Testing the Upper Echelons Theory in the European context

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Author's Biography

Flávio Miguel Gens Ramos was born on 24th of April 1988 in Portugal. Prior to enrolling in the Master in Finance at the Faculty of Economics of University of Porto, Portugal, starting in September 2013, he obtained a Bachelor's Degree in Economics from Nova Business School, in Lisbon, Portugal.

After his Bachelor's, he worked as an Audit FSI Senior Consultant for Deloitte & Associados, SROC, SA, during four years.

During the Master in Finance, the author joined EQUUS Consulting, an IT Swiss based company, as a Financial Services Senior Consultant, which is his current place of work.

The author takes this opportunity to thank his girlfriend, his family and University and workplace colleagues for all the support and patience during these long nine months.

As well as his University's Professors who supported the endeavor of producing the thesis while aboard. Highlighting the importance of the contribution of Professor Paulo Jorge Marques de Oliveira Pereira, the Director of the Master in Finance, who allowed for this exception, and of Professor Júlio Fernando Seara Sequeira Mota Lobão, the Thesis Supervisor, who was always available to provide assistance despite the geographical limitations.

Abstract

The current research applies the premises of the Upper Echelons Theory, presented by Hambrick and Mason (1984), and shows that the Top Management Team (TMT) of European firms has a significant impact on firms' decisions and performance.

The undertaken study considered some of the original Propositions presented by Hambrick and Mason (1984), and added additional variables to address the main criticisms and limitations presented by previous researches.

In the explanation of firms' decisions and performance an innovative approach was taken by applying the models in a cross-national basis, meaning taking into consideration companies from a large number of European countries simultaneously and without a country control variable.

In order to do so, a large database comprising data regarding TMT characteristics, firms' financial indicators and corporate decisions, was used and applied in a large study period starting in 2004 and ending in 2013.

Sample databases were taken from the aforementioned large database in order to study the chosen relationships between different corporate decisions and firm indicators with the different TMT demographic and background characteristics.

The largest data sample included information regarding 634 companies from 10 different countries, and 2417 top managers with 31 different nationalities.

Applying this methodology it was possible to achieve meaningful results, some of which contradict the Upper Echelons Theory's propositions such as the positive relationship between age and leverage and the negative impact of TMT heterogeneity in companies' performance, and others that support the Theory such as the long-term negative relationship between age and growth in return.

Doing so this study is one of the first to implement successfully the analysis of the Upper Echelons Theory in the European context, on a cross-national level, and considering one of the largest data samples, allowing also to overcome the limitations presented by studies dependent on questionnaires.

Key-words: Upper Echelons, Manager, TMT heterogeneity, conflict, strategic leadership, corporate decisions, firm performance.

JEL-Codes: G02, G32, G34, M10, Z10

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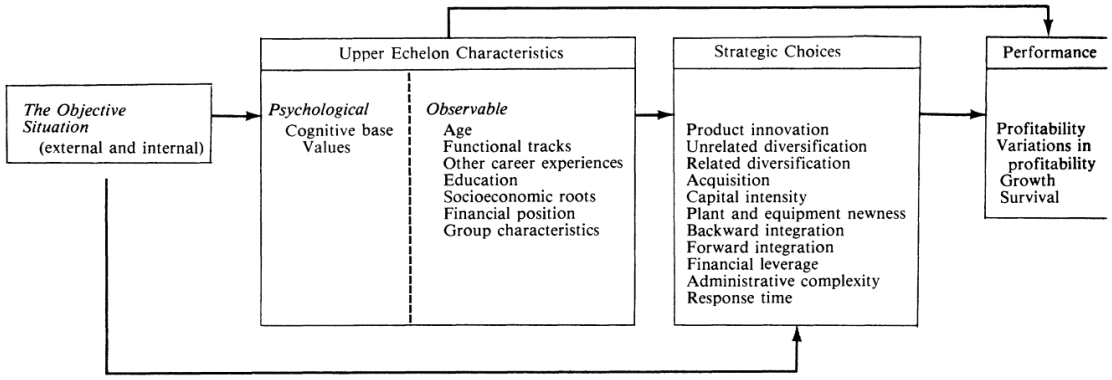
1. Introduction

Corporate decisions and performance are a reflection of the personal characteristics of companies' Upper Echelons, i.e. the TMT, and not only a natural consequence of the environment surrounding the firm.

This assertion is defended by Hambrick and Mason's (1984) Upper Echelons Theory, which takes a step further in the knowledge of corporate decision making, by assuming that the environment is not enough to explain the actions and outcomes of corporations:

Figure 1 - Upper Echelons perspective of organizations



Source: Hambrick and Mason (1984)

The Upper Echelons Theory is in accordance with the Behavioral Finance spectrum, since top managers are not automated machines, possessing limited knowledge and cognitive capacities, which allow for a biased corporate decision making process.

The Theory has been analyzed extensively since 1984, using different scopes and methods, yielding a variety of results, and suffering from important limitations.

A first great limitation of previous studies is the recurring use of questionnaires with low or incomplete response rates, due to the lack of a wide database with information about managers' and corporations' characteristics. Secondly, multiple authors limited their studies to very specific market circumstances or managers' characteristics.

Finally, the use of demographic characteristics as a proxy for psychological characteristics has also been criticized by Priem *et al.* (1999), since there is no real proxy for the "black box" of decision making.

In order to overcome the aforementioned survey limitations this study is based on the use of very large databases, obtained from Amadeus and Zephyr, with a complete set of information regarding TMT characteristics and corporate decisions and performance.

Additionally, this research considers multiple environment related control variables allowing to understand the circumstances in which the decision occurs, consequently making the demographic characteristic a better proxy for human expected behavior.

The current research also adds new features to the study of the Upper Echelons Theory by considering a cross-national European environment, still neglected by literature.

Contrary to previous studies, this research selected three different demographic characteristics, namely age, functional background and TMT heterogeneity, addressing multiple impacts of managers on corporate decisions and outcomes of European firms.

The results of the current study indicate that only some TMT demographic characteristics, namely age and heterogeneity, impact specific corporate decisions and performance.

Some corporate decisions, namely the degree of diversification corporate acquisitions, were proven to be negatively correlated with cultural individualism, a cultural variable which Hofstede (2001) has shown to be significantly different across countries.

Overall, age presented results that were contrary to the Upper Echelons Theory, since it was found that it has a positive impact in leverage and in the volatility of the profit margin, and a negative correlation with the long-term sales of the firm.

These results indicate that older managers take more risks than younger managers, which can be a result of the specific European firms' financing structures. As Goldman and Sachs (2015) show European firms depend greatly on loans, which favor more experienced managers in detriment of young entrepreneurs.

The impact of TMT heterogeneity partially contradicted the expectations of Hambrick and Mason (1984), being negatively correlated with firm performance, measured by profit margin and ROA, for both the stable and the turbulent economic periods.

The results support the hypothesis of Goldstein *et al*. (1985) who defend that in uncertain environments it may be preferable to concentrate the decision process on fewer people.

The current research is structured as follows: it initiates in Chapter 2 with a literature review, followed by the presentation of the study implementation circumstances in Chapter 3. The models constructed, their variables and results are debated in Chapter 4 and 5. Finally the conclusions and limitations are discussed is presented in Chapter 6.

2. Literature Review

The Upper Echelons Theory has been vastly researched on, leading to multiple conclusions which increased the knowledge on the impact of the TMT on corporations. Simultaneously, several contradictory results were obtained thus leading to a great number of unsolved questions.

In this Chapter a literature review on Hambrick and Mason's (1984) Upper Echelons Theory, and on the three demographic characteristics studied, namely age, functional track and TMT heterogeneity, is made. This Chapter is concluded with the analysis of the methodological aspects of similar studies.

2.1 The Upper Echelons Theory and following studies on the TMT impact

The Upper Echelons Theory presented by Hambrick and Mason (1984) provides a new direction on the research on corporate decision making, by proposing that managers' personal characteristics are reflected in the decisions taken by the firms.

The aforementioned Theory proposed the use of several demographic characteristics, namely age, socioeconomic background, functional track, formal education, financial position, group heterogeneity and other career experiences, as a proxy for the psychological drivers of decision making.

The expected impact of TMT characteristics on decisions and outcomes of firms is deeply connected with the Behavioral Finance research, since psychological biases prevent individuals from acting in full rationality.

As Kahneman (2011) and Zhu and Chen (2015) defend psychological biases, such as overconfidence, and the consequent use of heuristics to decide, lead to choices different from rational expectations.

Consequently, decisions do not depend strictly on the environment and it is possible that different managers decide differently in similar situations, as shown by Norburn (1986) and Norburn and Birley (1986).

Although the Upper Echelons Theory provides a new framework of research it was a result of previous studies regarding the impact of managers on firms, such as the research of Hambrick and Snow (1977) who provide a framework called dominant coalition, defending that managers only see a subset of the environment, since their vision is clouded by past and current performance which induces mandatory strategies.

The impact of managers on corporate outcomes was firstly studied by Lieberson and O'Connor (1972) and by Weiner and Mahoney (1981) who found that leadership and stewardship, respectively, have a significant on corporate performance and stock returns. Following the presentation of the Theory, several authors debated the different impacts of managers in corporations. Hambrick (1989), for instance, introduced the concept of strategic leadership, in which both internal and external factors affect corporate decisions. In an attempt to prove the importance of managers, Bennedsen *et al.* (2007) show, using the case of 6.753 Danish firms, that when managers or one of their relatives die, the performance of the company is impacted negatively up to two years after the event.

As Tixier (1984) and Graham *et al.* (2013) show not only the managers are important but also their characteristics. The first author found that companies from different countries in Europe look for different profiles.

The second author discovered that the degree of risk aversion depends both on the role of the manager, either CEO or CFO, and on its location, namely Europe or United States.

As Child (1972) defends managers affect both the decision and the way it is presented to stakeholders. Adams *et al.* (2005) support Child (1972) premises by showing, in their study of CEO's of 336 of Fortune 500 companies, that CEO's and executive managers can indeed affect the corporate decisions.

Following these results, Hambrick (2007) enriched the Upper Echelons Theory by proposing the inclusion of power and discretion as moderators of managerial influence. In order to measure power, Carpenter *et al.* (2004) defended that TMT compensation can indicate the level of discretion of the management.

Later studies found that the discretion power of managers can be constrained by the institutional logic of the firm, as defended by Clark *et al.* (2014), and by the management structure which sometimes includes supervisory boards, as defended by Nielsen (2010).

Based on all the knowledge gathered on the impact of managers in corporate decisions and performance a wide spectrum of authors from several different fields of science, used the Upper Echelons Theory as base for their research.

In one of the most referenced books on the importance of Upper Echelons, "The art and science of leadership", Nahavandi (2008) presented the six forces affecting strategic leadership: structure, strategy, technology, environment, culture and leadership.

Eisenhardt and Schoonhoven (1990), in their study of the United States semi-conductor industry, shown that the specific characteristics of firms combined with market characteristics will drive growth, since different firms have different available resources, for instance the ability to hire highly skilled and experienced managers.

Nielsen and Nielsen (2012) used a sample of 146 Swiss based firms and shown that nationality diversity in the TMT is a driver of performance, especially if the tenure of the TMT increases, implying that affective conflicts are solved over time.

D'Aventi (1990), shown that the elite status of managers is also an important determinant on how firms acts, since the prestige of managers generates trust of creditors and other stakeholders on the firm. Kadushin (1995), also shown that the largest French companies chose managers who belong to specific elites, such as schools and country clubs.

Hayden (2012) in his PhD discussion, studying Dutch managers, added a new feature to the study of the Upper Echelons Theory by proposing that in fact the all managers, independently from their background, focus on innovation, either exploitative, i.e. efficiency improvement, or exploratory, i.e. new product development.

On the ethical background, Manner (2010) shown, using KLD ratings of 650 United States corporations as a proxy for corporate social responsibility practices, that the academic background impacts the ethical behavior of managers.

Zee and Swagerman (2009), following the scandals regarding IT firms in USA, shown that the introduction of Sabarnes-Oxley act impacted slightly the constitution of the TMT.

Human capital research shown that managers may impact performance by choosing the right people, as argued by Winne and Sells (2006).

Aurora Teixeira (2002) on the other hand, found that the degree of qualification of the human capital does not impact directly performance, but allows for a better the adaptation to the constant technological changes.

Lee *et al.* (2014) took the study of managers' characteristics to the adoption of new technologies by Australian companies and show that TMT beliefs regarding IT innovation will impact positively and strongly the adoption of new technologies.

Concluding, the studies that followed the TMT have proven without a doubt that corporate decisions do not depend solely on the environment. Managers' characteristics, such as age, functional background or diversity, shape the actions and performance of firms.

2.2 Age

Age is the first TMT characteristic presented in the Upper Echelons Theory. This demographic variable is associated with vigor, availability to take risk, careless decisions, and learning.

Therefore, firms managed by younger individuals are expected to risk more, taking on more leverage, obtaining higher returns, and a greater variability of performance.

The assumption that younger individuals risk more, and take more careless decisions, is supported by the studies of several authors. Taylor (1975) proved that older managers take more time to decide to be able to gather more information, to select the useful inputs in the diagnosis of the situation, allowing for a better assessment.

The time taken to decide is also associated with rigidity in the decision making process. As show Chown (1960) has proven, older people tend to be more rigid when deciding, being this rigidity associated with a delay in the reaction to new circumstances was shown by Carlsson and Karlsson (1970).

The greater risk taken by younger individuals does not impact only the care in decision making. Child (1974) found that that younger age is associated with innovation, growth in sales and increasing net earnings, and that older age is connected to the preference for stable earnings.

Additionally, Stevens *et al.* (1978) have found that age is positively associated with commitment. Which may also contribute for the volatility presented by firms with younger managers, who are less reluctant to leave the company when it stops fitting their career objectives, generating instability inside the firm.

As the studies of Norburn (1986) and Norburn and Birley (1986) show, younger managers tend to be found managing growth firms, which by nature are firms with a greater risk, and a greater growth since they are in the beginning of their life.

Finally, Marinova *et al.* (2010) in their research, on the impact of gender of executive manage on the performance of Danish and Dutch firms, found that age has a negative impact on corporate performance.

2.3 Functional track

Hambrick and Mason (1984) present functional track, or the previous working experience of TMT members, as another very important demographic and/or background characteristic.

According to the Upper Echelons Theory a manager experienced in sales will focus much more on the output, trying to increase the financial performance of the firm by entering new markets, selling innovative products, or even investing in early growth markets.

On the other hand, a manager with a deeper contact to manufacturing processes will try to increase internal performance, focusing more on processes and the efficiency of the procedures already in place, also trying to cut costs and to cut input to output time.

As a result of these two different approaches to management, Hambrick and Mason (1984) classified the functional track of managers as output or throughput.

Some studies have supported the assumptions of the Upper Echelons Theory, such as the one from Deaborn and Simon (1958), who have shown that managers present selective attention and therefore are better prepared to deal with situations that they are used to handle, for instance the tasks of their own department.

As Deaborn and Simon (1958) show a manager deeply related to manufacturing will tend to analyze the problem as a manufacturing process, and consider the several tasks that could be changed to increase performance.

According to Miles *et al.* (1978) managers tend to present three types of strategic believes which are dependent on to their past experience. The first, is the belief in traditional strategy, i.e. focusing on performance and on improving the internal processes.

The, second belief is in the human resources strategy, i.e. focusing on growth, on new markets, and on innovation. Finally, there is the analyzer strategy which is a belief that it is possible to mix the previous two.

Finally, as Hayed and Abernathy (1980) argue the preferred strategies for firms will depend on the previous types of roles of the TMT. Their study has shown that managers who come from financial and law related roles will focus more on defensive strategies, trying to increase efficiency and cutting costs, avoiding innovation and taking risks.

2.4 TMT heterogeneity

Since the introduction of the Theory in 1984, the demographic vector that captured the greater attention was TMT heterogeneity, i.e. the demographic and background diversity inside the TMT is expected to impact firm performance.

The attention given to this vector is a natural reaction to the changing world environment, in which globalization has been breaking cultural differences and dogmas.

Companies, on the other hand, do not change so rapidly, for instance as Baker (2014) defends it is still difficult for women to rise inside companies, and as Allemand *et al.*(2014) shows without mixed mechanisms, of quotas and talent pooling it is difficult for women to reach top positions.

Despite the great expectations that TMT heterogeneity may change the paradigm of companies increasing their performance, the results of previous researches on heterogeneity, made in both inside and outside Europe, have been quite divergent.

Outside the European context, some studies advocate that greater diversity increases performance [Marimuthu and Kolandaisamy (2009) Erhardt *et al.* (2003); Boeker (1997); Lee and Farh (2004); Robertson and Park (2006)].

Others defend that homogeneity improves performance [Miller *et al.* (1998); West and Schwenk (1996)] and there are even others that found no support for the impact of heterogeneity on performance [Wiersema and Bantel (1992); Bergen *et al.* (2005)].

As the meta-analysis of Certo *et al.* (2006) shows, most studies performed outside Europe present a positive relationship between heterogeneity and Return on Assets (ROA).

In the European context, results are also inconclusive. Rodriguez and Pawlak (2014) found that, for 147 large Spanish, education level diversity impacts performance negatively, but industry and international diversity have a positive impact.

On the other hand, Marinova *et al.* (2010) found no impact of gender diversity, in the executive and supervisory boards, on the performance of 186 listed Danish and Dutch companies, measured by an adjusted Tobin-Q.

Tibben (2010) also found no impact of diversity on the performance, measured by the Tobin-Q, of 126 listed firms from Belgium, The Netherlands, Germany and France. The author simultaneously found a U-shaped relationship between diversity and performance.

On the other hand, Honing (2012), studying 277 firms from Germany, The Netherlands and the U.K, and Germet (2011), studying 87 firms from The Netherlands, found a positive impact of nationality diversity in stock returns and in Tobin-Q respectively.

Different explanations for the inconclusive results of studies of the impact of TMT diversity in corporate performance have been presented.

Priem *et al.* (1999) defends that specific personal characteristics, such as charisma and power, should be included in the study of TMT heterogeneity.

Other authors defended that decisions of heterogeneous groups are subject to several layers of conflict. Amason (1996) started to present the concepts of functional and dysfunctional, i.e. affective, conflict.

