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***The Use of Derivatives by Italian Companies  
during the Sovereign Debt Crisis***

**- Summary -**

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## 1. An analysis of the derivative use in the last 20 years.

In the last decades some empirical studies on the use of derivatives by Italian companies have been carried out. Through the related papers an analysis of the evolution of hedging strategies in Italy can be performed.

Risk management through derivatives is a phenomenon which has been gaining importance in the last 12 years. Before 2002 instead adoption of hedging strategies was directly correlated with size, as only bigger companies used derivatives. Specifically, Bison, Pelizzon and Sartore (2002) found out that during the 90's the probability to hedge was strongly correlated with both total amount of assets and level of exposure to foreign currencies. Exchange rate risk was indeed the primary concern. Bison *et al.* showed also that the entrance into the European Monetary Union did not cause any decrease in the amount of contracts signed to hedge currency risk (at least initially). However their analysis did not control for the effective volume of derivatives used, but only for the decision by companies to use hedging instruments.

Several scholars tried to formulate a theory on the potential connection between leverage and derivative use. Stulz (1984) theorized that the use of derivatives decreases the earnings volatility and in turn increases debt capacity. Ross (1977) suggested instead a different relationship between leverage and derivatives, as there is an incentive-signaling equilibrium, according to which only "healthy" companies are able to manage high levels of debt, while "unhealthy" firms would not have any incentives to use a mimicking strategy, due to the costs implied by the high leverage. This theory would suggest a negative relationship between derivative use and level of indebtedness, as the ability of a company to increase leverage should be related to a decrease in derivative exposure, in an effort not to give negative signals to the market.

Nonetheless no particular evidences supporting a potential connection between hedging instruments and leverage were found in Italy during the 90's. This is due to the fact that most of the Italian firms included in the experiment performed by Bison *et al.* hedged primarily the exchange rate risk (75% share). Only 32% of the companies examined used derivatives to hedge interest rate risk. In the same time period in Germany (Bodnar and Gebhardt (1998)) and US (Wharton School 1998) the use of exchange rate derivatives showed trends

similar to Italy's, while the use of interest rate derivatives was more than double. These results were quite surprising because in the years from 1993 to 1999 the volatility of interest rates in Italy was higher than in the other two countries.

In the paper by Bison *et al.* contradictory and mixed results in the years from 1993 to 1999 characterized also expected taxes, which theoretically should be lower when the expected earnings before taxes are less volatile, assuming a convex relationship between EBT and marginal tax rate. Under this perspective hedging should contribute to stabilize EBT and decrease taxes.

Underinvestment, defined in terms of R&D expenses, did not show empirically any particular impact on the use of derivatives in the years from 1993 to 1999.

Chiorean, Donohoe and Sougiannis (2012) found out that companies in their sample did not use derivatives as a tool to alleviate underinvestment, however they showed how introduction and growth phases represented the most common periods during which derivative contracts were signed.

The use of derivative contracts to hedge interest rate risk started to increase from the second half of 2002, when the contracts signed jumped from a notional value of about \$100 billion in 2002 to ca. \$250 billion in June 2004. In 2003 both the number of companies using derivatives and the range of products used were in line with the international trends.

The reason why many companies started to rely more on the use of derivatives was the macroeconomic instability in both interest rate and exchange rate markets.

A recent study by the Bank of Italy (October 2012) analyzed the use of derivatives in the years from 2004 to 2012 not only by large size companies, but also by small and medium size firms. The three main results of the paper were:

- Differently from the evidence of the 90's, financial derivatives are nowadays a widespread hedging instrument among Italian non-financial companies.
- Users have more total assets, higher exposure to risks, lower earnings and commit more funds for Capex.
- Examining risk indicators there is a correlation between financial distress and derivative exposure, in contrast with previous results by Bison *et al.*

The literature analysed shows that exchange rate risk was the primary concern before the introduction of the Euro, whilst afterwards interest rate risk hedge became the most relevant issue. As a matter of facts, the press releases

published by the Bank of Italy in the years from 2008 to 2012 show how interest rate derivative contracts represented the most common instruments, averaging over the period approximately \$9,913 billion in terms of total notional amount. However only about a 6% share was held by a non-financial counterparty in the years, implying that non-financial companies play a marginal role in the Italian derivative market. In particular interest rate swaps represent 70% of the total interest rate hedging instruments.

