risk, inherent in two substantial orders of problems. First, information transparency plays a fundamental role: the use of such instruments does not always require relative accounting disclosure, generally for financial firms or for only companies listed on regulated markets this information is mandatory, however far from appearing exhaustive. Second, the strong heterogeneity and complexity of these instruments imposes growing evaluation skills that know how to discriminate between the real purposes of the use of derivatives, which currently appear ambiguous. It is known that these can be used for hedging purposes (in reality mitigation) of specific risks or for speculative purposes that could generate an increase in risks; as there is no information on these instruments, this ambiguity is growing.

The regulatory answer to the increasing associated risks has certainly not been expected especially in the Anglo-Saxon background, notoriously market-oriented with respect to other geographical areas. For example, the US regulatory environment has undergone frequent changes over the years, effectively driving the evolution and adoption of similar international standards for the firms. In US, the ASC 815 represents the current accounting and disclosure regulations for derivatives. In 2014, IASB published IFRS 9, which sets the principles for the measurement, evaluation and accounting of derivatives; the jeopardized adoption of these principles represents the actualinternational challenge. In the Euro area, the EU directive 2013/34 introduces the direct reporting in the financial statements of derivative instruments, leaving individual countries, as usual, the adoption of the regulation over time (in Italy, the Legislative Decree 139/2015, in force since 2016).

The recurrent vicissitudes linked to the use of derivative instruments highlight to the public opinion how the regulation is still coming. The academic community has long analysed the phenomenon of derivatives, placing its focus on different topics that characterize these instruments, particularly in finance. The literature has focused the main research questions on what were the determinants that push companies to use derivatives and the effects they generate on their performance, see for example Smith and Stulz (1985) and Allayannis and Weston (2001). Some exhaustive reviews of the literature on the factors that impact on the use of derivatives are Judge (2006) and Aretz and Bartram (2010). Recently, Campbell et al. (2019) proposes a review of the literature that highlights how the research process shouldfollow the evolution of the regulation, in order to capture the greatest quantity and quality of information on the phenomenon; the work reviews a large number of contributions focused on disclosure of derivatives, as well as their use. By encouraging new works using accounting data linked to the adoption of new regulations, the authors suggest that the prevailing considerations in the literature appear to be dated and sometimes conditioned by the lack of information transparency and, therefore, the potential existence of noise factors and/or errors in the analysis (such as in the past, the absence of accounting information on derivatives created barriers in distinguishing between speculative and hedging positions, generating a growing ambiguity and potential results biased in the literature). A further fundamental consideration that undermines the basis of many past works is related to the measurement of the use of derivatives or even which are the research methods that best record the use of derivatives. Although apparently trivial, this aspect is much more relevant, the stronger is the absence of accounting data relating to these instruments. A study that measures the use of derivatives directly from gains and losses in financial statements is the one proposed by Manchiraju et al. (2016), spending attention on the relationship between the use of derivatives and the managerial compensation.

In line with the above mentioned literature considerations, our work proposes an analysis of the determinants of the use of derivatives for a sample of 223 Italian non-financial companies listed in the 2012-2017 period, exploiting the accounting information that emerged from the adoption of the EU directive concerning derivative instruments. Starting from the seminal work of Modigliani and Miller (1958) and in line with the Risk Management Theory, our approach is analogous to that already proposed for the classic topic of the firm capital structure; we expand the number of factors or imperfections (also control variables) that, consistently with the literature, should affect the use of derivatives. By using some univariate and multivariate analysis (stepwise probit regressions), for each factor we take into account a large set of potential proxies in order to understand which are most associated to the probability of derivatives' use. We find that different factors have different association and impact with the probability of use of derivatives, depending also on the scenario (short or long term) approximated by the data used for the analysis. Thus, some factors(financial distress) positively and persistently affect the use of derivatives over time, although theydo not appear to be predominant. Otherwise, other factors highlight an association only on the long-term scenarios. This is the case with agency costs that in the short term do not seem to be associated with the use of derivatives; this result should not come as a surprise, since the incentive to use derivative instruments for mitigating these costs goes through the use of some derivative instruments, so called exotic (OTC), which necessarily require long term skills and planning time, given the strong complexity. However, the (univariate) analysis finds that the derivatives use reduces the cost of capital and therefore increases the firm value, in special way in a long-term scenario. The observation that more than half (118) of the companies in the sample are not derivatives users (and therefore give up the benefits linked to them) reinforces the idea that these firms face cognitive barriers in developing and organizing specific skills useful for the management of these instruments. In fact, in our analysis the size effect highlights a strictly positive relationship with the probability of derivatives' using, but it also appears to be extremely explicative and persistent both in short and in long term. On the other hand, larger companies have greater capacity to amortize the substantial costs associated with these specific skills.

Our work attempts to complement the literature in some ways. First, we propose an analysis of the determinants of the use of derivatives using accounting data that are consistent with the regulatory adoption of the EU directive and consistent with the international approach (directly related to the balance sheet and the income statement). This feature allows us to define, discriminate and measure which companies use derivatives and which do not, overcoming some fundamental problems in terms of measurement already emerged in literature, see Campbell et al. (2019). Secondly, we propose new evidence on a specific sample of non-financial companies in the Italian stock market that confirms the prevailing findings in the literature, regarding the factors or market imperfections considered, both for analysis on international data and for specific to one or few countries. Finally, our resultssuggest that factors can affect the use of derivatives in contingent wayor in the long term. This findingcould point outbarriers to which companies could be exposed; firms, that do not have adequate internal skills to manage complex derivatives or majorly exposed to some managerial behavioural factors (positive or negative excess of confidence), may not use such instruments. To the extent that the efficient use of derivatives can determine a lower cost of capital and therefore greater firm value, then the existence of cognitive barriers becomes relevant for companies.

The work is organized in following way. Next Section 2 presents a literature review about the determinants of derivative use for non-financial firms and some considerations on specific topics. Section 3 exposes the sample data and methodologies of the analysis. Next Section 4 comments the results and Section 5 concludes.

2. Literature

In complete and perfect capital markets, the derivatives' use to hedge is irrelevant (Modigliani & Miller, 1958), because investors can hedge individually the specific risks; analogously to the capital structure problem (homemade leverage), investors can adopt a homemade risk management. Theoretically, investors may diversify away a firm's exposure to a given rate or price if they wish to; but they should be able even want an exposure to a particular rate or price. De Marzo and Duffie (1991) define in this perspective a puzzle: the derivative use is generally expensive (in specific skills and resources) for a firm as well as to an individual investor, but this latter could use better derivatives' instruments according to their risk preferences. In the same spirit of evolution for the capital structure theory, the corporate risk management assumes that the capital markets are dominated by imperfections (default costs, tax shields, agency costs,…), generating uncertainty in the firms' cash flows and increasing the cost of capital (hence decreasing the firm value). The Table 1 presents a set of papers collected in function of these imperfections.

Guay and Kothari (2003) identify some market imperfections: financial distress costs, asymmetry in tax costs, costly external financing and costs related to the risk aversion (or appetite) of the managers.

Smith and Stulz (1985) and Myers (1977) bring evidence about the impact of financial distress factor (the likelihood of default) and use of derivatives like risk management tool. Trueman and Titman (1988) suggest that derivatives allow firms to smooth out their cash flows and earnings, so reducing the probability of default.

The tax incentives (or shields) are largely investigated in relation with derivative use in order to verify if firms use derivatives to smooth out the earnings, as pointed out by Smith and Stulz (1985) and by Graham and Smith (1999), and so to decrease its volatility but in special way to reduce the effective tax rate (tax asymmetry) as indicated by Donohoe (2015a). Nance, Smith and Smithson (1993) study the determinants of corporate hedging analyzing the impact of different tax codes, which the investment credits, tax loss carry forwards, foreign tax credits and others. It is clear that a lower volatility of the cash flows allow to the firms of increasing the debt capacity and therefore the relative tax shields, see for example Leland (2002) and Stulz (1996).

Concerning the agency costs and related topics, recently Choi, Mao, and Upadhyay (2013) confirm the idea that growth companies,using derivatives and ones more exposed to information asymmetry, could experience some benefits, increasing the value of firm. This opinion is in line with Géczy, Minton, and Schrand (1997) but also with Froot, Scharfstein, and Stein (1993),which underline how information asymmetries between external and internal company financing (with the first more expensive than the second) can be mitigated through the use of derivatives. Beatty, Petacchi and Zhang (2012) study the agency costs of debt (and so its cost) in relation with the derivative instruments whose use is useful to manage the cash flow volatility.

Anyway, the evidence for the effect of derivative use on market value is also mixed around the world. Allayannis and Weston (2001) find that firm value (as measured by Tobin's q) is higher for U.S. firms with foreign exchange exposure that use foreign currency derivatives to hedge.Graham and Rogers (2002) calculate that the increase in debt capacity and leverage associated with hedging increases firm value by an average of about 1.1%. However, Guay and Kothari (2003) estimate the cash flow implications from hedging programs for 234 large U.S. nonfinancial firms and find that the economic significance of the cash flows, and consequently the inferred potential change in market values, is small. Jin and Jorion (2006) examine 119 firms in the oil and gas industry and also find that the effect of hedging on market value is not statistically significant. While there is some anecdotal evidence of individual firms suffering hedging losses from time to time (Adam and Fernando, 2006; Bartram et al., 2011), some past academic studies have found that derivatives have a generally positive effect on firm performance. Especially, these instruments can better the firm valuation (Allayannis et al., 2012; Perez-Gonzalez and Yun, 2013), lower cost of equity (Gay et al., 2011) and reduce total and systematic risks (Bartram et al., 2009). Nevertheless, the evidence is mixed outside the US market. For instance, some country-specific studies, using non-financial firms from France (Belghitar et al., 2013; Khediri, 2010), showed that investors do not assign a premium value to derivatives use, but rather that these instruments tend to lead to lower firm valuations. In Australia (Nguyen and Faff, 2010) concluded that the corporate use of derivatives among Australian firms resulted in a severe discount in firm value. On the large-scale study of non-financial firms from 47 countries, Bartram et al. (2011) found that the usage of derivatives reduces both total and systematic risk as well as increasing firm value. Following, Bartram et al. (2012) investigate the impact of the use of exchange rate (FX), interest rate (IR), and commodity price (CP) derivatives on cash flow volatility, the standard deviation of stock returns, and market betas, as well as market values.

Campbell et al. (2019) reviews a large number of contributions focused on disclosure of derivatives, as well as their use, suggesting that the prevailing considerations in the literature appear to be dated and sometimes conditioned by the lack of information transparency and, therefore, the potential existence of noise factors and/or errors in the analysis (such as in the past, the absence of accounting information on derivatives created barriers in distinguishing between speculative and hedging positions, generating a growing ambiguity and potential results biased in the literature). A further fundamental consideration that undermines the basis of many past works is related to the measurement of the use of derivatives or even which are the research methods that best record the use of derivatives. Although apparently trivial, this aspect is much more relevant, the stronger is the absence of accounting data relating to these instruments.Authors highlight how the research process should follow the evolution of the regulation, in order to capture the greatest quantity and quality of information on the phenomenon, by encouraging new works using accounting data linked to the adoption of new regulations. A study that measures the use of derivatives directly from gains and losses in financial statements is the one proposed by Manchiraju et al. (2016), spending attention on the relationship between the use of derivatives and the managerial compensation.

In line with the results of the literature proposed above, we take advantage of the suggestions of Campbell et al. (2019) and we believe that new primary evidence, based on a measurement of the use of derivatives in line with more advanced accounting standards, may help to better clarify: 1) for each potential factor, which proxies perform a more explicative function; 2) what are the determinants(factors) that impact majorly on the probability of using derivatives by a non-financial company; 3) to confirm or not the positive impact of the use of derivatives on company performance (lower cost of capital, greater firm value); 4) if the impact of each factor is merely contingent or long-term (which involves that the management of the several factors can be differentiated over time and therefore using derivatives is essentially a problem of organization and programming in a competitive financial market where the companies can easily find these tools); 5) which omitted variables could help to explain why companies do not use derivatives, neglecting the benefits connected to their use.

In the following sections, we present an analysis on the use of derivatives by Italian listed non-financial companies that aims to answer to the 5 points highlighted in the previous paragraph. Furthermore, the idea of studying the Italian stock market is motivated by two rationales. The first concerns the regulatory evolution and therefore a greater availability of data on the phenomenon and this allows us to perform more reliable analysis and tests than most of the existing literature. Secondly, the empirical evidence already collected regarding this market is insufficient, even in terms of the number of (direct and indirect) scientific contributions, highlighting a literature's gap. Specifically, some works on international samples have indirectly analysed this region but with data relating to a small number of Italian companies (see for example Bartram, 2000 and Bartramet al., 2009); o even if the focus was placed exclusively on Italian companies, the number of listed companies analysed was low and notoriously for the stock market companies there are high informational requirements (see Bodnar et al., 2013, which collect a sample of around 400 Italian companies of which only a small fraction consists of listed companies).

3.1 Design of Research

The fundamental aim of this work is to investigate the theoretical determinants for corporate derivative use for Italian country and in specific way for listed non-financial firms. As noted previously, hypotheses tested in literature are derived mostly from existing theories describing the incentives for derivatives use based on such factors as financial distress, taxes, agency problems, size,international market structure and/or normative (regulation). Many of these underlying theories are discussed in detail in several relevant papers (see, among others, Myers (1977); Smith and Stulz (1985); Trueman and Titman (1988); Géczy, Minton, and Schrand, 1997; Guay (1999); Bartram, 2000; Allayannis and Ofek (2001); and Graham and Rogers, 2002).

As already pointed out, the main underlying reason for studying the Italian stock market is to be found in the availability of accounting data about the use of derivatives by the Italian companies. The new regulations (i.e.EU directive2013/34and Italian Legislative Decree no. 139/2015), in force since 2016, require that listed companies record this kind of information directly in the balance sheet and in the income statement, so offering the possibility of knowing without doubt which companies are really users of derivatives and what impact this use entails.

Other works have already considered the analysis of the Italian market (Bodnar et al. 2013), albeit with different research targets and with different data available, for example because they are representative of samples of different companies (even unlisted companies that have much less strict accounting disclosure requirements) or because it is part of a wider geographical analysis (see Bartram 2000, 2009) where the analyzed Italian firms' number is minimal fraction of the total one. However, all these works related to the Italian country do not offer a clear exposition of the effects of the main theoretical factors identified in literature and especially are previous to the regulations cited. For example, the financial distress factor seems to show a positive relationship with the probability of using derivatives by companies in the world; the empirical evidence does not clarify which relation is prevalent for the Italian area and in particular for listed companies.

As a first step, the research design envisages the definition of which companies have been really users of derivatives and subsequently the identification of which theoretical factors could be most impacting in the Italian area. This last phase is subdivided into an univariate and multivariate analysis to highlight significant differences (between users and non-users) and to outline which determinants are more persistent at the end of a variable selection process based on multivariate probit regressions.

The next section 3.2 presents the main data relating to the selected sample of companies and of course the data search strategy used; a fundamental part is the definition of the users of derivatives within the sample. The following section 3.3 presents the methodologies and processes adopted for univariate and multivariate analysis. Finally in the section 3.4, the potential proxies for 8 factors are presented.

3.2 Data

In order to analyze the non-financial companies of the Italian stock market, we decide to investigate the Aida database that is part of the platform of the provider Bureau Van Dijk. We set up a research strategy that is consistent with the new regulations in the matter of derivative instruments; therefore, we filter all the non-financial companies listed on the Italian Stock Exchange and setting as a constraint the availability of known data relating to the 6 financial statement items introduced by the regulations for the period from 2016 to 2017. The choice of this two-year period is not random: 2016 represents the first year in force for the aforementioned regulations, while 2017 is the first year of data available on the sample research date. Given these constraints, the final sample is composed of 223 non-financial companies listed on the Italian stock market. The Tables A2.1 A2.2 and A2.3 (in the Appendix) expose some statistics about all sample variables used in the analysis.

Given the above, it is clear that the first step of the analysis concerns the study of accounting information relating to the use of derivatives by Italian listed companies. Table 2 shows the 6 (6 first rows) accounting items required by the new regulations; the first 4 (BIII4, CIII5, B3, AVII) impact on the balance sheet while the last 2 (D18d, D19d) on the income statement.

Below, we present briefly these new items:
BIII4 = Active Financial Derivative Instruments – Fixed Financial Assets.
CIII5 = Active Financial Derivative Instruments – Financial Assets.
B3 = Passive Financial Derivative Instruments – Provisions for Risks and Charges.
AVII = Reserve for Hedging Operations on the Expected Financial Flows – Equity.
D18d = Revaluation of Financial Derivative Instruments – Adjustments for Financial Assets and Liabilities.
D19d = Depreciation of Financial Derivative Instruments – Adjustments for Financial Assets and Liabilities.