Carson *et al.* (2004) later introduced the task conflict. And finally, Evans and Carson (2005) added the moderating impact of social capital in the decision making process.

Li (2014) and Vries *et al.* tested the way conflict impacts teams interactions and found that the greater integration and identification the lower the levels of affective conflict.

Based on Li's (2014) results it is important to understand the situations in which different decisions are taken. As several studies show the environment shapes the decision making process.

Keck *et al.* (2014) defend that groups tend to combine more information when deciding, reflecting an opinion to which all members can compromise, converging to risk neutrality.

However, as Dovidio *et al.* (2009) defend there are different hierarchies in group decisions, since large groups can be divided into two types of sub-groups, the advantaged group and the disadvantaged group, who seek for different types of outcomes.

Besides the different hierarchies which may block opinions, individuals may feel inhibited from sharing their opinion in group decisions since, as Xiao *et al.* (2009) defends, people suffer from regret biases.

The hierarchical and human biases effects may be amplified by the stress/ambiguity brought by the environment.

According to Hermann (1963) groups react to changes in the environment, either by innovating or by taking destructive decisions. However, when stress increases the dependence on leadership and the risk of making wrong decisions also increases.

As Diskell and Salas (1991) state, in large groups the leader will tend to ignore the opinions of employees, centralizing the decision on the top of the company.

Goldstein *et al.* (1985) and Lejarraga *et al.* (2014) reached a similar conclusion. When faced with changing environments groups show rigidity, by choosing to consider the same amount of information with little routine adaptation, failing to adapt to the environment.
According to Straw *et al.* (1981), the impact of rigidity is twofold and depends on the threat itself. If the threat implies a change in the environment, the more rigid companies' are expected to fail to adapt at the necessary speed, generating greater negative impact.
On the other hand, if the threat does not change the environment, the group is expected to use the same decision mechanisms, considering the same necessary inputs, implying that no destructive action is taken.
Concluding, groups are expected to bring up the best inputs from individuals and provide the best solution for the organization.
However, conflict may arise within groups, especially when the stress in the environment increases and when rigidity is great, as proposed by McNeil and Thomson (1971). Therefore the turbulence on the environment, as a driver of stress, and the power of the TMT will be essential to understand the impact of TMT heterogeneity.

2.5 Analysis of the methodological aspects of similar studies

As discussed, in the previous Sections, several studies have analyzed the Upper Echelons Theory, by analyzing the specific situations in which the characteristics of the TMT influence the decisions and outcomes of the companies.
These studies considered different methodologies, such as the use of surveys or databases, and were performed in different industries and countries.
Nevertheless, as we can observe in Table 1, most studies either focused on companies from the United States (USA), or only considered one specific country.
As we can observe in Table 1, in the nineteen most relevant studies, only nine were performed outside the USA, from which two considered Asia, and seven Europe.
From the universe of studies done in Europe, five focused on central and northern Europe, namely United Kingdom, Switzerland, The Netherlands, Germany, Belgium, Denmark and France. The other two studies included a southern European county, namely Spain.
Only four out of the nineteen studies considered more than one country. However they included a country control variable. Therefore, no true cross-border study, in which multiple firms are considered independently from their location, was ever attempted.

Concluding, on the data and statistical grounds a great number of researches used a survey methodology with a low rate of response, being in the majority lower than 20%. From the remaining which recurred to databases, most used a cross-sectional or panel data analysis, and only 2 studies recurred to the use of an ANOVA analysis.

The details presented above are summarized in Table 1 presented below:

Table 1 - Methodological aspects of similar studies

Authors	Management type	Characteristic	Country studied	Data colection*	Database	Sample size	Period	Statistics
Norburn (1986)	TMT	Family Education Career	U.K.	Survey (19.67%)	Unavailable information	354 managers	1971-1981	Regression
Norburn and Birley (1986)	TMT	Experience Tenure Education	USA	Data gathering	Dun and Bradstreet Handbook of Corporate leaders (1984)	150 firms (953 managers)	1980-1984	Regression and ANOVA
Eisenhardt and Schoonhoven (1990)	CEO	Background	USA	Survey (90%)	Dataques and Integrated Circuit Engeneering research firms	92 firms	1978-1985	Regression
Wiersema and Bantel (1992)	TMT	Heterogeneity	Fortune 500	Data gathering	TRINET	87 firms	1981-1983	Regression
West and Schwenk (1996)	TMT	Heterogeneity and Conflict	USA	Survey (18.67%)	Unavailable information	112 firms	Not stated	Regression
Boeker (1997)	CEO and TMT	Tenure	USA	Data gathering	Dataquest (1984) to define the set of firms	67 companies	1978-1992	Regression
Miller *et al.* (1998)	TMT	Heterogeneity	USA	Survey of 3 sets of firms (12%, 100%, 20%)	Unavailable information	38 firms 198 Hospitals 80 managers	Not stated	Regression
Erhardt *et al.* (2003)	Supervisory Board	Heterogeneity	USA	Fortune 2000 survey	Fortune 50 Minority firms	112 firms	1993-1998	Regression
Lee and Farh (2004)	Organizational behavior students	Heterogeneity	H.K. (China)	Field study	Group projects	45 group projects (260 students)	Not stated	ANOVA
Bergen *et al.* (2005)	Workforce	Heterogeneity	USA	Data gathering	Fortune 50 Minority firms	76 firms	1998-2002	Regression
Robertson and Park (2006)	25 top paid positions	Heterogeneity	USA	Fortune 1000 survey	Fortune 50 Minority firms Center for Responsibility in Business	100 firms	1998-2003	Regression
Marimuthu and Kolandaisamy (2009)	TMT and Supervisory Board	Heterogeneity	Malaysia	Data gathering	Not stated	100 non-financial firms	2000-2006	Regression
Marinova *et al.* (2010)	TMT and Supervisory Board	Heterogeneity	Denmark and The Nederlands	Data gathering	Amadeus and Datastream	186 firms	2007	Two staged least squares regression
Nielsen (2010)	TMT and Supra TMT	Heterogeneity	Unavailable information	Review of journals	Ebscohost	60 articles	1984-2005	Unavailable information
Tibben (2010)	TMT and Supervisory Board	Heterogeneity	Belgium, France, Germany, The Netherlands, Spain	Data gathering	Amadeus and Datastream	126 firms	2007-2009	Regression
Germet (2011)	TMT	Heterogeneity	The Netherlands	Data gathering	Amadeus and The Netherlands board Index 2008	87 firms	2007	Regression
Honing (2012)	TMT	Heterogeneity	Germany The Netherlands U.K.	Data gathering	Amadeus and Datastream	277 firms	2009-2010	Normality analysis
Nielsen and Nielsen (2012)	TMT	Heterogeneity	Switzerland	Data gathering Annual Reports	Worldscope and Datastream	146 firms	2001-2008	Regression
Fernandez et al. (2014)	TMT	Heterogeneity	Spain	Data gathering Annual Reports Corporate websites	SABI, CNMV	147 firms	2004-2007	Hierarchical Linear Regression Model

** response rate shown in brackets*

3. Study implementation

As stated previously, the aim of this research is to understand the drivers of corporate decision and performance in European companies, based on the understanding of the main characteristics of their Upper Echelons.

In 1984, Hambrick and Mason presented several Propositions to guide the research on TMT influence in corporations. Therefore, to obtain a greater knowledge about European firms it is essential to determine which Propositions to study.

After determining the research questions, i.e. Propositions, it is possible to determine the necessary information and, recurring to similar studies, the model to be implemented.

In this Chapter all the aforementioned subjects are discussed, starting by a presentation of the Propositions chosen, followed by a presentation of the databases used, a discussion of the base model to be implemented, and the demonstration of the data processing tasks, which led to the final databases to be used.

3.1 Propositions of the Upper Echelons Theory chosen for the study

The Propositions of the Hambrick and Mason (1984) Upper Echelons Theory are intended to steer the study of the impact of the TMT in the decisions and performance of companies.

Therefore, by testing these Propositions in their original form it will be possible to obtain a greater knowledge regarding the impact of managers in European companies.

The Propositions to be tested were chosen based in two different criteria. On one hand, the information regarding the TMT specific characteristic should be easily accessible and easily interpreted by investors, allowing them to use the results of the current research without great effort.

On the other hand, the study itself is dependent on the currently existing information, thus the quality and quantity of data present in the databases Amadeus and Zephyr implies that not all the Propositions can be tested. A preliminary data analysis was undertaken in order to understand the available information in the aforementioned databases.

The result of the aforementioned analysis of relevance and data quality culminated in the selection of the following Propositions:

P1 Age: Firms with younger managers will be more inclined to pursue risky strategies than will firms with older managers. Specific forms of risk include unrelated diversification, product innovation, and financial leverage;

P2 Age: Firms with younger managers will experience greater growth and variability in profitability from industry averages than will firms with older managers;

P3 Functional track: There will be a positive relationship between the degree of output-function experience of top managers and the extent to which the firm emphasizes outputs in its strategy. Indicators of an output emphasis include product innovation, related diversification, advertising, and forward integration;

P20 Group heterogeneity: In stable environments, team homogeneity will be positively associated with profitability;

P 21 Group heterogeneity: In turbulent, especially discontinuous environments, team heterogeneity will be positively associated with profitability.

The study of these Propositions will allow the study to focus simultaneously on the impact of several demographic and background characteristics in diverse financial corporate decisions and corporate performance.

The analysis of these different dimensions of decision making will allow to obtain a global overview regarding European firms' TMT's impact on decisions and performance. Additionally, since each Proposition is tested separately, considering only a combination of one individual demographic or background characteristic, and one decision or performance indicator, it is possible to maintain the focus in specific decisions, allowing to understand the framework/ environment in which each relationship occurs.

3.2 Data collection and databases used

The research on the several Propositions presented in the previous section carries also large data requirements. Therefore, it is important to use databases which contain detailed information about European firms' financial corporate decisions, financial performance, and demographic indicators of the TMT.

Amadeus database compiles almost all of the information necessary containing, at date of the study, data about more than nineteen million and nine hundred thousand European enterprises, including public, private, profit and non-profit organizations.

From those companies, one hundred thousand are profit organizations with information regarding the TMT and financial indicators for ten year study period, starting in the 1st of January 2004 and ending in the 31st of December of 2013.

The only information unavailable in Amadeus were the details regarding the M&A deals performed by these companies in the ten year period under study. Consequently it was also necessary to merge the information in Amadeus with the information in Zephyr.

Since the study of each Proposition focuses on different demographic characteristics and financial indicators, different samples were taken from the one hundred thousand firms.

3.3 Base model

Several authors criticized prior researches, on the Upper Echelons Theory, which were based on cross-sectional data, given that to establish causality it is important to understand how the demographic variables interact with the financial variable over time, which is possible using panel data.

The information present in Amadeus allows for the study of the different relationships for multiple and consecutive one year periods, for thousands of companies, from a broad set of industries and European countries, being the perfect base for this research.

The study of each Proposition will imply the use of several individual models, nevertheless each model will have a similar structure as presented below:

$$D(c)_{i,t} = \alpha + \beta_{1i,t} Manager\ characteristic + \beta^{j}_{2,i,t} Control\ Variable + \in_{i,t}$$

Where, D (c) stands for Decision taken by the corporation;

Manager characteristic stands for the demographic, background or group characteristic under study in the Proposition;

Control Variable stands for the set of control variables that intend to overcome the already found exogenous effects.

The set of control variables chosen intends to obtain a clearer view over the impact of Upper Echelons characteristics in corporate decision and performance.

These control variables are TMT tenure, company size, industry, TMT size, previous year performance, economic environment turbulence, age of the company, maturity stage of industry, international experience, TMT compensation, gender diversity, presence of

executive managers in supervisory roles, and the degree of individualism of the country in which each firm is located.

3.4 Data processing and data retrieved

The application of the model to different Propositions implies that in some cases information regarding the TMT and the financial indicators of the firms is sufficient, and that in other cases it is necessary to obtain also information regarding the M&A deals performed by those firms.

Therefore, two different databases were taken from Amadeus. The first considering only the TMT and financial information, and the other restricting the number of firms to the ones that have performed M&A deals in the study period.

In order to extract the data from Amadeus several restrictions were applied, the study period was defined as the ten year period starting in the beginning of 2004 and ending in December 2013, corresponding to the maximum number of years with data available.

The rationale beneath the choice of the large study period is directly linked to the research topic, the relationships defined by the Propositions should always be true, even though they may be affected by the environment. The large study period allows to understand if in fact the relationships occur and are maintained in the European context.

Consequently, the first restriction on the database implied that all the firms selected had to have information about their financial indicators and TMT demographic characteristics for all the years studied.

An additional restriction was made on the types of firms chosen. The firms in the study had to be public or private, thus excluding government institutions and non-profit organizations, which suffer more from restrictions from institutional logic rules, as debated by Clarck *et al.* (2014).

As a result of the aforementioned restrictions it was possible to extract from Amadeus the first set of data with 110.579 firms, from 29 different countries.

The second dataset extracted, for the study of the impact of TMT characteristics in the diversification of M&A deals, had an additional restriction, namely the existence of at least one corporate acquisition in the study period.

The aforementioned selection process held a total of 3.012 firms, from 34 different countries. This database was then complemented with information from Zephyr.

After the extraction of data it was observed that in several cases there were blank fields or fields with the description “N.A.”, meaning non available.

Consequently, an exclusion process was performed considering that in order to conduct the study it was necessary to have complete information about the necessary financial indicators and control variables of each firm for all the study period.

Additionally, the information regarding the TMT of each firm needed to be complete enough to allow for meaningful results. In this case the criteria was different, since having data for all the top managers of the firm is an excessive restriction.

Therefore, it was considered that having demographic information for two thirds of the top managers is enough to understand the characteristics of the TMT, since most decisions in a firm can be performed with a qualified majority.

Additionally, for the specific case of firms with small TMT’s, i.e. firms with less than the average number of members, a 60% minimum information principle was applied.

The average number of members in the database is four individuals, since usually firms have odd TMT sizes this number was rounded up to five managers. The previous criteria implies that the database has to have complete information for at least three managers.

The principles presented above do not guarantee full information for all variables, nevertheless it is still one of the most restrictive criteria applied in the research on the Upper Echelons Theory, since some studies were only performed to subsets of the TMT, and others even ignored the total number of top managers.

The data treatment process was complete with the exclusion of control variables for which information was not complete or consistent. The first variable to be excluded was TMT compensation, which was missing for almost all managers. This exclusion is not critical since another proxy of power was also considered.

The second variable excluded was the date of inception, since impossible numbers were present in the database, since there were companies with inception date after 2004 that had financial information for the entire study period, which ranged from 2004 to 2013.

Finally, the variable international experience had to be excluded, since the biographies present on Amadeus did not contain enough information to allow to understand the degree of international experience of managers.

3.5 Final databases

Resulting from the aforementioned demanding data process five different sample databases were constructed.

The first two databases intended to study Proposition 1, so the relationship between age and the level of risk undertaken by the corporation. The first sample database considered as dependent variable the degree of solvency ratio[1], as proxy for leverage, and the second sample database considered as dependent variable the ratio of unrelated acquisitions.

In the following table we can observe the main descriptive statistics regarding the first sample database variables:

Table 2 - Database 1 main variables

Statistics	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Average age	47.51	48.37	49.12	50.04	50.87	51.56	52.31	53.12	53.94	54.66
Age standard deviation	9.55	9.55	9.38	9.27	9.20	9.09	8.98	8.96	8.85	8.80
Average solvency ratio	36.50%	35.66%	36.38%	36.66%	35.64%	35.63%	34.69%	34.18%	32.65%	27.32%
Solvency ratio standard deviation	35.86%	35.68%	35.09%	34.80%	34.69%	34.28%	34.54%	36.47%	40.56%	48.57%
Correlation between age and solvency ratio	0.09	0.09	0.08	0.06	0.10	0.12	0.09	0.09	0.10	0.06
Average percentage of female managers	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.22
Percentage of female managers standard deviation	33.00%	32.64%	31.89%	31.65%	31.15%	30.86%	30.56%	30.08%	29.71%	28.42%
Average percentage of executive managers with supervisory roles	53.71%	53.52%	53.77%	53.91%	54.35%	54.72%	54.92%	55.49%	56.31%	58.21%
Percentage of executive managers with supervisory roles standard deviation	48.37%	48.30%	48.21%	48.05%	47.94%	47.73%	47.51%	47.13%	46.71%	45.80%
Average TMT Tenure	5.42	6.13	6.62	7.25	7.62	8.09	8.46	8.81	9.08	8.81
TMT Tenure standard deviation	4.28	4.34	4.53	4.74	4.98	5.13	5.43	5.77	6.14	6.67
Number of companies	634	634	634	634	634	634	634	634	634	634
Number of managers	1'101	1'145	1'215	1'273	1'387	1'456	1'555	1'651	1'772	2'012

As we can infer, despite their positive correlation the average age and the solvency ratio variables have a different evolution across time, since the average age records a slight increase and the solvency ratio present a moderate decrease.

All the remaining variables present an increase, especially the number of TMT members which increases constantly and significantly across the study period.

[1] The solvency ratio, already present in Amadeus followed the formula:
Solvency Ratio = (Net Income + Depreciation) / (Short-term + Long-term Liabilities)

As stated previously the aim of this study is to understand the impact of TMT characteristics on European firms' corporate decisions and performance, being important to understand the distribution of nationalities and headquarters distribution of the sample:

Table 3 - Nationalities of managers in database 1

Nationality	Number of managers
United Kingdom	900
Italy	741
Finland	156
United States of America	23
France	16
Sweden	15
Bulgaria	13
Spain	13
Germany	12
Australia	10
Netherlands	10
Canada	7
Switzerland	7
Ireland	5
Denmark	4
Norway	4
Portugal	4
Romania	4
South Africa	4
Japan	3
Poland	3
Algeria	2
Colombia	2
Greece	2
India	2
Malaysia	2
New Zealand	2
Singapore	2
Estonia	1
Pakistan	1
United Arab Emirates	1
Not classified	41
Total	**2'012**

Table 4 - Locations of companies in database 1

Location	Number of Companies
United Kingdom	297
Italy	231
Finland	53
Spain	17
Sweden	15
France	8
Bulgary	5
The Netherlands	4
Romania	3
Ireland	1
Total	**634**

According to the information presented, the large majority of companies' locations and managers' nationalities are from the United Kingdom, Italy and Finland.