## 2. Analysis of a sample of Italian non-financial listed companies.

The sample on which is based the empirical analysis carried out in this dissertation is composed by 175 non-financial listed companies, representing about 78% of the total capitalization of the Italian stock exchange as at the end of 2012. In particular 52 companies are in the Industrials sector, 41 in the Telecoms, Media and Technology sector, 23 in the Consumer sector and 15 in Energy and Power.

The number of total hedgers is quite stable in the years from 2009 to 2012, around 124 units. The first risk hedged is interest rate volatility and it counts a number of derivative users going from 101 in 2009 to 110 in 2012. Exchange rate risk is hedged on average by 75 companies, while commodity price risk by 20 companies.

|      | Derivative users |            | Derivative users by type of risk hedged |            |                   |            |                     |            |                                   |             |                  |
|------|------------------|------------|---|------------|-------------------|------------|---------------------|------------|-----------------------------------|-------------|------------------|
|      | Number           | % of Total | Interest rate (1)                       |            | Exchange rate (2) |            | Commodity price (3) |            | Number of simultaneous hedgers of |             |                  |
|      |                  |            | Number                                  | % of Total | Number            | % of Total | Number              | % of Total | (1) and (2)                       | (1) and (3) | (1), (2) and (3) |
| 2009 | 122              | 69%        | 101                                     | 57%        | 74                | 42%        | 21                  | 12%        | 55                                | 20          | 19               |
| 2010 | 122              | 69%        | 101                                     | 57%        | 75                | 43%        | 19                  | 11%        | 55                                | 18          | 17               |
| 2011 | 125              | 71%        | 104                                     | 59%        | 76                | 43%        | 20                  | 11%        | 57                                | 19          | 18               |
| 2012 | 125              | 71%        | 110                                     | 63%        | 77                | 44%        | 18                  | 10%        | 63                                | 17          | 16               |

The most common instrument is the interest rate swap converting the variable into fixed interest rate (it is used by more than 50% of the companies in the sample), while the floating-for-fixed interest rate swap is used only by less than 10% of the companies. Options are quite rarely mentioned in the financial statements analysed, while there are a few cases of cross-currency interest rate swap (15 in 2012) and interest rate caps (11 in 2012).

The net change in the number of interest rate derivative users is positive, but

quite low, for an overall 9% in the years from 2009 to 2012.

Hedgers have on average more total assets and revenues than non-hedgers.

They exhibit higher leverage and commit more funds for capital expenditures.

#### Derivative users vs. non-users - Median values

|                              | 2009  |           | 2010  |           | 2011  |           | 2012  |           |
|------------------------------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|
|                              | Users | Non-Users | Users | Non-Users | Users | Non-Users | Users | Non-Users |
| <b>Total Assets</b> (in € m) | 625   | 140       | 718   | 157       | 715   | 140       | 685   | 120       |
| <b>Revenues</b> (in € m)     | 404   | 72        | 493   | 94        | 468   | 72        | 462   | 69        |
| <b>ROE</b>                   | 10%   | 7%        | 10%   | 7%        | 11%   | 5%        | 10%   | 6%        |
| <b>D/(D+E)</b>               | 44%   | 36%       | 43%   | 38%       | 51%   | 46%       | 50%   | 45%       |
| <b>Capex</b> (in € m)        | 20    | 4         | 17    | 3         | 20    | 3         | 17    | 3         |

Considering only derivative uses, the mean of notional amount is on average €807 million and it decreases from €904 million in 2009 to €639 million in 2012. The mean is biased upwards by the presence of many outliers. However the median is on average €47 million, suggesting that at least half of the hedgers display in their accounts notional amounts lower than €50m.