The table shows some statistics relating to the new positive balance sheet items expressed both in absolute terms and in relative terms; thus, the value of total assets or total sales, rather than equity. The last rows report statistics related to some ad hoc built exposure variables: for example, BS exp expresses the net exposure of the different liabilities items (BIII4 + CIII5 - BIII +/- AVII, algebraically aggregated); similarly for PL exp (D18d - D19d). These exposures are related to the other variables such as the total value of assets, equity or the PL with the intent to highlight which impact has the greatest effect.Looking at the last few lines of the table, the use of derivatives by the companies of this sample seems to have a greater impact on the Profit & Loss statement, rather than on the balance sheet.

Next step is to determine among the 223 selected companies how many users and how many are not users in the selected period (2016-2017). In this regard, we build a dummy variable that assumes value 1 if the absolute value of the company's total net exposure on the balance sheet or income statement is positive in a given sample observation, otherwise 0. The company's total net exposure on both documents assures us to effectively identify which companies are using derivatives, since a null value of the absolute value would result in a zero exposure in terms of derivatives and therefore a non-use by the company.

The dummy variable allows us to define how many firm-observations in the sample for each year of the two-year period: in 2016 there are 92 observations, while 109 in 2017. After this sample stratification we find some companies that are not users of derivatives (zero-dummy on both years) and other companies (dummy 1) that are frequent users (having observations on both years) or not frequent (only one observation on two possible) in the two-year period.At this point, we identify a potential bias: building a dummy on simple business observations (the dummy just built) means considering an issuer with only 1 observation in the two-year period once as an user and the other not. It is clear that this hypothesis could be too stringent as this company is certainly user of derivatives.

To overcome this potential bias, we define a list of derivative users, valid for the entire two-year period considered, by building a dummy variable that assumes 1 if the issuer is user (frequent or not in the two years) of derivatives, 0 otherwise. This decision is motivated by the fact that the use of derivatives requires a specific competence that needs to be programmed in advance, therefore it is unthinkable that companies with a single observation in the two-year period can be considered with certainty as not-frequent or even occasional users.

Based on these considerations, the final sample is divided more or less homogeneously into 115 derivatives users out of 223, therefore 118 companies do not have information on derivative exposures in the two-year period considered and so we consider as not-users.

To strengthen our analysis, we decide to build two research samples by extending back the sample period; therefore also considering the periods 2014-2017 and 2012-2017. The underlying rationale remains the same: the use of derivatives requires skills acquired, organized and implemented in advance, therefore an user in the 2016-2017 two-year period is considered as such also in the next two built samples. Although these additional analysis samples could be subject to indeterminate inaccuracies with respect to the original, we still decide to analyze them for two reasons. First of all because they could reinforce or reject the conclusions that emerged in the original 2016-2017 sample. Secondly, because the three samples can represent a different picture of the phenomenon: the original 2016-2017 sample frames the use of derivatives in a short-term scenario, while the other two are medium and long-term. This aspect gives us the opportunity to study the impact of different theoretical factors (financial distress, taxes, agency problems, and so on) on the use of derivatives over time, trying to understand whether in the short term some prevail over others, while in the medium-long term they weaken (or vice versa).

After these assumptions, the dependent variable analyzed is the probability of using derivatives by firms which is approximated by the newly built dummy variable of 223 firm-observations in each year. This hypothesis implies that the maximum total firm-observations of the dependent variable in the pooled analysis of the original sample (2016-2017) will be 446, while in the other two samples respectively 892 for 2014-2017 and 1338 for 2012-2017. All the other variables (61 accounting variables) used in the univariate and multivariate analyzes are detailed in statistical terms in the Appendix.

3.3 Methodology of Analysis

The analysis of the determinants of the probability of using derivatives by companies has beensplit into two parts: the first univariate and the multivariate one.

The univariate analysis aims to highlight the differences between the two groups: users or not of derivatives; significant differences in the main accounting variables associated with the sample companies in the three sample periods (short, medium and long term). This operation is performed through a Wilcoxon Rank Sum Test.

The multivariate analysis foresees probit regressions with the dependent variable (y-vector) the probability of using derivatives (dummy variable), while as regressors (X-matrix) 8 groups of variables that approximate the 8 theoretical factors taken into account in the work. Each group has a number of variables ranging from a minimum of 1 to a maximum of 24. Thus,

$$y=\Phi(\beta X+\varepsilon) \quad (1)$$

where the symbol (Φ) represents the cumulative normal distribution function, (β) the betas vector and (ε) the usual error.

The aim of the multivariate analysis is to define which of the potential factors can be considered as determinants of the use of derivative instruments by companies. Starting from the information available to us, the first challenge we face is how to manage theoretically and statistically the amount of data, especially the large number of collected accounting variables (emerged in the literature and built ad hoc). Performing a regression with all (61) variables is statistically inappropriate and requires considerable computational power (among other things, it could omit the analysis of specific factors).

Therefore, we decide to program a learning machine or multiphase selection process (stepwise probit regressions) to determine which variables could represent the best proxy for each factor (clearly where there are more than one). To this end, we set up a selection process based on probit regressions, composed of two macro phases.

In the first, preliminary (screening), we perform a single probit regression with each of the potential proxy variables of each factor (for exhibition reasons the results are presented in the Appendix in the Tables A4.1, A4.2 and A4.3); the intent is to exclude all those variables that are not significant with at least 90% confidence. This allows us to proceed with a lower number of variables than the original 61.

The second phase provides a selection process for each factor through multivariate probit regressions, where the first regression is performed with all the significant variables (for each factor) emerged in the first preliminary phase and the subsequent ones with only the variables that remained significant in the previous regression (thus excluding non-significant ones and always maintaining the same interval of 90% confidence).

So set up, the process involves a potential automatic learning in order to reach the final set of regressors.The process stops when it finds a set of all significant explicative variables, emerging from a regression. Sometimes, the selection process involves a number of 3, 4 or 5 regressions (if the starting number of the variables is high), sometimes only one.

As pointed out before, in the probit regressions the dependent variable analysed is the dummy variable built and exposed in the previous section. The Table A.1 reports the list of 61 accounting variable considered (potential independent variables), split in the 8 factors (financial distress, taxes, agency costs, and so on), as regressors.

3.4 Potential Proxies

In Appendix, in the Table A.1, the variables' list highlights how every potential proxy has been built; briefly, we report some useful comments for any variables, following some relevant papers already cited in literature's section. We use prevalently accounting data for two reasons: first, this type of data is easily available respect to others (we found partially governance data, nevertheless their inclusion reduces dramatically the number of observations); secondly because generally in the literature different accounting data are used as a proxy for many events or factors. Nevertheless, these reasons and this type of information could represent the primary limitations of this work.

Financial Distress – The literature has proposed several proxies to describe the financial distress factor. Depending on the kind of specific risk, in addition to the debt ratio (Leverage) we can certainly recall some financial statement ratios, including Coverage, Quick and Current ratios. Instead, other proxies could be associated with default costs; for example, the Tangible Assets, Profit Margin, ROA or ROE. The maturity structure of liabilities can also have an impact in terms of financial distress and in this regard the ratios between Long-term Liabilities and Total or Short-term Liabilities should capture this information. Finally, a dummy variable (Neg. Equity BV) that assumes 1 if the book equity is negative and 0 otherwise should capture situations of liquidity deficit of the company.

Agency Costs – The agency costs are described in terms of the company's investment capacity, i.e. debt capital and/or equity, with conditions affecting shareholders, managers and also creditors. The main raison is to understand if an increase of investment capacity is connected with an increase of underinvestment problem. The derivatives users can smooth the agency problems, balancing the issue of capital. The literature has proposed several proxies to describe the agency costs factor. Depending on the kind of specific risk, as above-mentioned underinvestment, in addition to the following brackets ratio (market-to-book value *leverage), we focus on some financial statement ratios, includingcapital expenditures, capex, and capex with others accounting items as sum or multiplication; here follows the main examples: capex to asset * leverage; capex to size * leverage; capex to cash flow * leverage; capex+R&D; capex+R&D to asset; capex+R&D to size; capex+R&D to cash flow. Next, the patrimonial structure of property, plant and equipment, PPE, can also have an impact in terms of agency problems and in this regard the ratios involved are the followings: net PPE; PPE to asset; PPE to size; PPE to cash flow. Depending on the other kind of specific risk, i.e.entrenchment/underinvestment, we focus as in the literature show in Table 1 on the following index, including Tobin Q; login Tobin Q; market-to-book value; and R&D; R&D to sales; or R&D to size. Finally, considering the specifickind of risk entrenchment, we can recall cash flow to asset; cash flow to size; earnings yield and cash to asset.

Tax Shields – The tax impacts are described both in terms of benefits or discounts (Tax Credit and regard to Total Asset) and in terms of costs, pressure or expenses (Tax Debt and regard to Total Liabilities) and therefore also in net terms (Tax Credit + Tax Debt). Furthermore, we also use a couple of dummy variables, following what has already been proposed in the literature.

Size – The literature has proposed some proxies to describe the size factor. We can refer to some accounting and financial items, as market capitalizationplus total debt (alsothe relative logarithm), the log assets and cash flow.

Economic – The literature has proposed some proxies to describe the economic factor concerning the market of commodities, main resources for the production of many firms. We focus on the accounting items: raw materials and raw materials to asset. Finally, a dummy variable (CP Exposure) that assumes 1 if the raw materials are positiveand 0 otherwise.

Operating Hedging – We considerthe specific accounting item: foreign profits and losses; foreign PL to PL. Finally, a dummy variable (FX Exposure) that assumes 1 if the absolute value of foreign PL is positive and 0 otherwise.

Diversification – We decide of using the US Standard Industrial Classification, SIC, differentiating the primary codes number by the secondary ones. Div1, Div2 andDiv3 represent different levels of diversification. Thus, Div1 is a dummy variable assuming 1 if the total number of industrial codes is equal or higher of one, otherwise 0; with this variable we can group all sample firms and pointing out that the diversification is irrelevant if this variable will be non significant in order to explain the probability of derivatives' use.

Normative – Wedefine a normative variable to capture some specific features relative to environmental and social topics. So,we build a dummy variable assuming 1 if the US SIC belongs to manufactural industry.

4. Results

As already anticipated, the results of the univariate analysis (in Tables A4.1, A4.2 and A4.3, for spacereasons in the Appendix) and multivariate (in Tables 3.1, 3.2 and 3.3) are exposed and commented to study the single and joint impact of factors on the probability of using derivative instruments by Italian listed non-financial companies. Furthermore, each table refers to a specific data analysis time range (2016-2017, 2014-2017, 2012-2017), thus offering the possibility of analyzing a short and medium-long term framework.

The univariate analysis results confirm the main trend in the literature that the use of derivatives improves corporate performance. All Wilcoxson tests carried out on performance (roa variables, roe, Tobin's Q, market-to-book) show significant difference in median confirming the common empirical evidence that the use of derivatives lowers the cost of capital, increasing the value of firm (although the averages show sometimes different relationships than the medians, all tests are performed on the latter).Despite the significance in the level differences highlighted, however, the univariate analysis does not offer information about the association of these variables with the probability of using derivatives, unlike the multivariate one whose results are shown below.

With regard to the financial distress factor (first rows in the Tables A.3, first FD and last F1-F2 columns in the Tables 3.1, 3.2 and 3.3), the results show, on all three ranges (thus jointly observing the three tables for both univariate and multivariate analysis), that the variables representing the maturity structure of the liabilities and the tangible assets (in the multivariate analysis also the profit margin) appear more associated with the probability of using derivative instruments. Specifically, the maturity of the debt impacts with two ratios: long-term debt to total debt (more statistical persistent) and long-term debt to short term debt. The first expresses the proportion of total debts with maturity over 1 year and is representative of the company's default costs, since theoretically the latter increase with long-term scenarios. The second is the relationship between long-term debts over short-term debts. However in the F1 and F2 columns, a clear nonsense appears evident: both should be positively associated with the probability of using derivatives; instead only the first one is, the second shows a negative relationship.However, watchingTable A4.1, this ratio, if individually regressed, seems to have a positive relationship (therefore we do not consider it sufficiently reliable with respect to the first). Other variables (tangible assets, profit margins, roe) show a change of sign between the analysis on the single factor (FD model) or jointly between factors (F1 model), suggesting an unstable relationship with the probability of using derivatives. From an explicativepoint of view, the FD factor individually appears to haverelatively lesspower(p-seudo R2 range between 8% and 13%) compared to others (see agency costs, AC, and size, S) and rationally this powercoulddecrease if considered together with the other factors (suggesting correlations between these).One result deserves attention because it is apparently not intuitive; it is the case of the leverage variable that was expected to highlight a certain significance as a determinant of the probability of using derivatives, especially given the important exposure shown by the sample companies (over 40% for both groups, users and non-users of derivatives). However, this result is also attributable to the economic context and therefore to the time range of the analysis. Specifically, for European (and therefore also Italian) companies, the range from 2012 to 2017 was dominated by the various Quantitative Easing programs implemented by the European Central Bank, with a consequent and consistent reduction in interest rates that has allowed to mitigate the associated credit risk.In conclusion, the use of derivatives by Italian listed companies appears to be influenced by a greater or lesser exposure to financial distress, to a significant extent in the short rather than in the long term (given the different regression coefficients relating to the different time ranges).

Unlike financial distress, the agency costs (AC) factor does not appear to have a constant impact on all three ranges; in fact, on short-term data (Table 3.1) no variable considered in the joint regressions between factors is significant. This findingsuggests that Italian listed companies do not consider this factor as a determinant in short-term choices whether to use derivatives or not. On the other hand, this should not be surprising: there are no standard derivative instruments that cover risks related to underinvestment or entrenchment issues. It is likely that some exotic derivatives can answerto this purpose: these instruments are generally designed on the specific needs of the counterparts (for this reason non-standard and therefore not tradedin regulated markets but in OTC) and theircontracts and implementationsare time consuming.Furthermore, there is a substantial part of the literature that shows how frequently used hedging strategies offer more efficient results as opposed to infrequent operations that offer inefficient punctual results in terms of risk management (many contributions are focused on verifying whether the use of derivatives effectively reduces the ex post volatility).In our results, in medium and long term scenarios (Tables 3.2 and 3.3) we observe a significant impact also in the joint F1 and F2 models. Moving on to the proxy variables, it emerges how the ratio, capex on assets, has a stable positive relationship with the probability of using derivatives: the greater the capex that the company sustains, the greater the investments in fixed assets that it is accustomed to realize in their markets and therefore the greater the risk that an extemporaneous underinvestment problem can generate highlosses of business and therefore of profit. It is plausible to imagine that high values of the relationship can be associated with high leverage. On the other hand, the relationship between all the company's investments (capex + R&D) and its size shows a stable negative relationship, signaling how companies, with high ratios and lower loads of leverage due to high R&D costs (notoriously more risky than those capex), should therefore be less exposed to a lower underinvestment problem associated with leverage. As far as the two compound ratios are concerned (capex to asset or size * leverage), their effects appear contrasted, but they imply different information.

In the first case (to asset) higher values are associated with companies with high fixed assets in the balance sheet and therefore potentially with greater real guarantees that expose them less to underinvestment problems (so they do not need to use derivatives, negative relationship), unlike in the second case (to size) higher ratios are attributable to companies that have a low capitalization that signals situations of potential financing crisis and therefore a greater exposure to underinvestment (they need to use derivatives, positive relationship). The logarithm of the variable Tobin's Q, consistent with the literature, shows a positive and stable relationship, which confirms that companies exposed to underinvestment could use derivatives. Certainly, the AC factor appears to be the most explicative in individual terms (p-seudo R2 with a range of 73%-79%), although it should be noted that this statistic depends on the number of regressors considered. However, its strength is also evident in the combined regressions between factors (F1 and F2); where the factor is not considered (Table 3.1) the value of the R2 statistic collapses compared to the others. Finally, we can state that the use of derivatives depends on the agency costs factor, but only in long term. If it is true that the use of derivatives improves business performance by reducing the risks related to agency costs, then the non-use of these cannot be justified only by the contingent absence of specific management skills, but probably also by managerial cognitive barriers (over governance, as already indicated in literature).

The factor of Tax Shields (TS), or tax incentives, appears significant only with the tax debt proxy (positive relation), on 2 intervals (Tables 3.1 and 3.3) on three: the probability of using derivatives increases with high tax debts; this figure could be correlated to the financial distress factor as greater tax debts push the company towards a state of financial crisis. The explicative power (R2) of the TS factor is comparable to FD one (and therefore constant in the short, medium and long term).

Individually, the size (S) factor has an important explicativeforce (R2 above 19%), on all time ranges, and the logarithm of the total assets represents the best proxy positively associated with the probability of using derivatives, confirming how much emerged in the literature.