Nonetheless, companies from ten different countries are studied, being one of the largest number of countries ever considered in the research on the Upper Echelons Theory.

The following table presents the main descriptive statistics regarding the second database:

Table 5 - Database 2 main variables

Statistics	Period 2004 - 2013
Average age	50.09
Age standard deviation	5.63
Average unrelated aquisition rate	15.01%
Unrelated aquisition rate standard deviation	34.05%
Correlation between age and diversified aquisition rate	-7.08%
Average percentage of female managers	13.16%
Percentage of female managers standard deviation	23.37%
Average percentage of executive managers with supervisory roles	79.22%
Percentage of executive managers with supervisory roles standard deviation	38.34%
Average TMT Tenure	5.80
TMT Tenure standard deviation	3.54
Number of companies	134
Number of managers	569

The second database includes the list of corporate acquisition deals performed by 134 companies during the period starting in 2004 and ending in 2013. It is possible to observe that the average age is similar to the values presented by database 1, and that there is a tendency for concentration M&A deals, which represent 85% of M&A deals.

This second database is smaller than the previous one since it only considers the companies which undertook an acquisition deal in the study period. Despite the lower number of companies the list of nationalities and locations is still relevant.

Nonetheless, we can observe that there is a great concentration in the United Kingdom:

Table 6 - Nationalities of managers in database 2

Nationality	Number of managers
United Kingdom	312
Italy	100
Finland	36
Ireland	28
Netherlands	10
United States of America	7
Malaysia	5
Romania	5
Norway	4
Belgium	3
Denmark	3
Germany	3
South Africa	3
Spain	3
Sweden	3
Canada	2
Austria	1
France	1
Saudi Arabia	1
Switzerland	1
Not classified	38
Total	**569**

Table 7 - Locations of companies in database 2

Location	Number of Companies
United Kingdom	99
Finland	10
Ireland	6
The Netherlands	6
Italy	5
Spain	3
Sweden	2
Denmark	1
France	1
Romania	1
Total	**134**

The third database addresses the study of Proposition 2, which related the variability and growth in return with the age of the TMT members.

This Proposition relates to two different features of return, namely changes in returns and the growth in return. Therefore, the database had to contain enough information to address specifically each one of these features. The main variables descriptive statistics in database 3 can be presented as follows:

Table 8 - Database 3 main variables

Statistics	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Average age	46.13	47.09	47.91	48.85	49.75	50.44	51.32	52.15	52.97	53.86
Age standard deviation	9.30	9.27	9.30	9.26	9.21	9.14	9.09	9.06	8.91	8.67
Average profit margin	2.72%	2.97%	3.26%	3.75%	2.50%	1.01%	1.47%	-0.54%	-8.24%	-13.08%
Profit margin standard deviation	11.51%	9.38%	9.65%	11.24%	10.92%	14.39%	12.59%	15.69%	23.60%	30.31%
Correlation between age and profit margin	2.74%	8.87%	7.10%	3.08%	0.28%	-0.69%	2.54%	7.16%	-2.61%	-0.45%
Average ROA	4.25%	3.98%	4.68%	5.13%	2.66%	1.06%	1.15%	-1.93%	-11.28%	-15.79%
ROA standard deviation	11.21%	9.59%	10.95%	13.02%	12.52%	15.51%	10.29%	20.91%	29.33%	34.74%
Correlation between age and ROA	-4.25%	-2.50%	-9.38%	-11.52%	-6.30%	-12.59%	-11.60%	-2.15%	0.63%	0.24%
Average sales growth	not applicable	not applicable	23.95%	14.58%	7.70%	-1.42%	8.82%	7.06%	300.48%	150.31%
Sales growth standard deviation	not applicable	not applicable	91.97%	35.21%	39.43%	71.93%	46.21%	52.37%	5790.52%	3181.41%
Correlation between age and sales growth	not applicable	not applicable	-14.33%	-5.44%	-7.79%	-5.35%	0.76%	-3.82%	7.43%	8.64%
Average percentage of female managers	16.54%	16.66%	16.64%	17.45%	17.51%	17.81%	18.00%	17.83%	18.05%	17.68%
Percentage of female managers standard deviation	31.09%	30.90%	30.35%	30.56%	30.51%	30.52%	30.54%	29.66%	29.28%	27.19%
Average percentage of executive managers with supervisory roles	14.23%	14.33%	14.77%	15.22%	15.67%	16.38%	17.15%	18.20%	19.97%	23.68%
Percentage of executive managers with supervisory roles standard deviation	30.16%	29.94%	30.04%	29.95%	30.27%	30.82%	30.99%	31.14%	32.05%	33.82%
Average TMT Tenure	5.67	6.49	7.25	7.95	8.70	9.37	9.98	10.54	10.92	10.69
TMT Tenure standard deviation	4.57	4.56	4.65	4.75	4.90	5.05	5.26	5.64	6.10	6.76
Number of companies	356	356	356	356	356	356	356	356	356	356
Number of managers	593	610	628	653	709	746	796	845	917	1'083

Similarly to database 1 the average age is increasing over the study period from 2004 to 2013. Additionally, profit margin and ROA, proxy of performance, are much more volatile than the solvency ratio, showing a decreasing trend over the period of research. All the remaining variables show an increasing trend, especially the number of managers which almost duplicates during the period of study.

This sample database also presents a great number of nationalities and locations, being Italy the largest location and nationality:

Table 9 - Nationalities of managers in database 3

Nationality	Number of managers
Italy	786
Finland	198
Bulgaria	13
Sweden	13
United Kingdom	9
France	6
Spain	5
Denmark	4
Norway	4
Romania	4
Algeria	2
Germany	2
Netherlands	2
Estonia	1
Ireland	1
Japan	1
Poland	1
Switzerland	1
United States of America	1
Not classified	29
Total	**1'083**

Table 10 - Locations of companies in database 3

Location	Number of Companies
Italy	246
Finland	69
Sweden	13
Spain	10
France	7
Bulgary	5
The Netherlands	3
Romania	3
Total	**356**

The forth database is intended to address Propositions 3 and 4, which relate the degree of output focus, measured by the degree of M&A deals' diversification, with the functional background of the TMT members.

In order to perform this analysis, the sample had to contain companies that undertook corporate acquisitions, and that had information about the biography of managers and their previous roles.

Given the restrictions imposed by the aforementioned variables only a small number of companies, located mostly in the United Kingdom, was considered. Additionally the study period had to be shortened in order to obtain the necessary information:

Table 11 - Database 4 main variables

Statistics	Period 2006 - 2013
Average output functional background ratio	71.93%
Output functional background ratio standard deviation	24.27%
Average unrelated aquisition rate	30.03%
Unrelated aquisition rate standard deviation	45.02%
Correlation output functional background and unrelated aquisition rate	28.21%
Average percentage of female managers	6.29%
Percentage of female managers standard deviation	11.55%
Average percentage of executive managers with supervisory roles	48.94%
Percentage of executive managers with supervisory roles standard deviation	41.69%
Average TMT Tenure	4.10
TMT Tenure standard deviation	3.66
Number of companies	24
Number of managers	115

As a consequence of the reduced number of cases the descriptive statistics of database 4 are not similar to the ones presented in database 2, being the ratio of unrelated acquisitions the double of the previous database, namely 30%.

Also as a consequence of the smaller number of cases the different number of locations and nationalities is the smallest among all the five databases:

Table 12 - Nationalities of managers in database 4

Nationality	Number of managers
United Kingdom	58
United States of America	15
Russian Federation	10
Sweden	8
Canada	5
France	5
Australia	2
Germany	2
Netherlands	2
Belgium	1
Ireland	1
Spain	1
Not classified	5
Total	**115**

Table 13 - Locations of companies in database 4

Location	Number of Companies
United Kingdom	19
France	1
Deutchland	1
The Netherlands	1
Russia	1
Sweden	1
Total	**24**

Finally, the fifth database intended to study Propositions 21 and 22, namely the relationship between TMT's heterogeneity and financial performance.

Since the proxy of performance were the profit margin and ROA, the companies considered for this sample database were the same as in database 3. Consequently, the only significant difference is the dependent variable heterogeneity:

Table 14 - Database 5 main variables

Statistics	2005	2006	2007	2008	2009	2010
Average Blau heterogeneity index	23.14%	24.11%	25.97%	26.86%	28.08%	29.15%
Blau heterogeneity index standard deviation	26.05%	26.28%	26.63%	26.81%	26.85%	26.85%
Average profit margin	2.97%	3.26%	3.75%	2.50%	1.01%	1.47%
Profit margin standard deviation	9.38%	9.65%	11.24%	10.92%	14.39%	12.59%
Correlation between Blau heterogeneity index and profit margin	1.69%	-0.84%	-9.92%	-7.63%	-8.15%	-2.41%
Average ROA	3.98%	4.68%	5.13%	2.66%	1.06%	1.15%
ROA standard deviation	9.59%	10.95%	13.02%	12.52%	15.51%	10.29%
Correlation between Blau heterogeneity and ROA	1.39%	-2.48%	-9.14%	-9.02%	-6.17%	-3.85%
Average percentage of executive managers with supervisory roles	14.33%	14.77%	15.22%	15.67%	16.38%	17.15%
Percentage of executive managers with supervisory roles standard deviation	29.94%	30.04%	29.95%	30.27%	30.82%	30.99%
Average TMT Tenure	6.49	7.25	7.95	8.70	9.37	9.98
TMT Tenure standard deviation	4.56	4.65	4.75	4.90	5.05	5.26
Number of companies	356	356	356	356	356	356
Number of managers	610	628	653	709	746	796

As we can observe the degree of TMT heterogeneity, proxy by the Blau index of heterogeneity, is increasing along the study period starting in 2005 and ending in 2010. Nevertheless, the correlation between the explanatory and the explained variables shows a great volatility, changing between negative and positive figures.

This volatility can be associated with the different types of environments, namely stable and turbulent environments.

During the years composing the study period it was possible to identify one environment changing event, the sub-prime crisis which is estimated to have burst in late 2007.

In order to compare the impact of TMT heterogeneity on performance, two sub-sets of equal length were determined, namely the period from 2005 to 2007 and the period from 2008 to 2010.

Although the study period is smaller than in database 2 the number of nationalities is still relevant:

Table 15 - Nationalities of managers in database 5

Nationality	Number of managers
Italy	551
Finland	164
Bulgaria	13
Sweden	12
United Kingdom	7
France	4
Norway	4
Romania	4
Spain	4
Denmark	3
Algeria	2
Germany	2
Estonia	1
Ireland	1
Japan	1
Netherlands	1
Poland	1
Switzerland	1
United States of America	1
Not classified	19
Total	**796**

4. Chosen variables and models constructed

The test of each Proposition required the use of specific sample databases and models, in order to analyze more clearly the relationship between the demographic characteristics of TMT members and the financial decisions and corporate performance of their firms.

4.1 Chosen variables

- **Dependent variables**

Each model focused on the relationship between different TMT characteristics variables, i.e. the explanatory variables, and different corporate decision and financial indicators, i.e. the dependent variables.

Therefore, the determination of the corporate decision and financial indicators' variables depended on the research questions selected.

In the study of Proposition 1, an analysis between age and risk taking decisions is made with the selection of two indicators of corporate risk taking, financial leverage and the degree of diversification of corporate acquisitions.

The financial leverage indicator selected was the "solvency ratio", which indicates the ability of each firm to generate enough cash to fulfil the payment of its debt. Therefore, the lower the ratio, the higher the leverage.

The degree of diversification of corporate acquisitions was measured by the ratio of "unrelated diversification" computed as the percentage of unrelated businesses' acquisitions by each one of the 134 companies in the period ranging from 2004 until 2013. Diversification is associated with risk reduction therefore the higher the rate of unrelated businesses acquired the lower the risk taking behavior from managers.

The study of Proposition 2 focused on the relationship between age, the variability of performance and the growth in return. The performance and return indicators chosen were profit margin, ROA and sales growth.

The performance variables selected, profit margin and ROA, followed previous studies such as Lieberson and O'Connor (1972), who defended that managers have a greater degree of discretion over accounting measures, and Certo *et al.* (2006) who concluded that most studies found a positive relationships between TMT diversity and ROA.

Proposition 2 defends that age is expected to impact the variability of performance, therefore the variables used were the standard deviation of the profit margin and of ROA.

Since age is also expected to be directly linked with growth, the growth variable, sales growth, was computed as the yearly percentage increase in sales.

Propositions 3 and 4 defend that there is a relationship between the functional background and the focus of the decisions made by managers, either connected with external growth and innovation, or focused on internal performance.

In order to study these propositions, the dependent variable chosen was the degree of diversification, proxy by the degree of unrelated corporate acquisitions performed by 24 firms over the 2006 to 2013 period. The diversification level indicates the focus on unknown businesses and the will to expand current operations.

Finally, the study of Propositions 21 and 22 comprised the analysis of the relationship between TMT heterogeneity and corporate performance. Therefore, performance indicators were once again used, namely the profit margin and ROA of each firm for the period ranging from the beginning of 2005 until the end of 2013.

Differently from Proposition 2, it is expected that TMT heterogeneity impact performance directly, therefore the yearly values of profit margin and ROA were used.

- **Explanatory variables**

The current research focuses on the impact of three main TMT characteristics, age, functional background and TMT heterogeneity.

The explanatory variable Age was obtained as the average age of the TMT members, in which the TMT comprised both executive managers and supervisory board.

The functional background variable was proxy by the "Output ratio", which measures the percentage of TMT members whose previous job functions are related to the output role, explained by Hambrick and Mason (1984).

The TMT heterogeneity was measured by the Blau's Index for heterogeneity computed using the number of different cultural identities in the TMT in each year.

Each cultural identity was built as a combination of three different TMT characteristics, nationality, gender and age. Therefore, in each company the different combinations of the three factors composed a sub-group inside the TMT.

Based on the aforementioned sub-group construction it was possible to compute the Blau's Index of heterogeneity, following West and Schwenk's (1996) research:

$$Heterogeneity\ Index = 1 - \sum P_i^2$$

in which P represents the number of different cultural identity groups in each TMT, i.

- **Control variables**

Control variables are key in the current analysis since they allow to determine the environment in which corporate decisions are taken, and performance indicators are observed, allowing to understand more easily the impact of each TMT characteristic.

The control variables considered in the study were firm size, TMT size, industry, gender diversity, independence of the supervisory board, TMT tenure, prior performance, and degree of individualism of the country where firms are located.

Firm size was measured by the assets size, computed as the natural logarithm of the total assets of each firm. The size of the company signals different environmental constraints, for instance the capacity to grow or the capacity to take debt.

TMT size was determined as the natural logarithm of the number of TMT members in each company. It allows to moderate the different types of conflict, since the larger TMT size allows to reduce agency conflicts and hazardous decisions by the predominant group.

The industry control variable was composed by six industry dummy variables representing six different industries, considering that the firms without an industry classification in the database were included in the intersect, "α". Similarly to the firm size, the industry variable allows to understand the environmental constraints of each firm.

Gender diversity was proxy by the female ratio, computed as the proportion of women managers in the TMT of each company. Although, women representativeness is low, it is expected that women's different perspective has a moderating impact in decisions.

The degree of independence of the supervisory board was obtained using the "dependency ratio", computed as the percentage of supervisory roles performed by executive managers. The variable allows to understand how much decision making power executive managers has.

TMT tenure stands for the number of years the managers belonging to the TMT have been working together as part of the TMT in that specific company.

Contrary Zee and Swagerman (2009), who measured tenure as the length of time each manager had been working in that company, the method chosen, in the current research,

considers that TMT tenure can only act as a moderating factor if managers have been working together in the current role building trust and procedures.

The measures of prior performance depended on the specific model in which they were applied, thus three control variables were built, previous year sales growth, previous year profit margin and previous year ROA. As referred by Honing (2012), the current year performance may be a result of previous years' performance.

Finally, Hofstede (2001) has shown that some specific culture indicators, such as the country's individualism, are significantly different across countries. Given its expected significant impact, the firms' countries degree of individualism was considered.

The importance of these variable is supported by the results from Ferris *et al.* (2013) who found a significant relationship between the overconfidence of individuals from a country, which can be influenced by individualism, with the number of M&A deals.

Concluding, most of the control variables chosen have been used previously by other researchers. In the following table a comparison between the proxy of the current research and the ones chosen by other authors is made:

Table 16 - Set of control variables used

Control variable	Proxy used	Other studies	Proxy used
Firm size	Ln of Total Assets	Tibben P. (2010)	Ln of Total Sales
TMT size	Ln of number of TMT members	Tibben P. (2010)	Number of TMT members
Industry	Dummy variable	Tibben P. (2010)	Dummy variable
Gender diversity	Percentage of women in the TMT	Allemand, I. et al. (2014)	Percentage of women in the TMT
Independence of supervisory board	Percentage of supervisory roles taken by executive managers	Allemand, I. et al. (2014)	Percentage of supervisory managers in the TMT
TMT Tenure	Number of years the same set of managers has been appointed	Zee and Swagerman (2009)	Number of years the TMT members have worked for the company
Prior performance	Value observed by the performance variable in the prior year	Honing (2012)	Average value observed by the performance variable in the prior 5 years

4.2 Models constructed

Conducting the study of different relationships between TMT characteristics and firm decisions and performance indicators implies the determination of different databases and models to address each specific Proposition presented by Hambrick and Mason (1984).