When considering both hedgers and non-hedgers the figures are deflated and what emerges is that on average the mean notional amount is €446 million, while the median notional amount is €5 million. This implies that, if the sample is efficient in representing Italian non-financial listed companies, more than half of the Italian listed companies hedge less than €5 million of debt in the years from 2009 to 2012.

Companies hedge primarily interest rate risk. Indeed, on industry basis, the frequency of hedging instruments is always higher than 40%, with peaks of 70-80% reached by Energy and Power, Utilities and Industrials.

#### Interest Rate Risk Hedgers on Industry Basis

|                              | Total number of companies | 2009        | 2010 | 2011 | 2012 |
|------------------------------|---------------------------|-------------|------|------|------|
|                              |                           | Industrials | 52   | 65%  | 65%  |
| Telecoms, Media & Technology | 41                        | 41%         | 44%  | 46%  | 49%  |
| Energy and Power             | 15                        | 80%         | 93%  | 80%  | 87%  |
| Consumer                     | 23                        | 43%         | 39%  | 43%  | 57%  |
| Real Estate                  | 10                        | 70%         | 60%  | 60%  | 70%  |
| Infrastructure               | 11                        | 55%         | 55%  | 55%  | 55%  |
| Healthcare                   | 10                        | 60%         | 50%  | 50%  | 50%  |
| Utilities                    | 8                         | 75%         | 75%  | 75%  | 75%  |
| Luxury                       | 5                         | 60%         | 60%  | 60%  | 60%  |

Exchange rate risk is instead hedged mainly by those companies with more intense international activities, like Industrials, Energy and Power, Consumer and Luxury. The last two sectors are intuitively more exposed to cross-border

business due to the consolidated success of the “Made-in-Italy”, while the first two industries encompass big corporate groups with global footprint.

#### Exchange Rate Risk Hedgers on Industry Basis

|                              | Total number<br>of companies | 2009 | 2010 | 2011 | 2012 |
|------------------------------|------------------------------|------|------|------|------|
| Industrials                  | 52                           | 62%  | 63%  | 65%  | 65%  |
| Telecoms, Media & Technology | 41                           | 17%  | 17%  | 17%  | 22%  |
| Energy and Power             | 15                           | 53%  | 47%  | 47%  | 47%  |
| Consumer                     | 23                           | 57%  | 57%  | 52%  | 48%  |
| Real Estate                  | 10                           | 20%  | 30%  | 30%  | 30%  |
| Infrastructure               | 11                           | 9%   | 9%   | 18%  | 18%  |
| Healthcare                   | 10                           | 40%  | 40%  | 40%  | 40%  |
| Utilities                    | 8                            | 38%  | 38%  | 38%  | 38%  |
| Luxury                       | 5                            | 80%  | 80%  | 80%  | 80%  |

Commodity price risk is hedged only by those companies which have a part of the business centred on the use of raw materials and need to limit their unexpected price movements as a way to stabilize inflows and outflows.

#### Commodity Price Risk Hedgers on Industry Basis

|                              | Total number<br>of companies | 2009 | 2010 | 2011 | 2012 |
|------------------------------|------------------------------|------|------|------|------|
| Industrials                  | 52                           | 17%  | 15%  | 17%  | 13%  |
| Telecoms, Media & Technology | 41                           | 2%   | 2%   | 2%   | 2%   |
| Energy and Power             | 15                           | 53%  | 47%  | 47%  | 47%  |
| Consumer                     | 23                           | 0%   | 0%   | 0%   | 0%   |
| Real Estate                  | 10                           | 0%   | 0%   | 0%   | 0%   |
| Infrastructure               | 11                           | 0%   | 0%   | 0%   | 0%   |
| Healthcare                   | 10                           | 0%   | 0%   | 0%   | 0%   |
| Utilities                    | 8                            | 38%  | 38%  | 38%  | 38%  |
| Luxury                       | 5                            | 0%   | 0%   | 0%   | 0%   |

