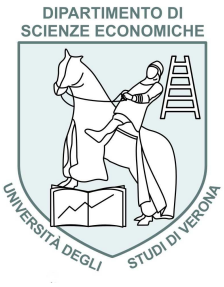

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The Role of Women in the Italian Network of Boards of Directors, 2003-2010*

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ABSTRACT

We use an innovative dataset (8 years with 2,057 firms) composed of Italian listed firms to analyze the network of women in boards, and to evaluate their effect on company value and performance. In particular, we use Social Network Analysis to analyze the growth of the female directorship network. We also study the dynamics of change over time, and the different behavior of firms respect the growth of the female directorates. We study the impact of interlocking directorships and female interlocking directorships on equity value and firm performance. Italy is an interesting case for this kind of study, due to the high presence of interlocking directorates. We find that interlocking directorate has a negative impact on equity value and firm performance, which is consistent with economic theory and previous literature findings. Furthermore, female interlocking directorship has no effect on firm value and performance.

Keywords: Corporate Governance, Interlocking Directorships, Company Performance, Social Network Analysis, Board Diversity.

JEL classifications: C14, C23, G34, L14, M21.

* We wish to thank Alessandro Bucciol for useful comments. Any errors are ours.

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1. Introduction

It is well-known that in Italy women play a minor role in the labour market. According to the Italian Institute of Statistics, the participation rate is 46.1% with respect to 67.7% of men, and although female students tend to outperform their male counterpart, they earn lower wages (-4.9%, according to the European Union, -7.2% according to Cnel, the National Council for Economy and Labour) and do not reach the same positions. When we look at corporate governance we find a dismal picture: only 7.2% of total board seats is held by a woman in 2011, although this share is slowly increasing from 4.1% in 2001.[1] The Italian Corporate Governance Code makes no recommendations on the issue of gender diversity (indeed any diversity) in the boards, differently from many other codes in Europe. According to Assonime (2011: 39) "Gender diversity is steadily, albeit slightly, increasing (up from 166 in 2009, 158 in 2008, 136 in 2007 and 125 in 2006). 127 companies, i.e. 47% of the total, have at least one woman sitting in their Board of Directors (up from 124 in 2009, 120 in 2008, 105 in 2007 and 93 in 2006); 95 companies have one woman on the Board, 26 have two women, 3 companies have three women, other 2 have four women and one has five women on the Board. Women account for at least 25% of the board in 15 companies: in 11 companies the female presence varies between 35% and 50%; one company had a majority of women in their Boards of Directors".

To address this issue, in June 2011 the Italian Parliament passed a bipartisan bill requiring that from 2015 one third of Board of Directors (and of the Board of Statutory Auditors) sits to be held by female directors. This target will be obtained in a number of steps: in the first year of application one-fifth of board members should be female, in the second and third year this share would rise to one-third.[2] Given the current number of listed companies, it is expected that there will be 700 more women in boards of directors, and 200 more in the boards of auditors.

Social network theory sees the establishment of a group of directors motivated by their access to resources that are valuable to the company. Directors are nodes in a network of organizational linkages, sustain with their knowledge and abilities the other members of the network; as a whole they share power and act as a socially cohesive group. Women, ethnic minorities and other diverse groups are usually outside the reproduction of these groups, and therefore, there is a strong tendency to under-represent them. The use of social network analysis can shed light on the structure of the Italian network of directors, the role of women in it, and its dynamics over time. Moreover, as Assonime (2011) points out, women (not differently from men) may hold more than one board position: the total number of positions is 224 (169 directors and 55 statutory auditors), but they are actually held by a lower number (198) of natural persons. 182 women hold only one position, while 16 hold more than one office, up to a maximum of 6 (woman holds 4 positions and four women 3 positions). On average, women hold 1.13 offices (just below the average, 1.23); the average number of positions held by women holding more than one office is 2.63 (above the average, 2.39).

The paper is organized as follows. Section 2 reviews the literature on board diversity and its effects on corporate governance and company performance, while Section 3 illustrates the methodology and the data employed in the study. Section 4 reports the results of the descriptive analysis of the network of (female) directors and looks at the relationship between women presence on board and financial outcomes. Section 5 concludes.

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[1] Il Sole 24 Ore, June 28th, 2011, reporting data from Aliberti Governance Advisors.

[2] For a company that does not comply first there is a warning from the Italian stock market authority (Consob) with the request to change the board composition within four months; if it fails to comply again there is a second warning and a fine up to € 1 million. In case of further non compliance after three months, the Board of Directors (or the Board of Statutory Auditors) will be dissolved. The law will be effective for 9 years.

2. Literature review

The importance of diversity in corporate boards has been shown in light of the agency theory and in the resource dependence framework.[3] Both theories maintain that individuals' characteristics can influence the ability to monitor and advise the inside directors and provide outside connections. The literature has mainly analysed the effects of women in corporate governance (independence, monitoring, committees, etc.), and then the relationship between women in boards and company performance.

According to the agency theory, a heterogeneous board is more able to monitor the behaviour of the executives behaviour in the interest of the shareholders because diverse people have different backgrounds and bring different viewpoints to board oversight (Anderson et al., 2009; Adams and Funk, 2010; Adams and Ferreira, 2009; Rhode and Packel, 2010). Women directors also frequently ask questions: CEOs report that women become more vocal and active as directors when there are three or more females (Konrad et al., 2008).

Peterson and Philpot (2007) find that men and women have different board roles, in particular women less likely to serve on key committees. Women are less likely to be on executive committees and more likely to be on public affairs committees, whereas no difference is found in the likelihood of being on the nomination, compensation, finance, or audit committees.

Brown et al. (2002) maintain that boards with three or more women are significantly different from all male boards: three-quarters of boards with women explicitly identify criteria for measuring strategy, compared to less than half of all-male boards, and 94% of boards with three or more women explicitly monitor the implementation of corporate strategy, compared to only two-thirds of all-male boards. Similar statistics concerns conflict of interest guidelines and ensuring a code of conduct for the organization. Furthermore, boards with two or more female directors place more importance on the use of search consultants than other boards and are also more likely to have higher levels of board accountability, with formal limits to authority and formal director orientation programs. They are also likely to ensure more effective communication among the board and its stakeholders. In addition, such boards are significantly more active in promoting nonfinancial performance measures such as customer satisfaction, employee satisfaction, and gender representation, as well as considering measures of innovation and corporate social responsibility. Singh and Vinnicombe (2004) find that FTSE 100 firms with women directors adopted and reported the new governance practices recommended by the Higgs Review earlier than firms with all male boards.[4]

Adams and Ferreira (2009) claim finds that gender diversity has a positive effect on some board practices associated with good governance: the greater the percentage of women in the board the higher the attendance of male directors, the number of board meetings and the pay-for-performance.