The first model addresses Proposition 1, which considered as dependent variable the solvency ratio of each firm for each year, and as explanatory variable the average age of the TMT members:

$$\text{Solvency ratio}_{i,t} = \alpha + \beta_{1i,t} Age + \beta_{2,i,t} Assets\ size + \beta_{3,i,t} Female\ ratio + \beta_{4,i,t} BoD\ ratio + \beta_{5,i,t} TMT\ tenure + \beta_{6,i} TMT\ size + \beta_{7,i}^{13} Industry + \in_{i,t} \quad (1)$$

The second model also focused on Proposition 1, by studying the impact of age on the percentage of unrelated corporate acquisitions made by the firm each year. Differently, from the first model the data available did not allow for the use of a panel data model, since there were not enough firms with acquisitions occurring each single year:

$$\text{Unrelated diversification}_i = \alpha + \beta_{1i} Age + \beta_{2,i} Assets\ size + \beta_{3,i} Female\ ratio + \beta_{4,i} Individualism + \beta_{5,i} BoD\ ratio + \beta_{6,i} TMT\ tenure + \beta_{7,i} TMT\ size + \beta_{8,i}^{14} Industry + \in_i \quad (2)$$

The third model is the first one to study Proposition 2, considering as dependent variable the variability in performance, measured by two different variables, the profit margin and ROA, and as explanatory variable the average age of the TMT members.

$$\text{Profit Margin Volatility}_i = \alpha + \beta_{1i} Age + \beta_{2,i} Assets\ size + \beta_{3,i} Female\ ratio + \beta_{4,i} BoD\ ratio + \beta_{5,i} TMT\ tenure + \beta_{6,i} TMT\ size + \beta_{7,i}^{13} Industry + \in_i \quad (3a)$$

$$\text{ROA Volatility}_i = \alpha + \beta_{1i} Age + \beta_{2,i} Assets\ size + \beta_{3,i} Female\ ratio + \beta_{4,i} BoD\ ratio + \beta_{5,i} TMT\ tenure + \beta_{6,i} TMT\ size + \beta_{7,i}^{13} Industry + \in_i \quad (3b)$$

Since the variability of performance was measured as the standard deviation of the profit margin and of the ROA of each firm, a cross-sectional analysis was also performed, using the average figures of the explanatory and control variables for the study period, ranging from 2004 to 2013.

Proposition 2 also comprised the study of relationship between the firm growth in return, measured by sales growth, and the average age of the TMT members.

This specific relationship was studied using both a cross-sectional and a panel data analysis, allowing to understand the effect of age on growth in a yearly basis and over an extended period. Consequently two models were built:

$$\text{Sales growth}_i = \alpha + \beta_{1i}Age + \beta_{2,i}Assets\ size + \beta_{3,i}Female\ ratio + \beta_{4,i}BoD\ ratio + \beta_{5,i}TMT\ tenure + \beta_{6,i}TMT\ size + \beta_{7,i}^{13}Industry + \in_i \quad (4a)$$

$$\text{Sales growth}_{i,t} = \alpha + \beta_{1i,t}Age + \beta_{2,i,t}Assets\ size + \beta_{3,i,t}Female\ ratio + \beta_{4,i,t}BoD\ ratio + \beta_{5,i,t}TMT\ tenure + \beta_{6,i}TMT\ size + + \beta_{7,i,t}Previous\ year\ growth + \beta_{8,i}^{14}Industry + \in_{i,t} \quad (4b)$$

Since the data available started in 2004 the sales growth values had to be computed starting from 2005, thus reducing the study period of model 4a to the set of years ranging from 2005 until 2013.

The variable "previous year growth" was added to model 4b, as a measure of prior performance, resulting in the reduction of the study period to the timeframe ranging from the 2006 to 2013.

Propositions 3 and 4 comprised the analysis of the relationship between diversification, measured by the degree of unrelated businesses acquired by each firm, and the functional track of each TMT member:

$$\text{Unrelated acquisition}_i = \alpha + \beta_{1i}Output\ ratio + \beta_{2,i}Assets\ size + \beta_{3,i}Female\ ratio + \beta_{4,i}Individualism + \beta_{5,i}BoD\ ratio + \beta_{6,i}TMT\ tenure + \beta_{7,i}TMT\ size + \beta_{8,i}^{13}Industry + \in_i \quad (5)$$

As in Proposition 1 the model used recurred to a cross-section regression, but the study period had to be reduced, ranging from 2006 until 2013, in order to have enough information for a low number of companies, 24 firms were studied.

Finally, Propositions 21 and 22 were addressed by analyzing the impact of TMT heterogeneity in corporate performance, measured by the profit margin and ROA, in both stable and turbulent economic environments.

Given the fact that the analysis comprised two different types of environments, the study period was divided in two equal timeframes, namely the stable period ranged from 2005 until 2007 and the turbulent period ranged from 2008 until 2010 respectively. The model was used in both periods was:

$$\text{Profit Margin}_{i,t} = \alpha + \beta_{1i,t} Heterogeneity\ Index + \beta_{2,i,t} Assets\ size + \beta_{3,i,t} Female\ ratio + \beta_{4,i,t} BoD\ ratio + \beta_{5,i,t} TMT\ tenure + \beta_{6,i} TMT\ size + + \beta_{7,i,t} Previous\ year\ Profit\ Margin + \beta_{8,i}^{14} Industry + \in_{i,t} \quad (6a)$$

$$\text{ROA}_{i,t} = \alpha + \beta_{1i,t} Heterogeneity\ Index + \beta_{2,i,t} Assets\ size + \beta_{3,i,t} Female\ ratio + \beta_{4,i,t} BoD\ ratio + \beta_{5,i,t} TMT\ tenure + \beta_{6,i} TMT\ size + + \beta_{7,i,t} Previous\ year\ ROA + \beta_{8,i}^{14} Industry + \in_{i,t} \quad (6b)$$

The "previous year profit margin" and "previous year ROA" were added as control variables based on the same expectations of model 4b, in which the profitability of one year will impact the actions of the TMT in the following year.

5. Empirical results

5.1 Results from the regressions

The models presented in the previous Chapter, and their respective databases, were tested using the tool "E-views", whose outputs are presented in appendix 1.

As stated in the "Base model" Section, the analysis of the selected Propositions intended to extend the use of panel data to the study of the Upper Echelons Theory, being this method applied in three out of the six models.

In the models in which panel data was used, the random effects method of estimation was chosen, since the activity of each company depends partially on the environment in which each company operates, not being expected a common intersect for all the firms.

- **Proposition 1**

The first model to be estimated, used the panel data method, and intended to understand if the age of the TMT members of European firms impacts the risk taking behavior, measured by the Solvency Ratio, of these firms.

Proposition 1, assumes that as individuals get older their risk taking behavior reduces, implying that an older TMT would prefer a lower leverage, i.e. a higher solvency ratio. The results of the estimation of the model are presented below:

Table 17 - Relationship between age and solvency ratio

Variable	Expected Sign	2004-2013
C	N/A	0.758639 (14.70575)***
Age	+	-0.001334 (-1.815294)*
Assets_size	-	-0.0047840 (-29.69905)***
TMT_Tenure	+	0.000868 (0.958157)
Dependency_ratio	-	0.020681 (1.086101)
Female_ratio	+	-0.039448 (-1.743748)*
TMT_size	-	-0.012716 (-1.439482)
Leisure_and_retail	N/A	-0.090368 (-2.027819)**
Manufacturing	N/A	-0.102027 (-2.135083)**
Natural_resources	N/A	0.050384 (-0.518169)
Other	N/A	0.080862 (1.604538)
Professional_services	N/A	0.0047065 (1.099107)
Public_services_and_utilities	N/A	-0.090818 (-1.987677)**
Number of observations		6340 (634 cross-sections)
F statistic		98.48805***
R-squared		0.157395

This table presents the panel data with random effects estimation results of the estimation of model 1. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable.

In fact, the variable age was negatively correlated with the solvency ratio, being significant at the 10% significance level, indicating that as managers get older they will take more risks.

This leverage propensity with increasing age may be a result of the standard European financing mechanisms. As Goldman Sachs (2015) shows European firms financing is very conservative compared to the United States.

In fact more than 70% of financing comes from bank loans, which usually demand guarantees and proven capabilities, features which are associated with more experienced managers.

Assets size was also found to be negatively correlated with the solvency ratio. These results may be justified by the fact that companies with a greater amount of assets are able to support a greater amount of debt.

Against expectations, the female ratio was also negatively correlated with the solvency ratio, and thus the result point out that in fact companies with more female managers risk more, by taking more debt.

Finally, some industries presented significant results, meaning that, as expected, leverage do not depend only on the TMT characteristics but also on industry standards.

The study of Proposition 1 was complemented with the analysis of the impact of age in the degree of unrelated corporate acquisitions, being older TMT's acquire more unrelated businesses in order to diversify their investments and reduce risks. The results of the model tested are presented in the Table below:

Table 18 – Relationship between age and corporate diversification

Variable	Expected Sign	2004-2013
C	N/A	0.808075 (2.059404)**
Age	+	-0.002712 (-0.490805)
Assets_size	+	0.009352 (1.581329)
TMT_Tenure	-	-0.003186 (-0.331949)
Dependency_ratio	-	0.205806 (1.800395)*
Female_ratio	-	-0.132118 (-1.020166)
Individualism	-	-0.836329 (2.204101)**
TMT_size	-	0.006746 (0.115923)
Leisure_and_retail	N/A	-0.167721 (-1.392602)
Manufacturing	N/A	-0.054917 (-0.449537)
Natural_resources	N/A	-0.238546 (-0.679322)
Other	N/A	0.352799 (1.395449)
Professional_services	N/A	0.037064 (0.398776)
Public_services_and_utilities	N/A	-0.064183 (-0.558954)
Number of observations		134
F statistic		1.278871
R-squared		0.121686

This table presents the OLS, cross-sectional, results of the estimation of model 2. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable.

Results show that there is no significant relationship between age and the degree of diversification. However, as defended by Hofstede (2001) the cultural variable individualism had a significant impact by being negatively associated with the degree of diversification of corporate acquisitions.

These results show that more individualistic cultures prefer more risky policies, namely towards concentration, contradicting Ferris *et al.* (2013) who found similar impacts of overconfidence in concentration and diversification.

Additionally, oppositely to expectations the dependency ratio was found to be positively associated with the degree of diversification of M&A deals, indicating that when the executive board has greater discretion there is a tendency to acquire unrelated businesses. This specific result may be related to the hubris hypothesis in corporate takeovers defended by Roll (1986) who defended that managers may acquire other firms to grow their power.

Therefore, when the supervisory board cannot prevent the executive board from acting on hubris, it is likely that number of acquisitions increase thus increasing the likelihood of diversification.

- **Proposition 2**

According to Proposition 2, the risk taking behavior of younger managers will imply higher growth in returns but also a higher volatility in performance. Since the impact of risk taking on return is twofold two models were built.

The first model, tested the impact of age on the variability of return, measured by the standard deviation of the profit margin and of ROA. The second model tested the impact of age in growth in return, measured by the growth in sales.

The second model was tested using both a panel data methodology and a cross-sectional methodology, in order to infer the impact of age in sales growth yearly and over a period.

The results of the first model are presented below:

Table 19 - Relationship between age and firm's volatility in profit margin

Variable	Expected Sign	2004-2013
C	N/A	0.053819 (0.840434)
Age	-	0.001313 (2.433267)**
Assets_size	-	0.004555 (1.308499)
TMT_Tenure	-	-0.000580 (-0.525008)
Dependency_ratio	+	0.09626 (0.513871)
Female_ratio	-	0.004462 (0.313899)
TMT_size	-	-0.021033 (-2.300124)**
Leisure_and_retail	N/A	-0.049344 (-0.891024)
Manufacturing	N/A	-0.038181 (-0.666409)
Natural_resources	N/A	-0.045410 (-0.722651)
Other	N/A	-0.092960 (-1.528285)
Professional_services	N/A	-0.003521 (-0.063084)
Public_services_and_utilities	N/A	-0.015366 (-0.268004)
Number of observations		356
F statistic		2.701615***
R-squared		0.086355

This table presents the OLS, cross-sectional, results of the estimation of model 2. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable. This model was subject to a Newey-

Table 20 - Relationship between age and firm's volatility in ROA

Variable	Expected Sign	2004-2013
C	N/A	0.271419 (3.295047)***
Age	-	-0.000516 (-0.680692)
Assets_size	-	-0.017204 (-4.166459)***
TMT_Tenure	-	-0.003088 (-1.951983)*
Dependency_ratio	+	0.048580 (2.133624)*
Female_ratio	-	0.006219 (0.266200)
TMT_size	-	0.008814 (0.634709)
Leisure_and_retail	N/A	0.021498 (0.304250)
Manufacturing	N/A	0.041958 (0.590618)
Natural_resources	N/A	-0.054270 (-0.634053)
Other	N/A	-0.00533 (-0.052959)
Professional_services	N/A	0.034525 (0.482197)
Public_services_and_utilities	N/A	0.025508 (0.357321)
Number of observations		356
F statistic		3.18051***
R-squared		0.100117

This table presents the OLS, cross-sectional, results of the estimation of model 2. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable.

Against expectations the variable age has a slightly positive significant impact on the variability of the profit margin, implying that as TMT members get older they implement riskier policies making the volatility in return increase. Age was also found to have no impact on the volatility of ROA.

A possible explanation may be the rigidity in decision making, in an environment that is facing deep changes, as defended by Chown (1960). This rigidity will imply a slower response to changing environments and consequently a greater impact on the profitability.
In accordance with expectations it was found that the TMT size negatively impacts the variability in the profit margin, corroborating the assumption from Germet (2011), that the larger the TMT the more difficult it is for the dominant sub-group to act independently, reducing the risks taken.
Also, in accordance with expectations the variable dependency ratio was found to be positively and significantly related with ROA volatility, implying that a management with greater power will affect more the decisions taken, thus accentuating impact of their personal characteristics on the decisions and on performance.
The assets size variable was also found to impact negatively the volatility ROA, thus as the company gets larger it will get a lower volatility in profitability.
Finally, the TMT tenure was also negatively associated with the volatility in ROA, implying that as the TMT members relationships increase so will the alignment between their opinions, resulting in a lower risk taking behavior.
As stated previously the second model, which addressed Proposition 2, was implemented using two different methods. The estimation of the first method which considered the impact of age on sales growth over an extended period are presented below:

Table 21 - Relationship between age and growth over an extended period

Variable	Expected Sign	2005-2013
C	N/A	0.066372 (0.731890)
Age	-	-0.002563 (-2.214243)**
Assets_size	-	-0.000874 (-0.129012)
TMT_Tenure	-	-0.004041 (-1.885868)*
Dependency_ratio	+	0.022626 (0.691633)
Female_ratio	-	-0.000000 (-0.000487)
TMT_size	-	-0.0037539 (-1.477682)
Leisure_and_retail	N/A	0.113920 (1.616382)
Manufacturing	N/A	0.112331 (1.629805)
Natural_resources	N/A	0.081488 (1.046033)
Other	N/A	0.154473 (1.992821)**
Professional_services	N/A	0.135329 (1.947819)*
Public_services_and_utilities	N/A	0.100124 (1.39967)
Number of observations		356
F statistic		0.158273
R-squared		0.047065

This table presents the OLS, cross-sectional, results of the estimation of model 2. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable. This model was subject to a Newey-West correction.

As shown by the results and according to expectations age was found to be negatively correlated with sales growth. These results are aligned with the findings presented by Norburn (1986) and Norburn and Birley (1986), and Marinova *et al.* (2010), implying that on the long-run companies with older manager will tend to have a lower growth.

The variable TMT tenure, as expected, was found to be negatively correlated with sales growth. As expected if the TMT tenure increases the alignment between TMT members also increases, reducing extreme positions which implies a conversion to risk neutrality. The second implementation of the model studied the impact of age in yearly sales growth:

Table 22 - Relationship between age and yearly growth

Variable	Expected Sign	2006-2013
C	N/A	-8.084145 (-1.436206)
Age	-	0.081234 (1.611242)
Assets_size	-	0.456226 (1.700738)*
TMT_Tenure	-	0.105138 (0.2501)
Dependency_ratio	+	-0.697558 (-0.486278)
Female_ratio	-	-0.529614 (-0.337657)
TMT_size	-	-0.276705 (-0.320317)
Previous_year_growth	+	-0.000240 (-0.050217)
Leisure_and_retail	N/A	0.010739 (0.002203)
Manufacturing	N/A	-0.489199 (-0.099834)
Natural_resources	N/A	-0.316850 (-0.053706)
Other	N/A	0.827383 (0.119196)
Professional_services	N/A	-0.276732 (-0.056033)
Public_services_and_utilities	N/A	2.924575 (0.593781)
Number of observations		2848 (356 cross-sections)
F statistic		1.406248
R-squared		0.006409

This table presents the panel data with random effects estimation results of the estimation of model 1. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable.

No statistically significant result was found between TMT average age and the yearly growth in sales.

The only variable which presented statistically significant results was assets size, which against expectations presented a positive relationship with the yearly growth in sales. This result implies that the larger companies have a greater growth capacity each year.

- **Proposition 3 and 4**

According to Propositions 3 and 4, managers with an output related background will also take decisions much more focused on innovation and on increasing their markets, implying that they would be tempted to invest in unrelated firms.

The model constructed intended to use the previous roles performed by the TMT as a sign of the degree of diversification of corporate acquisitions. However, due to the reduced number of firms in the sample-database the results were inconclusive, as it is possible to observe in the following table:

Table 23 - Relationship between functional track and corporate diversification

Variable	Expected Sign	2006-2013
C	N/A	1.273492 (0.787063)
Output_ratio	+	0.370247 (0.520751)
Assets_size	+	0.041227 (1.438519)
TMT_Tenure	-	-0.023878 (-0.668404)
Dependency_ratio	+	0.134605 (0.396901)
Female_ratio	-	-0.309624 (-0236692)
Individualism	-	-1.037128 (-0.752564)
TMT_size	-	-0.482351 (-1.537856)
Leisure_and_retail	N/A	-0.459088 (-0.688231)
Manufacturing	N/A	-0.577689 (-0.530784)
Natural_resources	N/A	-0.356416 (-0.432526)
Professional_services	N/A	-0.117760 (-0.167996)
Public_services_and_utilities	N/A	-0.607339 (-0.714299)
Number of observations		24
F statistic		0.658414
R-squared		0.418019

This table presents the OLS, cross-sectional, results of the estimation of model 2. In which *,** and *** represent the coefficients of significance 10%,5% and 1% respectively. "N/A" stands for not applicable.

- **Proposition 21 and 22**

The last model to be implemented intended to test Propositions 21 and 22, according to which it is expected that in stable economic environments homogeneity has a positive effect on performance, and that in turbulent environments TMT heterogeneity will lead to better results.