### 3. Econometric models to detect some causality effects on the use of interest rate derivatives.

The impact of some financials on the probability to use derivatives for interest rate risk coverage is addressed in the first part of Chapter 3 through the use of a probit model, which is a type of regression where the dependent variable can only take two values, in this case user or non-user of hedging instruments. In the context of this experiment size and leverage have a positive impact on the probability to use derivatives. Market capitalization, as expected, is instead negatively correlated with risk hedging. Indeed controlling for size, companies with lower market capitalization tend to be hedgers probably in an effort to offset

the higher risk perceived by the market.

Taxes do not exhibit any particular effect on the dependent variable. This might be due to the fact that Italy has a fixed tax rate regime which does not provide any particular incentives to stabilize the EBT through the use of hedging policies.

When controlling for size and leverage, capital expenditures do not have any relevant impact on the use of derivatives. In other words, even if hedgers commit on average more funds for capital expenditures, it is likely to assume that within a regression, most of the impact of higher Capex is incorporated into size, as bigger companies can spend more on property, plant and equipment.

The pseudo- $R^2$  associated to the model falls from over 20% in 2010 to a range of 11%-15% (according to the number and type of variables included in the regressions) in 2011. Part of this decrease might be caused by the sovereign debt crisis, which caused a fall in the market capitalization of Italian companies with a subsequent increase in leverage. So part of this decrease in fit ability of the model could be justified by the presence of an external macroeconomic shock introducing more volatility in the variables of the sample. To verify whether this hypothesis is correct, a regression referring to 2013 should be included, as the total market capitalization of the Italian Stock Exchange at the end of December 2013 was €447 billion, 22% higher than in December 2012.

One of the limits of the proposed probit model is the low level of the pseudo- $R^2$ , which could be overcome by looking for other potential factors influencing the decision to hedge.

One of these might be the sophistication of management, as more qualified managers might ask for complicated hedging strategies.

Another factor could be the average duration of financial liabilities, expressed as years to maturity. Assuming indeed that two companies have the same size it might be the case that the company with higher share of long-term debt is more likely to use interest rate derivatives to limit the potential adverse impact related to unexpected unfavourable movements in the interest rate curve.

Since Italian companies use primarily fixed-for-floating interest rate swaps, another interesting analysis would be finalized to understand whether the percentage of variable interest rate debt over total debt has an impact on the probability to sign derivative contracts.



Furthermore the decision to use sophisticated hedging policies might be linked to the composition of shareholdings. A company whose majority of shareholding positions is held by institutional investors might be more incentivized to use sophisticated hedging policies.

Even the attitude of shareholders towards risk might influence the management's decisions on derivative use. If the shareholders with the biggest stakes in the company are mostly risk-averse, the use of derivatives could provide investors with more insurance about the stability of cash flows. A proxy for shareholders' preference for risk might be the level of dividend per share paid by the company during the reference year. Evidence indicates that risk-averse investors prefer investing in companies granting a fairly high dividend per share level, whilst risk lovers prefer investing in those companies whose share price is characterized by higher volatility in order to increase their payoff.

This thesis also investigates possible factors influencing the level of notional amounts, i.e. the part of debt hedged through interest rate derivatives, chosen by the companies within the sample.

To this purpose, in the second part of Chapter 3, the use of a regression based on panel data and controlling for both entity fixed and time fixed effects, shows that companies' notional amount is directly correlated with total assets and negatively correlated with cash.

A possible explanation follows below:

- If a company is more liquid than others having a similar level of leverage, it should be able to have access to better contractual terms for financial loans, so companies with less cash should hedge a higher amount of debt.
- Bigger companies need more funds to finance their assets.