The empirical research has also focused on the relationship between gender diversity and performance. Erhardt et al. (2003), Carter et al. (2003) find a positive relationship between gender (and ethnic) diversity and Tobin's *q* or accounting measures of performance. Anderson et al. (2009) claim that board diversity (including gender) positively affects the performance of more complex firms but has detrimental effects in less complex organizations. Adams and Ferreira (2009) find in general a negative relationship between gender diversity

[3] Terjesen et al. (2009) review a number of theories, more related with social psychology (such as social identity, social network and social cohesion, gendered trust, ingratiation, and leadership) that provide basis for research on board diversity.

[4] Women's boardroom presence leads to more civilized behaviour and sensitivity to other perspectives (Bilimoria, 2000; Huse and Solberg, 2006).

and both Tobin's *q* and ROA, although this is reversed when controlling for firm's governance.

The results of the studies on the effects of gender diversity have to be taken with caution, since they may suffer from endogeneity problems. Results on the impact of female directorship on corporate governance measures could be driven by differences in some unobservable firms characteristics, such as corporate culture[8], affecting both performance and gender diversity. Therefore, a reverse causality problem arises, making it difficult to give a causal interpretation.

Bianco et al. (2011) is the closest paper to ours. They consider all directors of Italian publicly-traded firms at the end of 2009 and investigate the main characteristics of Italian female directors, and potential determinants of diverse boards. They find that only 6.8% of total board sits was held by a woman and the majority of listed companies had all-male boards. They also find that 47.3% of diverse board companies women directors have a family connection with the controlling shareholder. "Family" directors are on average less educated than not-affiliated women directors (95% vs. 60%). Both the size of the board and market capitalization of the company are positively correlated with the presence of at least one woman in boards. Moreover, they look at the correlation between female directorship and some governance and performance measures, finding no correlation between women directors, jointly considered or classified according to family affiliation, and companies' performance (as measures by Tobin's *q* and stock volatility). Finally, the average number of board meetings is higher in firms with not-affiliated women than in companies where only family directors are in the boardroom.

We depart from their approach in a number of ways. First, we analyze the share of women directors, not the mere presence of women in the Board of Directors. Second, we consider a panel of listed Italian companies over the 2003-2010 period and we address the issue of the role of women in the network of Italian directors. Finally, we also address the issue of board diversity and company performance.

Gamba and Goldstein (2009) take an historical approach documenting the role of women in Italian boards of directors since 1934. While the overall number of directors in Italian listed companies increased from 1,337 in 1934 (with only one woman[5]) to 4,347 in 2007, the number of women grew from 0.6% (13 individuals) in 1962 – when data become more easily available - to 6.7% (291 individuals) in 2007. They show that women are less represented in boards in Italy than in other comparable OECD countries, and that listed companies are less open to women than other centres (e.g., public administration and liberal professions). In addition, very few women hold multiple directorships, a device that is often used by major companies in order to ensure control (Drago et al., 2007).

3. Methodology and data

In this work we use an original dataset consisting of data related to the interlocking directorship networks, where in particular we consider the gender of the different board directors. The source for these data is Consob (years 2003-2010), and we include all listed companies and all board directors. An important variable in this case is as well the role of the single director. In this way we can compute various measures of the boards (for example some indexes of gender participation to the total in the different boards). It is also possible to compare over time the changing roles by gender in the networks of directors. This dataset partition is matched with the economic information related to the companies, in which we consider various relevant elements as the economic performance, the debt, and so on. All the

[5] Maria Magnetti sat on the board of Paramatti, a Turin paint manufacturer, between 1932-1955.

variables in the first partition related to the networks are used in the network analysis, where the data related to the performance are specifically used in the second part of the work. A preliminary part to computing the participation rates over time by company is considered here.

In particular the methodology (see tables 1-3) is divided in three distinct parts: a Social Network Analysis on the different networks of the directors in the boards (Wasserman and Faust, 1994), a second part in which we explore the data related to the women participation of the board, and a third part related to the confirmatory analysis by testing the hypothesis we take from the literature. In the third part we consider the econometric analysis of the relationships and we discuss his robustness.

It is important to stress that considering an exploratory data analysis approach before confirming the hypothesis could be useful for various reasons: firstly to check the relevant assumptions of the models, secondly to observe the real data structure, and thirdly to identifying eventual outliers that could be determinate some problems in the modeling phase.[6] At the same time it is important to stress that the hypotheses of the work (H0-H2) are defined a priori with respect to the subsequent analysis so the exploratory data analysis approach does not influence in this work the hypothesis, but confirm usually the findings.

In the first part of the work we perform a social network analysis of the board interlocking networks by considering the director's networks during the period 2003-2010. In particular we compute the female directors network for the years 2003 and 2010 to compare the changing structure of the network during the time. In particular, we analyze the network structure by considering a visual recognition of the different components of the woman network and the structural characteristics of the network, the centrality issues and so on (Wasserman and Faust, 1994). These analyses are useful to understand the complex nature of the woman participation to the boards, jointly considering their role as specified in the variables. In fact an higher level of centrality in the network, for example, can be associated in higher duties in a specific board.

Hypotheses to test (H0-H2) are defined prior to the exploratory data analysis and are tested at the end by considering the outliers that could be detected in the statistical analysis (we consider in this sense some classification methods to analyzing the evolution of the participation rates by companies typologies). The main goal is to test (H0) if we can have a same structure of participation (by considering man/woman directors) over time. In particular, the null hypothesis is the equality of the medians over time, in which no shock significantly impacted over time.

We consider as well: the different participation rates on the board man/woman and its evolution over time by creating some clusters of companies that tend to have the same behavior.[7] This micro-level of the analysis permits us to understand what are the different trajectories over time by considering the women participation rates (for example in what types of companies this participation tends to grow). In Statistics a way to build a hierarchy of clusters could be considered as the Hierarchical Clustering. In particular we are using a specific distance, a pairwise measure of similarity or dissimilarity between the different statistical units considered and we build a hierarchy by considering the most similar or the least dissimilar at a time. In our case we consider as statistical units the different years and the attributes are the different companies over time (or the woman participation rates).

In the case of the K-Means, in this case we use a specific algorithm that permit to dividing the different y statistical units in p partitions by considering his attributes. Here the companies are the statistical units and the years are the attributes. At the end of the procedure

[6] See Hartwig and Dearing (1979) for the different approaches in exploratory and confirmatory data analysis.
[7] We apply a cluster analysis using a k-means algorithm (Gherghi and Lauro, 2008).

we obtain a mean for each attribute and a specific assignment of the statistical units to a cluster. In particular the objective of the algorithm is minimizing the variance intra-cluster. By considering the hierarchical clustering we want to understand if in the period 2003-2010 we can observe some years more similar to others and in that sense observing the evolution of the different changes in the participation of the woman in the boards in the system of companies. By considering the K-Means algorithm we want to classifying the different companies in order to different trajectories over time in participation of the woman in board (in practice discriminating if the number of the woman in the boards is increasing or not over time).