The impact of TMT heterogeneity on firm performance was studied considering both the profit margin and ROA proxy of financial return. The results of the estimation of the impacts of TMT heterogeneity on both variables are as shown in the following Tables:

Table 24 - Relationship between TMT heterogeneity and profit margin

Variable	Expected Sign	2005-2007	2008-2010	2005-2010
C	N/A	0.016181 (0.546500)	-0.012959 (-0.446228)	0.006845 (0.339726)
TMT_ Blau_heterogeneity	-/+	-0.038933 (-1.650817)*	-0.006748 (-0.345782)	-0.020120 (-1.381308)
Assets_size	+/-	-0.002064 (-1.356100)	-0.000204 (-0.130112)	-0.001200 (1.128152)
TMT_Tenure	+	0.000979 (1.758556)*	0.001444 (2.678540)***	0.000719 (1.962978)**
Dependency_ratio	+/-	-0.009830 (-1.135801)	-0.005405 (-0.652450)	-0.008399 (-1.436158)
TMT_size	+	0.022398 (1.755078)*	0.007723 (0.797410)	0.009859 (1.316439)
Previous_year _profit_margin	+	0.3944908 (17.17080)***	0.594694 (28.65253)***	0.551836 (3531552)***
Leisure_and_retail	N/A	0.009567 (0.338322)	-0.001854 (-0.067500)	0.003907 (0.83885)
Manufacturing	N/A	0.011842 (0.416329)	-0.010779 (-0.389854)	0.000579 (0.030034)
Natural_resources	N/A	-0.023925 (-0.699518)	-0.016951 -0.509795)	-0.018161 (0.872683)
Other	N/A	-0.015015 (-0.381689)	0.012411 (0.325119)	-0.002980 (-0.111760)
Professional _services	N/A	0.051941 (1.807413)	0.028371 (1.016009)	0.038072 (1.953213)*
Public_services_and _utilities	N/A	0.007423 (0.259504)	0.008797 (0.316243)	0.008212 (0.6722)
Number of observations		1068 (356 cross-sections)	1068 (356 cross-sections)	2136 (356 cross-sections)
F statistic		23.96320***	52.45258***	89.75088***
R-squared		0.214187	0.373676	0.336565

This table presents the panel data with random effects estimation results of the estimation of model 1. In which *,** and *** represent the coefficients of significance 10%,5% and 1%

Table 25 - Relationship between TMT heterogeneity and ROA

Variable	Expected Sign	2005-2007	2008-2010	2005-2010
C	N/A	0.076976 (2.262895)**	0.007427 (0.191944)	0.050669 (1.970689)**
TMT_ Blau_heterogeneity	-/+	-0.049413 (-1.816604)*	-0.043267 (-1.663387)*	-0.044806 (-2.412854)**
Assets_size	-	-0.007079 (-4.021235)***	-0.000295 (-0.141038)	-0.004192 (-3.085119)***
TMT_Tenure	+	-0.000643 (-0.998456)	0.000366 (0.509500)	-0.000751 (-1.607431)
Dependency_ratio	+/-	-0.005565 (-0.558435)	-0.004479 (-0.406384)	-0.006822 (-0.915841)
TMT_size	+	0.022464 (1.528560)	0.015718 (1.218931)	0.015458 (1.619907)
Previous_year_ROA	+	0.445270 (1672383)***	0.345944 (14.38015)***	0.403966 (22.37311)***
Leisure_and_retail	N/A	0.014098 (0.434770)	0.007469 (0.024099)	0.013279 (0.543315)
Manufacturing	N/A	0.012493 (0.383060)	-0.012711 (-0.345247)	0.003895 (0.158440)
Natural_resources	N/A	-0.007819 (-0.199400)	-0.001870 (-0.042264)	-0.001264 (-0.042757)
Other	N/A	-0.053116 (-1.177553)	0.0030039 (0.590993)	-0.009836 (-0.289363)
Professional _services	N/A	0.024465 (0.743055)	0.006312 (0.169912)	0.017981 (0.724542)
Public_services_and _utilities	N/A	0.003794 (0.115698)	0.011661 (0.314777)	0.010612 (0.429088)
Number of observations		1068 (356 cross-sections)	1068 (356 cross-sections)	2136 (356 cross-sections)
F statistic		23.75450***	15.68134***	40.24682***
R-squared		0.212718	0.151367	0.18533

This table presents the panel data with random effects estimation results of the estimation of model 1. In which *,** and *** represent the coefficients of significance 10%,5% and 1%

According to expected, results show that the previous year performance indicators, either profit margin or ROA, had a positive and significant impact on the performance of the current year, implying that the decisions taken always consider past performance.

TMT tenure presented a positive relationship with the profit margin, which is according to expectations and implies that the extent of time TMT members work together the

greater their alignment between the TMT, which translates into a lower degree of conflict and consequently a greater return.

Also according to expectations the assets size was found negatively correlated with ROA, implying that the growth in assets does not translate in a proportional growth in sales.

Finally, the Blau heterogeneity index of heterogeneity was found to be negatively correlated with profitability on both economic periods, and over the entire study period.

These results in the stable economic period are in line with Hambrick and Mason (1984) expectations, since in stable periods companies with TMT members with similar characteristics will have a lower level of conflict, making it easier to apply the standard internal policies which maximize the return.

However, the results in the turbulent period contradict the original Theory, indicating that in turbulent periods the affective conflict generated by diversity will have a greater impact on performance than the benefits of different experiences.

Overall, these results contradict the research made in Europe, namely Marinova (2010) and Tibben (2010) which also found no impact of diversity, and Germet (2011) and Honing (2012) who found a positive impact of nationality diversity on performance.

Comparing these results with studies outside Europe, they are found to be aligned with the results of Miller *et al.* (1998) and West and Schwenk (1996), who defend the positive impact of TMT homogeneity.

Concluding, the results indicate that to survive negative periods the company has to decide and act quickly and in consonance, therefore using the best of opinions, in the shortest period of time.

In a heterogeneous TMT environment without the proper managing tools the process of gathering, debating and deciding, taking into consideration all TMT members opinion, can be difficult, and thus a stronger guidance based on a lower number of opinions may be preferable, as discussed by Goldstein *et al*. (1985).

5.2 Consistency checks

The models presented in the previous session were tested in order to verify the consistency of their results. The first checks performed were the tests of autocorrelation and heteroscedasticity of the cross-sectional models, their results are shown in appendix 2.

There is no initial expectation that autocorrelation it is present in the models developed since the estimations performed attempt to detect a linear relationship between a very specific demographic characteristic and a very specific financial decision or indicator.
However, models 3a and 4a were found to have serial correlation, implying the necessity to apply a Newey-West correction. The results presented in the previous Section already consider the necessary corrections.
Firm decisions and financial indicators may depend on the environment, allowing for the presence of heteroscedasticity in the models. Nevertheless, no model presented this effect.
The second checks performed validated the specific results of the models which test the differences between different types of groups of firms, namely model 3 and model 6.
Model 3, used in the study of Proposition 2, tested the impact of age in the volatility of performance, by verifying if indeed volatility is greater in firms with younger managers. The results of the estimation prove that the relationship is exactly the opposite, though the estimator for the impact of age is close to zero. To prove clearly that firms with different TMT average ages have significantly different volatilities, a Levene test was performed. Doing so, the sample database was initially divided between the large TMT size group and the small TMT size group, and then each sub-group was divided in five quintiles of average age. The results of the Levene test, present in appendix 3, are resumed as follows:

- Large TMT:

Table 26 – Large TMT inter-percentile statistical comparison

Correlation	Levene test profit margin	Levene test ROA
Quintile 1 with Quitile 2	Not statistically diferent	Not statistically diferent
Quintile 1 with Quitile 3	Statistically different***	Statistically different***
Quintile 1 with Quitile 4	Not statistically diferent	Not statistically diferent
Quintile 1 with Quitile 5	Not statistically diferent	Not statistically diferent
Quintile 2 with Quitile 3	Statistically different***	Not statistically diferent
Quintile 2 with Quitile 4	Not statistically diferent	Not statistically diferent
Quintile 2 with Quitile 5	Not statistically diferent	Statistically different***
Quintile 3 with Quitile 4	Not statistically diferent	Statistically different*
Quintile 3 with Quitile 5	Statistically different***	Not statistically diferent
Quintile 4 with Quitile 5	Statistically different***	Statistically different*

*,** and *** represent the coefficients of significance 10%,5% and 1% respectively.

- Small TMT:

Table 27 - Small TMT inter-percentile statistical comparison

Correlation	Levene test profit margin	Levene test ROA
Quintile 1 with Quitile 2	Statistically different***	Not statistically diferent
Quintile 1 with Quitile 3	Statistically different**	Not statistically diferent
Quintile 1 with Quitile 4	Statistically different**	Not statistically diferent
Quintile 1 with Quitile 5	Not statistically diferent	Statistically different**
Quintile 2 with Quitile 3	Statistically different***	Statistically different***
Quintile 2 with Quitile 4	Statistically different***	Statistically different***
Quintile 2 with Quitile 5	Statistically different***	Statistically different***
Quintile 3 with Quitile 4	Statistically different***	Statistically different*
Quintile 3 with Quitile 5	Statistically different**	Not statistically diferent
Quintile 4 with Quitile 5	Statistically different***	Statistically different***

*,** and *** represent the coefficients of significance 10%,5% and 1% respectively.

As we can observe, in the larger TMT groups the variance of performance indicators of most of the age quintiles is not statistically different.

On the other hand, on the smaller TMT groups, the variance of profit margin of nine out of ten quintile relationships is statistically different, and the variance of ROA of six out of ten quintile relationship is statistically different.

Thus, we can conclude that for the small TMT group, which composes the large majority of the database, the age of the TMT is significantly correlated with the volatility of the profit margin.

On the other hand, given the low number of statistical differences between age quintiles, we cannot conclude that the age of the TMT is significantly correlated with ROA volatility.

Model 6, used in the study of Propositions 21 and 22, intended to test the different impacts of the TMT heterogeneity on the performance of the firms, given a specific economic environment, either stable or turbulent.

The analysis of the database clearly indicates that from 2007 to 2008 the performance of the companies dropped suddenly, which indicates the expected transition between environments due to the sub-prime crisis.

In order to support the results presented in the previous Section, an Anova analysis was performed, proving that there is a statistically significant difference between the profit margins and the ROA of the firms' pre-2008 and post-2008.

The profit margin the Anova F-Test, presented in appendix 4, presents a value of 34.63477, proving that the profit margins' were statistically significantly different, between the two periods, at the 1% significance level.

The ROA the Anova F-Test, presented in appendix 4, presents a value of 6.776375, proving that the ROAs' were statistically significantly different, between the two periods, also at the 1% significance level.

6. Conclusion

The Upper Echelons Theory presented in 1984 by Hambrick and Mason has been subject to multiple tests using distinct methods during the last three decades. The results from these previous studies have lead to a better knowledge regarding the managerial impact on the decisions and performance of companies.

The great majority of past studies focused on specific environmental circumstances, industries and countries, being mainly performed in samples of firms operating in the United States. Therefore, the knowledge regarding the impact of managers in European companies is still scarce.

The current study attempts to increase the knowledge on European companies' decision making by introducing a different methodology. This new approach considers a cross-national European environment, in which the firms are treated as equal independently of the country in which they are based.

The approach chosen contradicts the criticism made by Hambrick (2007), assuming that the influence of specific characteristics of managers on the decisions taken by the firms should not be entirely connected to the culture of each manager.

In order to apply this methodology some of the original Propositions presented by Hambrick and Mason (1984) were tested using a large sample of firms across a broad study period, ranging from the beginning of 2004 until the end of 2013.

Once again, the methods chosen differ from previous research, firstly by avoiding the restriction of the study of the Upper Echelons Theory to specific environmental circumstances, and secondly by preventing the use of survey methodologies which depend greatly on the rates of response.

Finally, the current research builds on knowledge gathered from previous studies, namely by considering as part of the TMT both executive management and the supervisory boards, since it is expected that human traits influence the perception of all the managers. As a result of this approach it was possible to better understand the influence of some TMT characteristics on the decisions and performance of European firms.

The first main finding contradicted the results from Bertrand e Schoar (2003) since, in European firms, age has been found to be positively correlated with leverage.

These results may be associated with the conservative financing structure of European firms, which favors loans whose clauses may be excessively demanding for younger and less experienced managers with a lower wealth.

The second conclusion allows to realize that corporate acquisitions are not solely influenced by managers' personal characteristics, it is in fact also a result of specific cultural variables, namely the individualism of the country where companies are located, as Hofstede (2001) and Ferris *et al.* (2013) have point out.

The third conclusion contradicted the original expectations of Hambrick and Mason (1984) once again, since age has been found to be positively associated with the volatility of profitability, when measured by the profit margin.

In accordance to the Upper Echelons Theory it has been found that age is negatively correlated with sales growth. Once again the findings do not support the idea that younger managers risk more, although they seem to have a better sales growth.

Finally, the most interesting and surprising findings were related to TMT heterogeneity which was found to be overall negatively correlated with firm performance, measured by two indicators the profit margin and ROA.

Dividing the study period into a stable, 2005 to 2007, and a turbulent economic period, 2008-2010, it was possible to find a statistically significant negative correlation between diversity and the profit margin for the turbulent period, and a significant negative correlation between diversity and ROA for both the stable and the turbulent periods.

These results support the theory for the stable period, since it is expected that homogeneous TMTs act in an aligned way following the structures and procedures already in place.

On the other hand, contrary to the Theory results indicate that in turbulent periods TMT heterogeneity impacts negatively performance, which may be a result from affective conflict present in stressful environments.

Concluding, these findings corroborate the arguments presented by Goldstein *et al.* (1985), Lejarraga *et al.* (2014) and Diskell and Salas (1991), which indicate that under threat groups show rigidity in the decision making process, and react slowly to the changes in the environment.

Therefore, in a turbulent economic situation it may be preferable to concentrate the decision making process in a more restrict and homogeneous group, in order to prevent the negative consequences of a slow reaction.

Finalizing, the aforementioned results shall be used with caution since they depend on the samples used, which depend on the availability of information in the databases, and on the classification of the functional background and types of M&A variables, which followed the criteria presented in appendix 5.

Nevertheless, as mentioned previously, the use of a large database allows for a less biased analysis than questionnaire methods, being expected that the future improvement of the quality of information, present in the databases, will increase the knowledge on the European companies' decision making process.

References

Adams, R. B. *et al.* D. (2005), "Powerful CEOs and Their Impact of Corporate Performance", *The Review of Financial Studies*, Vol.18, No.4, pp.1403-1432

Allemand, I. *et al.* (2014), "Institutional theory and gender diversity on European Boards", Working paper, Cahiers du CEREN 46

Amason, A. C. (1996), "Distinguishing the Effects of Functional and Dysfunctional Conflict on Strategy Decision Making: Resolving the Paradox for Top Management Teams", *The Academy of Management Journal*, Vol.39, No.1, pp.123-148

Baker, C. (2014), "Stereotyping and women's roles in leadership positions", *Industrial and Commercial Training*, Vol. 46, No. 6, pp. 332-337

Bennedsen, M. *et al.* D. (2007), "Do CEOs Matter?", Working paper, Copenhagen Business School, Columbia University and New York University

Bergen, C.W. V. *et al.* (2005), "Workforce diversity and organizational performance", *Equal Opportunities International*, Vol.24, No.3/4, pp.1-16

Bertrand, M. and Schoar, A. (2003). "Managing with Style: the Effect of Managers on Firm Policies.", *Quarterly Journal of Economics*, Vol. 118, No.4, pp.1169-1208

Boeker, W. (1997), "Strategic Change: The Influence of Managerial Characteristics and Organizational Growth", *The Academy of Management Journal*, Vol.40, No.1, pp.152-170

Carlsson, G. and Karlsson, K. (1970), "Age, Cohorts and the Generation of Generations", *American Sociological Review*, Vol.35, No.4, pp.710-718

Carpenter, M. A. *et al.* (2004), "Upper Echelons Revised: Antecedents, Elements, and Consequences of Top Management Team Composition", *Journal of Management*, Vol.30, No.6, pp.749-778

Carson, C. M. *et al.* (2004), "Performance gains through diverse top management teams", *Team Performance Management: An International Journal*, Vol.10, No.5/6, pp. 121-126

Certo, S. T. *et al.* (2006), "Top Management Teams, Strategy and Financial Performance: A Meta-Analytic Examination", *Journal of Management Studies*, Vol.43, No.4, pp.813-839

Child, J. (1972), "Organizational Structure, Environment and Performance: The Role of Strategic Choice", *British Sociological Association*, Vol.6, No.1, pp.2-22

Child, J. (1974), "Managerial and Organizational Factors Associated with Company Performance", *The Journal of Management Studies*, pp.175-189

Clark, J. *et al.* (2014), "When do CEOs matter? Ownership, governance and the influence of CEOs on firm performance", *The Leadership Quarterly*, Vol. 25, pp. 358-372

Chown, S. (1960), "A Factor Analysis of the Wesley Rigidity Inventory: Its Relationship to Age and Nonverbal Intelligence", *Journal of Abnormal and Sociological Psychology*, Vol.61, No.3, pp.491-494

D'Aventi, R. (1990), "Top Managerial Prestige and Organizational Bankruptcy", *Organizations Science*, Vol.1, No.2, pp.121-142

Dearborn, D. and Simon, H. (1958), "Selective Perception: A Note on the Departmental Identifications of Executives", *Sociometry*, Vol.21, No.2, pp.140-144

Diskell, J. and Salas, E. (1991), "Group decision making under stress", *Journal of Applied Psychology*, Vol.76, No.3, pp.473-478

Dovidio, J.F. *et al.* (2009), "Cooperation and Conflict within Groups: Bridging Intragroup and Intergroup Processes", *Journal of Social Issues*, Vol.65, No.2, pp. 429-449

Eisenhardt, K. and Schoonhoven, C. B. (1990), "Organizational Growth: Linking Funding Team, Strategy, Environment, and Growth Among U.S. Semi-Conductor Ventures, 1978-1988", *Administrative Science Quarterly*, Vol.35, No.3, pp.504-529

Erhardt, N. L., *et al.* (2003), "Board of Director Diversity and Firm Financial Performance", *Journal of Corporate Governance*, Vol.11, No.2, pp.102-111