In the context of this regression it is assumed that the sovereign debt crisis could impact the results through two channels:

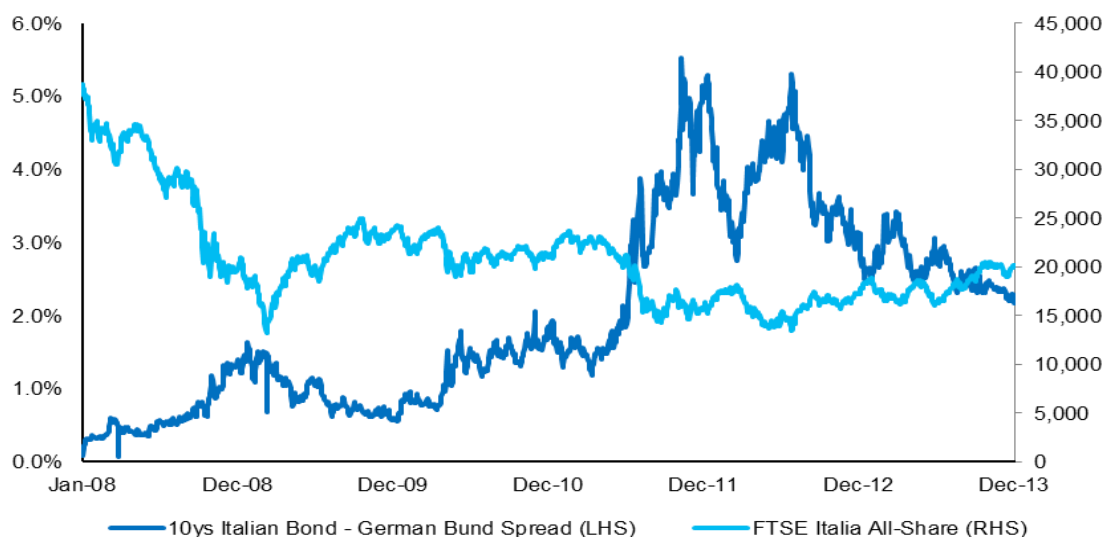
- A direct one, characterized by the intercept, as a sort of time fixed effect. To this purpose a dummy variable to differentiate data referring to 2009 and 2010 from data referring to 2011 and 2012 was introduced.
- An indirect one, expressed as leverage. Indeed, due to the inverse correlation between market capitalization and sovereign bond returns, after controlling for cash and size, a positive correlation between leverage and notional amount could imply that companies hedge more during a period of macroeconomic

shock, when the leverage increases as a consequence of an exogenous factor.

Due to the interconnection between Treasury bond market and stock market, it could be expected that the sovereign debt crisis can represent a reason for companies to change the notional amount on derivative contracts in 2011 and 2012 compared to the previous years.

As a proof of the interconnection between sovereign bond market and price of the stocks, the following graph represents the trend of both the interest rate on the 10-year Italian Treasury bond and the FTSE MIB All Share index, showing their inverse correlation. This should outline two important remarks:

- Assuming that leverage has some impact in the choice of the share of debt to be hedged, Italian companies should increase notional amounts as market capitalization erodes, in an effort to stabilize the costs of increased leverage.
- The Treasury bond market offers sustainable returns at a virtually limited risk, meaning that banks should be more incentivized to invest in Treasury bonds rather than to lend fresh money to clients. This translates to higher volatility and instability in credit market, thus to the need to hedge new loans.



Source: Bloomberg.

Contrary to expectations, neither the intercept nor leverage confirm the hypothesis of a correlation between notional amount and sovereign debt shock. Indeed, when controlling for size and cash, leverage does not exhibit any particular significance inside the model.

The intercept instead is significant, however its impact shows that controlling for

size and cash, companies tend to hedge lower notional amounts during the crisis than in the years before.