As well we can consider the different structures of the participation at a macro level by considering a kernel density estimation over time and a hierarchical clustering. The shape of the density can show differences where we are able to observe some shocks or structural changes in board composition over time. This type of exploratory data analysis (in particular the kernel density estimation) is usually performed without imposing any type of preliminary hypothesis on the data to observe the data structure at macro level and obtaining relevant information on this one, the number of outliers and so on. In this sense we obtain from the hierarchical cluster analysis of the boards at a macro level specific information on the different structure of the boards we can compare at an aggregate level with the network dynamics over time.

Kernel Density Estimation is a non-parametric method useful in the estimation of the probability density function of a random variable. Kernel density estimation can be used in statistics for smoothing problems. It is calculated as:

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right)$$

Where n is the number of observations h is a defined bandwidth, and a K is a kernel (in this case the Epanechnikov Kernel is used). Here we are interested in comparing the participation rates over the years as a whole. In particular, as pointed out in literature using kernel density estimates could be useful respect to the use of the histogram (that could be the direct competing methods in this case related to the exploratory data analysis), in fact two similar observations in the case of the histogram could be put on a same bin, where the kernel estimator tends to return a smoothed shape.

Finally, we perform the median test on the equality of the medians (Hypothesis H0) of the woman participation for the years considered and in that sense we compare the results with the relevant literature.

At the same time we want to investigate whether Interlocking directorate (ID) as an impact on firm value and performance. Our research tries to understand the influence of ID with no gender distinction and what we call female ID, that is an interlock between two women.

As proxy of firm value we use the equity value of each firm as dependent variable; while as proxy of firm performance we use the annual stock return.

Usually the hardest part of modeling ID is how to interpret draw ID influence in the model. We decided to consider two different options:

a) Absolute value. Here we consider ID (and also Female ID) as the total number of ID referring to a single company board.

b) Dummy variable. In this case we used a dummy which equals 1 if ID (or Female ID) exists in a company board.

The models derived from the above considerations are the following:

$$E_{s,t} = \beta_0 + \beta_1 \cdot ID_{s,t} + \beta_2 \cdot IDf_{s,t} + \beta_3 \cdot LnTA_{s,t} + \beta_4 \cdot Lev_{s,t} + \beta_5 \cdot SS_{s,t} + \beta_6 \cdot BS_{s,t} + \varepsilon_{s,t} \quad (1)$$

$$R_{s,t} = \beta_0 + \beta_1 \cdot ID_{s,t} + \beta_2 \cdot IDf_{s,t} + \beta_3 \cdot LnTA_{s,t} + \beta_4 \cdot Lev_{s,t} + \beta_5 \cdot SS_{s,t} + \beta_6 \cdot BS_{s,t} + \varepsilon_{s,t_{s,t}} \quad (2)$$

Where: $E_{s,t}$ = log of equity value at time *t* for firm *s*; $R_{s,t}$ = stock return at time *t* for firm *s*; $ID_{s,t}$ = number of interlocks at time *t* for firm *s* (in dummy models this variable will be substituted with a dummy variable equaling 1 when at least 1 interlock occurs and 0 otherwise); $IDf_{s,t}$ = number of female interlocks at time *t* for firm *s* (in dummy models this variable will be substituted with a dummy variable equaling 1 when at least 1 interlock occurs and 0 otherwise); $mktE_{s,t}$ = equity value average in the market at time *t*; $lnTA_{s,t}$ = logarithm of total assets at time *t* for firm *s*; $Lev_{s,t}$ = financial leverage at time *t* for firm *s*, defined as total debt to asset ratio; $SS_{s,t}$ = sales per share at time *t* for firm *s*; $BS_{s,t}$ = board size at time *t* for firm *s*; and β_0 = constant. Table 1 shows the descriptive statistics of the variables involved in the regressions

[Tables 1 about here]

After using the above models with a fixed and random panel data methodology, we consider also the endogeneity issue. It is not clear whether the dependent variable depends on ID or *vice versa*: for example a poorly performing company may look for interlocked directors in order to get financial and commercial helps from other companies. The same approach can be raised for the other control variables: total assets, financial leverage, sales per shares and board size. To address this issue we run also Instrumental Variables estimations using one lag for all dependent variables.

The methods used are summarized in Table 2.

[Table 2 about here]

Starting from the literature, we can maintain three hypotheses on the presence of women in Italian Boards of Directors:

H1: Women tend to have the same participation rate over the years.

H2: The equity value and stock returns of a company decreases with the presence of board interlocking (a possible effect of the expropriation of value). Women interlockers do not make difference.

H3: The presence of women has positive effects on the equity value and stock returns. This effect increases as the share of women directors increases.

4. Results

The results related to the first part of the work are related to the different network structures. We can observe growth in the role of women, by considering an increased number of the woman directors in the interlocking directorship network over time. In particular, we

can observe that in 2003 the structure is weak, it became more complex in 2010 (figures 1 - 4). This result is interesting because the descriptive analysis shows that the participation tends to grow over time.

[Figures 1-4 about here]

This result can be as well observed by considering the growing female participation in the boards. By considering the macro level of the participation, we can observe that the median value for all years is 0, whereas the mean increases from 0.05 to 0.07. This result is consistent with previous literature, but we observe over time a growth of the participation, that could be captured by the changes in the kernel density shapes. By considering the participation of the different listed companies by years, we detect some similarities for the first years and relevant changes for the last of two years (figure 5). The result is confirmed by considered a hierarchical clustering of the years over time (table 3).

[Figure 5 and table 3 about here]

By considering the micro level we considering the evolution of the participation in the different companies. In that sense we consider various *k* (the number of clusters) where we decide to stop the partitioning procedure when the deviations within the different clusters are minimized. We can observe that the woman participation is stable for some clusters in which there are inside companies that are well-established in the interlocking directorship network, where the woman participation is higher in companies characterized by being strongly innovative by considering, for example, the technological level. The point is related with the capability of the different companies to increase the woman participation because some companies tend to be very stable in their board composition over time (table 4). Another interesting finding related to Drago et al. (2007) is that the dynamics of the participation rates in the boards is different and lower for the companies in the center of the network (clusters 3 and 5, in particular) versus other companies in the periphery (clusters 2, 6 and 7). Appendix 1 reports the allocation of each firm in each cluster.

Finally, the test of equality of medians over time show that the medians are significant different between the different years. That means that there are some changes over time (table 5).