Also the economic factor (E), which interprets the exposure to raw materials and therefore to the complexities of the international market structure, shows (like the AC factor), medium and long term effects with the ad hoc dummy variable. This result suggests that the factor does not constitute a determinant in the short term for companies in the use of derivatives. Similarly, we might think that the high complexity of the international commodity market is faced by companies in a long-term perspective, requiring specific skills and knowledge. However, the individual explicative force is noteworthy, between 14% and 17% of R2, reflecting the fact that this factor represents an important control variable in the analysis.

On the contrary, the (OH) operating hedging factor shows a constant impact both in the short and medium-long term (in addition to a fairly good explicative individual strength, R2 over 7%), with the dummy variable calculated on profits realized in foreign currency by each company.

While the diversification factor (D) does not appear to have (on all time ranges) impact(and a lowexplicativepower) in the combined regressions when taken into account withthe other potential determinants, the last control variable considered, the normative factor (or regulation), suggests that manufacturing companies, most often exposed to environmental and social risks (and therefore to a multitude of regulations), show a greater probability of using derivatives (standard or not) to mitigate these risks. This factor is both singularly and jointly significant, leaving to emerge that corporate social responsibility issues could affect or be associated with the probability of using derivatives.

In summary, we can say that the results suggest that different factors have a different impact on the use of derivatives depending on the different time horizons that companies pursue. Specifically, it is plausible to think that the probability of using derivatives is influenced by short-term factors (tax shields), long-term factors (agency costs, commodity risks) and permanent ones (financial distress, size, foreign and regulatory risks), on the contrary of the diversification factor that appears intuitively as a substitute for the risk management function; a general implication is that the benefits connected to their use cannot always be found in the short term. Furthermore, the idea that derivatives show their positive effects with different intensity over time suggests that companies (or their managers) that do not use such instruments (and therefore seemingly and inexplicably decide to give up the related benefits) face managerial cognitive barriers that focus their economic expectations only on short-term horizons, maybe for a positive or negative excess of confidence. In this regard, potential omitted variables could be information indicating the degree of short-termism and/or corporate insiders' behavioral variables; intuitively, these could represent good proxies in the analysis in order to check the effects on the probability of using derivatives or not. Moreover, the fact that diversification does not represent a determinant, unlike being a manufacturing or industrial enterprise and so potentially subjected to many regulations, suggests that ESG variables (and therefore environmental, social and governance) could contribute to explaining the use of derivatives.

5. Conclusions

We propose an analysis of the determinants of the use of derivatives for a sample of 223 Italian non-financial companies listed in the 2012-2017 period, exploiting the accounting information that emerged from the adoption of the EU directive concerning derivative instruments.

This issue is still widely discussed in public and individual terms because of the great grow experienced by such category among all other financial asset classes and for increasing risks related to the information transparency (the use of such instruments does not always require relative accounting disclosure) and the strong heterogeneity and complexity of these instruments, imposing growing evaluation skills in order to understand the real purposes of the use, which currently appear also ambiguous.The regulatory answershave been frequent in the last decades. In US, the ASC 815 represents the current accounting and disclosure regulations for derivatives, whilst IASB published IFRS 9, which sets the principles for the measurement, evaluation and accounting of derivatives: the jeopardized adoption of these principles represents the real international challenge. In the Euro area, the EU directive 2013/34 introduces the direct reporting in the financial statements of derivative instruments, leaving individual countries, as usual, the adoption of the regulation over time (in Italy, the legislative decree 139/2015, in force since 2016). The literature has focused the main research questions on what were the determinants that push companies to use derivatives and the effects they generate on their performance.In the same spirit of evolution for the capital structure theory, the corporate risk management theory assumes that the capital markets are dominated by imperfections (default costs, tax shields, agency costs,…), generating uncertainty in the firms' cash flows and increasing the cost of capital (hence decreasing the firm value). Recent considerations outlines how the research process should follow the evolution of the regulation, in order to capture the greatest information quantity and quality (previously precluded by law),by encouraging new works using accounting data linked to the adoption of new regulations.

The fundamental rationalein order to study the Italian stock market concerns the availability of accounting data about the use of derivatives by the companies. The new regulations (i.e.EU directive2013/34and Italian Legislative Decree no. 139/2015), in force since 2016, require that listed companies record this kind of information directly in the balance sheet and in the income statement, so offering the possibility of knowing without doubt which companies are really users of derivatives and what impact this use entails.

In line with future research suggestions, we perform an univariate and multivariate (step-wise probit regressions) analysis to clarifywhich proxies perform better, or what are the determinants that impact majorly on the probability of using derivatives by a non-financial company, also to confirm or not the positive impact of the use of derivatives on company performance,or if the impact of each factor is merely contingent or long-term and at last but not least which omitted variables could help to explain why companies do not use derivatives, neglecting the benefits connected to their use.

Our results suggest that different factors have a different impact on the use of derivatives depending on the different time horizons that companies pursue. The probability of using derivatives is influenced by short-term factors (tax shields), long-term factors (agency costs, commodity risks) and permanent ones (financial distress, size, foreign and regulatory risks), on the contrary of the diversification factor that do not appear intuitively as a substitute or complementary for the risk management function. A general implication is that the benefits connected to their use cannot always be found in the short term. Furthermore, the idea that derivatives show their positive effects with different intensity over time suggests that companies (or their managers) that do not use such instruments (and therefore decide to give up the related benefits) face managerial cognitive barriers that focus their economic expectations only on short-term horizons, maybe for a positive or negative excess of confidence. Moreover, the fact that diversification does not represent a determinant, unlike being a manufacturing or industrial enterprise and so potentially subjected to many regulations, suggests that ESG variables (and therefore environmental, social and governance) could contribute to explaining the use of derivatives.

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Table 1 – Theoretical (expected) and Empirical (actual) Signs respectively for each Factor, Specific Risk and Variable. Each Factor represents a deviation (or imperfection) from the Miller-Modigliani's Value theory in efficient capital markets; for example, the financial distress (so the transaction costs) with the default costs are imperfections as well as the agency costs depends on the asymmetric information. Each sign interprets the firm response in terms of derivative use due to an increase of the variable taken into account. The theoretical sign reports the response expected while the empirical one the actual frequent firm behavior observed in literature.

Factor	References	Specific Risk	Variable	Theoretical Sign	Empirical Sign
Financial Distress	Myers (1977);Smith, and Stulz (1984); Froot, Scharfstein, and Stein (1993).	Credit Risk	Leverage	+	-
		Interest Rate	Coverage	-	+
		Credit Risk	Quick Ratio	-	
			Current Ratio	-	
	Smith, and Stulz (1985); Trueman and Titman (1988). Trueman and Titman (1988); Minton and Schrand (1999); Barton (2001); Knopf, Nam and Thornton (2002); Francis, LaFond, Olsson and Schipper (2004); Koonce, Miller and Winchel (2015).	Default Costs	Tangible Assets	-	
			Profit Margin	+	-
			ROA	+	-
			ROE	+	-
			DebtLT to Debt Tot	+	
			DebtLT to DebtST	+	
		Credit Risk	Neg. Equity BV	+	
			FD Exposure dum	+	
Agency Costs	Choi, Mao and Upadhyay (2013).	Underinvestment	MtB*Leverage	+	+
			Capex	+	+
			Capex to Asset * Lev	+	+
			Capex to Size * Lev	+	+
			Capex to Cash Flow * Lev	+	+
			Capex + R&D	+	+
			Capex+R&D to Asset	+	+
			Capex+R&D to Size	+	+
			Capex+R&D to Cash Flow	+	+
			Net PPE	+	+
			PPE to Asset	+	
			PPE to Size	+	
			PPE to Cash Flow	+	
	Smith, and Stulz (1985); Graham, Harvey and Rajgopal (2005); Spanò (2007).	Entrenchment/Underinvestment	Tobin Q	+	+
			Log Tobin Q	+	+
			Market-to-Book	+	+
			R&D	+	+
			R&D to Sales	+	
			R&D to Size	+	
		Entrenchment	Cash Flow to Asset	+	-
			Cash Flow to Size	+	-
			Earnings Yield	+	-
			Cash to Asset	+	-
Tax Shields	Stulz (1996); Leland (2002); Graham and Rogers (2002); Donohoe (2015b).	Tax Benefits	Tax Credit	+	+
		Tax Costs	Tax Debt	-	-
			Tax Deb. to Tot Liab.	-	-
		Tax Benefits	Tax Cred. dum	+	+
		Tax Costs	Tax Deb. dum	-	-
	Smith, and Stulz (1985); Graham and Smith (1999); Donohoe (2015a).	Tax Net	Tax Cred.+Deb.	+/-	
			Tax Cred.+Deb. To Asset	+/-	
			Tax Rate	-	-
Size	Géczy, Minton, and Schrand, (1997); Choi, Mao and Upadhyay (2013). Stulz (1996); Leland (2002); Graham and Rogers (2002); Donohoe (2015b).	Transaction Costs	Market Cap + Tot Debt	+/-	+
			Log (Mkt Cap + Tot Debt)	+/-	+
			Log Assets	+/-	+
			Cash Flow	+/-	-
Economic	Market	Commodity	Raw Materials	+	
			Raw Materials to Asset	+	
			CP Exposure dum	+	
Operating Hedging	Guay (1999); Zhang (2009).	Exchange	Foreign PL	+	+/-
			Foreign PL to PL	+	
			FX Exposure dum	+	
Diversification	Shareholders	Downside	US SIC primary codes Number	+/-	
			US SIC secondary codes Number	+/-	
			US SIC total codes Number	+/-	
			Div1 (>=1)	+/-	
			Div2 (>=2)	+/-	
			Div3 (>=3)	+/-	
Risk-Taking	Guay (1999); Zhang (2009).	Risk Appetite	Exposure to Risks N	+/-	-
			Exposure to Risks dum	+/-	
Normative	Koonce, Miller and Winchel (2015).	Ethics	Man Exp Industry US SIC	+/-	

Table 2 – General Statistics of the new Derivative items for the Balance Sheet and Profit & Loss statements, regard to new regulations (EU directive 2013/34 and Italian Legislative Decree 139/2015).The sample is composed of 223 Italian non-financial public firms, observed from 2016 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

	min	max	mean	median	St. Dev.	25th Per	75th Per	t stat	p-value	Obs. N.
BIII4	1.133	5.33e+005	21211	515	81931	78	5107.3	2.33	0.022329	81
CIII5	0.019	2.4691e+006	1.3393e+005	1093.5	4.482e+005	14.272	16625	1.9822	0.053872	44
B3	1.512	4.7455e+006	62584	289	4.4152e+005	51	3248.8	1.8208	0.070465	165
AVII	0.019	1.053e+006	21979	153	1.0914e+005	23.766	2613.3	2.1783	0.03141	117
D18d	0.618	4.7994e+005	15406	327	78753	23.814	2398.4	1.1899	0.24186	37
D19d	0.622	3.4009e+005	14799	664.22	50863	93	4352	2.3638	0.021089	66
BIII4 to Asset	1.0565e-005	0.045934	0.0033401	0.00063516	0.0069038	0.00018648	0.002903	4.3543	3.9179e-005	81
CIII5 to Asset	3.6438e-007	0.045385	0.004922	0.00042529	0.0094644	9.5353e-005	0.0040145	3.4496	0.0012695	44
B3 to Asset	3.2683e-006	0.087226	0.0042601	0.00087517	0.0099043	0.00034949	0.0034333	5.5251	1.2698e-007	165
AVII to Asset	3.6438e-007	0.025917	0.0024239	0.0006265	0.0042649	0.00024705	0.0022977	6.1477	1.1456e-008	117
D18d to PL	4.9744e-005	1.1531	0.14959	0.042419	0.27222	0.006437	0.075736	3.3425	0.0019466	37
D19d to PL	4.6826e-005	10.014	0.23049	0.022985	1.2367	0.0078543	0.071417	1.5142	0.13483	66
BIII4 to Equity	2.2414e-005	0.08407	0.0079676	0.0020605	0.015889	0.00043058	0.0086587	4.5132	2.1688e-005	81
CIII5 to Equity	1.0763e-006	0.10275	0.014085	0.0012424	0.027344	0.0002011	0.0089504	3.4169	0.0013952	44
B3 to Equity	7.6251e-006	0.17631	0.011873	0.0025585	0.025973	0.00077014	0.0096576	5.8716	2.3301e-008	165
AVII to Equity	1.0763e-006	0.17265	0.0089522	0.0016125	0.022473	0.00044531	0.0069218	4.3089	3.4559e-005	117
D18d to Equity	1.0532e-005	0.022911	0.005863	0.0031922	0.0068298	0.00053139	0.01057	5.2217	7.6179e-006	37
D19d to Equity	3.8336e-006	0.10205	0.0086715	0.0017282	0.020217	0.00054305	0.0080557	3.4846	0.00088771	66
BS Exp to Asset	7.2877e-007	0.046353	0.004868	0.0012438	0.0088932	0.00031691	0.0045999	7.6241	1.086e-012	194
BS Exp to Equity	2.1525e-006	0.21378	0.01488	0.003446	0.031632	0.00075568	0.012629	6.5519	5.0392e-010	194
BS Exp to PL	1.6646e-005	593.36	3.4018	0.035594	42.597	0.0083311	0.14768	1.1123	0.26739	194
PL Exp to Asset	4.1947e-006	0.038669	0.0030259	0.00096565	0.0055252	0.00028788	0.0033396	5.253	9.775e-007	92
PL Exp to Equity	9.6143e-006	0.10205	0.0083454	0.0031247	0.017469	0.00076248	0.0090992	4.5822	1.4586e-005	92
PL Exp to PL	4.6826e-005	10.014	0.22061	0.037736	1.0578	0.0083951	0.077426	2.0005	0.048431	92

Table3.1 – Short Term Factor Model Regressions (2016-2017). Results from Probit regressions on accounting data for 2016-2017 years. The dependent variable is the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The independent variables represent hypothetic proxies for the several factors involved. The columns point out specific models individuated in order to investigate the single and/or joint impact of the factors. FD, AC, TS, S, E OH, D, N and F, indicating respectively the Financial Distress, Agency Costs, Tax Shields, Size, Economic, Operating Hedging, Diversification, Normative and Full models; the variant 1 or 2 (for example F1 or F2) represent attempts to refine the model.The p-value of the t-test for each estimated beta coefficient is shown in italics. The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2016 to 2017. Data source: Bureau Van Dijk.

	FD	AC	TS	S	E	OH	D	N	F1	F2
Intercept	-0.49659	0.36646	-0.62907	-4.2951	-0.27147	-0.55541	-0.093923	-0.21254	-7.5962	-5.5234
p-value	*3.1295e-005*	*0.24891*	*0.063949*	*2.241e-020*	*0.00086202*	*2.1426e-007*	*0.20121*	*0.01749*	*4.3592e-005*	*4.4542e-124*
Coverage Ratio	-1.6924e-005								-0.00068173	
	0								*0.20371*	
Tangible Assets	0.93972								-0.78926	
	0.054892								*0.52184*	
Profit Margin	-0.00030038								0.0062319	-0.00023973
	0								*5.8933e-006*	*1.3944e-318*
DebtLT to Debt Tot	1.874								2.4903	1.7601
	2.5482e-007								*0.005871*	*9.7043e-035*
DebtLT to DebtST	-0.11939								-0.27405	-0.15797
	0.0040801								*0.012982*	*1.768e-016*
MtB * Lev		0.2862							0.17954	
		0.030484							*0.26194*	
Capex + R&D		-2.8594e-007							5.1923e-007	
		1.1577e-007							*0.13691*	
PPE		1.5333e-006							-4.3958e-007	
		4.815e-056							*0.35433*	
PPE to Cash Flow		-0.00067935							0.011665	
		4.6364e-102							*0.065779*	
Tobin's Q		-0.62544							-0.37662	
		0.023376							*0.34545*	
Log Tobin's Q		1.2292							0.76494	
		0.044682							*0.36958*	
R&D		-3.32e-006							-4.0061e-006	
		0.0050243							*0.6821*	
Cash Flow to Asset		2.6201							1.308	
		0.032144							*0.40639*	
Tax Credit			2.803e-006						-9.2155e-006	
			0						*0.486*	
Tax Debt			1.5573e-005						1.0369e-005	1.4774e-005
			0						*0.034097*	*0*
Tax Debt dummy			0.57578						0.36548	
			0.089856						*0.60707*	
Log Tot Asset				0.36692					0.48958	0.36602
				8.3316e-021					*6.8679e-005*	*2.3848e-176*
Raw Materials					2.3629e-005				6.1095e-006	

				1.7701e-281					*0.7947*	
Raw Materials to Asset				-3.2696					-7.9097	
				3.0906e-008					*3.7116e-020*	
CP Exposure dum				0.66309					0.51143	
				2.5228e-007					*0.17951*	
FX Exposure dum					0.91685				1.0117	0.98098
					6.5597e-012				*0.0015986*	*2.1422e-012*
Div1 (>=1)						0.39526			-0.079838	
						0.0019668			*0.79832*	
Man Exp Industry US SIC dum							0.46165	0.70704	0.36749	
							0.0001486	*0.052188*	*6.9466e-181*	
LL	563.29	153.03	579.66	503.72	541.24	565.98	608.03	603.03	93.527	417.98
Pseudo R-square (Mc Fadden)	0.081083	0.73366	0.084512	0.19122	0.14048	0.079611	0.01669	0.024126	0.84626	0.33665
AIC	14	20	10	6	10	6	6	6	50	18
Obs N.	438	143	446	446	446	446	446	446	141	442

Table3.2 – Medium Term Factor Model Regressions (2014-2017). Results from Probit regressions on accounting data for 2014-2017 years. The dependent variable is the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The independent variables represent hypothetic proxies for the several factors involved. The columns point out specific models individuated in order to investigate the single and/or joint impact of the factors. FD, AC, TS, S, E OH, D, N and F, indicating respectively the Financial Distress, Agency Costs, Tax Shields, Size, Economic, Operating Hedging, Diversification, Normative and Full models; the variant 1 or 2 (for example F1 or F2) represent attempts to refine the model. The p-value of the t-test for each estimated beta coefficient is shown in italics. The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2014 to 2017. Data source: Bureau Van Dijk.

