

# **Board Diversity and Investments in Innovation: Empirical Evidence from Italian Context**

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## **Abstract**

The aim of this paper is to investigate the relationship between the board diversity and the investments in innovation in a sample of companies listed on the Italian Stock Exchange (named Borsa Italiana) and operating in the consumer goods industry and in the consumer services one. This sample covers the period from 2006 until 2010 and contains 345 observations. Drawing on the literature review, we pinpointed six hypotheses related to the impact on the investments in innovation of the following independent variables: 1. presence of outside directors; 2. average number of the other positions held by the members of the board; 3. minority shareholders representatives in the board; 4. presence of women in the board of directors; 5. number of committees; 6. frequency of board meetings. Furthermore, on the basis of the previous empirical studies, to measure the investments in innovation (the dependent variable), we chose these accounting ratios: total intangible assets divided by total assets and total R&D costs divided by total sales. From the methodology standpoint, we used both the bivariate statistic (i.e. Pearson Correlations and Anova one way) and the multivariate one (i.e. OLS regression analysis with robust standard errors calculated by the Newey-West (HAC) method). Our findings confirm the previous studies and show that, also for the Italian listed companies operating in the industries

mentioned earlier, the outsiders as well as the frequency of meetings held by the Strategy Committee assume a relevant role in supporting the investments in innovation. Conversely, the other independent variables concerning the board diversity (i.e. women, minority shareholders representatives etc.) are not statistically significant and, as a result, do not influence the investments in innovation.

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## **1. Introduction**

Studies in management of innovation have increasingly focused their attention on the role, if any, of corporate governance mechanism, structures and practices in influencing innovation (Lee and O'Neil, 2003; Munari *et al.*, 2010). A key issue in this stream of research is related to board of directors contribution in promoting investment in innovation (Zahra *et al.*, 2009). Despite the high number of researches on this topic the results are still conflicting and works have produced partial results by focusing only on the monitoring and control of board functions, based on the agency theory (Fama and Jensen, 1983). Actually, the role of the board in sustaining innovation investment can be also investigated either looking at its the strategic role (Zahra and Pearce, 1989) or considering it as a portfolio of resources and competences that firm can use in order to explore and exploit innovative opportunities (Pfeffer, 1972).

We try to address this gap in our research investigating whether the board composition and structure can influence investments in innovation, building on a resource based perspective. In particular, we focus our attention not only on the presence of outside directors but also on the presence of woman, the presence of directors that represent the minority shareholders, the number of other positions held by the directors in other corporate boards, the number and type of committees and the frequency of board and committees meetings.

The rest of the paper is organized as follows. In Section 2 we present the theoretical model and our hypotheses, discussing whether board composition and structure influence the decision to invest in innovative activities. Section 3 describes the data set and the variables. In the Section 4 we present the methods adopted in the econometric analysis and its results and implications, while Section 5 illustrates our discussions, conclusions and significant issues for future research.

## **2. Theoretical framework and hypotheses**

Corporate innovation strategies are important for firm's profitability, success, and growth (Kor, 2006; Stopford and Baden-Fuller, 1994; Lumpkin and Dess, 1996; Zona *et al.*, 2006). Innovation has become one of the most important strategies that can improve firm efforts in gaining competitive advantage, expanding market share, increasing firm performance and creating new wealth (Morbey, 1988; Franko, 1989; Hitt *et al.*, 1996; Miller and del Carmen Triana, 2009). Given its potential contributions, scholars have identified various factors that promote innovative activities within the firm. Among them, one of the most relevant are corporate governance mechanisms that firm adopts (Baysinger *et al.*, 1991; Hansen and Hill, 1991; Hill and Snell, 1988; Hitt *et al.*, 1996; Zahra, 1996; Zahra *et al.*, 2000, 2009; Miller and del Carmen Triana, 2009). In particular, studies in this field have concentrated their attention on the role of board of directors in promoting and

encouraging corporate innovation strategy within the firm (Baysinger *et al.*, 1991, Rindova, 1999; Zona *et al.*, 2006; Pugliese *et al.*, 2009).

Innovation activities are often time consuming, expensive and risky (Zahra and Covin, 1995). Hence, some managers may not have the sufficient motivation to support investments in innovation activities, due their risk aversion and the focus on short term value creation (Jacob, 1991; Zahra, 1996). Based on these assumptions, scholars focused on agency theory, suggested that promoting innovation initiatives requires a strong and independent board that monitors, evaluates and challenges top management team (Zahra *et al.*, 2000). Thus, researchers have focused mainly on the monitoring role of the board, considering the board of directors as a formal body for stakeholders or principals to control managerial behavior (Fama and Jensen 1983; Gabrielsson and Winlund, 2000). From an agency theory perspective, the board can be used as a monitoring tool for shareholder interests to safeguard their investments (Fama and Jensen 1983) and the board of directors can be considered as an important information system for stakeholders to monitor executives behavior, ensure their focus on long term value creation and increase firm performance (Eisenhardt 1989; Zahra 1996; Gabrielsson and Winlund, 2000). Moreover, the board can be considered responsible for ensuring legal and ethical conduct by the corporation and its employees (Lorsch 1995, Conger et al, 1998).

Actually, researches on the board role have highlighted other important functions that board can perform to promote and increase innovation activities as well as to support the management and the firm (Zahra and Pearce, 1989; Mintzberg 1983; Zona *et al.*, 2006). We refer to the strategic role of the board that can be related to the resource based theory (Pfeffer, 1972; 1973; Barney, 1991). According to this perspective, board of directors is considered as a portfolio of resources and competences that can help firm in exploring and exploiting strategic innovative activities. Hence, the directors' knowledge, their skills and experiences, can support and complement the management of the firm and, if properly organized, can contribute to increase firm performance. Moreover, directors can help firm in the formation of strategic networks, can provide advices on strategic issues and can give authority to the firm (Mintzberg 1983; Zahra and Pearce, 1989; Borch and Huse 1993; Gabrielsson and Winlund, 2000). In other words, from a resource-based perspective (Barney, 1991; Barney *et al.*, 2001) the board is a potential provider of resources used to promote innovation within the firm and create new wealth (Pfeffer, 1972; Zald, 1969; Gabrielsson and Winlund, 2000; Filatotchev and Wright, 2005; Zahra *et al.*, 2009). It can provide knowledge and resources that enable executives to pursue opportunities that, in the years ahead, could turn into benefits for shareholders through the improvement of firm performance (Keasy and Wright, 1993; Zahra *et al.*, 2009). The board can identify viable opportunities for growth by giving attention to innovation