[Tables 4 and 5 about here]

Results about the econometric section propose, first of all, the fixed and random panel data estimation for the two models and with the two definitions of ID (absolute value and dummy variable). Therefore, Table 6 reports results for the for both model (equity and stock returns) and both methodology (fixed and random), but only for ID absolute value. Table 8 shows as first result a poor effectiveness of the stock return models (c) and (d). Beyond that, we observe that models (a) and (b) suggest a negative influence of both ID and female ID on Equity value; at the same time control variables have significant coefficients; but we notice that *lnTA* has a positive influence on Equity value, while previous literature evidences support a negative one. The Haussman test maintains that the fixed-effects model should be preferred to the random-effect model.

Table 7 reports results for the same models but using ID as a dummy variable. This analysis shows no influence at all of ID on dependent variables. Also in this case model 2)

(the one with stock return as dependent variable) reports only market average as significant variable. Also in this case the Haussman test points in favor of the fixed-effect model.

[Tables 6 and 7 about here]

Now we consider the hypothesis that we have an endogeneity issue because we are not able to say with certainty that our independent variables are not influenced by dependent variable themselves. To address this issue we use the Instrumental Variables method by inserting lags for all variables as instruments (dependent included). Table 8 and 9 report our findings for the two definitions of the ID variable, respectively, and these are the most clear and convincing ones. If we exclude model (j), where ID is not significant, what we found is aligned with our expectations: ID influences equity value and stock return negatively while female ID has no effect.

[Table 8 and 9 about here]

5. Conclusions

Our research is based on a time extended dataset of Italian listed companies; Italy appears to be a natural laboratory due to the high presence of ID. The dataset gathers 2.057 listed firms along 8 years (2003-2010). In terms of the Hypotheses we have maintained, we found that H1 is rejected, whereas both H2 and H3 can be accepted.

The Social Network Analysis of the female directorates shows that there is a growth over time of the female networks but we confirm the important role of the families in defining the position in these networks of the single directorates. We can observe that women tend not have a strong relevant position in the entire global network of interlocking directors with exception of some members of families.

We tested the hypothesis of ID influence on equity value and firm performance. We found that female ID is negatively related with firm value. ID is consistent with our expectation and with previous literature findings. However, the small number of female interlocks in the sample suggests that we cannot strongly conclude that female ID is not relevant for value and performance: to better investigate this issue a more female ID populated dataset is needed, and the reform just passed would provide an adequate environment to perform such test in the years to come.

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Figure 1 - Network Female Directors 2003: deleting pendents and isolates