	FD	AC	TS	S	E	OH	D	N	F1	F2
Intercept	-0.44343	0.4848	-0.95006	-4.1074	-0.23862	-0.5646	-0.093923	-0.21254	-7.9228	-7.9897
p-value	*8.8605e-008*	*1.2213e-016*	*0.0011697*	*6.8156e-038*	*3.3254e-005*	*1.7328e-013*	*0.070284*	*0.00076476*	*7.4617e-007*	*5.9175e-013*
Tangible Assets	1.0277								-2.4493	-2.3139
	0.0054121								*0.028794*	*0.0075862*
Profit Margin	-1.8585e-005								0.0062091	0.0065348
	0								*6.5946e-007*	*2.6516e-039*
ROE	0.73662								0.0059195	
	0.00011182								*0.2323*	
DebtLT to Debt Tot	1.5545								2.0774	2.397
	8.7553e-011								*0.0012443*	*1.0199e-005*
DebtLT to DebtST	-0.057702								-0.23072	-0.25188
	0.0078112								*0.0012146*	*5.0792e-005*
Mtb* Lev		0.60488							0.29929	
		3.4385e-021							*0.0917*	
Capex to Asset		4.5971							5.2128	2.5911
		9.7143e-202							*0.0079142*	*1.1127e-010*
Capex to Asset * Leverage		-9.2085							-10.315	-5.3828
		5.1871e-139							*0.026819*	*3.9773e-031*

Capex to Size * Leverage	9.0888								9.9093	4.1876
	2.0871e-116								*0.071778*	*4.3834e-007*
(Capex + R&D) to Size	-4.6102								-4.1685	-1.582
	5.183e-289								*0.073036*	*2.9796e-006*
PPE	1.0132e-006								6.2684e-008	
	6.2657e-162								*0.70256*	
PPE to Asset	-0.1764								-0.82801	-0.49356
	0.0008402								*4.2607e-006*	*0.001074*
Log Tobin's Q	1.6802								1.2278	0.85742
	6.3462e-013								*0.018354*	*0.013817*
Market to Book	-0.52933								-0.37184	-0.14656
	6.9764e-011								*0.02356*	*0.034315*
Tax Credit		1.4061e-006							-7.0126e-006	
		0							*0.18807*	
Tax Debt		1.5689e-005							3.6666e-006	
		0							*0.45876*	
Tax Credit dummy		0.35011							0.041122	
		0.070679							*0.93085*	
Tax Debt dummy		0.57393							0.30017	
		0.025783							*0.63273*	
Log Tot Asset			0.35401						0.53584	0.54316
			5.7188e-039						*3.0423e-008*	*5.621e-011*
Raw Materials				2.5045e-005					1.118e-005	
				0					*0.40393*	
Raw Materials to Asset				-2.6078					-4.6374	
				4.7152e-009					*0.31734*	
CP Exposure dum				0.56122					0.56973	0.42171
				1.031e-009					*0.047705*	*0.072373*
FX Exposure dum					0.93977				1.1662	1.2198
					6.3833e-023				*1.8236e-006*	*2.1603e-008*
Div1 (>=1)						0.39526			-0.24565	
						1.1683e-005			*0.28184*	
Man Exp Industry US SIC dum							0.46165	0.67427	0.7587	
							7.777e-008	*0.0099904*	*0.0015314*	
LL	1071.4	258.8	1133.2	1000.4	1070	1114.4	1216.1	1206.1	150.34	163.85
Pseudo R-square (Mc Fadden)	0.11421	0.77385	0.10274	0.19502	0.15017	0.090912	0.01669	0.024126	0.87457	0.86583
AIC	14	22	12	6	10	6	6	6	54	34
Obs N.	834	257	874	883	869	882	892	892	249	255

Table3.3 – Long Term Factor Model Regressions (2012-2017). Results from Probit regressions on accounting data for 2012-2017 years. The dependent variable is the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The independent variables represent hypothetic proxies for the several factors involved. The columns point out specific models individuated in order to investigate the single and/or joint impact of the factors. FD, AC, TS, S, E OH, D, N and F, indicating respectively the Financial Distress, Agency Costs, Tax Shields, Size, Economic, Operating Hedging, Diversification, Normative and Full models; the variant 1 or 2 (for example F1 or F2) represent attempts to refine the model. The p-value of the t-test for each estimated beta coefficient is shown in italics. The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. Data source: Bureau Van Dijk.

	FD	AC	TS	S	E	OH	D	N	F1	F2
Intercept	-0.37335	-0.27602	-0.48402	-3.9409	-0.21204	-0,53	-0.093923	-0.21254	-5.4731	-7.7106
p-value	*2.0968e-006*	*0.20313*	*0.0021118*	*1.6545e-021*	*9.0778e-006*	*1,6807e-017*	*0.026617*	*3.7317e-005*	*1.0877e-005*	*6.5888e-048*
Quick Ratio	-0.22348								-0.0013916	
	0.001232								*0.0093091*	
Current Ratio	0.057399								-0.11734	
	0.07913								*0.39369*	
Tangible Assets	0.79614								-2.0267	-1.5074
	0.0050101								*0.027238*	*0.036765*
Profit Margin	-2.3355e-005								0.0050446	
	0								*1.434e-005*	
ROE	0.66813								-24.449	
	2.3823e-005								*0.27238*	
DebtLT to Debt Tot	1.4922								1.132	1.468
	2.4512e-014								*0.024149*	*0.0001272*
DebtLT to DebtST	-0.058322								-0.10888	-0.073434
	0.0018854								*0.037936*	*0.0043047*
MtB * Lev		1.3019							0.15286	
		1.23e-011							*0.66719*	
Capex to Asset		3.032							3.0978	2.3609
		8.9889e-010							*4.2164e-006*	*1.0469e-009*
Capex to Asset * Leverage		-6.8863							-5.3761	-6.1394
		6.162e-016							*4.7457e-005*	*4.0015e-070*
Capex to Size * Leverage		6.8521							4.6918	6.4656
		1.0183e-017							*0.0051028*	*1.3485e-053*
Capex to CF * Leverage		0.0047534							-0.0014499	
		4.2131e-019							*0.9491*	
Capex+ R&D		-3.922e-008							-5.9196e-008	
		0.0088417							*0.58202*	
(Capex+ R&D) to Size		-3.029							-2.7532	-2.1817
		6.6789e-009							*0.00041768*	*6.0533e-006*
(Capex+ R&D) to CF		0.010512							0.012297	
		5.9797e-014							*0.31596*	
PPE		7.8105e-007							6.1423e-008	
		1.3802e-173							*0.81245*	
PPE to CF		-0.013729							-0.011998	
		6.8315e-012							*0.00099869*	
Tobin's Q		1.0056							-0.11626	

	6.9202e-006			*0.83419*	
Log Tobin's Q	1.3144			1.5952	0.57708
	2.448e-006			*0.0035581*	*0.001048*
Market to Book	-1.309			-0.34315	
	7.243e-016			*0.36589*	
R&D	-3.5559e-006			1.2706e-007	
	1.6135e-164			*0.96017*	
R&D to Asset	-8.6858			-6.4241	
	0.014259			*0.10655*	
Cash to Asset	2.9132			-2.2974	
	0.0039377			*0.15197*	
CF to Size	-4.0551			0.11372	
	2.9867e-005			*0.95034*	
CF to Asset	5.4179			-0.32481	
	5.049e-007			*0.88038*	
Earnings Yield	-0.18855			2445.7	
	3.2603e-007			*0.2722*	
Tax Credit	1.4848e-006			1.9525e-006	
	0			*0.14463*	
Tax Debt	1.3643e-005			6.541e-006	7.2785e-006
	0			*0.00078147*	*1.9301e*-004

continued

Tax Credit dummy	0.47285			0.073121	
	0.00267			*0.84768*	
Size		1.4742e-007		1.7739e-007	
		6.3496e-022		*0.19964*	
Log Size		0.13213		-1.352e-007	
		0.094245		*0.32664*	
Log Tot Asset		0.19571		0.3964	0.49834
		0.01527		*7.6274e-006*	*1.5048e-041*
Cash Flow		-7.6413e-007		-6.5307e-007	-3.0224e-007
		3.1618e-263		*0.001331*	*3.1502e-062*
Raw Materials			2.6968e-005	3.1686e-005	5.0934e-006
			0	*5.4225e-060*	*0.011929*
Raw Materials to Asset			-1.9077	-5.1555	
			0	*0.042165*	
CP Exposure dum			0.4626	0.57969	0.35975
			1.3717e-021	*0.0089558*	*0.031627*
FX Exposure dum			0,92673	1.0375	1.0843
			1,835e-032	*2.8296e-010*	*1.4716e-011*
Div1 (>=1)				0.35489	-0.119
				3.1346e-006	*0.52472*

Div1 (>=3)							0.41352		-0.22474	
							0.045639		*0.37507*	
Man Exp Industry US SIC dum								0.46165	0.80194	0.94165
								4.6202e-011	*0.00023597*	1.8702e-007
LL	1565.5	354.9	1653.2	952.14	1559.3	1634,5	1819.9	1809.1	210.84	264.24
Pseudo R-square (Mc Fadden)	0.13141	0.79206	0.12129	0.4725	0.17506	0,10649	0.019602	0.024126	0.88139	0.8533
AIC	18	42	10	12	10	6	8	6	84	34
Obs N.	1219	391	1269	861	1258	1293	1338	1338	370	390

Appendix

Table A1 – Theoretical (expected) and Empirical (actual) Signs respectively for each Factor, Specific Risk and Variable. Each Factor represents a deviation (or imperfection) from the Miller-Modigliani's Value theory in efficient capital markets; for example, the financial distress (so the transaction costs) with the default costs are imperfections as well as the agency costs depends on the asymmetric information. Each sign interprets the firm response in terms of derivative use due to an increase of the variable taken into account. The theoretical sign reports the response expected while the empirical one the actual frequent firm behavior observed in literature.

Variable	Definition
Leverage	Total debt/sum of market capitalization, total debt andpreferred stock.
Coverage	EBIT/interest expense on debt.
Quick Ratio	(Cash & Equivalents + Receivables (Net))/Total CurrentLiabilities.
Current Ratio	Current Assets/Current Liabilities.
Tangible Assets	(Total Assets – Intangibles)/Total Assets.
Profit Margin	Gross Income/Net Sales or Revenues (3-year average).
ROA	(Net Income before Preferred Dividends +((Interest Expense on Debt-Interest Capita lized) * (1-TaxRate)))/Last Year's Total Assets.
ROE	Return on Equity = Net Income/Equity.
DebtLT to Debt Tot	Total Long-Term Debt/Total Debt.
DebtLT to DebtST	Total Long-Term Debt/Total Short –Term Debt.
Neg. Equity BV	Dummy variable, negative value of book equity.
MtB*Leverage	Interaction variable for Market-to-Book multiplied by Leverage.
Capex	Capital Expenditures/Net Sales or Revenues.
Capex to Asset * Lev	(Capital Expenditures/Total Assets) * Leverage.
Capex to Size * Lev	(Capital Expenditures/(Market Capitalization + Total Liabilities)) * Leverage.
Capex to Cash Flow * Lev	(Capital Expenditures/Cash Flow) * Leverage.
Capex + R&D	Capital Expenditures + Research and Development Expense.
Capex+R&D to Asset	(Capital Expenditures + Research and Development Expense)/Total Assets.
Capex+R&D to Size	(Capital Expenditures + Research and Development Expense)/(Market Capitalization + Total Liabilities).
Capex+R&D to Cash Flow	(Capital Expenditures + Research and Development Expense)/Cash Flow.
PPE	Patrimonial structure of property, plant and equipment.
PPE to Asset	(Patrimonial structure of property, plant and equipment)/Total Assets.
PPE to Size	(Patrimonial structure of property, plant and equipment)/(Market Capitalization + Tot al Liabilities).
PPE to Cash Flow	(Patrimonial structure of property, plant and equipment)/Cash Flow.
Tobin Q	Total Market Value of firm/Total Asset Value of firm (*i.e.* Market Capitalization/Asse ts' replacement cost).

Log Tobin Q	Natural logarithm of the Total Market Value of firm/Total Asset Value of firm
Market-to-Book	Market Equity Capitalization/Equity Book Value.
R&D	Research and Development Expense
R&D to Sales	Research and Development Expense/Total Sales.
R&D to Size	Research and Development Expense/(Market Capitalization + Total Liabilities).
R&D to Asset	Research and Development Expense/Total Assets.
Cash to Asset	Cash & Equivalents /Total Assets.
Cash Flow to Asset	Cash Flow/Total Assets.
Cash Flow to Size	Cash Flow/(Market Capitalization + Total Liabilities).
Earnings Yield	Earnings/Market Equity Capitalization.
Tax Credit	Includes short and long term credits.
Tax Cred. to Asset	Tax Credit/Total Assets
Tax Debt	Includes short and long term debts
Tax Deb. to Tot Liab.	Tax Debit/Total Liabilities.
Tax Cred. Dum	Dummy variable.
Tax Deb. Dum	Dummy variable.
Tax Cred.+Deb.	Total Tax Credit and Debit.
Tax Cred.+Deb. To Asset	Total Tax Credit and Debit/Total Assets.
Tax Rate	Total Taxes/Taxable Income
Market Cap + Tot Debt	Market Capitalization (stock price) + (Total Long-Term + Total Short-Term Debt)
Log (Mkt Cap + Tot Debt)	Natural logarithm of the sum of market value of common equity, total debt, and preferred stock.
Log Assets	Natural logarithm of the Total Assets.
Cash Flow	Cash flows from Operating, Investing and Financing activities.
Raw Materials	Total Costs of the Raw Materials.
Raw Materials to Asset	Total Costs of the Raw Materials/Total Assets.
CP Exposure dum	Dummy variable.
Foreign PL	International Profit and Losses
Foreign PL to PL	International Profit and Losses /Total Profit and Losses
FX Exposure dum	Dummy variable.
US SIC primary codes Number	Number of business segments (primary SIC codes) that make up the company's revenue.
US SIC secondary codes Number	Number of business segments (secondary SIC codes) that make up the company's revenue.
US SIC total codes Number	Total Number of business segments (primary and secondary SIC codes) that make up the company's revenue.
Div1 (>=1)	Dummy variable assuming 1 if US SIC total codes Number is equal or higher of one, 0 otherwise.
Div2 (>=2)	Dummy variable assuming 1 if US SIC total codes Number is equal or higher of two, 0 otherwise
Div3 (>=3)	Dummy variable assuming 1 if US SIC total codes Number is equal or higher of three, 0 otherwise.
Man Exp Industry US SIC	Dummy variable assuming 1 if US SIC primary codes Number corresponds to the manufacturing industry.