activities that allow the company to create new wealth; it is also a potential source of creative thinking about new opportunities for growth and innovative ideas. The board can share useful information, for making effective strategic choices, and can ensure that members of the top management team have the knowledge, skills, and abilities to help the company growth (Hillman and Dalziel, 2003; Zahra *et al.*, 2009; Tuggle *et al.*, 2010). Finally, the board can align the interests of managers and the firm, thereby encouraging wealth creation and innovation activities by providing resources (Huse, 2007). The board's provision of resources involves a variety of specific activities, including providing legitimacy to the public image of the firm (Selznick, 1949), providing expertise (Baysinger and Hoskisson, 1990), administering advice and counsel (Lorsch and MacIver, 1989; Mintzberg, 1983), linking the firm to important stakeholders or other important entities (Hillman *et al.*, 2001), facilitating access to resources, such as capital (Mizruchi and Stearns, 1988), building external relations, diffusing innovation (Haunschild and Beckman, 1998) and aiding in the formulation of strategy and other important firm decisions (Judge and Zeithaml, 1992; Lorsch and MacIver, 1989).

Building on this last perspective, in this paper we propose to investigate the relationship between board attributes, in terms of composition and structure, and the propensity for investments in innovation.

### ***Board composition***

Looking at the board composition, we concentrate our attention on the mix of director types and the minority representation. Type refers to the widely recognized dichotomy between inside and outside directors. Outsiders are not members of the top management team, their associates, or families; are not employees of the firm or its subsidiaries; and are not members of the immediate past top management group (Jones and Goldberg, 1982). They also have contacts outside a firm and typically bring a broader range of experience because of their contacts with different companies and industries (Kesner, 1988). Insiders are board members who are current or former employees of a firm or who are otherwise closely affiliated with the firm (Judge and Zeithaml, 1992). Minority representation refers to the presence of directors in the board room that are expression of the minority shareholders (Anderson and Reeb, 2004; Loderer and Waelchli, 2010) and to the representation of females on the board (Rosener, 1995; Vieito, 2012).

The proportions of insider/outsider representation on a board are the most studied variables in the corporate governance literature (Judge and Zeithaml, 1992). Prior researchers have found that insider representation is positively associated with the innovativeness of strategies (Hill and Snell, 1988) and with the level of corporate R&D spending (Baysinger *et al.*, 1991). They bring firm-

specific knowledge and familiarity with the firm's markets and established networks (Tuggle *et al.*, 2010). They have the useful information about the firm, its history, its strategy and its management style. Opposite, studies focusing on agency theory have suggested that outside directors may play an important monitoring function on the top management team (Clarysse *et al.*, 2007). Outsiders can ensure the pursuit of long term wealth creation by monitoring executives and encouraging innovation activities. From a resource based perspective, outsiders can be seen as provider of access to scarce or strategic resources (Lynall *et al.*, 2003, Tuggle *et al.*, 2010). They can also bring awareness of innovations and new opportunities from their own industries into a firm's boardroom (Hillman and Dalziel, 2003; Tuggle *et al.*, 2010). Thus, we can maintain that outsiders can positively influence the level of firm's investment in innovation, as they can provide the resources useful to exploit innovation activities, offer different perspectives about investments in innovation and suggest new growth opportunities for the firm.

In quality of outsiders, these types of directors have also the possibility to have executive and / or non-executive positions also in the board of other different firms. Tuggle *et al.* (2010:553) maintain that "boards whose members have heterogeneous functional backgrounds can bring a greater breadth of knowledge and different approaches to problem solving, which in turn can make them more likely to" increase the quality of decisions and more inclined to discuss about new ideas and innovation opportunities. From a resource based perspective, we can sustain that board characterized for directors with a high number of positions in other corporate board can better provide new resources, perspectives and opportunities and thus facilitate the innovation activities.

So our hypothesis are:

*Hp 1a. The investments in innovation are positively related to the presence of outside directors in the board room.*

*Hp 1b. The investments in innovation are positively related to the average number of positions in other board of directors.*

Concerning the minority representation in the board room, literature asserts that boards have an important role in protecting minority shareholders (Anderson and Reeb, 2004). Recently, the Italian law (art. 147-ter, T.U.F. and Consob Regulation n. 11971/99) has introduced a voting list mechanism in order to ensure that the board composition is actually an expression of the whole social structure, including minority shareholders. However, independent directors remain one of the primary tools of defense that minority shareholders can employ in protecting their rights against the influence and power of large, controlling shareholders (Anderson and Reeb, 2004). Outside

directors, that represent the minority shareholders, can potentially prevent large shareholder from directly expropriating firms' resources via excessive compensation, special dividends, or unwarranted perquisites. They can also verify the competence of the CEO, attend to the executive investment decisions and protect shareholders' wealth (Shleifer and Vishny, 1990). From a resource based perspective, we can assert that directors that represent the minority shareholders can be a source of administrative and strategic control. However, their control role and the focalization of attention on the wealth protection for shareholders can hinder the willingness of the board in innovation activities and investments that are characterized for a high level of uncertainty. Thus, our hypothesis is:

*Hp 2. The investments in innovation are negatively related to the minority shareholders representatives in the board room.*

Gender diversity, i.e. the presence of women on corporate boards of directors, is a highly debated corporate governance topic, since is considered as an instrument to improve board variety and thus discussion (Anastasopoulos *et al.*, 2002). Rosener (1995 in Vieito, 2012) stresses the role of females in top management, maintaining that they are “more flexible and better able to deal with ambiguity than males and these abilities to motivate team building and be flexible are essential factors for the success of any modern business that is conducted in an uncertain context”. Some scholars have found that women are more likely to be represented in the top management positions of larger organizations characterized for high public visibility, and consumer-goods businesses, such as pharmaceuticals or cosmetics (Harrigan, 1981). According to the resource based perspective, women are frequently felt to bring marketing expertise to the board and a consumer or community orientation that is particularly valuable in certain industries and service businesses (Harrison, 1986; Fryxell and Lemer, 1989). As innovation activities require a high level of flexible and high motivation, we can retain that the presence of women in the board of directors can support the investments in innovation within the firm.