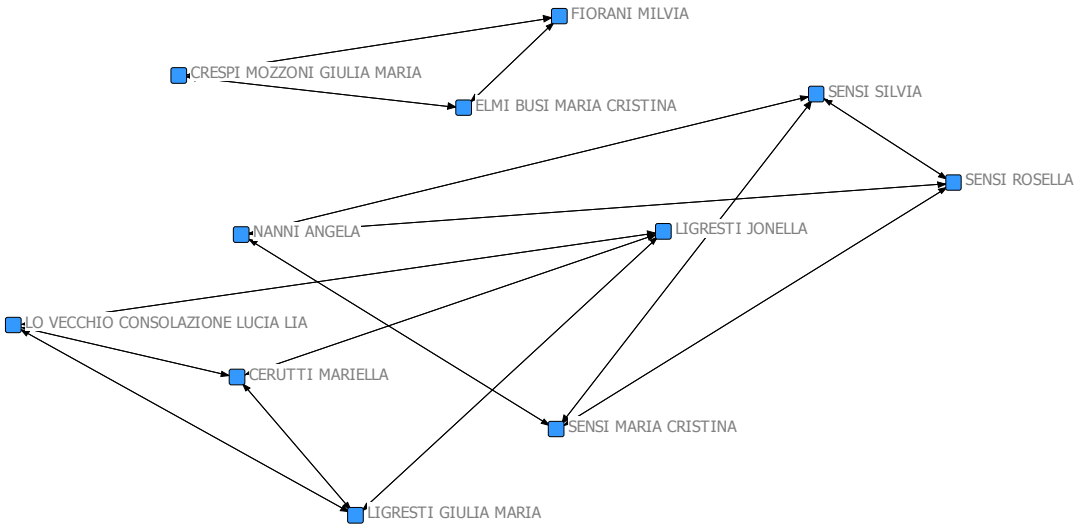

Figure 2 - Network Female Directors 2003: all

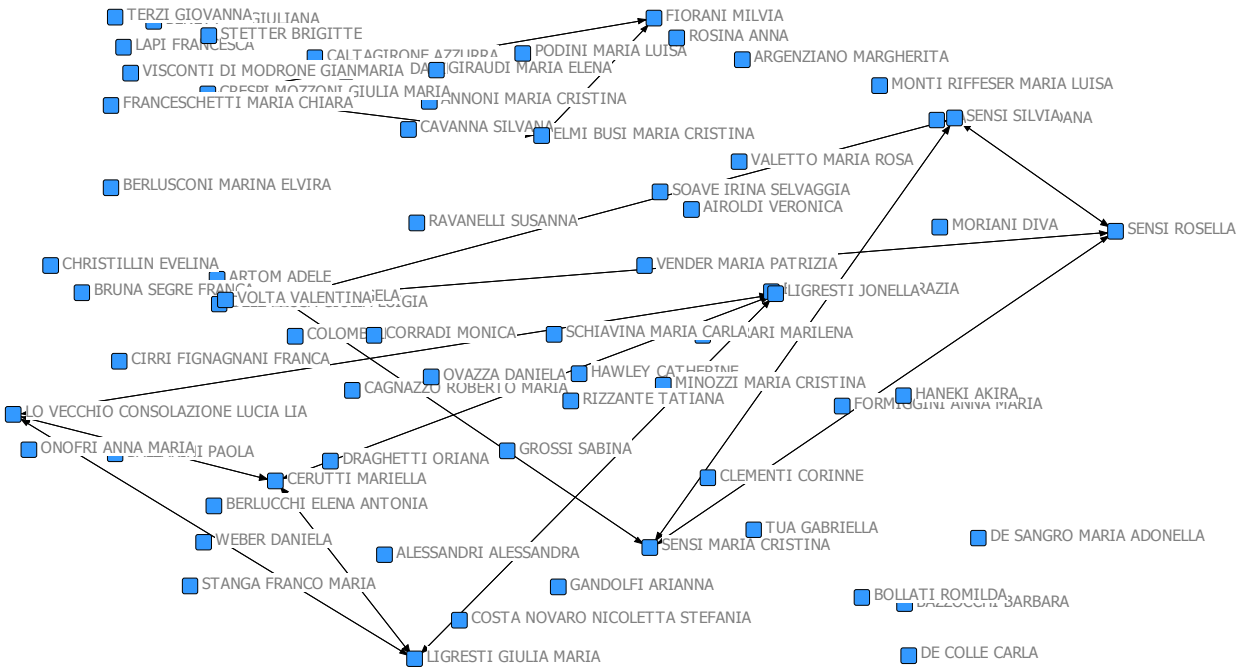

Figure 3 - Network Female Directors 2010: deleting pendents and isolates

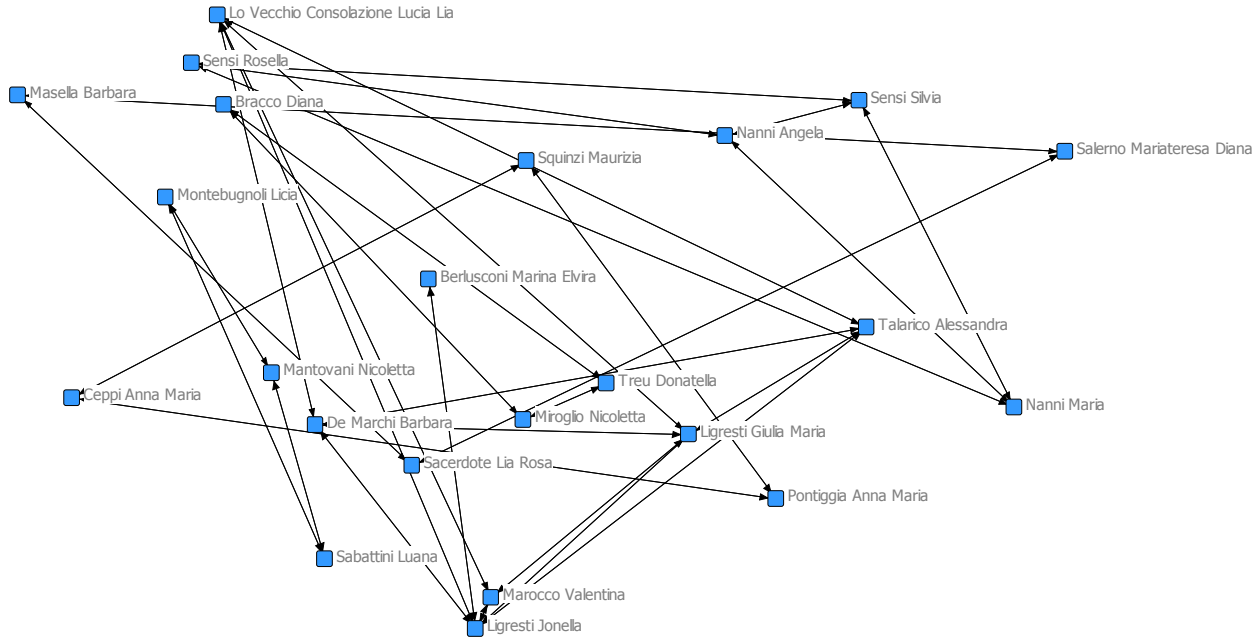

Figure 4 - Network Female Directors 2010: all

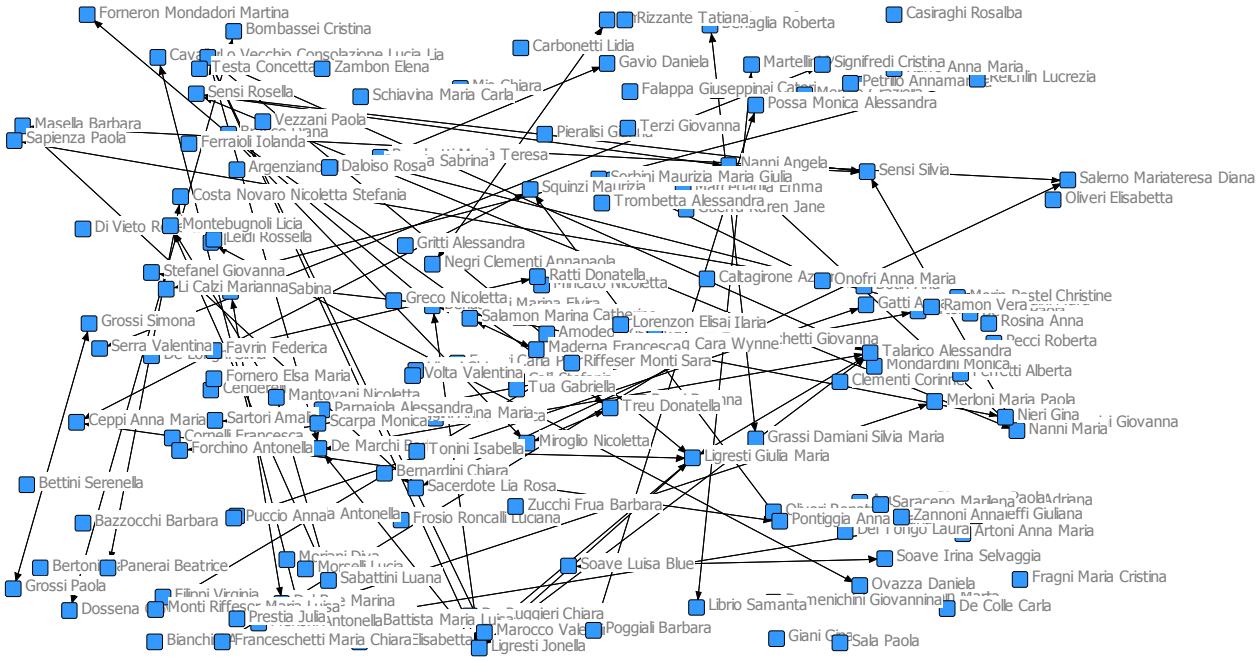

Figure 5 - Kernel density estimation woman participation rates by year 2003-2010

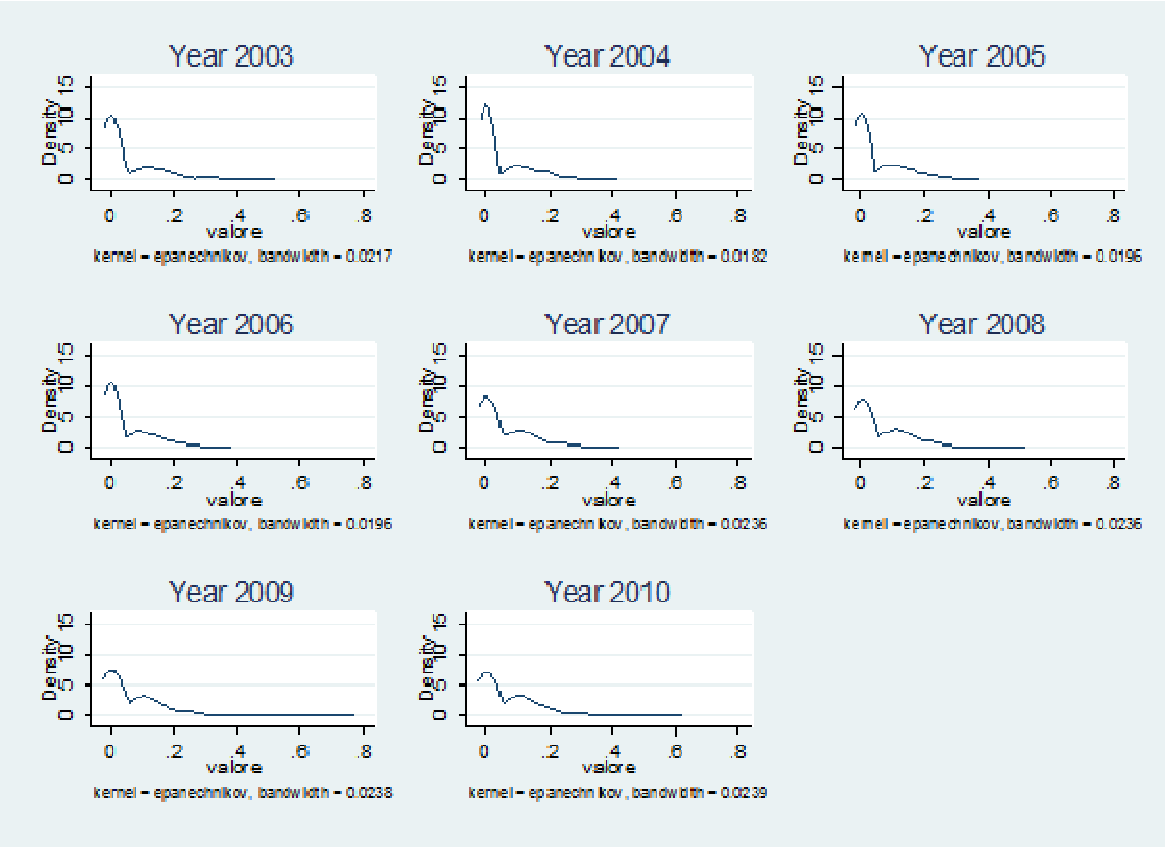

Figure 6 - Hierarchical clustering on the years 2003-2010 (method=median)

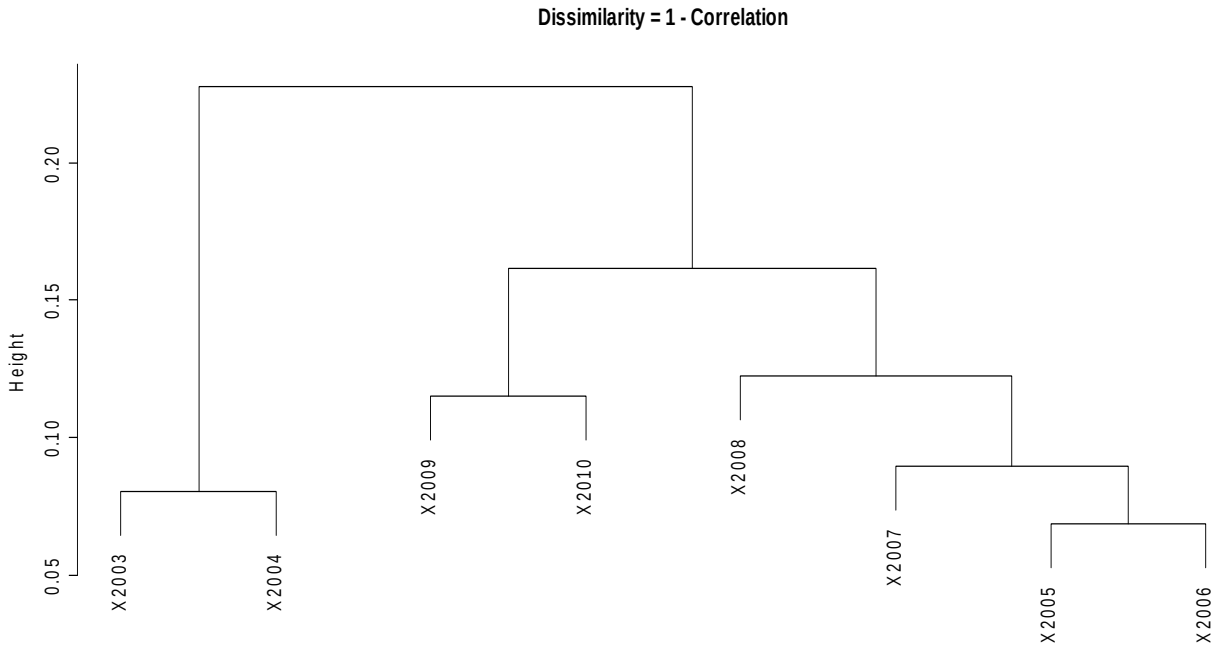

Table 1 – Descriptive statistics

Variable	Mean	Standard dev.	Min	Max
LnEquity	12.67	1.87	8.1	18.35
ID	6.32	8.42	0	31
Female ID	0.27	1.17	0	10
LnTotal assets	13.64	2.17	9.26	20.75
Financial leverage	0.45	0.87	0.08	3.44
Board size	10.25	4.08	1	31
Sales-per-share	9.62	19.03	0.0001	332.09

Table 2 – Econometric methodology.

Social Network Analysis and Methods of the Explorative Analysis		
Relevant Objectives	Methodology	Details
Analyzing the Men\Woman network of interlocking directorships	Social Network Analysis (figure. 1-figure. 4)	Visualization, betweenness (deleting isolates and pendents)
Men\Women participation "macro level"	Kernel Density Estimation (figure. 5)	Epanechnikov Kernel, optimal bandwidth computed
Men\Women participation "macro level" (exploring differences between years)	Hierarchical Clustering (figure. 6)	Correlation distance, median method
Men\Women participation "micro level" by company over time	Partitioning: K-Means Algorithms (figure. 7)	K=12 (minimizing deviations within clusters)
Testing Hypotheses (H0)		
Changing structure over time	Testing equality of the medians over time (figure. 8)	Null hypothesis: equality of the medians
Econometric Analysis (H2 and H3)		
Testing Female ID influence on performance	Panel data (random and fixed), IV	ID considered both with both absolute value and as a dummy
Testing ID influence on performance	Panel data (random and fixed), IV	

Table 3 - K-Means Clustering of the companies 2003-2010 (clusters=12)

Cluster	Within cluster sum of squares	Cluster size
1	0.129015	13
2	0.0277	2
3	0.151323	13
4	0.046025	4
5	0.0668	13
6	0	1
7	0.121325	12
8	0.103	5
9	0.129438	16
10	0.033145	11
11	0.0371	2
12	0.136125	48