Table A2.1 – General Statistics (2016-2017). The sample is composed of 223 Italian non-financial public firms, observed from 2016 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

	min	max	mean	median	St. Dev.	25th Per	75th Per	t stat	p-value	Obs. N.
Leverage	-0.99015	9.1711	0.43835	0.43144	0.59894	0.22802	0.5781	15.456	1.9011e-043	418
Coverage	-44115	1.8079e+006	5864.9	51.422	90947	26.219	102.83	1.3527	0.17685	414
Quick Ratio	0	937.73	4.026	0.19654	53.437	0.050202	0.50658	1.5911	0.11229	446

Current Ratio	0.066363	938.16	5.3986	1.3872	53.41	0.97615	2.0212	2.1347	0.033334	446
Tangible Assets	0	0.72079	0.099693	0.047808	0.13077	0.0068547	0.14046	16.1	2.7379e-046	446
Profit Margin	-267.35	55376	136.76	0.083685	2638.5	0.0093516	0.24529	1.0897	0.27643	340
ROA	-1.2206	0.5261	0.015017	0.01045	0.11597	-0.0137	0.0589	2.7348	0.0064913	249
ROE	-1.3736	0.9905	0.061898	0.05895	0.23091	-0.0051	0.1378	5.5586	4.7863e-008	319
DebtLT to Debt Tot	0	0.94366	0.31636	0.28951	0.25342	0.098281	0.48854	26.365	5.9616e-093	446
DebtLT to DebtST	0	16.75	1.0364	0.40748	2.1663	0.10899	0.95518	10.104	9.5556e-022	446
Neg. Equity BV	0	1	0.017937	0	0.13287	0	0	2.8509	0.0045617	446
MtB*Leverage	-6.1399	89.918	1.2714	0.59964	5.1294	0.22214	1.2259	4.6239	5.3221e-006	315
Capex	-22.604	27.72	0.91809	0.16227	3.5497	0.022026	0.57174	3.4797	0.00062974	174
Capex to Asset * Lev	-18.952	15.311	0.28	0.044561	2.4873	0.0071002	0.2585	1.5145	0.13165	166
Capex to Size * Lev	-10.613	9.3669	0.14746	0.03265	1.5909	0.0025565	0.19134	1.12	0.26457	134
Capex to Cash Flow * Lev	-46147	386.1	-294.3	0.27017	3513.9	0.0042021	2.1232	-1.1048	0.27079	146
Capex + R&D	-4.7576e+005	5.5983e+007	6.6072e+005	29940	4.5683e+006	4960	90130	1.9187	0.056644	165
Capex+R&D to Asset	-22.604	27.72	0.9287	0.16035	3.5986	0.021721	0.56879	3.4237	0.00076938	165
Capex+R&D to Size	-0.31015	16.958	0.79709	0.083444	2.417	0.013291	0.44058	3.9848	0.00010658	138
Capex+R&D to Cash Flow	-548.85	46617	302.04	0.96447	3581.1	0.038475	5.9635	1.1029	0.27161	144
PPE	0	1.3986e+007	1.802e+005	6852.8	1.1941e+006	865.08	31370	3.1691	0.0016356	441
PPE to Asset	0	82.026	0.71272	0.051949	4.4914	0.0077223	0.1857	3.3324	0.00093376	441
PPE to Size	0	14.452	0.32873	0.031412	1.3655	0.0035078	0.13517	4.4649	1.0886e-005	344
PPE to Cash Flow	-180.09	22075	63.573	0.24349	1090.1	0.0063914	1.459	1.1881	0.23549	358
Tobin Q	0.3463	11.494	1.7143	1.2196	1.474	0.95997	1.7651	21.696	1.4506e-066	348
Log Tobin Q	-1.0604	2.4418	0.32653	0.19851	0.59763	-0.040856	0.56819	10.192	1.633e-021	250
Market-to-Book	-4.4649	100.37	2.9729	1.7013	6.1715	0.9748	2.9639	8.9863	1.673e-017	342
R&D	-2.335e+006	6801.2	-17245	0	1.5439e+005	0	0	-2.2563	0.024581	360
R&D to Sales	-393.33	0.067625	-1.4595	0	21.385	0	0	-1.3735	0.17036	357
R&D to Size	-0.19981	0.036197	-0.0040191	0	0.017845	0	0	-4.1591	4.0504e-005	296
R&D to Asset	-0.17535	0.036634	-0.0057909	0	0.021208	0	0	-5.5155	6.1952e-008	360
Cash to Asset	0	0.99172	0.095436	0.05888	0.12723	0.015946	0.12195	15.841	3.8588e-045	446
Cash Flow to Asset	-0.43736	0.85318	0.062643	0.05959	0.1112	0.034266	0.088042	10.387	3.9852e-022	290
Cash Flow to Size	-1.2812	23.62	0.18594	0.086712	1.2905	0.04227	0.14581	2.9494	0.0033632	360
Earnings Yield	-17.057	57.046	0.1284	0.056059	2.8842	-0.010043	0.13867	0.94017	0.34764	325
Tax Credit	0	4.3845e+005	10044	799.5	37437	180	3672.7	5.666	2.6285e-008	446
Tax Cred. to Asset	0	13.348	0.11286	0.006723	0.77597	0.0013934	0.020538	3.0717	0.0022592	446
Tax Debt	0	8.9096e+005	12668	801.34	76389	224.16	3067	3.5022	0.00050812	446
Tax Deb. to Tot Liab.	0	0.50524	0.021418	0.0059912	0.054144	0.002363	0.014982	8.3541	8.4681e-016	446
Tax Cred. dum	0	1	0.95291	1	0.21206	1	1	94.9	2.0171e-297	446
Tax Deb. Dum	0	1	0.96637	1	0.18048	1	1	113.08	0	446
Tax Cred.+Deb.	-8.8942e+005	4.3049e+005	-2623.5	36.56	83200	-1070.2	1895	-0.66593	0.5058	234
Tax Cred.+Deb. To Asset	-0.48833	13.325	0.091444	0.00050561	0.77708	-0.0063402	0.01125	2.4852	0.013316	234
Tax Rate	-17.024	27.111	0.19866	0.13845	1.7029	0	0.39414	2.4638	0.014126	336
Market Cap + Tot Debt	5511.7	9.2619e+007	2.8058e+006	2.3206e+005	9.8924e+006	77988	1.1497e+006	5.2911	2.1592e-007	348
Log (Mkt Cap + Tot Debt)	8.6146	18.344	12.653	12.355	2.0045	11.264	13.955	117.75	7.8548e-282	348
Log Assets	6.3724	18.239	11.888	11.804	2.0642	10.341	13.267	121.62	0	446
Cash Flow	-2.0949e+005	1.0632e+007	2.1329e+005	10307	1.0167e+006	1618.5	66516	4.2943	2.1809e-005	360

Raw Materials	0	3.87e+005	9200.8	0	34720	0	3098.7	5.5964	3.8315e-008	446
Raw Materials to Asset	0	3.022	0.056197	0	0.25434	0	0.021148	4.6663	4.0643e-006	446
CP Exposure dum	0	1	0.48655	0	0.50038	0	1	20.535	2.086e-066	446
Foreign PL	-5.48e+005	3.54e+005	-177.3	0	34880	-58	0	-0.10735	0.91456	268
Foreign PL to PL	-63.659	14.267	-0.10659	0	3.1367	-0.0064935	3.4731e-005	-0.71768	0.47333	277
FX Exposure dum	0	1	0.6435	1	0.4795	0	1	28.341	1.0152e-101	446
US SIC primary codes Number	1	2	1.0135	1	0.11533	1	1	185.57	0	446
US SIC secondary codes Number	0	5	0.4843	0	0.85248	0	1	11.998	6.2873e-029	446
US SIC total codes Number	1	6	1.4978	1	0.85262	1	2	37.098	2.9129e-138	446
Div1 (>=1)	0	1	0.34081	0	0.47451	0	1	15.168	3.4648e-042	446
Div2 (>=2)	0	1	0.10314	0	0.30448	0	0	7.1537	3.5e-012	446
Div3 (>=3)	0	1	0.035874	0	0.18619	0	0	4.0692	5.5824e-005	446
Man Exp Industry US SIC	0	1	0.54709	1	0.49834	0	1	23.185	1.4838e-078	446

Table A2.2 – General Statistics (2014-2017). The sample is composed of 223 Italian non-financial public firms, observed from 2014 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

	min	max	mean	median	St. Dev.	25th Per	75th Per	t stat	p-value	Obs. N.
Leverage	-0.99015	9.1711	0.44716	0.44557	0.53475	0.24712	0.59665	24.848	9.7416e-104	831
Coverage	-6.8815e+005	1.8079e+006	2362.6	44.362	69284	26.355	86.693	0.99945	0.31786	812
Quick Ratio	0	937.73	2.4101	0.17682	38.219	0.04176	0.47658	1.8738	0.061284	883
Current Ratio	0	938.16	3.7729	1.373	38.225	0.95295	1.9561	2.933	0.0034444	883
Tangible Assets	0	0.7255	0.10123	0.049009	0.13032	0.0073147	0.14358	23.081	1.3889e-092	883
Profit Margin	-6175.9	7.6428e+005	946.89	0.08363	26038	0.012575	0.22626	1.0702	0.28485	673
ROA	-1.2206	0.5261	0.014776	0.0131	0.11454	-0.015325	0.057575	3.8334	0.00013537	506
ROE	-1.4112	0.9905	0.048384	0.053	0.24937	-0.0033	0.1343	5.6567	2.1084e-008	634
DebtLT to Debt Tot	0	0.96858	0.30137	0.26464	0.25551	0.080542	0.46251	35.049	2.8185e-169	883
DebtLT to DebtST	0	30.831	1.0681	0.35988	2.719	0.087597	0.86049	11.673	2.2319e-029	883
Neg. Equity BV	0	1	0.01812	0	0.13346	0	0	4.0345	5.9474e-005	883
MtB*Leverage	-99.39	89.918	1.0315	0.60575	5.6776	0.21061	1.3375	4.5817	5.5533e-006	583
Capex	-22.604	30.895	1.0814	0.14828	4.1376	0.022599	0.5225	4.7481	3.07e-006	322
Capex to Asset * Lev	-18.952	26.699	0.49322	0.045083	2.9002	0.0062959	0.22601	3.0894	0.0021765	304
Capex to Size * Lev	-10.613	9.3669	0.18805	0.025935	1.3518	0.0025565	0.17739	2.2345	0.026311	239
Capex to Cash Flow * Lev	-46147	386.1	-172.87	0.24196	2644.5	0.0024914	1.9067	-1.1473	0.25217	257
Capex + R&D	-4.7576e+005	5.5983e+007	8.6914e+005	29940	5.656e+006	4876	94555	2.7055	0.0071977	291
Capex+R&D to Asset	-22.604	30.895	0.99167	0.11264	3.8936	0.019151	0.50657	4.4843	1.0323e-005	291
Capex+R&D to Size	-0.31015	16.958	0.68678	0.079349	2.2404	0.013708	0.36742	4.9142	1.5926e-006	243
Capex+R&D to Cash Flow	-4700.4	46617	155.9	0.81255	2706.1	0.021667	4.5736	1.0028	0.31675	250
PPE	0	1.3986e+007	1.8431e+005	6682.5	1.161e+006	861.17	33171	4.6554	3.7444e-006	860
PPE to Asset	0	137.36	0.92788	0.052378	7.2999	0.0082491	0.18521	3.7145	0.00021681	854
PPE to Size	0	14.452	0.27265	0.030174	1.1168	0.0036133	0.13617	6.074	2.1798e-009	619
PPE to Cash Flow	-4222.6	22075	32.548	0.24302	820.27	0.0039832	1.5082	1.0968	0.27309	644
Tobin Q	0.26222	11.494	1.6542	1.1926	1.3935	0.93244	1.759	29.937	1.7605e-123	636
Log Tobin Q	-1.3386	2.4418	0.29224	0.17617	0.59945	-0.06995	0.56472	12.295	2.5815e-031	431
Market-to-Book	-106.06	100.37	2.5998	1.5851	6.6574	0.89281	3.0212	9.8484	2.1623e-021	623
R&D	-2.335e+006	6801.2	-16114	0	1.4113e+005	0	0	-3.1582	0.00165	665
R&D to Sales	-393.33	0.067625	-1.1025	0	16.435	0	0	-1.8457	0.065332	657
R&D to Size	-0.19981	0.036197	-0.0048225	0	0.018947	0	0	-6.3325	4.6441e-010	526
R&D to Asset	-0.17535	0.036634	-0.0060173	0	0.021164	0	0	-7.8589	1.3192e-014	664
Cash to Asset	0	0.99172	0.091222	0.055399	0.11994	0.014365	0.12055	22.601	1.3885e-089	883
Cash Flow to Asset	-2.0458	3.7281	0.064767	0.058585	0.21143	0.028459	0.084501	7.6396	8.2859e-014	518
Cash Flow to Size	-1.7246	49.541	0.21104	0.081378	2.0302	0.034314	0.14019	2.9144	0.0036649	660
Earnings Yield	-17.057	91.922	0.20625	0.052799	3.7941	-0.0073637	0.13758	1.6153	0.1066	649
Tax Credit	0	6.5761e+005	11202	761.5	45519	177.5	3570.5	7.3003	6.4265e-013	880
Tax Cred. to Asset	0	43.965	0.16916	0.0071034	1.7013	0.0014504	0.022016	2.9393	0.0033757	874
Tax Debt	0	1.2307e+006	13232	823.81	83015	229.73	3157.5	4.7282	2.6371e-006	880
Tax Deb. to Tot Liab.	0	0.53448	0.020929	0.0068683	0.048499	0.0025477	0.017987	12.801	1.585e-034	880
Tax Cred. dum	0	1	0.94886	1	0.2204	1	1	127.71	0	880
Tax Deb. Dum	0	1	0.96818	1	0.17562	1	1	163.54	0	880
Tax Cred.+Deb.	-1.2299e+006	6.5744e+005	-2164.6	-4.7655	92184	-1212	1474	-0.69418	0.48775	433
Tax Cred.+Deb. To Asset	-0.48833	43.953	0.14822	-7.8027e-006	1.7012	-0.0083688	0.010664	2.5757	0.010166	433
Tax Rate	-62.51	27.111	0.16112	0.17681	2.62	0	0.43745	1.8264	0.068134	668
Market Cap + Tot Debt	4483.9	9.2619e+007	2.9057e+006	2.3753e+005	1.0091e+007	79659	1.3813e+006	7.2619	1.1212e-012	636
Log (Mkt Cap + Tot Debt)	8.4082	18.344	12.71	12.378	1.986	11.285	14.138	161.39	0	636
Log Assets	4.3041	18.268	11.808	11.763	2.1241	10.249	13.202	165.19	0	883
Cash Flow	-2.0949e+005	1.3454e+007	2.2285e+005	9679	1.0924e+006	1132	63959	5.7227	1.491e-008	661
Raw Materials	0	3.87e+005	8740.7	0	31369	0	3034.5	8.2424	6.1495e-016	875
Raw Materials to Asset	0	3.022	0.055159	0	0.25717	0	0.021563	6.3228	4.1065e-010	869
CP Exposure dum	0	1	0.47657	0	0.49974	0	1	28.209	5.3969e-125	875
Foreign PL	-5.48e+005	3.54e+005	-587.74	0	28834	-18	1.514	-0.60537	0.54509	554
Foreign PL to PL	-63.659	14.267	-0.069126	0	2.2985	-0.0031416	0.0012664	-0.89268	0.37228	579
FX Exposure dum	0	1	0.64739	1	0.47805	0	1	40.218	1.275e-201	882
US SIC primary codes Number	1	2	1.0135	1	0.11527	1	1	262.59	0	892
US SIC secondary codes Number	0	5	0.4843	0	0.852	0	1	16.977	3.2092e-056	892
US SIC total codes Number	1	6	1.4978	1	0.85214	1	2	52.494	6.8252e-275	892
Div1 (>=1)	0	1	0.34081	0	0.47425	0	1	21.463	1.0709e-082	892
Div2 (>=2)	0	1	0.10314	0	0.30431	0	0	10.122	7.1628e-023	892
Div3 (>=3)	0	1	0.035874	0	0.18608	0	0	5.7579	1.1716e-008	892
Man Exp Industry US SIC	0	1	0.54709	1	0.49806	0	1	32.806	2.055e-155	892