So our hypothesis is:

*Hp 3. The investments in innovation are positively related to the presence of women in the board of directors.*

### ***Board structure***

Board structure concerns a board's organization (Zahra and Pearce, 1989) and involves the rules that exist to make the board more efficiently (Huse, 1995; Gabrielsson and Winlund, 2000). In to analyze, this dimension we concentrate our attention on the number and types of committees as

well as the frequency of committee meeting (Zahra and Pearce, 1989; Demb and Neubauer 1992; Huse 1995).

Board committees work toward the more effective operations of the board (Van Den Berghe and Levrau, 2004). Committees are important tools to monitor corporate activities and play a valuable role in the protection of shareholders wealth (Kesner, 1988). Klein (1995) evaluated the effects of the committee structure of boards and directors' roles within these committees on board effectiveness. She proposed a committee structure with specialized roles to enhance board performance in productivity and monitoring. Thus, she identified two different categories of committee: productivity and monitoring committee. Here, productivity can be assimilated to the strategic role of the board and includes board involvement in decision-making processes about strategic and innovative issues and the decisions that affect the creation of new wealth for shareholders.

Monitoring refers to board involvement in the evaluation and control of the activity of senior management, particularly in ensuring that senior management is engaged in the pursuit of innovative activities, even if these are risky activities. Thus, each board committee should be specialized in either innovative or monitoring issues and these committees should be staffed by the board members most likely to achieve these goals. Thus, boards should use committee structures to facilitate, evaluate, and confirm long-term investment decisions and to monitor the performance of senior management.

Given these considerations, we can hypothesize a strong relationship between the presence of committees and the level of investments in innovation within a firm. In particular, from an agency perspective, board committees can allow directors to better perform their control role. The specialization of committees and the large amount of information that directors can share during meetings increase the potential to monitor executives and protect shareholders wealth. Furthermore, from a resource-based perspective some board committees can enhance the involvement of directors in innovation activities (Harrison, 1987). Directors must be well prepared to participate in committees (Huse, 1995; Gabrielsson and Winlund, 2000), so they can better inform the whole board about the resources they can provide for the firm growth. They can also suggest to the top management team how to utilize the resources to exploit new innovation opportunities, create new wealth for shareholders and enhance R&D investment.

Thus, we can hypothesize that the number of board committee is positively associated with board's ability to promote and enhance innovation within the firm. In particular, the monitoring committees (audit, compensation and nomination) (Klein, 1995) can have a positive effect on promoting innovative investments, while productivity committees (Klein, 1995) (finance,

investment and strategic) can have a positive effect on enhancing innovative activities within the firm.

So, our hypothesis is:

*Hp 4. The investments in innovation are positively related to the presence of productivity and monitoring committees.*

Board and committees meetings are the key tool for informing and involving directors (Tuggle et al., 2010). They represent the place where directors can discuss firm's opportunities and evaluate management's operations with more details. The frequency of board and committees meetings is recognized as important for the board to have any possibility of performing its control and strategic role (Demb and Neubauer 1992, Huse 1995). The board cannot be expected to monitor firm performance and suggest innovative initiatives, if they are not given the opportunity to do these (Demb and Neubauer 1992, Huse 1995). From an agency perspective frequent meetings allow board to better control management activities in order to protect shareholders value (Gabrielsson and Winlud, 2000). From a resource based perspective, frequent meetings consent outsider director to interact with insider and to be well informed about firm activities. This can stimulate the entrepreneurial thinking of outsider. Therefore, they can better direct the resource provided in order to exploit new opportunities and enhance investment in innovation.

So, our hypothesis is:

*Hp 5. The investments in innovation are positively related to the frequency of board meetings.*

### **3. Data description and variables**

The sample has been constructed combining several sources of data. Firstly, we employed the Borsa Italiana's website in order to select the firms operating in the industries we intend to investigate, that are the "consumer goods" and the "consumer services". We chose these industries as it is interesting to analyze the relationship between board attributes and innovation investments in generally mature scopes. Further, since Italian financial context is characterized by a huge recourse to the bank loans, it is worthwhile to examine whether the corporate governance approach, adopted as a consequence of the listing, affects on propensity for innovation of the listed companies chosen. To this end, we hope for empirical evidence statistically significant, so that the Italian Stock Exchange could represent an attractive alternative of funding for other national companies or international investors (Pagano *et al.*, 1998; Pagano, Roell, 1998; Corvin, Harris, 2001; Corvino *et*

*al.*, 2010). At the same time, it could increase his role in the global financial environment. The following table 1 indicates the sample.

Table 1: Description of the sample

Industry	# firms	% firms
Consumer Goods	42	61%
Consumer Services	27	39%
Total	69	100%

The data collection process covers the period from 2006 until 2010 in which, as known, there has been one of the huger spike in economic downturn. From this standpoint, we attempt to examine whether also in these years the board attributes concurred in backing the investments in innovation. After having pinpointed the name of the listed firms from the Borsa Italiana's web-site, we collected both corporate governance data and accounting ones. In particular, in each corporate website, we downloaded the annual reports on corporate governance. Thanks to these reports, we collected the necessary data for testing the foregoing hypotheses. Relatively to corporate governance data, the sample represents the 98.5 per cent of the population, as only in one case we did not find any information.

Afterwards, from the AIDA database (Bureau Van Dijk), we selected some accounting data related to the total sales, total intangible assets and total assets. This database contains information on Italian companies required to file financial statements. To gather the data concerning the research and development (henceforth R&D) costs, from the corporate website, moreover, we downloaded the annual financial statements or, whereas available, the consolidated one. For each of them, we conducted a content analysis for deducing the investments in R&D. With regards to the accounting data, the sample represents the full population relatively to the total assets, the total sales, the total number of employees and to the ratio: total intangible assets divided by total assets. Considering the other ratio employed in our analysis, i.e. total R&D costs divided by the total sales, the sample represents the 97 per cent of the population. Overall, the number of observations is 345 that derives from the multiplication between 69, the amount of the listed companies (see Appendix A), and the time frame analyzed that is equal to five years.

Focusing the attention on corporate governance data, Table 2 highlights the features of the sample companies. In particular, the average board size is 10 while the average number of

committees amounts to 2. The number of outsiders ranges between 10% and 95% while the number of insiders ranges between 5% and 100%. The number of women in the board of directors is encompassed between zero and 5 while the number of minority shareholders representatives ranges between zero and 4. In some cases, hence, there is a total absence respectively of women and minority shareholders representatives in the board of directors.