An analysis of the statistics disclosed by the ECB shows that the volatility of interest rates on new loans to non-financial companies increased from the second half of 2011. Moreover, a comparison with Germany, Spain and France, reveals how Italy imposed on average the highest floating interest rates on loans up to €1 million. Generally speaking, average rates on new loans in Italy increased above the Euro area average from the second half of 2011. Moreover access to credit conditions worsened consistently.

Instability in the macroeconomic and financial market should cause higher demand for hedging instruments. However the experiment led in this dissertation provides results which are opposite to expectations.

To try to solve this issue, a more detailed analysis of the statistics disclosed by the Bank of Italy was carried out. Data related to the total notional amount of interest rate derivative contracts held by non-financial companies from 2004 do not show any particular increasing trend in 2011 and 2012. If the crisis had caused the choice by companies to increase hedging, the notional amounts should have changed by a much higher percentage. For instance, with reference to the financial crisis of 2007-2008, there was an increase in notional amount of about 34% from June 2008 to December 2008. Moreover, an analysis of the number of financial derivative users from September 2008 to June 2013 reveals a gradual decrease in the number of hedgers, rather than an increase.

Therefore the evidence collected through the panel data model and the Bank of Italy databases suggests that the decision of the level of debt to be hedged is potentially uncorrelated with the sovereign debt crisis. This might justify the outcome of both the direct and the indirect channels of propagation of the shock within the panel data model.

There is no evident correlation with macroeconomic trends and sovereign debt crisis. The time fixed effect observed in this study could rather consist in other external factors originated for instance by the market sentiment towards derivative instruments. Even most of the economic and financial theory is based on the concept of rational investors, in practice individuals take decisions which are influenced by several factors, including recent events which might cause

trust or distrust towards these instruments. The relevance that some derivative disasters have gained on mass media in the last years might have influenced the choice of several companies to decrease their exposure in derivative instruments. Even if the aim of IRS is to minimize the volatility of financing costs, managers could have tried to decrease the use of derivatives to please shareholders. It cannot indeed be assumed *at priori* that all the shareholders have an adequate understanding of the derivative market fundamentals.

Future studies should be finalized to understand the factors influencing the sign and the meaning of the intercept within the model.

The aim of this dissertation was to introduce to readers with an adequate financial understanding a preliminary snapshot of the evolution of the derivative use in the last years as well as an accurate description of the main features of Italian non-financial listed companies in relation with their risk hedging common practices. A further objective was to create a starting point for present and future discussion on the drivers which determine the choice to hedge against risk and the level of debt hedged. Although these last aspects require further research, this thesis points out both the big portrait of the Italian non-financial listed companies and the structure of the Italian stock exchange, which should be taken into account as a basis for the development of future models.

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### **Sitography**

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Borsa Italiana website, [www.borsaitaliana.it/borsaitaliana/statistiche/statistiche-storiche/capitalizzazioni/capitalizzazioni.htm](http://www.borsaitaliana.it/borsaitaliana/statistiche/statistiche-storiche/capitalizzazioni/capitalizzazioni.htm)

Cerved, [www.cerved.com](http://www.cerved.com)

Consob website, [www.consob.it](http://www.consob.it)

ECB website, [www.ecb.europa.eu](http://www.ecb.europa.eu)

EURIBOR website, [www.euribor.it](http://www.euribor.it)

OECD website, [www.stats.oecd.org/mei/default.asp?lang=e&subject=15](http://www.stats.oecd.org/mei/default.asp?lang=e&subject=15)