Evans, W. R. and Carson, C. M. (2005), "A social capital explanation of the relationship between functional diversity and group performance", *Team Performance Management: An International Journal*, Vol.11, No.7/8, pp.302-315

Ferris *et al.* (2013), "CEO Overconfidence and International Merger and Acquisition Activity", *Journal of Financial and Quantitative Analysis*, Vol. 48, No.1, pp.137-164

Fernandez, M. *et al.* (2014), "Top management demographic characteristics and company performance", *Industrial Management & Data Systems*, Vol. 114, No. 3, pp. 365-386

Germet, P. (2011), "The relationship between board characteristics and corporate performance: Evidence from the Netherlands", Master Thesis in Accountancy, Faculty of Economics and Business Studies, Tilburg University

Graham, J. R. *et al.* (2013), "Managerial attitudes and corporate actions", *Journal of Financial Economics*, Vol.109, pp.103-121

Goldman Sachs (2015), "European Economics Analyst: Unlocking Europe's economic potential through financial markets", Goldman Sachs Economics Research, Issue No.15/07

Goldstein, D.L. (1985), "Group decision making under threat: The Tycoon Game", *The Academy of Management Journal*, Vol. 28, No.3, pp. 613-627

Hambrick, D. C. (1989), "Guest Editor's Introduction: Putting Top Managers Back in the Strategy Picture", *Strategic Management Journal*, Vol.10, pp.5-15

Hambrick, D. C. (2007), "Upper Echelons Theory: An Update", *The Academy of Management Review*, Vol.32, No.2, pp.334-343

Hambrick, D. C. and Mason, P. A. (1984), "Upper Echelons: The Organization as a Reflection of Its Top Managers", The Academy of Management Review, Vol.9, No.2, pp.193-206

Hambrick, D. C. and Snow, C. C. (1977), "A Contextual Model of Strategic Decision Making in Organizations", Academy of Management Proceedings, pp.109-112

Hayes, R. and Abernathy, W. (1980), "Managing Our Way to Economic Decline", Harvard Business Review

Hermann, C. (1963), "Some consequences of crisis which limit the viability of organizations", Working Paper

Heyden, M. L. M. (2012), "Essays on Upper Echelons & Strategic Renewal: A Multilevel Contingency Approach", PhD Dissertation, Erasmus University Rotherdam

Hofstede, G. (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations 2nd Edition*, Sage, Thousand Oaks, California

Honing, S. (2012), "Does diversity in executive boards make a difference? Nationality Diversity and firm performance in German, Dutch and British Multinational Enterprises", Master Thesis, Amsterdam Business School, University of Amsterdam

Kadushin, C. (1995), "Friendship Among the French Financial Elite", *American Sociological Review*, Vol.60, No.2, pp.202-221

Kahneman, D. (2011), *Thinking fast and slow*, Macmillan

Keck, S. *et al.* (2014), "Group decision making under ambiguity: Convergence to neutrality", *Journal of Economic Behavior & Organization*, Vol. 103, pp. 60-71

Lee, C. and Farh, J.-L. (2004), "Joint Effects of Group Efficacy and Gender Diversity on Group Cohesion and Performance", *Applied Psychology: An International Review*, Vol.53, No.1, pp.136-154

Lee, J. *et al.* (2014), "Enablers of top management team support for integrated management control system innovations", *International Journal of Accounting Information Systems*, Vol.15, pp. 1-25

Lejarraga, T. (2014), "Decisions from experience: How groups and individuals adapt to change", *Mem Cogn*, Vol. 42, pg. 1384-1397

Li, C.R. (2014), "Top management team diversity in fostering organizational ambidexterity: Examining TMT integration mechanisms", *Innovation: Management policy & practice*, 2014, Vol.16, No.3, pp. 303-332

Lieberson, S. and O'Connor, J. F. (1972), "Leadership and Organizational Performance: A Study of Large Corporations", *American Sociological Review*, Vol.37, No.2, pp.117-130

Manner, M. H. (2010), "The Impact of CEO Characteristics on Corporate Social Performance", *Journal of Business Ethics*, Vol.93, Supplement 1, pp.53-72

Marimuthu, M. and Kolandisamy, I. (2009), "Demographic Diversity in Top Level Management and Its Implications on Firm Financial Performance: An Empirical Discussion", *International Journal of Business and Management*, Vol.4, No.6, pp.176-188

Marinova *et al.*, (2010), "Gender Diversity and Firm Performance: Evidence from Dutch and Danish Boardrooms", Working/Discussion paper 10-03, Utrecht School of Economics, University of Utrecht

McNeil, K. and Thompson, J. (1971), "The Regeneration of Social Organizations", *American Sociological Review*, Vol.36, N.4, pp.624-637

Miles *et al.* (1978), "Organizational Strategy, Structure and Process", *The Academy of Management Review*, Vol.3, No.3, pp.546-562

Miller *et al.* (1998), "Cognitive Diversity Among Upper-Echelon Executives: Implications for Strategic Decision Processes", *Strategic Management Journal*, Vol.19, pp.39-58

Nahavandi, A. (2008), *The Art and Science of Leadership 5th Edition*, New Jersey: Prentice Hall

Nielsen, S. (2010), "Top Management Team Diversity: A Review of Theories and Methodologies", *International Journal of Management Reviews*, pp.301-316

Nielsen, Bo B. and Nielsen, S. (2013), "Top Management Team Nationality Diversity and Firm Performance: A Multilevel Study", *Strategic Management Journal*, Vol. 34, pp. 372-382

Norburn, D. (1986), "GOGOs, YOYOs and DODOs: Company Directors and Industry Performance", *Strategic Management Journal*, Vol. 7, pp. 101-117

Norburn, D. and Birley, S. (1986), "An Empirical Test of Upper-Echelons Theory", Working paper 86.01, National Academy of Management Meeting, Chicago

Priem, R. L. *et al.* (1999), "Inherent Limitations of Demographic Proxies in Top Management Team Heterogeneity Research", *Journal of Management*, Vol. 25, N.6, pp. 935-953

Robertson, Q. M. and Park, H. J. (2006), "Examining the Link Between Diversity and Firm Performance: The Effects of Diversity Reputation and Leader Racial Diversity", CAHRS Working Paper 06-02, Cornel University

Roll, R. (1986), "The Hubris Hypothesis of Corporate Takeovers", *The Journal of Business*, Vol. 59, No. 2, pp.197-216

Stevens *et al.*, (1978), "Assessing Personal, Role and Organizational Predictors of Managerial Commitment", *The Academy of Management Journal*, Vol. 21, No. 3, pp. 380-396

Straw, B. *et al.* (1981), "Threat-Rigidity effects in Organizational Behavior: A multi-level analysis", *Administrative Science Quarterly*, Vol. 26, pp. 501-524

Taylor, R. (1975), "Age and Experience as Determinants of Managerial Information Processing and Decision Making Performance", *The Academy of Management Journal*, Vol. 18, No. 1, pp.74-81

Teixeira, A. (2002), "On the link between human capital and firm performance: A Theoretical and Empirical Survey", Working Papers da FEP no. 121, Faculdade de Economia, Universidade do Porto

Tibben P. (2010), "Top Management Team diversity and firm performance", Master Thesis in International Economics and Business, Utrecht School of Economics, University of Utrecht

Tixier, M. (1994), "Management Styles Across Western European Cultures", *The International Executive,* Vol.36, No.4, pp. 377-391

Vries, T. A. (2014), "Antecedents of Individuals' Inter-team Coordination: Broad Functional Experiences as a mixed blessing", *The Academy of Management Journal,* Vol. 57, No.5, pp. 1334-1359

Weiner, N. and Mahoney, T. A. (1981), "A Model of Corporate Performance as a Function of Environmental, Organizational and Leadership Influences", *The Academy of Management Journal,* Vol.24, No. 3, pp.453-470

West, C. T. Jr. and Schwenk , C. R. (1996), "Top Management Team Strategic Consensus, Demographic Homogeneity and Firm Performance: A Report of Resounding Evidence", *Strategic Management Journal,* Vol.17, No.7, pp.571-576

Wiersema, M. F. and Bantel, K. A. (1992), "Top Management Team Demography and Corporate Strategic Change", *The Academy of Management Journal,* Vol.35, No.1, pp.91-121

Winne, S. D. and Sels, L. (2006), "The Impact of Upper and Lower Echelon Human Capital and HR Practices on Innovation on Start-ups", Working paper, Department of Marketing and Organization Studies, Katholieke Universiteit Leuven

Xiao, Z. *et al.* (2009), "Economic environment and personality: how do they influence investment decisions and regret?", *Social Behavior and Personality,* Vol. 37, 10, pp. 1297-1304

Yamak, S. *et al.* (2014), "The Role of External Environment In Upper Echelons Theory: A Review of Existing Literature and Future Research Directions", *Group and Organizational Management,* Vol.39, 69-109

Zee, A. V. D. and Swagerman, D. (2009), "Upper Echelons Theory and Ethical Behavior: an Illustration of the Theory and a Plea for its Extension Towards Ethical Behavior", *Journal of Business Systems, Governance and Ethics,* Vol.4, No.2, pp.27-43

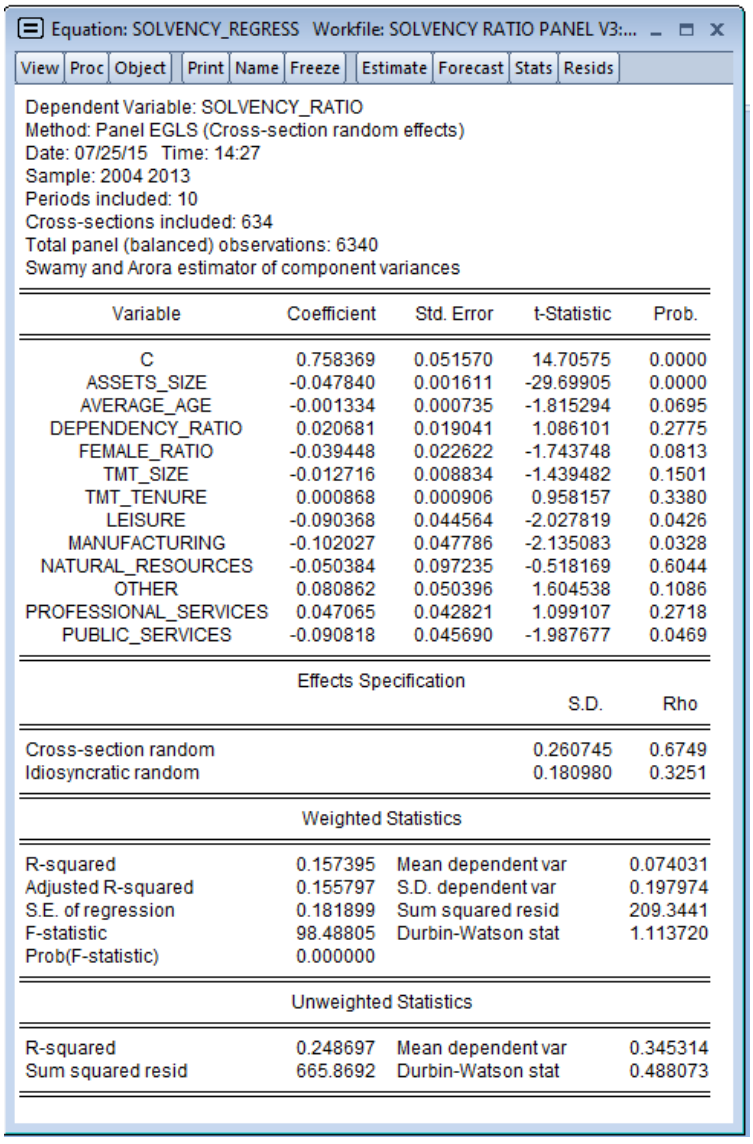
Zhu, D. and Chen, G. (2015), "CEO Narcissism and the impact of Prior Board Experience on Corporate Strategy", *Administrative Science Quarterly*, Vol. 60, No.1, pp. 31-65

Appendixes

Appendix 1 – E-views models' outputs

The econometric/statistical software E-views was the tool used in the testing of the different models. In this appendix the outputs for each model are presented in order to support the results presented in section 5.1.

- **Proposition 1 model 1: Relationship between age and solvency ratio**



Equation: SOLVENCY_REGRESS Workfile: SOLVENCY RATIO PANEL V3:...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: SOLVENCY_RATIO
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 14:27
Sample: 2004 2013
Periods included: 10
Cross-sections included: 634
Total panel (balanced) observations: 6340
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.758369	0.051570	14.70575	0.0000
ASSETS_SIZE	-0.047840	0.001611	-29.69905	0.0000
AVERAGE_AGE	-0.001334	0.000735	-1.815294	0.0695
DEPENDENCY_RATIO	0.020681	0.019041	1.086101	0.2775
FEMALE_RATIO	-0.039448	0.022622	-1.743748	0.0813
TMT_SIZE	-0.012716	0.008834	-1.439482	0.1501
TMT_TENURE	0.000868	0.000906	0.958157	0.3380
LEISURE	-0.090368	0.044564	-2.027819	0.0426
MANUFACTURING	-0.102027	0.047786	-2.135083	0.0328
NATURAL_RESOURCES	-0.050384	0.097235	-0.518169	0.6044
OTHER	0.080862	0.050396	1.604538	0.1086
PROFESSIONAL_SERVICES	0.047065	0.042821	1.099107	0.2718
PUBLIC_SERVICES	-0.090818	0.045690	-1.987677	0.0469

Effects Specification

	S.D.	Rho
Cross-section random	0.260745	0.6749
Idiosyncratic random	0.180980	0.3251

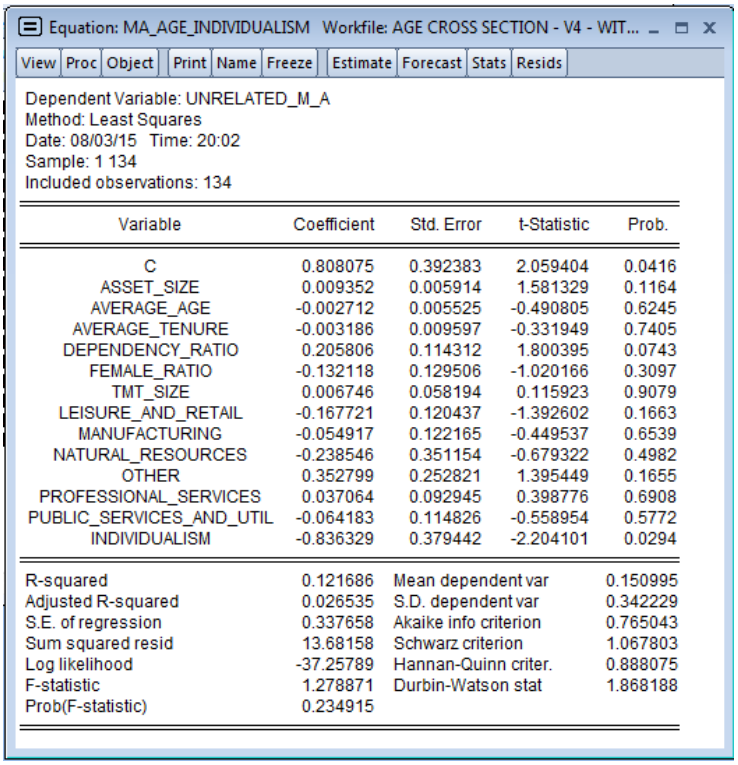
Weighted Statistics

R-squared	0.157395	Mean dependent var	0.074031
Adjusted R-squared	0.155797	S.D. dependent var	0.197974
S.E. of regression	0.181899	Sum squared resid	209.3441
F-statistic	98.48805	Durbin-Watson stat	1.113720
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.248697	Mean dependent var	0.345314
Sum squared resid	665.8692	Durbin-Watson stat	0.488073

- **Proposition 1 model 2: Relationship between age and unrelated diversification**



Equation: MA_AGE_INDIVIDUALISM Workfile: AGE CROSS SECTION - V4 - WIT...