Table 2: Descriptive Statistics

Variables	N	Min	Max	Mean	SD
Board Size	329	4	21	10	3,192
Number of Insiders	329	1	10	4	2,205
Percentage of Insiders	329	5%	100%	45%	23,038%
Number of Outsiders	329	1	20	5	3,354
Percentage of Outsiders	329	10%	95%	55%	23,026%
Number of Women in the Board of Directors	329	0	5	1	,870
Percentage of Women in the Board of Directors	329	0%	50%	8%	10,027%
Number of Minority Shareholders Representatives in the Board of Directors	315	0	4	,33	,814
Number of Committes	327	0	5	2	,953
Average Number of other positions held by the members of the Board of Directors	310	0	10	3	1,903
Age of the Firm	343	1	133	33	29,050
Valid (listwise)	298				

As shown in Table 2, the average number of other positions held by the members of the Board of Directors is 3. Furthermore, the firms analyzed are on average 33 years old.

We explore the research question mentioned earlier using as dependent variables the following accounting ratios: total intangible assets divided by total assets and total R&D costs divided by total sales. These ratios are widely adopted in empirical analyses as a proxy of innovation activities and, in general, of corporate entrepreneurship (Zahra, 1995; Manigart, Baeyens, 2006). In our study, we included several independent variables in order to measure the board diversity. They are reported in Table 3.

Table 3: Variables Description

Variables	Code	Source
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<i>Dependent Variables:</i>		
Total Intangible Assets / Total Assets	IA_TA	AIDA
Total R&D Costs / Total Sales	R&D_Sales	AIDA, Annual Financial Statements, Annual Consolidated Financial Statements
<i>Independent Variables:</i>		
Board Size	Board_Size	Annual Report on Corporate Governance
Number of Insiders in the Board of Directors	N_Insiders_BofDs	Annual Report on Corporate Governance
Percentage of Insiders in the Board of Directors	Percentage_Insiders	Annual Report on Corporate Governance
Number of Outsiders in the Board of Directors	N_Outsiders_BofDs	Annual Report on Corporate Governance
Percentage of Outsiders in the Board of Directors	Percentage_Outsiders_BofDs	Annual Report on Corporate Governance
Number of Women in the Board of Directors	N_Women_BofDs	Annual Report on Corporate Governance
Percentage of Women in the Board of Directors	Percentage_Women_BofDs	Annual Report on Corporate Governance
Number of Minority Shareholders Representatives in the Board of Directors	N_Minority_Shareholders_Repr_BofDs	Annual Report on Corporate Governance
Percentage of Minority Shareholders Representatives in the Board of Directors	Percentage_Minority_Shareholders_Repr_BofDs	Annual Report on Corporate Governance
Number of the Committees	N_Committees	Annual Report on Corporate Governance
Average Number of Other Positions held by the Members of the Board of Directors	Average_N_OP_Members_BofDs	Annual Report on Corporate Governance
Industry (dummy variable)	Industry_code	Borsa Italiana's corporate website
Presence of the Nomination Committee (dummy variable)	Presence_Nomination_Committee	Annual Report on Corporate Governance
Presence of the Remuneration Committee (dummy variable)	Presence_Remuneration_Committee	Annual Report on Corporate Governance

Presence of the Audit Committee (dummy variable)	Presence_Audit_Committee	Annual Report on Corporate Governance
Presence of the Strategy Committee (dummy variable)	Presence_Strategies_Committee	Annual Report on Corporate Governance
Number of the Meetings of the Board of Directors	N_Meetings_BofDs	Annual Report on Corporate Governance
Number of the Meetings of the Nomination Committee	Number_Meetings_Nomination_Committee	Annual Report on Corporate Governance
Number of the Meetings of the Remuneration Committee	Number_Meetings_Remuneration_Committee	Annual Report on Corporate Governance
Number of the Meetings of the Audit Committee	Number_Meetings_Audit_Committee	Annual Report on Corporate Governance
Number of the Meetings of the Strategy committee	Number_Meetings_Strategies_Committee	Annual Report on Corporate Governance
<i>Control Variables:</i>		
Natural Logarithm of the Total Sales	Ln_Sales	AIDA, Annual Financial Statements, Annual Consolidated Financial Statements
Natural Logarithm of the Total Assets	Ln_TA	AIDA, Annual Financial Statements, Annual Consolidated Financial Statements
Natural Logarithm of the Number of Employees	Ln_NE	AIDA, Annual Financial Statements, Annual Consolidated Financial Statements
Age of the Firm	Age_Firm	AIDA, firms' website

We take into account these independent variables, as they allow to investigate specific features of the board diversity, such as: the number of the women, insiders, outsiders, minority shareholders representatives in the Board of Directors or the institution of the Strategy committee (Zahra and Pearce, 1989; Huse, 1995; Baysinger *et al.*, 1991; Zahra, 1996; Zahra *et al.*, 2000; 2009).

In our analysis, there are the following dummy variables: presence of the Nomination Committee, presence of the Remuneration Committee, presence of the Audit Committee, presence of the Strategy committee and industry. The first three variables take the value of 1 if the company has instituted the relative committee and zero otherwise. The latest variable takes the value of 1 if the company operates in the “consumer goods” industry and zero if it operates in the “consumer services” one. Further, we include four control variables. More specifically, we consider the age of the firm since previous empirical studies pointed out the negative association with the innovation

(Acs and Audretsch, 1988). We calculated the age from the inception date of the firm until 2010. The remaining control variables pertain the company size, as SMEs are more innovative than the larger competitors (Scherer, 1980; Kamien, Schwartz, 1982). Company size is measured using the Total Assets, the Total Sales or the Total Number of Employees. To improve on regression analysis, we calculated their natural logarithmic.

#### ***4. Methodology and results***

From the methodology standpoint, we carried out bivariate analyses adopting the Pearson coefficient (well-known as “r”) and the Anova (one way). Firstly, we calculated the correlations between the innovation (the dependent variable) and some independent variables used for deepening the impact of board diversity on innovation. To this end, Pearson coefficient shows a positive association between the innovation and the number of the outsiders, so that hypothesis n. 1a is supported. In other words, we can argue that an increase in the number of the outsiders entails an increase, though slight ( $r = 0,16$ ), of the investments in innovation. Differently from hypothesis n. 3, our results highlight that there is no correlation between the number of the women and the innovation, since the Pearson coefficient is not statistically significant. In line with hypothesis n. 2, the minority shareholders representatives do not influence innovation.