Table A2.3 – General Statistics (2012-2017). The sample is composed of 223 Italian non-financial public firms, observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

	min	max	mean	median	St. Dev.	25th Per	75th Per	t stat	p-value	Obs. N.
Leverage	-0.99015	9.1711	0.45484	0.45672	0.48397	0.26123	0.60355	33.833	2.5625e-180	1228
Coverage	-6.8815e+005	1.8079e+006	2039.2	41.141	58460	24.883	75.357	1.2421	0.21443	1206
Quick Ratio	0	937.73	1.7823	0.14756	31.573	0.036721	0.43414	2.0322	0.042336	1296
Current Ratio	0	938.16	3.1785	1.3625	31.612	0.93376	1.9295	3.6197	0.0003063	1296
Tangible Assets	0	0.82153	0.10537	0.049627	0.13691	0.0084142	0.1524	27.707	4.6116e-133	1296
Profit Margin	-49319	7.6428e+005	607.35	0.078557	21548	0.012309	0.21954	1.0044	0.31536	983
ROA	-1.2206	2.9756	0.016789	0.0122	0.13787	-0.015925	0.055825	4.3857	1.2499e-005	736
ROE	-1.4264	0.9905	0.048986	0.0525	0.24606	-0.00505	0.13245	7.0216	3.6005e-012	921
DebtLT to Debt Tot	0	0.97435	0.288	0.23577	0.25787	0.060613	0.46043	40.207	4.4138e-230	1296
DebtLT to DebtST	0	37.985	1.0523	0.30851	2.8771	0.064524	0.85332	13.167	2.9745e-037	1296
Neg. Equity BV	0	1	0.01929	0	0.1376	0	0	5.047	5.128e-007	1296
MtB*Leverage	-99.39	89.918	1.0262	0.55296	4.9063	0.20639	1.2407	6.2045	8.4401e-010	809
Capex	-22.604	31.681	1.2321	0.16676	4.3953	0.024013	0.5388	6.4167	3.123e-010	510
Capex to Asset * Lev	-18.952	26.699	0.63028	0.054995	3.0597	0.0066466	0.23375	4.7153	3.0993e-006	483
Capex to Size * Lev	-10.613	9.3669	0.2102	0.031561	1.2192	0.0035324	0.18212	3.4351	0.00065486	368
Capex to Cash Flow * Lev	-46147	386.1	-115.74	0.2425	2152.7	0.0023663	1.9054	-1.1594	0.24688	382
Capex + R&D	-1.0239e+007	5.5983e+007	9.0187e+005	27196	5.8529e+006	5070	88861	3.337	0.00091434	435
Capex+R&D to Asset	-22.604	31.681	0.95488	0.11996	3.8482	0.018881	0.46981	5.3738	1.218e-007	435
Capex+R&D to Size	-0.41957	16.958	0.64637	0.078215	2.1149	0.014077	0.40784	6.0665	3.0754e-009	367
Capex+R&D to Cash Flow	-4700.4	46617	100.38	0.66437	2199.4	0.0060113	4.3945	0.97775	0.32871	363
PPE	0	1.3986e+007	1.8572e+005	6799.2	1.1354e+006	867.56	34087	5.7533	1.1026e-008	1237
PPE to Asset	0	137.36	1.1298	0.056411	8.5965	0.0089928	0.18722	4.5905	4.8803e-006	1220
PPE to Size	0	14.452	0.23979	0.030346	0.98409	0.0036744	0.14188	7.0789	3.0619e-012	844
PPE to Cash Flow	-4222.6	22075	24.287	0.22699	704.8	0.0034444	1.5896	1.1092	0.26762	868
Tobin Q	0.24179	11.494	1.5847	1.1558	1.3501	0.8793	1.7074	34.82	1.2406e-167	880
Log Tobin Q	-1.4197	2.4418	0.24569	0.14482	0.60422	-0.12864	0.53495	12.062	4.1196e-031	556
Market-to-Book	-106.06	100.37	2.4769	1.4566	5.8607	0.76692	2.9181	12.537	2.7279e-033	860
R&D	-2.335e+006	6801.2	-16343	0	1.3165e+005	0	0	-4.0324	5.9196e-005	901
R&D to Sales	-393.33	0.067625	-0.94009	0	14.169	0	0	-2.1387	0.032694	885
R&D to Size	-0.22636	0.036197	-0.0064305	0	0.023156	0	0	-8.1155	1.6826e-015	710
R&D to Asset	-0.17535	0.036634	-0.007251	0	0.023775	0	0	-9.8875	4.2038e-022	897
Cash to Asset	0	0.99172	0.08505	0.047463	0.11261	0.011736	0.11278	27.19	3.6147e-129	1296
Cash Flow to Asset	-2.0458	3.7281	0.067867	0.058571	0.20657	0.026661	0.091223	9.6402	5.9271e-021	711
Cash Flow to Size	-2.2222	49.541	0.18983	0.07989	1.8205	0.03303	0.14072	3.4332	0.00061906	906
Earnings Yield	-39.513	91.922	0.11697	0.051982	3.3614	-0.0083237	0.13756	1.2528	0.21052	945
Tax Credit	0	6.8166e+005	11746	730.61	48167	171	3535.8	8.7556	6.2606e-018	1289
Tax Cred. to Asset	0	74.486	0.24619	0.0074547	2.8395	0.0014421	0.023031	3.0922	0.0020297	1272
Tax Debt	0	1.5987e+006	13620	773	94142	218.75	3037.1	5.1941	2.3889e-007	1289
Tax Deb. to Tot Liab.	0	0.53448	0.02025	0.0071101	0.043462	0.002509	0.018564	16.728	5.3902e-057	1289
Tax Cred. dum	0	1	0.9488	1	0.2205	1	1	154.49	0	1289
Tax Deb. Dum	0	1	0.96587	1	0.18165	1	1	190.9	0	1289

Tax Cred.+Deb.	-1.5981e+006	6.7776e+005	-2076.1	-1	1.0408e+005	-1077.2	1586.7	-0.71056	0.47749	632
Tax Cred.+Deb. To Asset	-0.48833	74.454	0.22609	-5.7776e-006	2.8424	-0.0079717	0.011199	2.8335	0.0046767	632
Tax Rate	-62.51	90.5	0.32133	0.17959	3.5775	-0.00021281	0.47588	3.2335	0.0012536	971
Market Cap + Tot Debt	4483.9	1.0529e+008	3.0742e+006	2.412e+005	1.0705e+007	90761	1.416e+006	8.5186	6.9476e-017	880
Log (Mkt Cap + Tot Debt)	8.4082	18.472	12.754	12.393	1.9792	11.416	14.163	191.16	0	880
Log Assets	2.5511	18.268	11.743	11.728	2.1908	10.186	13.144	193.03	0	1297
Cash Flow	-2.0949e+005	2.1351e+007	2.5695e+005	9894	1.3298e+006	1067.5	67072	6.3734	2.7257e-010	909
Raw Materials	0	3.87e+005	8820.8	0	31602	0	2948.8	9.9665	1.3975e-022	1275
Raw Materials to Asset	0	3.022	0.054693	0	0.25312	0	0.02104	7.664	3.5871e-014	1258
CP Exposure dum	0	1	0.47608	0	0.49962	0	1	34.024	4.8159e-181	1275
Foreign PL	-5.48e+005	3.54e+005	6.9883	0	25162	-23.25	0.1225	0.0099868	0.99203	801
Foreign PL to PL	-63.659	29.5	-0.028649	0	2.0748	-0.0030955	0.00076483	-0.49631	0.61976	840
FX Exposure dum	0	1	0.64192	1	0.47962	0	1	48.126	2.0652e-290	1293
US SIC primary codes Number	1	2	1.0135	1	0.11525	1	1	321.66	0	1338
US SIC secondary codes Number	0	5	0.4843	0	0.85184	0	1	20.796	1.8876e-083	1338
US SIC total codes Number	1	6	1.4978	1	0.85198	1	2	64.304	0	1338
Div1 (>=1)	0	1	0.34081	0	0.47416	0	1	26.291	3.8173e-123	1338
Div2 (>=2)	0	1	0.10314	0	0.30425	0	0	12.4	1.6829e-033	1338
Div3 (>=3)	0	1	0.035874	0	0.18605	0	0	7.0533	2.7951e-012	1338
Man Exp Industry US SIC	0	1	0.54709	1	0.49796	0	1	40.187	3.285e-232	1338

Table A3.1 – Univariate Tests of Derivative Use. The results show several statistics (average, median, standard deviation) of different variables analyzed for derivative users and non-users. In the last column, the table shows the results (p-values) of Wilcoxon rank sum tests. The sample is composed of 223 Italian non-financial public firms, observed from 2016 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

Variable	Users				Not-Users				Wilcoxon Test
	N	Average	Median	Std. Dev.	N	Average	Median	Std. Dev.	p-value
Leverage	220	0.45986	0.48313	0.17649	198	0.50668	0.40151	0.83578	0.047921
Coverage	218	73.262	49.814	78.388	196	13387	59.485	1.3605e+005	0.028444
Quick Ratio	230	0.46938	0.19224	1.1341	216	7.8132	0.20428	76.687	0.9827
Current Ratio	230	1.8188	1.4297	1.8725	216	9.2104	1.3604	76.63	0.32011
Tangible Assets	230	0.11456	0.06783	0.13364	216	0.083865	0.01614	0.12602	1.3904e-006
Profit Margin	194	9.4907	0.14262	85.33	146	406	0.14236	4588.4	0.35692
ROA	149	0.06426	0.0529	0.058571	100	0.080148	0.0531	0.087601	0.41876
ROE	182	0.13543	0.09825	0.12739	137	0.15729	0.0843	0.20569	0.25792
DebtLT to Debt Tot	230	0.37267	0.34658	0.23699	216	0.25641	0.20853	0.25708	8.3354e-009
DebtLT to DebtST	230	1.1432	0.53041	2.0605	216	0.92275	0.26348	2.2729	8.3354e-009
Neg. Equity BV	230	0.0043478	0	0.065938	216	0.032407	0	0.17749	0.025934
MtB*Leverage	186	1.1807	0.76358	1.2427	129	1.9367	0.45124	8.1852	0.00028471
Capex	100	0.8447	0.15798	2.3786	74	1.4311	0.24966	3.926	0.38148
Capex to Asset * Lev	96	0.33824	0.075886	0.84524	70	0.83575	0.061007	2.4985	0.68392
Capex to Size * Lev	84	0.25114	0.042588	0.65212	50	0.43178	0.048044	1.4245	0.8342
Capex to Cash Flow * Lev	89	3.8089	0.7303	8.7298	57	10.285	0.41568	51.768	0.14205
Capex + R&D	96	1.1794e+006	68327	6.1494e+006	69	62274	11621	1.8254e+005	7.189e-008
Capex+R&D to Asset	96	0.86963	0.16035	2.4241	69	1.5103	0.25286	4.0538	0.27637
Capex+R&D to Size	85	0.67179	0.089787	1.9953	53	1.1269	0.1537	3.0998	0.27958
Capex+R&D to Cash Flow	90	8.9867	1.5295	23.814	54	969.39	2.6328	6360.8	0.3071
PPE	228	3.2959e+005	14457	1.6474e+006	213	20293	1963	60271	2.9559e-013
PPE to Asset	228	0.72344	0.048765	5.7379	213	0.70124	0.057093	2.5717	0.6267
PPE to Size	195	0.28702	0.031135	1.4754	149	0.38331	0.033723	1.2095	0.87653
PPE to Cash Flow	201	10.479	0.50037	82.74	157	160.08	0.48009	1768.9	0.50089
Tobin Q	197	1.6364	1.2465	1.0963	151	1.816	1.1833	1.854	0.2469
Log Tobin Q	153	0.50129	0.34885	0.46378	97	0.6618	0.46612	0.59364	0.045368
Market-to-Book	196	2.565	1.7848	2.4044	146	3.6937	1.6801	9.0442	0.34588
R&D	183	66.254	0	636.74	177	0	0	0	0.16488
R&D to Sales	183	0.00072115	0	0.0068814	174	0	0	0	0.16852
R&D to Size	161	0.00039409	0	0.0035601	135	0	0	0	0.19622
R&D to Asset	183	0.00035385	0	0.0034048	177	0	0	0	0.16488
Cash to Asset	230	0.083707	0.060853	0.091536	216	0.10792	0.054491	0.15581	0.5391
Cash Flow to Asset	177	0.076185	0.06577	0.054113	113	0.10649	0.070862	0.12525	0.30189
Cash Flow to Size	202	0.11545	0.099248	0.075706	158	0.38933	0.10475	2.0811	0.33356
Earnings Yield	183	0.15174	0.098476	0.25453	142	0.62574	0.085738	4.8206	0.3905
Tax Credit	230	14929	1514.4	45476	216	4843.2	442.89	25407	8.5503e-008

Tax Cred. to Asset	230	0.028414	0.0057494	0.1315	216	0.20278	0.010642	1.1009	0.0019516
Tax Debt	230	23234	1538.1	1.0536e+005	216	1416.9	348.89	2816	6.8997e-016
Tax Deb. to Tot Liab.	230	0.010995	0.0055037	0.016346	216	0.032516	0.0063851	0.074452	0.18467
Tax Cred. dum	230	0.96087	1	0.19433	216	0.94444	1	0.22959	0.41423
Tax Deb. Dum	230	0.98261	1	0.13101	216	0.94907	1	0.22036	0.050015
Tax Cred.+Deb.	117	19466	2779	53069	117	8109.9	1115	34138	3.6079e-005
Tax Cred.+Deb. To Asset	117	0.047203	0.0071821	0.18028	117	0.35522	0.017704	1.4755	0.0002802
Tax Rate	174	0.48975	0.28098	2.0781	162	0.39403	0.21824	0.67381	0.061026
Market Cap + Tot Debt	197	4.5944e+006	4.1957e+005	1.2844e+007	151	4.7231e+005	1.1204e+005	1.0626e+006	3.061e-014
Log (Mkt Cap + Tot Debt)	197	13.384	12.947	1.9736	151	11.699	11.627	1.6091	3.061e-014
Log Assets	230	12.828	12.665	1.9583	216	10.887	10.744	1.6681	8.8543e-023
Cash Flow	202	4.1088e+005	31792	1.4371e+006	158	44253	5990.5	98554	3.0053e-012
Raw Materials	230	15059	1220.4	45400	216	2962.6	0	14965	1.4238e-010
Raw Materials to Asset	230	0.025699	0.0021477	0.057481	216	0.088672	0	0.35821	6.4253e-005
CP Exposure dum	230	0.6087	1	0.48911	216	0.35648	0	0.48007	1.0414e-007
Foreign PL	115	8127	17	41705	153	49.51	0	249.74	6.7191e-011
Foreign PL to PL	119	0.17689	0.0010552	0.94132	158	0.10244	0	1.1361	4.4064e-009
FX Exposure dum	230	0.8	1	0.40087	216	0.47685	0	0.50062	1.1418e-012
US SIC primary codes Number	230	1.0174	1	0.13101	216	1.0093	1	0.096001	0.45789
US SIC secondary codes Number	230	0.56522	0	0.83724	216	0.39815	0	0.86201	0.0035393
US SIC total codes Number	230	1.5826	1	0.8357	216	1.4074	1	0.86306	0.0022579
Div1 (>=1)	230	0.4087	0	0.49267	216	0.26852	0	0.44422	0.0018246
Div2 (>=2)	230	0.12174	0	0.3277	216	0.083333	0	0.27703	0.18334
Div3 (>=3)	230	0.052174	0	0.22286	216	0.018519	0	0.13513	0.056566
Man Exp Industry US SIC	230	0.63478	1	0.48254	216	0.4537	0	0.49901	0.00012577

Table A3.2 – Univariate Tests of Derivative Use. The results show several statistics (average, median, standard deviation) of different variables analyzed for derivative users and non-users. In the last column, the table shows the results (p-values) of Wilcoxon rank sum tests. The sample is composed of 223 Italian non-financial public firms, observed from 2014 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