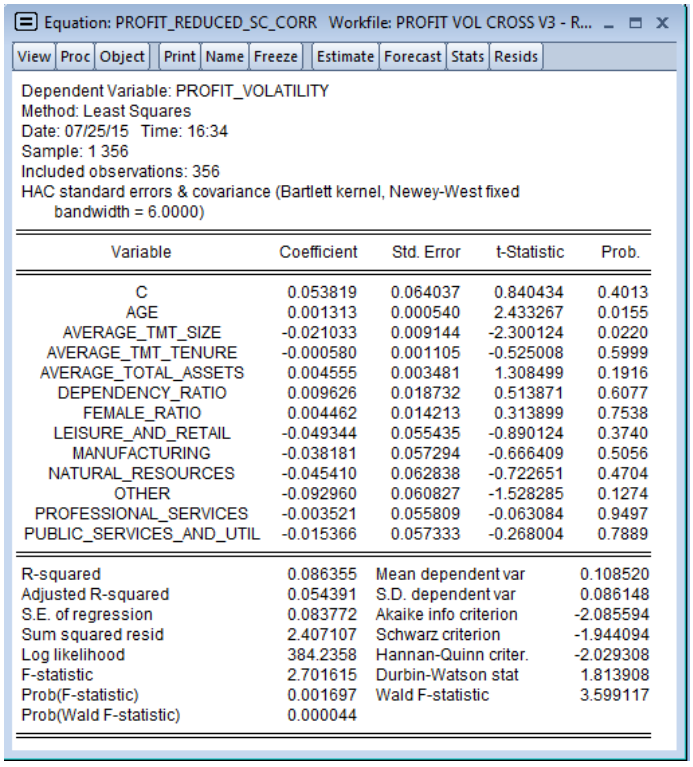
View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: UNRELATED_M_A
Method: Least Squares
Date: 08/03/15 Time: 20:02
Sample: 1 134
Included observations: 134

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.808075	0.392383	2.059404	0.0416
ASSET_SIZE	0.009352	0.005914	1.581329	0.1164
AVERAGE_AGE	-0.002712	0.005525	-0.490805	0.6245
AVERAGE_TENURE	-0.003186	0.009597	-0.331949	0.7405
DEPENDENCY_RATIO	0.205806	0.114312	1.800395	0.0743
FEMALE_RATIO	-0.132118	0.129506	-1.020166	0.3097
TMT_SIZE	0.006746	0.058194	0.115923	0.9079
LEISURE_AND_RETAIL	-0.167721	0.120437	-1.392602	0.1663
MANUFACTURING	-0.054917	0.122165	-0.449537	0.6539
NATURAL_RESOURCES	-0.238546	0.351154	-0.679322	0.4982
OTHER	0.352799	0.252821	1.395449	0.1655
PROFESSIONAL_SERVICES	0.037064	0.092945	0.398776	0.6908
PUBLIC_SERVICES_AND_UTIL	-0.064183	0.114826	-0.558954	0.5772
INDIVIDUALISM	-0.836329	0.379442	-2.204101	0.0294

R-squared	0.121686	Mean dependent var	0.150995
Adjusted R-squared	0.026535	S.D. dependent var	0.342229
S.E. of regression	0.337658	Akaike info criterion	0.765043
Sum squared resid	13.68158	Schwarz criterion	1.067803
Log likelihood	-37.25789	Hannan-Quinn criter.	0.888075
F-statistic	1.278871	Durbin-Watson stat	1.868188
Prob(F-statistic)	0.234915		

- **Proposition 2 model 3a: Relationship between age and profit margin volatility**



Equation: PROFIT_REDUCED_SC_CORR Workfile: PROFIT VOL CROSS V3 - R...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: PROFIT_VOLATILITY
Method: Least Squares
Date: 07/25/15 Time: 16:34
Sample: 1 356
Included observations: 356
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.053819	0.064037	0.840434	0.4013
AGE	0.001313	0.000540	2.433267	0.0155
AVERAGE_TMT_SIZE	-0.021033	0.009144	-2.300124	0.0220
AVERAGE_TMT_TENURE	-0.000580	0.001105	-0.525008	0.5999
AVERAGE_TOTAL_ASSETS	0.004555	0.003481	1.308499	0.1916
DEPENDENCY_RATIO	0.009626	0.018732	0.513871	0.6077
FEMALE_RATIO	0.004462	0.014213	0.313899	0.7538
LEISURE_AND_RETAIL	-0.049344	0.055435	-0.890124	0.3740
MANUFACTURING	-0.038181	0.057294	-0.666409	0.5056
NATURAL_RESOURCES	-0.045410	0.062838	-0.722651	0.4704
OTHER	-0.092960	0.060827	-1.528285	0.1274
PROFESSIONAL_SERVICES	-0.003521	0.055809	-0.063084	0.9497
PUBLIC_SERVICES_AND_UTIL	-0.015366	0.057333	-0.268004	0.7889

R-squared	0.086355	Mean dependent var	0.108520
Adjusted R-squared	0.054391	S.D. dependent var	0.086148
S.E. of regression	0.083772	Akaike info criterion	-2.085594
Sum squared resid	2.407107	Schwarz criterion	-1.944094
Log likelihood	384.2358	Hannan-Quinn criter.	-2.029308
F-statistic	2.701615	Durbin-Watson stat	1.813908
Prob(F-statistic)	0.001697	Wald F-statistic	3.599117
Prob(Wald F-statistic)	0.000044		

- **Proposition 2 model 3b: Relationship between age and ROA volatility**

Equation: UNTITLED Workfile: ROA VOL CROSS V1::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: ROA_VOLATILITY
Method: Least Squares
Date: 07/25/15 Time: 15:26
Sample: 1 356
Included observations: 356

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.271419	0.082372	3.295047	0.0011
AGE	-0.000516	0.000758	-0.680692	0.4965
AVERAGE_TMT_SIZE	0.008814	0.013887	0.634709	0.5260
AVERAGE_TMT_TENURE	-0.003088	0.001582	-1.951983	0.0518
AVERAGE_TOTAL_ASSETS	-0.017204	0.004129	-4.166459	0.0000
DEPENDENCY_RATIO	0.048580	0.022769	2.133624	0.0336
FEMALE_RATIO	0.006219	0.023361	0.266200	0.7902
LEISURE_AND_RETAIL	0.021498	0.070659	0.304250	0.7611
MANUFACTURING	0.041958	0.071041	0.590618	0.5552
NATURAL_RESOURCES	-0.054270	0.085592	-0.634053	0.5265
OTHER	-0.005333	0.100694	-0.052959	0.9578
PROFESSIONAL_SERVICES	0.034525	0.071598	0.482197	0.6300
PUBLIC_SERVICES_AND_UTIL	0.025508	0.071387	0.357321	0.7211

R-squared	0.100117	Mean dependent var	0.126114
Adjusted R-squared	0.068634	S.D. dependent var	0.124172
S.E. of regression	0.119835	Akaike info criterion	-1.369570
Sum squared resid	4.925621	Schwarz criterion	-1.228069
Log likelihood	256.7834	Hannan-Quinn criter.	-1.313283
F-statistic	3.180051	Durbin-Watson stat	1.970754
Prob(F-statistic)	0.000249		

- **Proposition 2 model 4a: Relationship between age and long-term growth**

Equation: UNTITLED Workfile: SALES GROWTH CROSS V3::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: SALES_GROWTH_AVERAGE
Method: Least Squares
Date: 07/25/15 Time: 15:33
Sample: 1 356
Included observations: 356
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 6.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.066372	0.090686	0.731890	0.4647
AGE	-0.002563	0.001158	-2.214243	0.0275
AVERAGE_TMT_SIZE	-0.037539	0.025404	-1.477682	0.1404
AVERAGE_TMT_TENURE	-0.004041	0.002143	-1.885868	0.0602
AVERAGE_TOTAL_ASSETS	-0.000874	0.006777	-0.129012	0.8974
DEPENDENCY_RATIO	0.022626	0.032713	0.691663	0.4896
FEMALE_RATIO	-1.36E-05	0.027894	-0.000487	0.9996
LEISURE_AND_RETAIL	0.113920	0.070478	1.616382	0.1069
MANUFACTURING	0.112331	0.068923	1.629805	0.1041
NATURAL_RESOURCES	0.081488	0.077901	1.046033	0.2963
OTHER	0.154473	0.077515	1.992821	0.0471
PROFESSIONAL_SERVICES	0.135329	0.069477	1.947819	0.0523
PUBLIC_SERVICES_AND_UTIL	0.100124	0.071827	1.393967	0.1642

R-squared	0.047065	Mean dependent var	-0.008339
Adjusted R-squared	0.013726	S.D. dependent var	0.179563
S.E. of regression	0.178327	Akaike info criterion	-0.574567
Sum squared resid	10.90753	Schwarz criterion	-0.433066
Log likelihood	115.2728	Hannan-Quinn criter.	-0.518280
F-statistic	1.411702	Durbin-Watson stat	1.703414
Prob(F-statistic)	0.158273	Wald F-statistic	2.103260
Prob(Wald F-statistic)	0.016282		

- **Proposition 2 model 4b: Relationship between age and yearly growth**

Equation: UNTITLED Workfile: SALES GROWTH PANEL V3 - WITH PREV Y...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: SALES_GROWTH
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 15:37
Sample: 2006 2013
Periods included: 8
Cross-sections included: 356
Total panel (balanced) observations: 2848
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.084145	5.628819	-1.436206	0.1511
AGE	0.081234	0.050417	1.611242	0.1072
DEPENDENCY_RATIO	-0.697558	1.434484	-0.486278	0.6268
FEMALE_RATIO	-0.529614	1.568496	-0.337657	0.7356
LEISURE_AND_RETAIL	0.010739	4.874730	0.002203	0.9982
MANUFACTURING	-0.489119	4.899313	-0.099834	0.9205
NATURAL_RESOURCES	-0.316850	5.899666	-0.053706	0.9572
OTHER	0.827383	6.941384	0.119196	0.9051
PREVIOUS_YEAR_GROWTH	-0.000240	0.004774	-0.050217	0.9600
PROFESSIONAL_SERVICES	-0.276732	4.938694	-0.056033	0.9553
PUBLIC_SERVICES_AND_UTIL	2.924575	4.925346	0.593781	0.5527
TMT_SIZE	-0.276705	0.863847	-0.320317	0.7488
TMT_TENURE	0.105138	0.091396	1.150358	0.2501
TOTAL_ASSETS	0.456226	0.268252	1.700738	0.0891

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	23.39850	1.0000

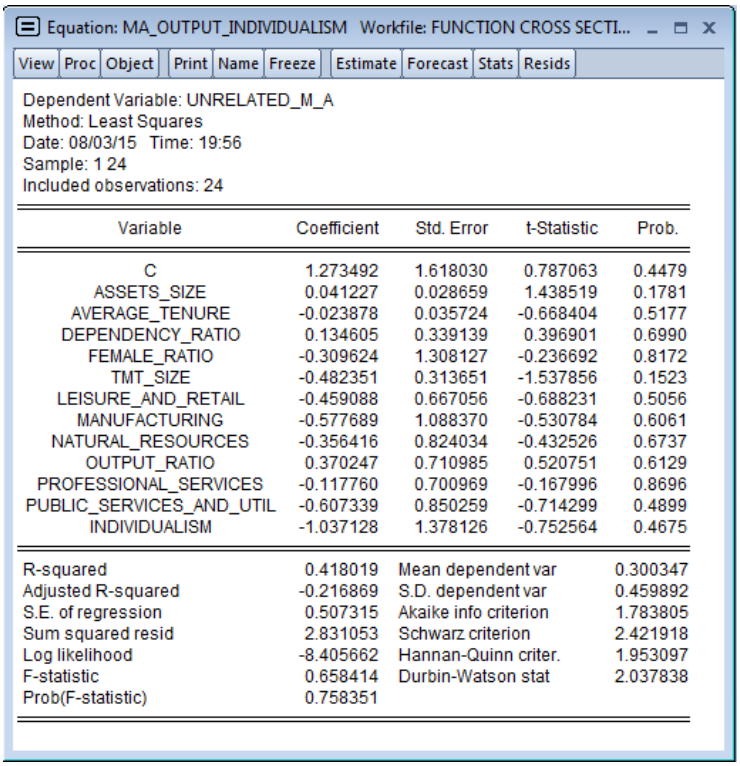
Weighted Statistics

R-squared	0.006409	Mean dependent var	0.639352
Adjusted R-squared	0.001852	S.D. dependent var	23.39051
S.E. of regression	23.36885	Sum squared resid	1547656.
F-statistic	1.406248	Durbin-Watson stat	2.014617
Prob(F-statistic)	0.147972		

Unweighted Statistics

R-squared	0.006409	Mean dependent var	0.639352
Sum squared resid	1547656.	Durbin-Watson stat	2.014617

- **Propositions 3 and 4 model 5: Relationship between functional background and unrelated diversification**



Equation: MA_OUTPUT_INDIVIDUALISM Workfile: FUNCTION CROSS SECTI...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: UNRELATED_M_A
Method: Least Squares
Date: 08/03/15 Time: 19:56
Sample: 1 24
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.273492	1.618030	0.787063	0.4479
ASSETS_SIZE	0.041227	0.028659	1.438519	0.1781
AVERAGE_TENURE	-0.023878	0.035724	-0.668404	0.5177
DEPENDENCY_RATIO	0.134605	0.339139	0.396901	0.6990
FEMALE_RATIO	-0.309624	1.308127	-0.236692	0.8172
TMT_SIZE	-0.482351	0.313651	-1.537856	0.1523
LEISURE_AND_RETAIL	-0.459088	0.667056	-0.688231	0.5056
MANUFACTURING	-0.577689	1.088370	-0.530784	0.6061
NATURAL_RESOURCES	-0.356416	0.824034	-0.432526	0.6737
OUTPUT_RATIO	0.370247	0.710985	0.520751	0.6129
PROFESSIONAL_SERVICES	-0.117760	0.700969	-0.167996	0.8696
PUBLIC_SERVICES_AND_UTIL	-0.607339	0.850259	-0.714299	0.4899
INDIVIDUALISM	-1.037128	1.378126	-0.752564	0.4675

R-squared	0.418019	Mean dependent var	0.300347
Adjusted R-squared	-0.216869	S.D. dependent var	0.459892
S.E. of regression	0.507315	Akaike info criterion	1.783805
Sum squared resid	2.831053	Schwarz criterion	2.421918
Log likelihood	-8.405662	Hannan-Quinn criter.	1.953097
F-statistic	0.658414	Durbin-Watson stat	2.037838
Prob(F-statistic)	0.758351		

- **Propositions 21 and 22 model 6a: Relationship between TMT heterogeneity and profit margin**

  Period 2005-2007

Equation: PM_2007 Workfile: UNTIL 2007 V2 - WITH PREV PROFIT::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: PROFIT_MARGIN
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 16:14
Sample: 2005 2007
Periods included: 3
Cross-sections included: 356
Total panel (balanced) observations: 1068
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016181	0.029605	0.546550	0.5848
ASSETS_SIZE	-0.002064	0.001522	-1.356100	0.1754
DEPENDENCY_RATIO	-0.009830	0.008655	-1.135801	0.2563
LEISURE_AND_RETAIL	0.009567	0.028276	0.338322	0.7352
MANUFACTURING	0.011842	0.028445	0.416329	0.6773
NATURAL_RESOURCES	-0.023925	0.034202	-0.699518	0.4844
OTHER	-0.015015	0.039338	-0.381689	0.7028
PREVIOUS_YEAR_PROFIT	0.394908	0.022999	17.17080	0.0000
PROFESSIONAL_SERVICES	0.051941	0.028738	1.807413	0.0710
PUBLIC_SERVICES_AND_UTIL	0.007423	0.028603	0.259504	0.7953
TMT_BLAU_HETEROGENEITY	-0.038933	0.023584	-1.650817	0.0991
TMT_SIZE	0.022398	0.012762	1.755078	0.0795
TMT_TENURE	0.000979	0.000557	1.758556	0.0789

Effects Specification

	S.D.	Rho
Cross-section random	0.027985	0.1452
Idiosyncratic random	0.067897	0.8548

Weighted Statistics

R-squared	0.214187	Mean dependent var	0.027068
Adjusted R-squared	0.205249	S.D. dependent var	0.088582
S.E. of regression	0.078970	Sum squared resid	6.579266
F-statistic	23.96320	Durbin-Watson stat	1.970734
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.284353	Mean dependent var	0.033258
Sum squared resid	7.839975	Durbin-Watson stat	1.778235

Period 2008-2010

Equation: UNTITLED Workfile: 2008 TO 2010 V2 - WITH PREV PROFIT::Untitl...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: PROFIT_MARGIN
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 16:09
Sample: 2008 2010
Periods included: 3
Cross-sections included: 356
Total panel (balanced) observations: 1068
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.012959	0.029042	-0.446228	0.6555
ASSETS_SIZE	-0.000204	0.001568	-0.130112	0.8965
DEPENDENCY_RATIO	-0.005405	0.008284	-0.652450	0.5143
LEISURE_AND_RETAIL	-0.001854	0.027471	-0.067500	0.9462
MANUFACTURING	-0.010779	0.027648	-0.389854	0.6967
NATURAL_RESOURCES	-0.016951	0.033250	-0.509795	0.6103
OTHER	0.012411	0.038173	0.325119	0.7452
PREVIOUS_YEAR_PROFIT	0.594694	0.020755	28.65253	0.0000
PROFESSIONAL_SERVICES	0.028371	0.027924	1.016009	0.3099
PUBLIC_SERVICES_AND_UTIL	0.008797	0.027816	0.316243	0.7519
TMT_BLAU_HETEROGENEITY	-0.006748	0.019516	-0.345782	0.7296
TMT_SIZE	0.007723	0.009685	0.797410	0.4254
TMT_TENURE	0.001444	0.000539	2.678540	0.0075

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.080861	1.0000

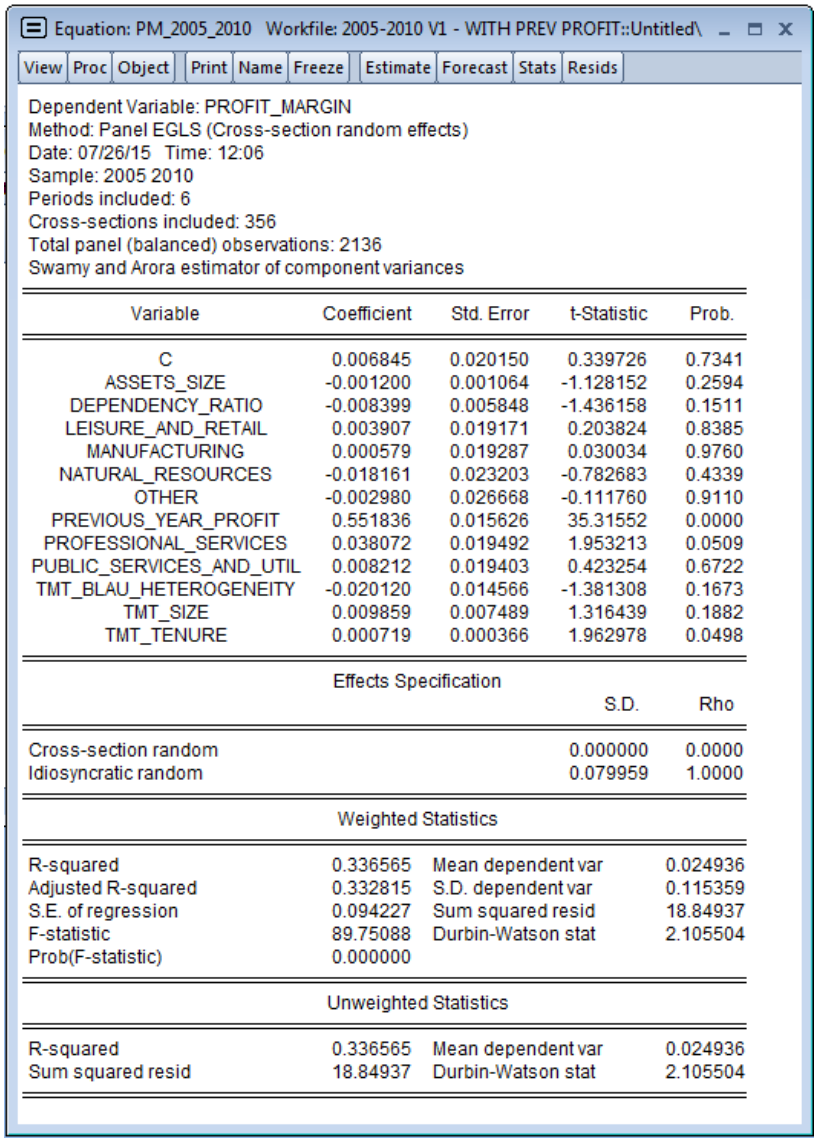
Weighted Statistics

R-squared	0.373676	Mean dependent var	0.016614
Adjusted R-squared	0.366552	S.D. dependent var	0.127365
S.E. of regression	0.101369	Sum squared resid	10.84089
F-statistic	52.45258	Durbin-Watson stat	2.240513
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.373676	Mean dependent var	0.016614
Sum squared resid	10.84089	Durbin-Watson stat	2.240513