Conversely, the average number of the other positions held by the members of the board exhibits a positive correlation with innovation. Indeed, for every new position the companies investigated are more prone to boost investments in R&D and in intangible assets. Therefore, this finding corroborates hypothesis n. 1b. Hypothesis n. 4, likewise, is supported since we found a positive correlation between the number of the committees and the innovation, measured by the accounting ratio: total intangible assets divided by total assets. Thus, an increase in the number of the committees backs the innovation investments.

Table 4: Board diversity and Innovation

		1. IA_TA	2. RD_Sales	3. Ln_Sales	4. Ln_TA	5. Ln_NE	6. Board Size	7. Number of Outsiders	8. Number of Women in the Board of Directors	9. Number of Minority Shareholders Representatives in the Board of Directors	10. Number of the Committees	11. Average Number of Other Positions held by the Members of the Board of Directors
1. IA_TA	Pearson Correlation	1	,260**	,276**	,259**	,036	,218**	,288**	-,027	-,073	,235**	,144*
	Sig. (2-tailed)		,000	,000	,000	,505	,000	,000	,630	,197	,000	,011
	N	345	335	345	344	345	329	329	329	315	327	310
2. RD_Sales	Pearson Correlation	,260**	1	,071	,143**	,132*	,252**	,160**	-,005	-,008	,094	,168**
	Sig. (2-tailed)	,000		,193	,009	,016	,000	,004	,927	,888	,095	,004
	N	335	335	335	334	335	320	320	320	306	318	301
3. Ln_Sales	Pearson Correlation	,276**	,071	1	,799**	,737**	,608**	,474**	,160**	,064	,424**	,255**
	Sig. (2-tailed)	,000	,193		,000	,000	,000	,000	,004	,257	,000	,000
	N	345	335	345	344	345	329	329	329	315	327	310
4. Ln_TA	Pearson Correlation	,259**	,143**	,799**	1	,886**	,675**	,521**	-,025	,099	,423**	,425**
	Sig. (2-tailed)	,000	,009	,000		,000	,000	,000	,657	,081	,000	,000
	N	344	334	344	344	344	328	328	328	314	326	309
5. Ln_NE	Pearson Correlation	,036	,132*	,737**	,886**	1	,585**	,369**	-,058	,099	,357**	,432**
	Sig. (2-tailed)	,505	,016	,000	,000		,000	,000	,295	,079	,000	,000
	N	345	335	345	344	345	329	329	329	315	327	310
6. Board Size	Pearson Correlation	,218**	,252**	,608**	,675**	,585**	1	,766**	,140*	,250**	,386**	,263**
	Sig. (2-tailed)	,000	,000	,000	,000	,000		,000	,011	,000	,000	,000
	N	329	320	329	328	329	329	329	329	315	327	310
7. Number of Outsiders	Pearson Correlation	,288**	,160**	,474**	,521**	,369**	,766**	1	,115*	,190**	,311**	,112**
	Sig. (2-tailed)	,000	,004	,000	,000	,000	,000		,037	,001	,000	,049
	N	329	320	329	328	329	329	329	329	315	327	310
8. Number of Women in the Board of Directors	Pearson Correlation	-,027	-,005	,160**	-,025	-,058	,140*	,115*	1	-,066	-,019	-,123*
	Sig. (2-tailed)	,630	,927	,004	,657	,295	,011	,037		,240	,737	,030
	N	329	320	329	328	329	329	329	329	315	327	310
9. Number of Minority Shareholders Representatives in the Board of Directors	Pearson Correlation	-,073	-,008	,064	,099	,099	,250**	,190**	-,066	1	-,110	,095
	Sig. (2-tailed)	,197	,888	,257	,081	,079	,000	,001	,240		,051	,099
	N	315	306	315	314	315	315	315	315	315	313	301
10. Number of the Committees	Pearson Correlation	,235**	,094	,424**	,423**	,357**	,386**	,311**	-,019	-,110	1	,280**
	Sig. (2-tailed)	,000	,095	,000	,000	,000	,000	,000	,737	,051		,000
	N	327	318	327	326	327	327	327	327	313	327	309
11. Average Number of Other Positions held by the Members of the Board of Directors	Pearson Correlation	,144*	,168**	,255**	,425**	,432**	,263**	,112*	-,123*	,095	,280**	1
	Sig. (2-tailed)	,011	,004	,000	,000	,000	,000	,049	,030	,099	,000	
	N	310	301	310	309	310	310	310	310	301	309	310

Significance Level: \* p < 0,05; \*\* p < 0,01;

Hypothesis 5 is fully supported, since the Pearson correlations show a statistically significant relationship between the investments in innovation and the frequency of committees meetings. In particular, Table 5 highlights a positive association between the accounting ratio, total intangible assets divided by total assets, and the number of the meetings of the followings committees: Audit and Strategy.

The number of the meetings of Remuneration committee is positively correlated even with both accounting ratios selected in our analysis, that are total intangible assets divided by total assets and total R&D costs divided by total sales. Unlike these findings, the number of the meetings of Nomination committee exhibits a negative association with the accounting ratio: total R&D costs divided by the total sales. Hence, an increase of this independent variable implies a slight reduction of investments in innovation.

Furthermore, it should be noted that the number of the meetings held by the board of directors does not influence either the innovation or the committees' efficiency. Lastly, all the committees investigated point out a relationship with the company growth, as the Pearson coefficient is always positive, relatively to the control variables that are the total sales, the total assets and the total number of employees.