Variable	Users				Not-Users				Wilcoxon Test
	N	Average	Median	Std. Dev.	N	Average	Median	Std. Dev.	p-value
Leverage	442	0.4635	0.47119	0.18689	389	0.51616	0.4517	0.73379	0.085702
Coverage	438	188.9	42.693	2205.8	374	7223.7	53.493	98599	0.00061044
Quick Ratio	458	0.40488	0.17573	0.91251	425	4.571	0.17725	55.033	0.59053
Current Ratio	458	1.7652	1.39	1.6412	425	5.9365	1.3017	55.023	0.035976
Tangible Assets	458	0.11681	0.080641	0.13462	425	0.084432	0.019797	0.1235	5.3377e-011
Profit Margin	392	8.5414	0.13947	76.874	281	2931.6	0.12386	45700	0.9572
ROA	299	0.065334	0.0517	0.061444	207	0.075667	0.0485	0.078089	0.53754
ROE	367	0.13285	0.0963	0.13155	267	0.14352	0.0773	0.18263	0.049441
DebtLT to Debt Tot	458	0.35875	0.33831	0.24871	425	0.23953	0.18309	0.24847	1.2624e-015
DebtLT to DebtST	458	1.2298	0.51129	2.8595	425	0.89379	0.22413	2.5508	1.2624e-015
Neg. Equity BV	458	0.0043668	0	0.06601	425	0.032941	0	0.17869	0.0014816
MtB*Leverage	347	1.1398	0.74461	1.2513	236	1.7591	0.49034	6.2562	0.00068894
Capex	191	0.98401	0.14022	3.5229	131	1.4881	0.22592	4.5315	0.27013
Capex to Asset * Lev	183	0.54871	0.062514	2.6693	121	0.86375	0.048357	2.6357	0.58746
Capex to Size * Lev	153	0.17957	0.04092	0.4991	86	0.49578	0.041151	1.5103	0.80673
Capex to Cash Flow * Lev	164	4.7164	0.65662	23.103	93	9.3014	0.22922	46.392	0.020343
Capex + R&D	172	1.5382e+006	63864	7.535e+006	119	56221	15140	1.4856e+005	1.405e-010
Capex+R&D to Asset	172	0.81593	0.10283	2.867	119	1.6105	0.24036	4.7373	0.13402
Capex+R&D to Size	152	0.48746	0.080557	1.6027	91	1.1333	0.1537	3.1005	0.19227
Capex+R&D to Cash Flow	160	9.3965	1.3725	33.62	90	589.12	2.2598	4931.1	0.31936
PPE	447	3.3472e+005	16405	1.5954e+006	413	21522	2088	62491	5.4545e-024
PPE to Asset	445	1.0822	0.052593	9.7043	409	0.75994	0.052163	2.9788	0.87708
PPE to Size	352	0.21421	0.033632	1.1204	267	0.34969	0.023197	1.1094	0.64459
PPE to Cash Flow	374	11.162	0.55338	100.05	270	97.785	0.50951	1349.4	0.34445
Tobin Q	362	1.6083	1.208	1.1094	274	1.7147	1.1551	1.6978	0.062853
Log Tobin Q	266	0.50986	0.34522	0.46803	165	0.65722	0.48667	0.57255	0.0074901
Market-to-Book	360	2.4965	1.6761	2.3906	263	3.3747	1.4964	7.1961	0.21396
R&D	337	35.978	0	469.79	328	0	0	0	0.16328
R&D to Sales	336	0.00039277	0	0.0050848	321	0	0	0	0.16722
R&D to Size	284	0.00022341	0	0.002684	242	0	0	0	0.19223
R&D to Asset	337	0.00019215	0	0.0025121	327	0	0	0	0.16392
Cash to Asset	458	0.078608	0.055292	0.084316	425	0.10482	0.055837	0.148	0.76448
Cash Flow to Asset	325	0.076368	0.065194	0.058921	193	0.13369	0.069711	0.30566	0.33074
Cash Flow to Size	383	0.11298	0.094843	0.074206	277	0.50528	0.096769	3.3955	0.61728
Earnings Yield	369	0.15746	0.096732	0.3765	280	0.81714	0.082138	6.5736	0.23036
Tax Credit	455	16124	1540	49463	425	5932.8	394.94	40273	8.6438e-017
Tax Cred. to Asset	453	0.029836	0.0061416	0.13252	421	0.31907	0.0093657	2.4401	0.0027587
Tax Debt	458	23982	1575.8	1.1403e+005	422	1563.8	359.16	3241.2	3.7654e-027
Tax Deb. to Tot Liab.	458	0.011766	0.0064828	0.017382	422	0.030873	0.0080076	0.066277	0.0024705
Tax Cred. dum	455	0.96703	1	0.17875	425	0.92941	1	0.25644	0.011407
Tax Deb. dum	458	0.98472	1	0.12281	422	0.95024	1	0.21771	0.0036233
Tax Cred.+Deb.	225	21031	2576	60147	208	10719	942	56879	4.9597e-008
Tax Cred.+Deb. To Asset	225	0.04992	0.0074095	0.18324	208	0.62481	0.01761	3.4437	1.5866e-005
Tax Rate	351	0.46509	0.33237	1.4937	317	0.55217	0.25001	1.1513	0.061392
Market Cap + Tot Debt	362	4.776e+006	4.2793e+005	1.305e+007	274	4.3479e+005	1.1802e+005	9.5085e+005	7.9946e-028

Log (Mkt Cap + Tot Debt)	362	13.472	12.967	1.941	274	11.703	11.679	1.5506	7.9946e-028
Log Assets	458	12.762	12.558	1.9951	425	10.78	10.671	1.7471	1.249e-042
Cash Flow	383	4.2687e+005	29545	1.5369e+006	278	47631	5526	1.2524e+005	2.5197e-021
Raw Materials	451	14344	1031	40782	424	2780.9	0	13954	1.0123e-017
Raw Materials to Asset	449	0.026993	0.0018492	0.06515	420	0.08527	0	0.36154	2.1586e-008
CP Exposure dum	451	0.58758	1	0.49282	424	0.35849	0	0.48012	1.2283e-011
Foreign PL	247	5344.3	50	30260	307	89.904	0	405.03	0
Foreign PL to PL	252	0.14516	0.0032344	0.669	327	0.08026	0	0.82339	2.2204e-016
FX Exposure dum	458	0.80568	1	0.39611	424	0.47642	0	0.50003	1.6177e-024
US SIC primary codes Number	460	1.0174	1	0.13087	432	1.0093	1	0.09589	0.29264
US SIC secondary codes Number	460	0.56522	0	0.83633	432	0.39815	0	0.86101	3.6687e-005
US SIC total codes Number	460	1.5826	1	0.83478	432	1.4074	1	0.86206	1.5466e-005
Div1 (>=1)	460	0.4087	0	0.49213	432	0.26852	0	0.4437	1.0261e-005
Div2 (>=2)	460	0.12174	0	0.32734	432	0.083333	0	0.27671	0.059636
Div3 (>=3)	460	0.052174	0	0.22262	432	0.018519	0	0.13497	0.0069519
Man Exp Industry US SIC	460	0.63478	1	0.48202	432	0.4537	0	0.49843	5.749e-008

Table A3.3 – Univariate Tests of Derivative Use. The results show several statistics (average, median, standard deviation) of different variables analyzed for derivative users and non-users. In the last column, the table shows the results (p-values) of Wilcoxon rank sum tests. The sample is composed of 223 Italian non-financial public firms, observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dijk.

Variable	Users				Not-Users				Wilcoxon Test
	N	Average	Median	Std. Dev.	N	Average	Median	Std. Dev.	p-value
Leverage	664	0.46505	0.47425	0.19333	564	0.52079	0.47345	0.65726	0.34573
Coverage	660	149.72	39.473	1802.5	546	5945.5	49.26	83921	6.1003e-005
Quick Ratio	682	0.35592	0.15366	0.78196	614	3.3667	0.14009	45.831	0.962
Current Ratio	682	1.7712	1.3896	1.8013	614	4.7417	1.2846	45.857	0.0070395
Tangible Assets	682	0.11914	0.080641	0.13844	614	0.090067	0.024154	0.13364	2.612e-013
Profit Margin	575	7.8596	0.1362	70.495	408	2032.5	0.10468	37930	0.20914
ROA	431	0.066441	0.0513	0.062801	305	0.082725	0.0474	0.18379	0.87513
ROE	538	0.13153	0.09145	0.13201	383	0.14689	0.0817	0.18441	0.068802
DebtLT to Debt Tot	682	0.34222	0.31082	0.25694	614	0.22778	0.15423	0.24542	7.2573e-020
DebtLT to DebtST	682	1.2042	0.45099	2.8504	614	0.88366	0.18236	2.8995	7.2573e-020
Neg. Equity BV	682	0.0043988	0	0.066226	614	0.035831	0	0.18602	4.0281e-005
MtB*Leverage	494	1.1011	0.71702	1.2889	315	1.6552	0.48006	5.5201	0.0011092
Capex	306	1.0806	0.16035	3.8008	204	1.7045	0.2122	4.9627	0.24976
Capex to Asset * Lev	297	0.64528	0.064712	3.0542	186	0.98595	0.074574	2.8142	0.98637
Capex to Size * Lev	239	0.19249	0.043975	0.6522	129	0.46354	0.049058	1.39	0.64913
Capex to Cash Flow * Lev	253	4.2321	0.70939	20.129	129	7.5837	0.25639	39.582	0.013179
Capex + R&D	260	1.6425e+006	61586	7.7616e+006	175	53390	13807	1.3124e+005	9.8959e-015
Capex+R&D to Asset	260	0.72954	0.13314	2.5814	175	1.6512	0.21154	5.0726	0.26489
Capex+R&D to Size	229	0.51289	0.086968	1.6794	138	1.0062	0.13856	2.8065	0.30659
Capex+R&D to Cash Flow	238	8.9637	1.5178	31.164	125	425.68	1.5116	4185.9	0.79526
PPE	647	3.3461e+005	17737	1.5544e+006	590	22447	2300.4	63261	1.7105e-032
PPE to Asset	643	1.2156	0.057999	10.575	577	1.0341	0.051652	5.6339	0.85165
PPE to Size	487	0.18726	0.035857	0.96126	357	0.31144	0.022241	1.0114	0.39836
PPE to Cash Flow	517	8.5547	0.56523	85.182	351	77.824	0.46466	1184	0.11477
Tobin Q	509	1.5725	1.1837	1.1718	371	1.6015	1.1089	1.5634	0.0083688
Log Tobin Q	350	0.51248	0.33295	0.48301	206	0.64974	0.49031	0.55051	0.0013068
Market-to-Book	507	2.4071	1.5528	2.4575	353	3.1101	1.3185	6.4381	0.073068
R&D	460	26.357	0	402.26	441	0	0	0	0.16639
R&D to Sales	457	0.00028878	0	0.0043618	428	0	0	0	0.17138
R&D to Size	386	0.00016437	0	0.0023033	324	0	0	0	0.19546
R&D to Asset	460	0.00014077	0	0.002151	437	0	0	0	0.16833
Cash to Asset	682	0.074893	0.048812	0.081383	614	0.096331	0.044896	0.13852	0.91613
Cash Flow to Asset	457	0.079139	0.064662	0.066135	254	0.14879	0.074345	0.29805	0.02953
Cash Flow to Size	542	0.11319	0.090828	0.076287	364	0.46922	0.097104	3.1139	0.33713
Earnings Yield	541	0.15195	0.09236	0.33075	404	0.66085	0.087219	5.5128	0.41431
Tax Credit	671	16832	1635	54504	618	6225	360.6	39478	1.2278e-024
Tax Cred. to Asset	667	0.034275	0.0066794	0.16003	605	0.47983	0.0098478	4.1029	0.0025824
Tax Debt	682	24483	1416.5	1.2847e+005	607	1413.6	355	2900.4	2.5044e-038
Tax Deb. to Tot Liab.	682	0.01234	0.0064652	0.018519	607	0.029138	0.0087907	0.05899	6.5543e-005
Tax Cred. dum	671	0.9687	1	0.17425	618	0.92718	1	0.26004	0.00073243
Tax Deb. dum	682	0.97654	1	0.15147	607	0.95387	1	0.20994	0.025342
Tax Cred.+Deb.	341	21568	2538	67358	291	11550	922	56697	4.3016e-010
Tax Cred.+Deb. To Asset	341	0.056395	0.0083105	0.21887	291	0.9745	0.016798	5.8762	6.1696e-007
Tax Rate	516	0.48689	0.35168	1.2806	455	0.97653	0.32001	4.7263	0.17483
Market Cap + Tot Debt	509	5.0253e+006	4.5586e+005	1.3737e+007	371	3.9728e+005	1.2056e+005	8.6062e+005	2.9718e-040
Log (Mkt Cap + Tot Debt)	509	13.525	13.03	1.9318	371	11.698	11.7	1.499	2.9718e-040
Log Assets	682	12.689	12.549	2.0535	615	10.694	10.635	1.8323	5.1134e-059
Cash Flow	542	4.8319e+005	30596	1.8539e+006	367	53853	6061	1.3847e+005	4.1716e-027
Raw Materials	659	14359	879.94	40953	616	2895.5	0	14366	1.209e-023
Raw Materials to Asset	655	0.029007	0.0013029	0.074024	603	0.082595	0	0.35542	2.0389e-011
CP Exposure dum	659	0.57967	1	0.49399	616	0.36526	0	0.48189	1.9008e-014
Foreign PL	363	5397.1	24	29050	438	69.18	0	346.03	0
Foreign PL to PL	376	0.11126	0.0028552	0.55669	464	0.13279	0	1.5398	0
FX Exposure dum	681	0.79736	1	0.40226	612	0.46895	0	0.49944	9.8893e-035
US SIC primary codes Number	690	1.0174	1	0.13082	648	1.0093	1	0.095853	0.19721
US SIC secondary codes Number	690	0.56522	0	0.83602	648	0.39815	0	0.86068	4.2797e-007

US SIC total codes Number	690	1.5826	1	0.83448	648	1.4074	1	0.86173	1.1943e-007
Div1 (>=1)	690	0.4087	0	0.49195	648	0.26852	0	0.44353	6.5099e-008
Div2 (>=2)	690	0.12174	0	0.32722	648	0.083333	0	0.2766	0.021034
Div3 (>=3)	690	0.052174	0	0.22254	648	0.018519	0	0.13492	0.00094419
Man Exp Industry US SIC	690	0.63478	1	0.48184	648	0.4537	0	0.49824	2.9842e-011

Table A4.1 – Financial Distress Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	constant	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Leverage	0.047399	0.52097	-0.018395	0.85353	617.81	2.8883e-005	446	
Coverage	0.05625	0.34833	-1.4446e-005	0	604.31	0.01664	440	***
Quick Ratio	0.052013	0.38265	-0.013267	0	614.6	0.0032029	446	***
Current Ratio	0.082353	0.060869	-0.019699	0	614.4	0.0035193	446	***
Tangible Asset to Asset	-0.074642	0.3218	1.1521	0.014834	611.61	0.010027	446	**
Profit Margin	0.056706	0.3435	-0.00025201	0	610.09	0.007282	442	***
ROA	-0.00081527	0.9894	2.1958	0.00091553	604.12	0.015746	446	***
ROE	0.037458	0.55318	0.60197	0.027448	589.38	0.03172	430	**
DebtLT to Debt Tot	-0.32774	0.00082232	1.1633	2.9537e-006	594.02	0.036206	446	***
DebtLT to DebtST	0.0087534	0.89469	0.029568	0.29412	616.69	0.0017008	446	
Neg. Equity BV	0.05726	0.34088	-1.2076	0.035455	612.31	0.0066289	446	**
Sample Time Range: 2014-2017								
Leverage	0.054976	0.31861	-0.018185	0.8182	1222.8	0.0078204	883	
Coverage	0.072846	0.089702	-7.4594e-007	0.3431	1187	0.028239	859	
Quick Ratio	0.05981	0.157	-0.017071	0	1216.5	0.011377	883	***
Current Ratio	0.078	0.065587	-0.014413	0	1217.1	0.010907	883	***
Tangible Asset to Asset	-0.076518	0.15556	1.2307	0.00027513	1209	0.019154	883	***
Profit Margin	0.066389	0.1201	-2.2653e-005	0	1195.8	0.023285	866	***
ROA	0.0030199	0.94482	2.4253	3.7355e-007	1191	0.0267	883	***
ROE	0.052818	0.23385	0.71094	0.00011613	1157.9	0.044504	850	***
DebtLT to Debt Tot	-0.30561	5.2537e-006	1.1783	2.134e-011	1174	0.0467	883	***
DebtLT to DebtST	0.015285	0.73768	0.029912	0.073879	1219.4	0.010571	883	*
Neg. Equity BV	0.065097	0.12726	-1.2154	0.0027231	1211.6	0.014555	883	***
Sample Time Range: 2012-2017								
Leverage	0.078403	0.10186	-0.027737	0.7008	1792.9	0.023761	1296	
Coverage	0.088524	0.012273	-9.9608e-007	0.26451	1749.9	0.039739	1268	
Quick Ratio	0.082366	0	-0.026306	0	1782.8	0.026997	1296	***
Current Ratio	0.098972	0.0046835	-0.016111	0	1786.3	0.026186	1296	***
Tangible Asset to Asset	-0.037656	0.39474	0.9901	0.00017823	1778.3	0.031707	1296	***
Profit Margin	0.084204	0.017002	-2.2439e-005	0	1751.5	0.040262	1270	***
ROA	0.045724	0.34481	1.0381	0.022403	1776.3	0.02858	1297	**
ROE	0.077725	0.033602	0.58708	9.9507e-005	1699.4	0.060223	1244	***
DebtLT to Debt Tot	-0.25042	2.6638e-006	1.1112	9.3034e-015	1728.2	0.059433	1296	***
DebtLT to DebtST	0.040115	0.28225	0.024623	0.057802	1789	0.02576	1296	*
Neg. Equity BV	0.085895	0.014896	-1.2609	0.00012125	1774.4	0.031277	1296	***

Table A4.2 – Tax Shields Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Tax Credit	-0.012777	0.84007	5.8203e-006	0.019247	608.41	0.016067	446	**
Tax Cred. to Asset	0.093373	0.12468	-0.86782	9.405e-005	604.73	0.015464	446	***
Tax Debt	-0.065381	0	1.9664e-005	0	582.5	0.083307	446	***
Tax Deb. to Tot Liab.	0.19101	0.0053806	-8.8048	0.00014945	593.37	0.027121	446	***
Tax Cred. dum	-0.18001	0.51419	0.23017	0.41547	617.18	0.001045	446	
Tax Deb. Dum	-0.62293	0.074356	0.68403	0.053618	613.87	0.0055038	446	*
Tax Cred.-Deb.	0.038109	0.52249	-1.2796e-006	0.12798	615.36	0.0059131	446	
Tax Cred.-Deb. To Asset	0.065137	0.27995	-0.51554	0.037171	610.14	0.0079349	446	**
Tax Rate	0.027761	0.64427	0.061814	0.19466	615.78	0.0033473	446	
Sample Time Range: 2014-2017								
Tax Credit	0.0076983	0.86529	3.3018e-006	0.0129	1207.5	0.020822	880	**
Tax Cred. to Asset	0.079892	0.059835	-0.41315	0	1188.2	0.031177	874	***