### **Data analysis, statistical and financial software**

- Stata
- Microsoft Excel
- FactSet
- Bloomberg

## **Companies' Financial Statements**

| <b>Industry</b>                | <b>Number of companies</b> | <b>Companies</b>  |
|--------------------------------|----------------------------|---|
| Industrials                    | 52                         | Ansaldo STS, Bastogi, B&C Speakers, Bialetti Industrie, Biesse, Bolzoni Auramo, Brembo, Buzzi Unicem, Caltagirone, Carraro, Cembre, Cementir, Cobra Automotive Technologies, Datalogic, DelClima, De Longhi, EEMS Italia, Elica, Emak, Fiat, Finmeccanica, Gefran, Giovanni Crespi, Gruppo Ceramiche Ricchetti, I.M.A., Impregilo, Indesit, Interpump Group, Isagro, Italcementi, Landi Renzo, Maire Tecnimont, Montefibre, Nice, Panariagroup Industrie Ceramiche, Piaggio, Pininfarina, Pirelli & C., Premuda <sup>1</sup> , Prima Industrie, Prysmian, Ratti, Reno de Medici, ROSSS, SABAF, Saes Getters, SOGEFI, Tenaris, Tesmec, Vianini Industria, Vianini Lavori, Zignago Vetro. |
| Telecoms, Media and Technology | 41                         | Acotel Group, Arnoldo Mondadori Editore, Best Union Company, CAD IT, Cairo Communication, Caltagirone Editore, CDC Point, CHL, Class Editori, Dada, Dmail Group, El Towers, EL.EN, Engineering - Ingegneria Informatica, Esprinet, Exprivia, Eurotech, Fidia, Fullsix, Gruppo Editoriale L'Espresso, Gtech, Gruppo Il Sole 24 Ore, It Way, Mediacontech, Mediaset, Mondo TV, Monrif, Moviemax, Noemalife, Olidata, Poligrafici Editoriali, Poligrafica San Faustino, RCS Mediagroup, Reply, Seat Pagine Gialle, SNAI, Tas Tecnologia Avanzata dei Sistemi, Telecom Italia Media, Telecom Italia, Tiscali, TXT –Eolutions.   |
| Consumer                       | 23                         | AEFFE, Antichi Pellettieri, Autogrill, Basic Net, Bioera, Bonifiche Ferraresi, Borgosesia, Caleffi, Centrale del Latte di Torino & C., Ciccolella, CSP International Fashion Group, Davide Campari, Enervit, Geox, Giorgio Fedon & Figli, La Doria, MARR, Parmalat, Poltrona Frau, Stefanel, Valsoia, Yoox, Zucchi.   |
| Energy & Power                 | 15                         | Alerion Clean Power, Ambienthesis, Edison, Enel Green Power, Enel, ENI, ERG, Falck Renewables, Gas Plus, Industria e Innovazione, Kinexia, K.R. Energy, Saipem, Saras, Ternienergia.  |
| Infrastructure                 | 11                         | Aeroporto di Firenze, ASTM, Atlantia, Autostrade Meridionali, Fiera di Milano, Retelit, SAT, Save, Snam, SIAS, Terna.   |
| Healthcare                     | 10                         | Amplifon, Cell Therapeutics, Diasorin, Eukedos, Molecular Medicine, Pierrel, Recordati, Servizi Italia, SOL, Sorin.   |
| Real Estate                    | 10                         | AEDES, Astaldi, Beni Stabili, Brioschi Sviluppo Immobiliare, Compagnia Immobiliare Azionaria, Gabetti Property Solutions, IGD, Nova Re, Prelios, Risanamento.   |
| Utilities                      | 8                          | A2A, Acea, Acque Potabili, ACSM – AGAM, Ascopiave, Biancamano, Hera, Iren.  |
| Luxury                         | 5                          | Brunello Cucinelli, Luxottica, Safilo Group, Salvatore Ferragamo, Tod's.  |
| <b>Total</b>                   | <b>175</b>                 |   |

<sup>1</sup>Premuda is more properly located in the shipping industry, however due to both the lack of other companies in the same industry and its scope of business (transportation of dry bulk and liquid bulk mostly for the heavy industry), it was included in the industrial sector.