Table 5: Board's Efficiency and Innovation

		1. IA_TA	2. RD_Sales	3. Ln_Sales	4. Ln_TA	5. Ln_NE	6. Number of the Meetings of the Board of Directors	7. Number of the Meetings of the Nomination Committee	8. Number of the Meetings of the Remuneration Committee	9. Number of the Meetings of the Audit Committee	10. Number of the Meetings of the Strategy Committee
1. IA_TA	Pearson Correlation	1	,260**	,276**	,259**	,036	,034	,017	,195**	,115*	,226**
	Sig. (2-tailed)		,000	,000	,000	,505	,552	,757	,001	,042	,000
	N	345	335	345	344	345	313	317	307	311	318
2. RD_Sales	Pearson Correlation	,260**	1	,071	,143**	,132*	-.037	-.120*	,252**	,111	,036
	Sig. (2-tailed)	,000		,193	,009	,016	,521	,036	,000	,055	,524
	N	335	335	335	334	335	304	308	298	302	309
3. Ln_Sales	Pearson Correlation	,276**	,071	1	,799**	,737**	,055	,141*	,339**	,459**	,207**
	Sig. (2-tailed)	,000	,193		,000	,000	,333	,012	,000	,000	,000
	N	345	335	345	344	345	313	317	307	311	318
4. Ln_TA	Pearson Correlation	,259**	,143**	,799**	1	,886**	-.070	,212**	,413**	,501**	,283**
	Sig. (2-tailed)	,000	,009	,000		,000	,218	,000	,000	,000	,000
	N	344	334	344	344	344	312	316	306	310	317
5. Ln_NE	Pearson Correlation	,036	,132*	,737**	,886**	1	-.109	,128*	,414**	,507**	,131*
	Sig. (2-tailed)	,505	,016	,000	,000		,053	,023	,000	,000	,020
	N	345	335	345	344	345	313	317	307	311	318
6. Number of the Meetings of the Board of Directors	Pearson Correlation	,034	-.037	,055	-.070	-.109	1	,064	-.015	,079	-.011
	Sig. (2-tailed)	,552	,521	,333	,218	,053		,263	,797	,164	,853
	N	313	304	313	312	313	313	309	302	309	310
7. Number of the Meetings of the Nomination Committee	Pearson Correlation	,017	-.120*	,141*	,212**	,128*	,064	1	,085	,247**	,059
	Sig. (2-tailed)	,757	,036	,012	,000	,023	,263		,138	,000	,295
	N	317	308	317	316	317	309	317	304	307	317
8. Number of the Meetings of the Remuneration Committee	Pearson Correlation	,195**	,252**	,339**	,413**	,414**	-.015	,085	1	,352**	,197**
	Sig. (2-tailed)	,001	,000	,000	,000	,000	,797	,138		,000	,001
	N	307	298	307	306	307	302	304	307	303	304
9. Number of the Meetings of the Audit Committee	Pearson Correlation	,115*	,111	,459**	,501**	,507**	,079	,247**	,352**	1	,219**
	Sig. (2-tailed)	,042	,055	,000	,000	,000	,164	,000	,000		,000
	N	311	302	311	310	311	309	307	303	311	308
10. Number of the Meetings of the Strategy Committee	Pearson Correlation	,226**	,036	,207**	,283**	,131*	-.011	,059	,197**	,219**	1
	Sig. (2-tailed)	,000	,524	,000	,000	,020	,853	,295	,001	,000	
	N	318	309	318	317	318	310	317	304	308	318

Significance Level: \* p < 0,05; \*\* p < 0,01;

Continuing in the bivariate statistics scope, we also used the Anova (one way) for digging deeper and possibly for finding other relationships between the board diversity and the investments in innovation. We chose this statistic as, taking into account the size of the sample investigated, the dependent variable is normally distributed, so that one of the assumptions requested for using the Anova can be considered satisfied.

Therefore, as known, in the Anova calculation each independent variable is divided in at least three sub-groups. Thanks to the descriptive statistics, we identified at least three ranges for each independent variable tested by the Anova. After having ascertained a statistically significant difference between the average values attained by the dependent variable on the basis of the sub-groups of the independent variable above mentioned, we adopted the “Post Hoc” method in order to pick out those sub-groups to which the foregoing difference is amenable. In this analysis the dependent variable is the amount of investment in innovation that is measured by .

Table 6 shows that the independent variables, like the percentage of outsiders, of women, the number of committees as well as the annual number of meetings of the Strategy committees, achieve positive results.

More specifically, in line with hypothesis 1a, innovation is influenced by the percentage of outsiders in the board of directors. This moreover confirms the result ensuing from Pearson correlation. Furthermore, thanks to the adoption of the Post Hoc method, we pinpointed that the following sub-groups: 26% - 50% and 76% - 100% are significantly different between them, in terms of average values of investments in innovation. Thus, a percentage of outsiders within 50% or over 76% implies that the company is more prone to innovation. This finding is indeed interesting if we consider some distinctive features of the ownership structure in the Italian economic environment (La Porta and Lopez, 1999; Barca and Becht, 2001).

The independent variable, named percentage of women, exhibits a statistically significant difference due to the following sub-groups: 0 – 20% and 20 – 40%. So this analysis suggests that, in line with hypothesis 3, in the board up to a percentage of 40%, the women affect the innovation in the sample companies investigated.

As reported in Table 6, the percentage of the minority shareholders representatives shows a negative result. Hence, hypothesis 2 is supported. Moreover, in line with the relative Pearson correlation, this independent variable has no impact on fostering investments innovation.

Unlike the previous independent variables, average number of other positions held by the members of the board of directors attains a different result compared with one related to the Pearson correlation. Thus, we cannot confirm what mentioned earlier. More specifically, for this independent variable, a not significant value derives from Anova analysis, so that hypothesis 1b is

not supported. This finding highlights that there is no causal link between innovation and average number of other positions held by the members of the board of directors.

With reference to hypothesis 4, the sub-groups of the independent variable, named “number of the committees”, that point out a positive result, are: 0 – 1 and 2 – 3. Thus, the institution of more than three committees does not facilitate innovation. By examining, in a cross manner, the results ensuing from the adoption of Pearson coefficient and those deriving from the Anova (one way), it is possible to deduce a further confirmation about the role of this variable in influencing innovation, provided that the committees are less than three.

A positive result amenable to the number of the meetings of the strategy committee is what we would have expected. But, at first glance, the value of the Levene test is not statistically significant. Nevertheless, we employed the Brown-Forsythe statistic, in order to test the equality between the averages of the subgroups compared. Since this statistic amounts to 0,000, the independent variable analyzed can be considered statistically significant. Furthermore, the Post Hoc method pointed out that the following sub-groups: “0 – 3” and “over 6” differ substantially from the other ones, in terms of average investments in innovation. In other words, innovation implies a constant commitment mainly every four-month period or even monthly. Hence, hypothesis 5 is partly supported relatively to the number of meetings of strategy committee. Differently from the result above mentioned, there are no statistically significant differences, if we consider the annual number of the meetings of the board, of the nomination committee, of the remuneration committee and of the audit committee. In these cases, hypothesis 5 is partly not supported.