Table 4 - Cluster means by year

Cluster	X2003	X2004	X2005	X2006	X2007	X2008	X2009	X2010
1	0.0908	0.0923	0.0769	0.0638	0.0692	0.0769	0.0823	0.0838
2	0.3100	0.2450	0.1700	0.1700	0.1400	0.1400	0.2150	0.3600
3	0.0523	0.0546	0.0862	0.0938	0.0823	0.0254	0.0000	0.0000
4	0.0000	0.0200	0.0950	0.0875	0.1475	0.1625	0.1500	0.1750
5	0.0038	0.0123	0.0123	0.0231	0.0392	0.0815	0.0815	0.0846
6	0.3300	0.3300	0.3600	0.3600	0.3600	0.3600	0.3600	0.3600
7	0.1667	0.1683	0.1933	0.2100	0.2117	0.2317	0.2308	0.2300
8	0.2180	0.2420	0.2420	0.2280	0.2120	0.1740	0.0900	0.1020
9	0.1338	0.1313	0.1325	0.1356	0.1381	0.1363	0.1313	0.1100
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0509	0.0936
11	0.4150	0.3650	0.0550	0.0550	0.1250	0.1550	0.1400	0.1400
12	0.0083	0.0052	0.0042	0.0035	0.0010	0.0027	0.0000	0.0000

Table 5 - Median test, woman participation rate 2003-2010

	2003	2004	2005	2006	2007	2008	2009	2010	**Total**
No	187	175	172	175	172	162	151	138	1,332
Yes	88	90	99	106	119	119	130	136	896
Total	275	265	271	281	291	291	281	274	2,228

Pearson chi2(7)=30.5844 Pr=0.000

Table 6 - Fixed and Random effects estimation for Model 1) and 2) with ID absolute value

	(a)	(b)	(c)	(d)
Dep. Variable	Equity	Equity	Stock Return	Stock Return
Methodology	Fixed	Random	Fixed	Random
Female ID	-0,08164 ***	-0,09782 ***	-0,1316	-0,00366
	(0,031)	(0,025)	(0,134)	(0,050)
ln total asset	0,46406 ***	0,676315 ***	-0,01813	-0,0113
	(0,039)	(0,019)	(0,172)	(0,032)
Fin. leverage	-0,00061 **	-0,00071 **	-2E-05	-0,00024
	(0,000)	(0,000)	(0,002)	(0,001)
Sales per share	-0,00385 ***	-0,00537 ***	0,001607	0,00212
	(0,001)	(0,001)	(0,004)	(0,003)
Board size	0,028403 **	0,026597 **	-0,00291	0,019203
	(0,009)	(0,008)	(0,038)	(0,018)
ID	-0,009709***	-0,014514***	-0,01109	-0,01351
	(0,003)	(0,003)	(0,020)	(0,009)
Cons	6,093102 ***	3,19E+00 ***	-1,03853	-1,37668 ***
	(0,522)	(0,242)	(2,407)	(0,364)
Hausman $\chi 2$		2,87		1,8
Prob > $\chi 2$		(000) ***		(0.937)

1. Standard error is reported in lower font below coefficients.
2. Significance levels: *: below 10%, **: below 5%, ***: below 1%.

Table 7 - Fixed and Random effects estimation for Models 1) and 2) with ID as dummy variable

	(e)	(f)	(g)	(h)
Dep. variable	Equity	Equity	Stock Return	Stock Return
Methodology	Fixed	Random	Fixed	Random
Female ID	-0,11944	-0,14485 **	-0,27473	-0,18696
	(0,075)	(0,070)	(0,327)	(0,183)
ln total asset	0,452934 ***	0,667865 ***	-0,01763	-0,01413
	(0,039)	(0,019)	(0,173)	(0,032)
Fin. leverage	-0,00062 **	-0,00074 **	-6,8E-05	-0,00017
	(0,000)	(0,000)	(0,002)	(0,001)
Sales per share	-0,00375 ***	-0,0054 ***	0,001526	0,001873
	(0,001)	(0,001)	(0,004)	(0,003)
Board size	0,036761 **	0,037833 **	-0,01754	0,012311
	(0,008)	(0,007)	(0,034)	(0,016)
ID	-0,101886**	-0,15828***	0,136578	-0,12663
	(0,050)	(0,047)	(0,233)	(0,138)
Cons	6,12769 ***	3,15E+00 ***	-1,08295	-1,2359 ***
	(0,524)	(0,243)	(2,412)	(0,350)
Hausman χ2		80,81		2,8
Prob > χ2		(000) ***		(0.833)

1. Standard error is reported in lower font below coefficients
2. Significance levels: *: below 10%, **: below 5%, ***: below 1%

Table 8 - IV estimation for Models 1) and 2) with ID absolute value

	(i)	(j)	(k)	(l)
Dep. variable	Equity	Equity	Stock Return	Stock Return
Methodology	Fixed	Random	Fixed	Random
Female ID	-0,17792	-0,19057 ***	-0,3773	-0,03038
	(0,156)	(0,045)	(0,264)	(0,052)
ln total asset	-0,21874	0,742216 ***	-0,4471	-0,05444 *
	(0,183)	(0,038)	(0,275)	(0,033)
Fin. leverage	0,008009	-0,00832 **	0,00371 **	0,002706 **
	(0,006)	(0,004)	(0,002)	(0,001)
Sales per share	-0,00288	-0,00532 *	-0,00029	0,004341
	(0,006)	(0,003)	(0,011)	(0,003)
Board size	0,038257	0,008285	-0,04817	0,02087
	(0,045)	(0,016)	(0,075)	(0,019)
ID	-0,054795***	-0,039671***	0,050192	-0,00152
	(0,021)	(0,009)	(0,041)	(0,010)
Cons	14,74635 ***	2,66E+00 ***	4,893833	-1,04308 ***
	(2,197)	(0,329)	(3,780)	(0,356)
Hausman $\chi 2$		37,37		8,12
Prob > $\chi 2$		(000) ***		(0.230)

1. Standard error is reported in lower font below coefficients
2. Significance levels: *: below 10%, **: below 5%, ***: below 1%

Table 9 - IV estimation for Models 1) and 2) with ID as dummy variable

	(m)	(n)	(o)	(p)
Dep. variable	Equity	Equity	Stock Return	Stock Return
Methodology	Fixed	Random	Fixed	Random
Female ID	-0,264	-0,31722 *	-0,38168	-0,1715
	(0,376)	(0,163)	(0,989)	(0,232)
ln total asset	-0,31663	0,746473 ***	-0,44961	-0,05766 *
	(0,196)	(0,033)	(0,286)	(0,033)
Fin. leverage	0,008836	-0,00815 **	0,003038 *	0,002687 **
	(0,006)	(0,003)	(0,002)	(0,001)
Sales per share	-0,00061	-0,00553 **	-0,00043	0,004108
	(0,007)	(0,003)	(0,011)	(0,003)
Board size	0,083587 **	0,026709 *	-0,0459	0,018988
	(0,049)	(0,015)	(0,078)	(0,019)
ID	-0,214534	-0,392252	1,02615	0,055654
	(0,328)	(0,142)	(0,774)	(0,194)
Cons	15,70553 ***	2,32E+00 ***	4,368096	-1,0245 ***
	(2,355)	(0,284)	(3,950)	(0,334)
Hausman χ2		36,26		6,36
Prob > χ2		(000) ***		(0.384)