Tax Debt	-0.051234	0	1.7868e-005	0	1151.3	0.089464	880	***
Tax Deb. to Tot Liab.	0.22389	9.9473e-006	-9.8421	3.2525e-008	1169.8	0.039336	880	***
Tax Cred. dum	-0.43073	0.026261	0.49832	0.012154	1212.4	0.01717	880	**
Tax Deb. Dum	-0.67449	0.0090425	0.74811	0.0043068	1209.7	0.015876	880	***
Tax Cred.-Deb.	0.045265	0.28701	-1.0889e-006	0.045647	1206.1	0.02315	874	**
Tax Cred.-Deb. To Asset	0.067212	0.11368	-0.30926	0	1194.6	0.026838	874	***
Tax Rate	0.049843	0.23974	-0.0089247	0.59689	1221.1	0.0087709	882	
Sample Time Range: 2012-2017								
Tax Credit	0.015615	0.67447	3.2865e-006	0.0019361	1767.8	0.041783	1289	***
Tax Cred. to Asset	0.086756	0.013628	-0.23818	0	1733.4	0.05372	1272	***
Tax Debt	-0.016184	0	1.505e-005	0	1691.6	0.098419	1289	***
Tax Deb. to Tot Liab.	0.24475	6.9201e-009	-9.6401	2.2183e-011	1717.4	0.054995	1289	***
Tax Cred. dum	-0.47279	0.003344	0.55178	0.0008363	1773.2	0.038645	1289	***
Tax Deb. Dum	-0.34876	0.071474	0.43645	0.026578	1777.5	0.029575	1289	**
Tax Cred.-Deb.	0.064034	0.069573	-9.18e-007	0.028191	1750.5	0.048691	1269	**
Tax Cred.-Deb. To Asset	0.083076	0.018408	-0.20287	0	1734.1	0.052745	1269	***
Tax Rate	0.07334	0.0372	-0.0249	0.10122	1789.2	0.025539	1296	

Table A4.3 – Agency Costs Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
MtB*Leverage	0.18072	0.010336	-0.011602	0.43301	475.69	0.19561	348	
Capex	0.22792	0.021702	-0.042165	0.1543	244.7	0.5836	181	
Capex to Asset * Lev	0.19886	0.038375	-0.037568	0.35357	245.96	0.58109	181	
Capex to Size * Lev	0.28821	0.0077816	0.052076	0.44824	193.76	0.65807	146	
Capex to Cash Flow * Lev	0.22012	0.023401	0.00035374	2.2227e-193	233.02	0.59942	174	***
Capex + R&D	0.16704	0.080463	1.8944e-007	1.3058e-026	231.57	0.60596	176	***
Capex+R&D to Asset	0.25763	0.010923	-0.043987	0.14066	236.51	0.59396	176	
Capex+R&D to Size	0.33245	0.0035459	-0.04469	0.31049	193.36	0.65913	146	
Capex+R&D to Cash Flow	0.24519	0.012776	-0.00026949	5.6618e-168	228.38	0.60422	171	***
PPE	-0.013186	0	7.2783e-007	1.4053e-179	591.33	0.054694	441	***
PPE to Asset	0.042143	0.48707	0.0007028	0.95805	610.84	0.010206	441	
PPE to Size	0.17898	0.011118	-0.031622	0.52761	470.3	0.20481	344	
PPE to Cash Flow	0.080472	0.19443	-0.00016478	0.707	572.19	0.061132	415	
Tobin Q	0.2553	0.01489	-0.051878	0.2619	475.07	0.19677	348	
Log Tobin Q	0.15006	0.052481	0.050237	0.65897	476.13	0.19529	348	
Market-to-Book	0.23432	0.0051069	-0.023771	0.17592	473.58	0.1983	348	
R&D	0.064929	0	-4.9988e-006	0	550.99	0.098721	408	***
R&D to Sales	0.11565	0.065537	0.011252	0.41818	555.62	0.077147	405	
R&D to Size	0.18131	0.01022	0.056446	0.98828	465.66	0.20919	341	
R&D to Asset	0.075484	0.24351	-4.0602	0.18772	561.2	0.073054	408	
Cash to Asset	0.13244	0.078883	-0.98817	0.043939	613.68	0.0054214	446	**
Cash Flow to Size	0.17875	0.023823	0.10567	0.86448	463.93	0.211	340	
Cash Flow to Asset	0.095719	0.13143	-0.14626	0.27017	576.49	0.053341	419	
Earnings Yield	0.040266	0.49933	-0.007767	0.7142	617.72	0.00010084	446	
Sample Time Range: 2014-2017								
MtB*Leverage	0.17416	0.00065768	0.00012515	0.98869	869.47	0.26336	636	
Capex	0.25311	0.00054008	-0.020931	0.22343	444.98	0.61618	330	
Capex to Asset * Lev	0.23677	0.00094364	-0.013595	0.57352	446.18	0.61507	330	
Capex to Size * Lev	0.31876	9.9547e-005	-0.014246	0.8109	341.56	0.69708	258	
Capex to Cash Flow * Lev	0.26054	0.00036984	0.00049313	0	409.27	0.64358	308	***
Capex + R&D	0.16444	0	3.6056e-007	3.3022e-073	399.84	0.66049	310	***
Capex+R&D to Asset	0.28399	0.00018523	-0.038417	0.058483	414.12	0.641	310	*
Capex+R&D to Size	0.37546	1.2065e-005	-0.076142	0.04248	335.3	0.70178	257	**
Capex+R&D to Cash Flow	0.25993	0.00044376	-4.805e-005	0.39009	406.07	0.64625	303	
PPE	-0.0097594	0	7.3854e-007	5.1107e-254	1151	0.078647	860	***
PPE to Asset	0.049103	0.25724	0.0042264	0.4966	1181.9	0.03917	854	
PPE to Size	0.19106	0.00028376	-0.064949	0.16823	844.24	0.28536	619	
PPE to Cash Flow	0.1034	0.023387	-5.882e-005	0.409	1053.3	0.12876	764	
Tobin Q	0.2304	0.0031553	-0.033905	0.34466	868.57	0.26403	636	
Log Tobin Q	0.14735	0.008251	0.09266	0.27034	868.22	0.26434	636	
Market-to-Book	0.1885	0.00054244	-0.0055041	0.48584	868.9	0.26364	636	
R&D	0.064931	0	-7.3465e-006	0	1024.5	0.16212	765	***
R&D to Sales	0.12874	0.0051047	0.013466	0.17659	1037.8	0.13467	757	
R&D to Size	0.18226	0.00054793	-3.2733	0.24737	841.36	0.28164	619	
R&D to Asset	0.067914	0.15326	-7.8888	0.0013517	1040.9	0.13758	764	***
Cash to Asset	0.15696	0.0037295	-1.2259	0.0011494	1211.9	0.014957	883	***
Cash Flow to Size	0.1968	0.00022402	-0.033031	0.8903	847.38	0.27723	622	
Cash Flow to Asset	0.11447	0.01256	-0.10642	0.17372	1080.3	0.10602	786	
Earnings Yield	0.049029	0.24674	-0.012492	0.3414	1221.9	0.0081944	883	
Sample Time Range: 2012-2017								

MtB*Leverage	0.19776	6.2952e-006	6.5589e-005	0.99398	1198.2	0.31796	880	
Capex	0.28256	1.3665e-006	-0.020766	0.10352	702.11	0.59279	524	
Capex to Asset * Lev	0.26545	3.6958e-006	-0.014095	0.43596	704.21	0.59154	524	
Capex to Size * Lev	0.33696	4.1254e-007	-0.027708	0.60414	523.02	0.68928	397	
Capex to Cash Flow * Lev	0.27822	3.1155e-006	0.00027597	0	617.96	0.63919	465	***
Capex + R&D	0.2276	0	1.6392e-007	3.4805e-025	612.53	0.6478	469	***
Capex+R&D to Asset	0.31425	3.8183e-007	-0.042572	0.012688	621.3	0.63738	469	**
Capex+R&D to Size	0.3807	3.8415e-008	-0.065745	0.03494	513.79	0.69419	394	**
Capex+R&D to Cash Flow	0.2767	4.3144e-006	-4.2378e-005	0.35416	613.33	0.64188	459	
PPE	-0.0045726	0	7.5472e-007	1.0305e-303	1652.9	0.11617	1237	***
PPE to Asset	0.066073	0.068603	0.0015986	0.7053	1687.6	0.080533	1220	
PPE to Size	0.21291	2.4736e-006	-0.07608	0.10097	1146.8	0.34829	844	
PPE to Cash Flow	0.1273	0.0011705	-5.9379e-005	0.4017	1424.9	0.20782	1036	
Tobin Q	0.21328	0.0012076	-0.0097457	0.75704	1198.1	0.31801	880	
Log Tobin Q	0.16568	0.00032367	0.13246	0.063198	1194.6	0.31989	880	*
Market-to-Book	0.21007	7.4548e-006	-0.0049648	0.51057	1197.7	0.31813	880	
R&D	0.083193	0	-7.7784e-006	0	1404.2	0.2294	1055	***
R&D to Sales	0.15653	7.0152e-005	0.014181	0.12377	1420.4	0.20328	1039	
R&D to Size	0.19885	1.1131e-005	-3.7519	0.063804	1153.6	0.3383	854	*
R&D to Asset	0.083951	0.039662	-8.6579	8.5047e-006	1420.3	0.2092	1051	***
Cash to Asset	0.1598	0.00031724	-1.1173	0.00058976	1781	0.029073	1296	***
Cash Flow to Size	0.22338	1.0503e-006	-0.070326	0.73601	1167.6	0.33084	861	
Cash Flow to Asset	0.14169	0.00026705	-0.081241	0.12188	1486.4	0.17167	1084	
Earnings Yield	0.066433	0.057128	-0.0058651	0.58243	1792.8	0.023794	1296	

Table A4.4 – Size Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Market Cap + Tot Debt	-0.03293	0	1.3934e-007	1.1141e-018	432.68	0.29892	348	***
Log (Mkt Cap + Tot Debt)	-3.8372	9.9294e-013	0.32007	1.2105e-013	408.06	0.32103	348	***
Log Assets	-4.2951	2.241e-020	0.36692	8.3316e-021	503.72	0.19122	446	***
Cash Flow	-0.060277	0	1.3105e-006	2.5245e-271	542.74	0.13776	419	***
Sample Time Range: 2014-2017								
Market Cap + Tot Debt	-0.037422	0	1.4725e-007	1.6315e-021	780.95	0.3691	636	***
Log (Mkt Cap + Tot Debt)	-4.2579	2.0868e-024	0.35327	4.8936e-026	727.08	0.39517	636	***
Log Assets	-4.1074	6.8156e-038	0.35401	5.7188e-039	1000.4	0.19502	883	***
Cash Flow	-0.023292	0	1.1221e-006	0	1024.5	0.17572	787	***
Sample Time Range: 2012-2017								
Market Cap + Tot Debt	-0.014816	0	1.4351e-007	6.1565e-021	1070.3	0.42155	880	***
Log (Mkt Cap + Tot Debt)	-4.5602	6.4722e-035	0.37878	2.6816e-037	984.18	0.45225	880	***
Log Assets	-3.8167	1.0696e-051	0.33278	7.2155e-054	1484.7	0.20064	1297	***
Cash Flow	0.014354	0	8.9909e-007	0	1416.9	0.23145	1088	***

Table A4.5 – Economic Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	Beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Raw Materials	-0.044766	0.49289	1.2261e-005	0.0035706	598.14	0.036431	446	***
Raw Materials to Asset	0.083034	0.1766	-0.97904	0.018904	609.17	0.0083074	446	**
CP Exposure dum	-0.27147	0.001344	0.64376	1.7818e-007	589.16	0.04747	446	***
Sample Time Range: 2014-2017								
Raw Materials	-0.050533	0.28196	1.3477e-005	1.8237e-005	1170.2	0.058301	875	***
Raw Materials to Asset	0.078609	0.072511	-0.80811	0.0018612	1190.1	0.031547	869	***
CP Exposure dum	-0.23755	6.5826e-005	0.58399	2.4502e-011	1165.8	0.057749	875	***
Sample Time Range: 2012-2017								
Raw Materials	-0.046198	0.23147	1.3147e-005	1.9915e-007	1706.9	0.082738	1275	***
Raw Materials to Asset	0.085071	0.019239	-0.70953	0.00030345	1725.3	0.061579	1258	***
CP Exposure dum	-0.21555	1.1513e-005	0.54561	4.0676e-014	1706.9	0.079003	1275	***

Table A4.6 – Operating Hedging Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Foreign PL	0.039336	0.50886	-1.0205e-007	0.95241	617.84	8.9435e-006	446	
Foreign PL to PL	0.040882	0.49248	0.024848	0.38309	616.8	0.00095824	446	
FX Exposure dum	-0.55541	2.1426e-007	0.91685	6.5597e-012	565.98	0.079611	446	***
Sample Time Range: 2014-2017								
Foreign PL	0.047936	0.25717	-8.9131e-007	0.5543	1221.1	0.0089154	882	
Foreign PL to PL	0.050689	0.23122	0.015575	0.46239	1219.4	0.0094303	881	
FX Exposure dum	-0.5646	1.7328e-013	0.93977	6.3833e-023	1114.4	0.090912	882	***
Sample Time Range: 2012-2017								
Foreign PL	0.066932	0.055424	3.9573e-008	0.97726	1788.8	0.025665	1293	
Foreign PL to PL	0.068016	0.051714	0.0021636	0.89783	1787.3	0.02614	1292	
FX Exposure dum	-0.53	1.6807e-017	0.92673	1.835e-032	1634.5	0.10649	1293	***

Table A4.7 – Diversification Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
US SIC primary codes Number	-0.36235	0.50558	0.39654	0.458	617.28	0.0010255	446	
US SIC secondary codes Number	-0.029693	0.66579	0.14328	0.047489	613.58	0.0065535	446	**
US SIC total codes Number	-0.18519	0.13199	0.15017	0.038244	613.16	0.0071799	446	**
Div1 (>=1)	-0.093923	0.20121	0.39526	0.0019668	608.03	0.01669	446	***
Div2 (>=2)	0.012533	0.84192	0.26339	0.18416	616.06	0.0031084	446	
Div3 (>=3)	0.017489	0.77295	0.657	0.058782	614.02	0.0072627	446	*
Sample Time Range: 2014-2017								
US SIC primary codes Number	-0.36235	0.34577	0.39654	0.29325	1234.6	0.0010255	892	
US SIC secondary codes Number	-0.029693	0.54073	0.14328	0.0050036	1227.2	0.0065535	892	***
US SIC total codes Number	-0.18519	0.032907	0.15017	0.0033387	1226.3	0.0071799	892	***
Div1 (>=1)	-0.093923	0.070284	0.39526	1.1683e-005	1216.1	0.01669	892	***
Div2 (>=2)	0.012533	0.77761	0.26339	0.059999	1232.1	0.0031084	892	*
Div3 (>=3)	0.017489	0.68283	0.657	0.0074423	1228	0.0072627	892	***
Sample Time Range: 2012-2017								
US SIC primary codes Number	-0.36235	0.24798	0.39654	0.1978	1851.8	0.0010255	1338	
US SIC secondary codes Number	-0.029693	0.45353	0.14328	0.00058339	1840.8	0.0065535	1338	***
US SIC total codes Number	-0.18519	0.0089525	0.15017	0.00032322	1839.5	0.0071799	1338	***
Div1 (>=1)	-0.093923	0.02656	0.39526	7.8262e-008	1824.1	0.01669	1338	***
Div2 (>=2)	0.012533	0.72928	0.26339	0.02119	1848.2	0.0031084	1338	**
Div3 (>=3)	0.017489	0.61661	0.657	0.0010402	1842.1	0.0072627	1338	***

Table A4.8 – Normative Regressions. Results for factor probit regressions with dependent variable the probability of using derivative instruments (dummy variable assuming 1 if the firm used derivative and 0 otherwise). The sample is composed of 223 Italian non-financial public firms (listed on the Italian Stock Exchange of Milan), observed from 2012 to 2017. 115 issuers are users of derivative instruments and 118 not-users. Data source: Bureau Van Dick.

Proxy	Intercept	p-value	beta	p-value	LL	R-square	Obs N.	
Sample Time Range: 2016-2017								
Man Exp Industry US SIC dum	-0.21254	0.01749	0.46165	0.0001486	603.03	0.024126	446	***
Sample Time Range: 2014-2017								
Man Exp Industry US SIC dum	-0.21254	0.00076476	0.46165	7.777e-008	1206.1	0.024126	892	***
Sample Time Range: 2012-2017								
Man Exp Industry US SIC dum	-0.21254	3.7317e-005	0.46165	4.6202e-011	1809.1	0.024126	1338	***