Table 6: Anova (one way) Board diversity and Innovation

Variables	Levene Test Sig.	F	Sig.	Brown-Forsythe Statistic
Percentage of Outsiders in the Board of Directors	,499	4,879	,002***	,002***
Percentage of Women in the Board of Directors	,172	3,655	,027**	,029**
Percentage of Minority Shareholders Representatives in the				

Board of Directors	,136	2,542	,08	,04*
Average Number of Other Positions held by the Members of the Board of Directors	,011	,116	,891	,872
Number of the Committees	,147	7,426	,001***	,004***
Number of the Meetings of the Board of Directors	,280	,598	,551	,696
Number of the Meetings of the Nomination Committee	,085	,446	,641	,558
Number of the Meetings of the Remuneration Committee	,307	,1,188	,306	,681
Number of the Meetings of the Audit Committee	,886	1,329	,266	---
Number of the Meetings of the Strategy Committee	,000	8,535	,000	,000***

Significance Level: \*\* p < 0,05; \*\*\* p < 0,01;

We also tested the foregoing hypotheses in the perspective of multivariate analysis. More specifically, we run OLS multivariate regression analysis into which the dependent variable is the innovation, measured by the accounting ratio: total intangible assets divided by total assets, while the independent ones pertain some features of the board diversity, such as the number of women, of insiders, of outsiders, of minority shareholders representatives, the presence of committees, the number of their meetings as well as the average number of other positions held by the members of board of directors. In our analysis, there are also three control variables related to the size (i.e. natural logarithms of total sales and total of number of employees) and the age of the sample companies.

As our dataset covers the period from 2006 until 2010, we tackled the problems concerning the violation of some linear regression assumptions, in particular the heteroskedasticity and the residuals autocorrelation. To this end, we calculated the robust standard errors by using the Newey-West (HAC) method (Wooldridge, 2009). Even if in Table 7 the Durbin-Watson statistic is poor, the Newey-West method calculates robust standard errors that safeguard the reliability of the linear regression analysis. Our findings indicate that, in terms of board diversity, only the number of

outsiders and the number of meetings held by the strategy committee affect the investments in innovation. Therefore, hypotheses 1a and 5, limited to the number of the meetings held by the strategy committee, are supported. R-Square highlights that the model, tested in this analysis, is reasonable fit for illustrating the variability of the investments in innovation of the sample companies.

As expected, furthermore, for the number of outsiders and the meetings of strategy committee, the coefficient is positive. Furthermore, only for to these independent variables, the multivariate analysis results validate the previous ones, ensuing from the adoption of the Pearson correlations and the Anova (one way).

On the contrary, neither the presence of the committees (i.e. nomination, remuneration, audit and strategy) nor the average numbers of other positions held by the members of the board of directors influence the dependent variable. Hence, hypotheses 4 and 1b are not supported. In the same way, the number of minority shareholders representatives and the number of women do not point out statistically significant coefficients. So, hypotheses 2 and 3 are not confirmed.

Table 7: OLS Regression Board Diversity and Innovation

Dependent Variable: IA\_TA

Included observations: 288 after adjustments

Newey-West HAC Standard Errors & Covariance (lag truncation=5)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
N_Women_BofDs	-0.018981	0.026945	-0.704436	0.4818
N_Outside rs_BofDs	0.015702*	0.009239	1.699669	0.0903
N_Minority_Shareholders_Repr_BofDs	0.009369	0.026920	0.348037	0.7281
Presence_Nomination_Committee (dummy variable)	0.054045	0.077587	0.696573	0.4867
Presence_Remuneration_Committee (dummy variable)	-0.089852	0.084309	-1.065755	0.2875
Presence_Audit_Committee (dummy variable)	-0.057224	0.096523	-0.592858	0.5538
Presence_Strategies_Committee (dummy variable)	0.062006	0.102287	0.606196	0.5449
N_Meetings_BofDs	-0.006602	0.007230	-0.913152	0.3620
Number_Meetings_Nomination_Committee	-0.020482	0.038532	-0.531562	0.5955
Number_Meetings_Remuneration_Committee	0.026263	0.021282	1.234048	0.2183
Number_Meetings_Audit_Committee	-0.086111	0.069491	-1.239165	0.2164
Number_Meetings_Strategy_Committee	0.067625*	0.039557	1.709565	0.0885
Average_N_OP_Members_BofDs	-0.002674	0.081669	-0.032742	0.9739
Ln_NE	-0.040725**	0.016651	-2.445854	0.0151
Ln_Sales	0.087061***	0.016674	5.221467	0.0000
Age_Firm	-0.004596***	0.000826	-5.566278	0.0000
C	-0.747487	0.295249	-2.531717	0.0119
R-squared	0.420158	Mean dependent var		0.452238
Adjusted R-squared	0.385923	S.D. dependent var		0.289173
S.E. of regression	0.226605	Akaike info criterion		-0.074004
Sum squared resid	13.91579	Schwarz criterion		0.142212
Log likelihood	27.65657	Hannan-Quinn criter.		0.012643

F-statistic	12.27303	Durbin-Watson stat	0.530656
Prob(F-statistic)	0.000000		

Significance Level: \*  $p < 0,10$ ; \*\*  $p < 0,05$ ; \*\*\*  $p < 0,01$ ;

Unless for the strategy committee, the number of meetings related to other committees attains a negative result in terms of statistical significance, so that hypothesis 5 is partly not validate. Lastly, it should be noted that, according to previous empirical evidence (Acs and Audretsch, 1988; Megginson *et al.* 1991, Lerner 1999), the control variables show a high statistical significance.

### ***5. Discussion and conclusion***

Our study intends to investigate the relationship between board attributes, in terms of composition and structure, and the propensity for investments in innovation. In other words, we hope for fostering the stream into which, in a resource-based perspective, the board is a provider of resources and know-how for improving firm performance and creating new wealth (Pfeffer, 1972; Zald, 1969; Gabrielsson and Winlund, 2000; Filatotchev and Wright, 2005; Zahra *et al.*, 2009). To this end, we deepen the consumer goods industry and the consumer services one that, in general, can be considered mature from the innovation standpoint. Another distinctive element concerns the focus on the companies listed in the Italian stock exchange, named Borsa Italiana. In the corporate governance perspective, Italian environment is interesting since the ownership structure is usually highly concentrated (La Porta and Lopez F., 1999; Barca and Becht, 2001).