1. Standard error is reported in lower font below coefficients
2. Significance levels: *: below 10%, **: below 5%, ***: below 1%

Appendix 1

Cluster assignment by company

Company	Cluster
ACEA SPA	3
ACEGAS - APS SPA	12
ACOTEL GROUP SPA	9
ACQUE POTABILI SPA - SOCIETA' PER CONDOTTA DI ACQUE POTABILI	12
ACTELIOS SPA	10
AEROPORTO DI FIRENZE - ADF SPA	3
AMPLIFON SPA	9
ARNOLDO MONDADORI EDITORE SPA	7
AS ROMA SPA	6
ASSICURAZIONI GENERALI SPA	5
ASTALDI SPA	1
AUTOGRILL SPA	12
AUTOSTRADA TORINO MILANO SPA	1
AUTOSTRADE MERIDIONALI SPA	1
BANCA CARIGE SPA - CASSA DI RISPARMIO DI GENOVA E IMPERIA	5
BANCA FINNAT EURAMERICA SPA	12
BANCA IFIS SPA	4
BANCA INTERMOBILIARE DI INVESTIMENTI E GESTIONI SPA	9
BANCA MONTE DEI PASCHI DI SIENA SPA	3
BANCA POPOLARE DELL'ETRURIA E DEL LAZIO SCARL	10
BANCA POPOLARE DI MILANO SCRL	12
BANCA PROFILO SPA	3
BANCO DI DESIO E DELLA BRIANZA SPA	12
BANCO DI SARDEGNA SPA	12
BASIC NET SPA	7
BASTOGI SPA	2
BEGHELLI SPA	12
BENETTON GROUP SPA	1
BENI STABILI SPA	12
BIESSE SPA	4
BOERO BARTOLOMEO SPA	7
BORGOSESIA SPA	8
BREMBO SPA - FRENI BREMBO	7
BULGARI SPA	12
BUZZI UNICEM SPA	5
CAD IT SPA	12
CAIRO COMMUNICATION SPA	12
CALTAGIRONE EDITORE SPA	9
CALTAGIRONE SPA	5
CAMFIN CAM FINANZIARIA SPA	1

CARRARO SPA	10
CDC POINT SPA	4
CEMBRE SPA	7
CENTRALE DEL LATTE DI TORINO & C. SPA	7
CHL - CENTRO HL DISTRIBUZIONE SPA	12
CIR SPA - COMPAGNIE INDUSTRIALI RIUNITE	12
CLASS EDITORI SPA	9
COFIDE SPA - COMPAGNIA FINANZIARIA DE BENEDETTI	10
CREDITO ARTIGIANO SPA	12
CREDITO BERGAMASCO SPA	1
CREDITO EMILIANO SPA	12
DADA SPA	4
DANIELI SPA - OFFICINE MECCANICHE DANIELI & C.	9
DATALOGIC SPA	1
DAVIDE CAMPARI - MILANO SPA	10
DE LONGHI SPA	5
DIGITAL BROS SPA	12
DMAIL GROUP SPA	3
EDISON SPA	12
EL.EN. SPA	9
EMAK SPA	1
ENEL SPA	12
ENGINEERING - INGEGNERIA INFORMATICA – SPA	5
ENI SPA	12
ERG SPA	10
ESPRINET SPA	10
FIAT SPA	12
FIDIA SPA	12
FIERA MILANO SPA	12
FINMECCANICA SPA	12
FONDIARIA - SAI SPA	7
GEFRAN SPA	7
GEMINA SPA - GENERALE MOBILIARE INTERESSENZE AZIONARIE	12
GEWISS SPA	9
GIOVANNI CRESPI SPA	3
GRANITIFIANDRE SPA	3
GRUPPO CERAMICHE RICCHETTI SPA	8
GRUPPO COIN SPA	11
GRUPPO EDITORIALE L'ESPRESSO SPA	1
I GRANDI VIAGGI SPA	9
I.M.A. INDUSTRIA MACCHINE AUTOMATICHE SPA	1
IMMSI SPA	12
IMPREGILO SPA	12
INTEK SPA	9

INTERPUMP GROUP SPA	12
IRCE SPA - INDUSTRIA ROMAGNOLA CONDUTTORI ELETTRICI	12
ISAGRO SPA	12
ITALCEMENTI SPA FABBRICHE RIUNITE CEMENTO	5
ITALMOBILIARE SPA	5
ITWAY SPA	12
JUVENTUS FOOTBALL CLUB SPA	12
LA DORIA SPA	8
LUXOTTICA GROUP SPA	1
MARCOLIN SPA	12
MEDIOBANCA SPA	5
MEDIOLANUM SPA	3
MILANO ASSICURAZIONI SPA	7
MITTEL SPA	12
MONDO TV SPA	9
MONRIF SPA	9
MONTEFIBRE SPA	12
OLIDATA SPA	9
PININFARINA SPA	8
PIRELLI & C. REAL ESTATE SPA	3
PIRELLI & C. SPA	1
POLIGRAFICA S. FAUSTINO SPA	12
POLIGRAFICI EDITORIALE SPA	7
PREMAFIN FINANZIARIA SPA HOLDING DI PARTECIPAZIONI	9
PREMUDA SPA	9
PRIMA INDUSTRIE SPA	12
RATTI SPA	2
RCS MEDIAGROUP SPA	5
RECORDATI SPA - INDUSTRIA CHIMICA E FARMACEUTICA	3
RENO DE MEDICI SPA	12
REPLY SPA	9
RICHARD GINORI 1735 SPA	3
RISANAMENTO SPA	10
SABAF SPA	12
SAES GETTERS SPA	3
SAIPEM SPA	5
SEAT PAGINE GIALLE SPA	12
SIAS - SOCIETA' INIZIATIVE AUTOSTRADALI E SERVIZI SPA	1
SNAI SPA	5
SNAM RETE GAS SPA	10
SNIA SPA	10
SOCIETA' SPORTIVA LAZIO SPA	12
SOCOTHERM SPA	7
SOGEFI SPA	10

SOL SPA	8
STEFANEL SPA	7
TAS TECNOLOGIA AVANZATA DEI SISTEMI SPA	11
TELECOM ITALIA MEDIA SPA	3
TELECOM ITALIA SPA	12
TISCALI SPA	12
TOD'S SPA	12
TREVI - FINANZIARIA INDUSTRIALE SPA	12
TXT E-SOLUTIONS SPA	12
VIANINI INDUSTRIA SPA	12
VIANINI LAVORI SPA	12
ZUCCHI SPA - VINCENZO ZUCCHI	5