In particular, we tried to examine whether some features of the board affect the investments in innovation. These features have been pinpointed on the basis of the gaps explained in the previous empirical evidence. With reference to the board, we selected the presence of outsiders, of minority shareholders representatives, of women, of committees as well as the frequency of meetings. Then, we built the dataset that cover the period from 2006 to 2010 and overall contains 345 observations. After having identified the foregoing hypotheses, we employed the bivariate (i.e. Pearson coefficients and Anova one way) and multivariate statistics (i.e. OLS regression analysis).

By examining, in a cross manner, the results ensuing from the adoption of the Pearson coefficients and the Anova (one way) with the ones deriving from the multivariate analysis, we can argue that only the number of outsiders and the number of meetings of strategy committee always influence the investments in innovation. Consistent with other studies (Demb and Neubauer 1992; Huse 1995; Hillman and Dalziel, 2003; Lynall *et al.*, 2003; Tuggle *et al.*, 2010), our findings confirm that, also for the Italian listed companies operating in the industries mentioned earlier, the outsiders as well as the frequency of committees meetings assume a relevant role in supporting the

investments in innovation. With specific regards to the number of meetings of strategy committee, the results attained reflect what we would have expected, in terms of sign and statistical significance. Therefore, our findings can inspire further research focused, for instance, on other economic contexts for carrying out a spatial comparison with Italian one. In this stream, in our opinion, another scope to investigate concerns the choice of different proxies for measuring the propensity for innovation of a firm (i.e. the number of new products, of patents etc.).

These empirical evidences are also interesting for entrepreneurs, since we document that the mere institution of a strategy committee is not enough for stimulating innovation in a company. Firstly, this can be considered an important decision for improving the corporate image. But, afterwards, the strategy committee must operate in order to strengthen the generation process of new strategic and operational ideas. To this end, we suggest that innovation implies a constant commitment for the members of the strategy committee mainly every four-month period or even monthly.

Lastly, our results indicate that the board diversity, under specific conditions (i.e. presence of outsiders and number of meetings of strategy committee), affects positively the propensity for the investments in innovation of the Italian listed companies operating in the consumer goods and consumer services industries.

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**APPENDIX A**

	<i>LISTED COMPANIES</i>	<i>INDUSTRY</i>
1	AEFFE	CONSUMER GOODS
2	ENERVIT	CONSUMER GOODS
3	ANTICHI PELLETTIERI	CONSUMER GOODS
4	ARENA	CONSUMER GOODS
5	B&C SPEAKERS	CONSUMER GOODS
6	BASIC NET	CONSUMER GOODS
7	BENETTON GROUP	CONSUMER GOODS
8	BIALETTI INDUSTRIE	CONSUMER GOODS
9	BONIFICHE FERRARESI	CONSUMER GOODS
10	BREMBO	CONSUMER GOODS
11	CALEFFI	CONSUMER GOODS
12	COBRA AUTOMOTIVE	CONSUMER GOODS
13	CRESPI	CONSUMER GOODS
14	CSP INTERNATIONAL	CONSUMER GOODS
15	CAMPARI SPA	CONSUMER GOODS
16	DE LONGHI	CONSUMER GOODS
17	DIGITAL BROS S.P.A.	CONSUMER GOODS
18	ELICA	CONSUMER GOODS
19	EMAK	CONSUMER GOODS
20	FIAT	CONSUMER GOODS
21	GEOX	CONSUMER GOODS
22	IMMSI	CONSUMER GOODS
23	INDESIT COMPANY	CONSUMER GOODS
24	LA DORIA	CONSUMER GOODS
25	LANDI RENZO	CONSUMER GOODS
26	LUXOTTICA	CONSUMER GOODS
27	MARCOLIN	CONSUMER GOODS
28	PARMALAT	CONSUMER GOODS
29	PIAGGIO & C.	CONSUMER GOODS
30	PININFARINA	CONSUMER GOODS
31	PIQUADRO	CONSUMER GOODS
32	PIRELLI & C.	CONSUMER GOODS
33	POLTRONA FRAU	CONSUMER GOODS
34	RATTI	CONSUMER GOODS
35	RICHARD-GINORI	CONSUMER GOODS
36	ROSSS	CONSUMER GOODS
37	SAFILO GROUP	CONSUMER GOODS
38	SALVATORE FERRAGAMO ITALIA SPA	CONSUMER GOODS
39	SOGEFI	CONSUMER GOODS
40	STEFANEL	CONSUMER GOODS

41	TOD'S SPA	CONSUMER GOODS
42	ZUCCHI	CONSUMER SERVICES
43	A.S. ROMA SPA	CONSUMER SERVICES
44	ARNOLDO MONDADORI	CONSUMER SERVICES
45	AUTOGRILL	CONSUMER SERVICES
46	CAIRO COMMUNICATION	CONSUMER SERVICES
47	CALTAGIRONE	CONSUMER SERVICES
48	CASA DAMIANI S.P.A.	CONSUMER SERVICES
49	CHL	CONSUMER SERVICES
50	CLASS EDITORI	CONSUMER SERVICES
51	DMAIL GROUP	CONSUMER SERVICES
52	FNM	CONSUMER SERVICES
53	GRUPPO EDITORIALE L ESPRESSO	CONSUMER SERVICES
54	I GRANDI VIAGGI	CONSUMER SERVICES
55	IL SOLE 24 ORE	CONSUMER SERVICES
56	JUVENTUS F.C.	CONSUMER SERVICES
57	S.S. LAZIO - S.P.A.	CONSUMER SERVICES
58	LOTTOMATICA	CONSUMER SERVICES
59	MARR	CONSUMER SERVICES
60	MEDIACONTECH	CONSUMER SERVICES
61	MEDIASET	CONSUMER SERVICES
62	MERIDIANA FLY	CONSUMER SERVICES
63	MONDO TV	CONSUMER SERVICES
64	MONRIF SPA	CONSUMER SERVICES
65	RCS MEDIAGROUP	CONSUMER SERVICES
66	SEAT PAGINE GIALLE	CONSUMER SERVICES
67	SNAI	CONSUMER SERVICES
68	TELECOM ITALIA MEDIA	CONSUMER SERVICES
69	YOOX	CONSUMER SERVICES