Period 2005-2010



Equation: PM_2005_2010 Workfile: 2005-2010 V1 - WITH PREV PROFIT::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: PROFIT_MARGIN
Method: Panel EGLS (Cross-section random effects)
Date: 07/26/15 Time: 12:06
Sample: 2005 2010
Periods included: 6
Cross-sections included: 356
Total panel (balanced) observations: 2136
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006845	0.020150	0.339726	0.7341
ASSETS_SIZE	-0.001200	0.001064	-1.128152	0.2594
DEPENDENCY_RATIO	-0.008399	0.005848	-1.436158	0.1511
LEISURE_AND_RETAIL	0.003907	0.019171	0.203824	0.8385
MANUFACTURING	0.000579	0.019287	0.030034	0.9760
NATURAL_RESOURCES	-0.018161	0.023203	-0.782683	0.4339
OTHER	-0.002980	0.026668	-0.111760	0.9110
PREVIOUS_YEAR_PROFIT	0.551836	0.015626	35.31552	0.0000
PROFESSIONAL_SERVICES	0.038072	0.019492	1.953213	0.0509
PUBLIC_SERVICES_AND_UTIL	0.008212	0.019403	0.423254	0.6722
TMT_BLAU_HETEROGENEITY	-0.020120	0.014566	-1.381308	0.1673
TMT_SIZE	0.009859	0.007489	1.316439	0.1882
TMT_TENURE	0.000719	0.000366	1.962978	0.0498

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.079959	1.0000

Weighted Statistics

R-squared	0.336565	Mean dependent var	0.024936
Adjusted R-squared	0.332815	S.D. dependent var	0.115359
S.E. of regression	0.094227	Sum squared resid	18.84937
F-statistic	89.75088	Durbin-Watson stat	2.105504
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.336565	Mean dependent var	0.024936
Sum squared resid	18.84937	Durbin-Watson stat	2.105504

- **Propositions 21 and 22 model 6b: Relationship between TMT heterogeneity and ROA**

  Period 2005-2007

Equation: UNTITLED Workfile: UNTIL 2007 V1 - WITH PREV ROA::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 16:27
Sample: 2005 2007
Periods included: 3
Cross-sections included: 356
Total panel (balanced) observations: 1068
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.076976	0.034017	2.262895	0.0238
ASSETS_SIZE	-0.007079	0.001760	-4.021235	0.0001
DEPENDENCY_RATIO	-0.005565	0.009966	-0.558435	0.5767
LEISURE_AND_RETAIL	0.014098	0.032426	0.434770	0.6638
MANUFACTURING	0.012493	0.032615	0.383060	0.7018
NATURAL_RESOURCES	-0.007819	0.039213	-0.199400	0.8420
OTHER	-0.053116	0.045107	-1.177553	0.2392
PREVIOUS_YEAR_ROA	0.445270	0.026625	16.72383	0.0000
PROFESSIONAL_SERVICES	0.024465	0.032924	0.743055	0.4576
PUBLIC_SERVICES_AND_UTIL	0.003794	0.032790	0.115698	0.9079
TMT_BLAU_HETEROGENEITY	-0.049413	0.027201	-1.816604	0.0696
TMT_SIZE	0.022464	0.014696	1.528560	0.1267
TMT_TENURE	-0.000643	0.000644	-0.998456	0.3183

Effects Specification

	S.D.	Rho
Cross-section random	0.023951	0.0717
Idiosyncratic random	0.086174	0.9283

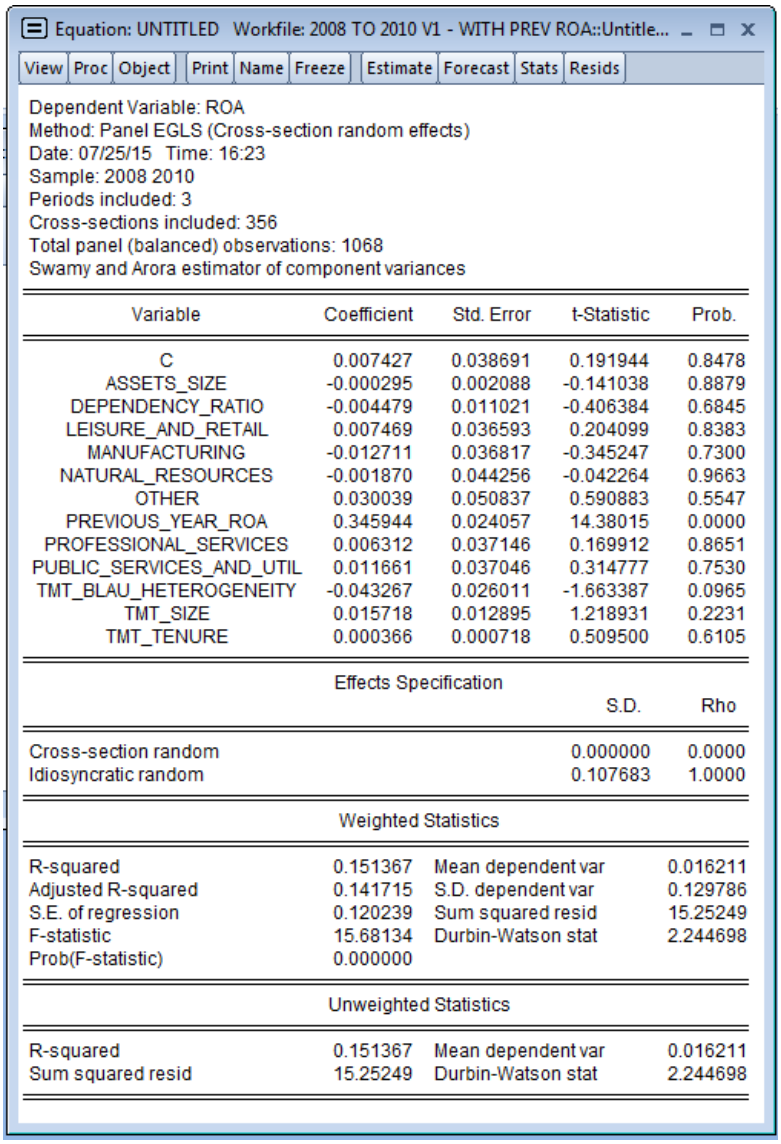
Weighted Statistics

R-squared	0.212718	Mean dependent var	0.041419
Adjusted R-squared	0.203763	S.D. dependent var	0.106245
S.E. of regression	0.094805	Sum squared resid	9.482299
F-statistic	23.75450	Durbin-Watson stat	1.996512
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.244875	Mean dependent var	0.045968
Sum squared resid	10.27245	Durbin-Watson stat	1.895845

Period 2008-2010



Equation: UNTITLED Workfile: 2008 TO 2010 V1 - WITH PREV ROA::Untitle...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 16:23
Sample: 2008 2010
Periods included: 3
Cross-sections included: 356
Total panel (balanced) observations: 1068
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.007427	0.038691	0.191944	0.8478
ASSETS_SIZE	-0.000295	0.002088	-0.141038	0.8879
DEPENDENCY_RATIO	-0.004479	0.011021	-0.406384	0.6845
LEISURE_AND_RETAIL	0.007469	0.036593	0.204099	0.8383
MANUFACTURING	-0.012711	0.036817	-0.345247	0.7300
NATURAL_RESOURCES	-0.001870	0.044256	-0.042264	0.9663
OTHER	0.030039	0.050837	0.590883	0.5547
PREVIOUS_YEAR_ROA	0.345944	0.024057	14.38015	0.0000
PROFESSIONAL_SERVICES	0.006312	0.037146	0.169912	0.8651
PUBLIC_SERVICES_AND_UTIL	0.011661	0.037046	0.314777	0.7530
TMT_BLAU_HETEROGENEITY	-0.043267	0.026011	-1.663387	0.0965
TMT_SIZE	0.015718	0.012895	1.218931	0.2231
TMT_TENURE	0.000366	0.000718	0.509500	0.6105

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.107683	1.0000

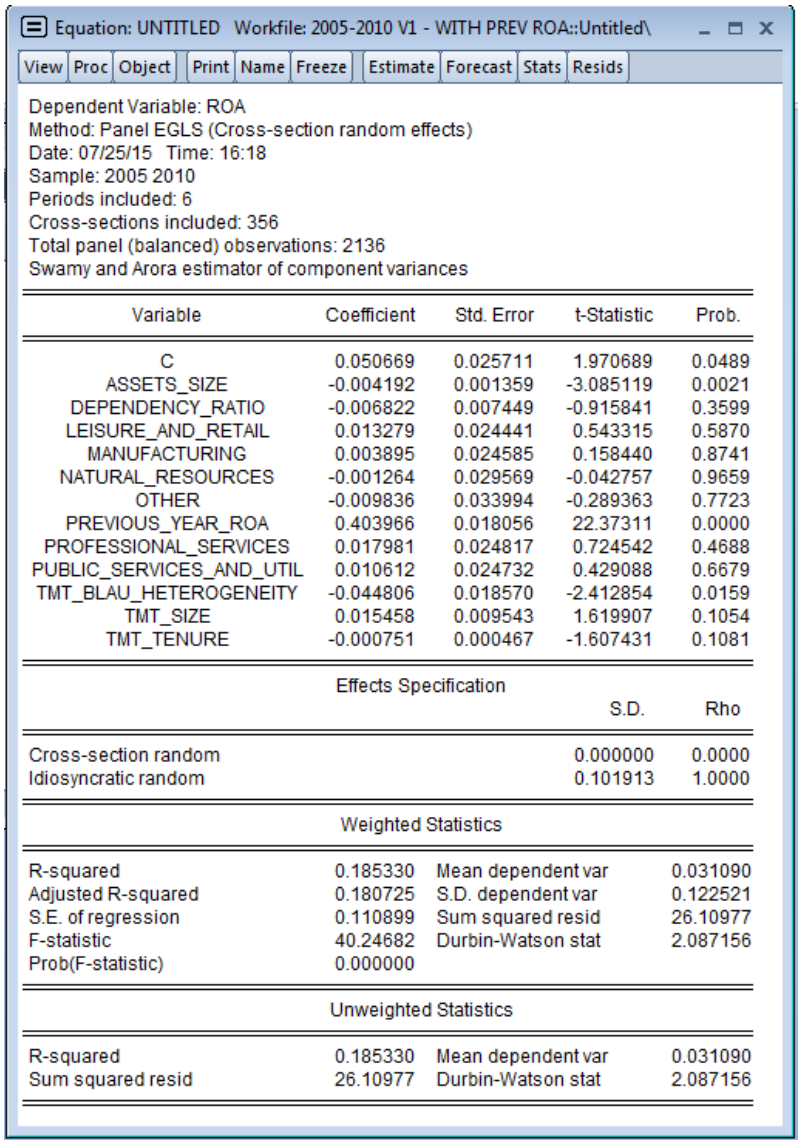
Weighted Statistics

R-squared	0.151367	Mean dependent var	0.016211
Adjusted R-squared	0.141715	S.D. dependent var	0.129786
S.E. of regression	0.120239	Sum squared resid	15.25249
F-statistic	15.68134	Durbin-Watson stat	2.244698
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.151367	Mean dependent var	0.016211
Sum squared resid	15.25249	Durbin-Watson stat	2.244698

Period 2005-2010



Equation: UNTITLED Workfile: 2005-2010 V1 - WITH PREV ROA::Untitled\

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 07/25/15 Time: 16:18
Sample: 2005 2010
Periods included: 6
Cross-sections included: 356
Total panel (balanced) observations: 2136
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.050669	0.025711	1.970689	0.0489
ASSETS_SIZE	-0.004192	0.001359	-3.085119	0.0021
DEPENDENCY_RATIO	-0.006822	0.007449	-0.915841	0.3599
LEISURE_AND_RETAIL	0.013279	0.024441	0.543315	0.5870
MANUFACTURING	0.003895	0.024585	0.158440	0.8741
NATURAL_RESOURCES	-0.001264	0.029569	-0.042757	0.9659
OTHER	-0.009836	0.033994	-0.289363	0.7723
PREVIOUS_YEAR_ROA	0.403966	0.018056	22.37311	0.0000
PROFESSIONAL_SERVICES	0.017981	0.024817	0.724542	0.4688
PUBLIC_SERVICES_AND_UTIL	0.010612	0.024732	0.429088	0.6679
TMT_BLAU_HETEROGENEITY	-0.044806	0.018570	-2.412854	0.0159
TMT_SIZE	0.015458	0.009543	1.619907	0.1054
TMT_TENURE	-0.000751	0.000467	-1.607431	0.1081

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.101913	1.0000

Weighted Statistics

R-squared	0.185330	Mean dependent var	0.031090
Adjusted R-squared	0.180725	S.D. dependent var	0.122521
S.E. of regression	0.110899	Sum squared resid	26.10977
F-statistic	40.24682	Durbin-Watson stat	2.087156
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.185330	Mean dependent var	0.031090
Sum squared resid	26.10977	Durbin-Watson stat	2.087156

Appendix 2 – E-views heteroscedasticity and autocorrelation tests

In order to assure the correctness of the results presented above, heteroscedasticity and autocorrelation tests were run on the cross-section models, using the tool E-views.

- **Proposition 1 model 2: Relationship between age and unrelated diversification**

Heteroskedasticity Test: White

F-statistic	0.630107	Prob. F(69,64)	0.9696
Obs*R-squared	54.20646	Prob. Chi-Square(69)	0.9040
Scaled explained SS	74.12337	Prob. Chi-Square(69)	0.3148

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/03/15 Time: 20:04
Sample: 1 134
Included observations: 134
Collinear test regressors dropped from specification

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.539947	Prob. F(1,119)	0.4639
Obs*R-squared	0.605261	Prob. Chi-Square(1)	0.4366

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/03/15 Time: 20:05
Sample: 1 134
Included observations: 134
Presample missing value lagged residuals set to zero.

- **Proposition 2 model 3a: Relationship between age and profit margin volatility**

Heteroskedasticity Test: White

F-statistic	1.147633	Prob. F(60,295)	0.2294
Obs*R-squared	67.37089	Prob. Chi-Square(60)	0.2396
Scaled explained SS	78.78876	Prob. Chi-Square(60)	0.0523

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/25/15 Time: 16:33
Sample: 1 356
Included observations: 356
Collinear test regressors dropped from specification

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.081482	Prob. F(1,342)	0.0801
Obs*R-squared	3.178982	Prob. Chi-Square(1)	0.0746

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/25/15 Time: 16:33
Sample: 1 356
Included observations: 356
Presample missing value lagged residuals set to zero.

- **Proposition 2 model 3b: Relationship between age and ROA volatility**

Heteroskedasticity Test: White

F-statistic	0.583483	Prob. F(60,295)	0.9935
Obs*R-squared	37.76622	Prob. Chi-Square(60)	0.9890
Scaled explained SS	155.5168	Prob. Chi-Square(60)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/25/15 Time: 15:26
Sample: 1 356
Included observations: 356
Collinear test regressors dropped from specification

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.073388	Prob. F(1,342)	0.7866
Obs*R-squared	0.076376	Prob. Chi-Square(1)	0.7823

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/25/15 Time: 15:27
Sample: 1 356
Included observations: 356
Presample missing value lagged residuals set to zero.

- **Proposition 2 model 4a: Relationship between age and long-term growth**

Heteroskedasticity Test: White

F-statistic	0.770681	Prob. F(60,295)	0.8881
Obs*R-squared	48.24087	Prob. Chi-Square(60)	0.8623
Scaled explained SS	672.2658	Prob. Chi-Square(60)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/25/15 Time: 15:32
Sample: 1 356
Included observations: 356
Collinear test regressors dropped from specification

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.994744	Prob. F(1,342)	0.0050
Obs*R-squared	8.131919	Prob. Chi-Square(1)	0.0043

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/25/15 Time: 15:32
Sample: 1 356
Included observations: 356
Presample missing value lagged residuals set to zero.

- **Propositions 3 and 4 model 5: Relationship between functional background and unrelated diversification**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.900563	Prob. F(12,11)	0.5723
Obs*R-squared	11.89366	Prob. Chi-Square(12)	0.4543
Scaled explained SS	2.224067	Prob. Chi-Square(12)	0.9990

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/03/15 Time: 19:59
Sample: 1 24
Included observations: 24

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.045525	Prob. F(1,10)	0.8353
Obs*R-squared	0.108764	Prob. Chi-Square(1)	0.7416

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/03/15 Time: 19:58
Sample: 1 24
Included observations: 24
Presample missing value lagged residuals set to zero.

Appendix 3 – E-views Levene tests on models 3a and 3b

In order to confirm if there is a statistical difference between the profit margin and the ROA volatility of firms with different TMT members' age, the database was divided between big TMT size firms and small TMT size firms, and was then divided in quintiles according to the age.

The variance of the profit margin of each quintile was compared with the other quintiles of the database.

- **Propositions 2 model 3a: Relationship between age and profit margin volatility**

  Large TMT firms

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_2
Date: 07/25/15 Time: 17:57
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	2	3.094492	0.2128
Levene	(2, 87)	0.160881	0.8516
Brown-Forsythe	(2, 87)	0.064521	0.9376

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_3
Date: 07/25/15 Time: 17:58
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	38.92120	0.0000
Levene	(4, 85)	12.04933	0.0000
Brown-Forsythe	(4, 85)	3.988092	0.0052

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 17:59
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	5	6.120940	0.2946
Levene	(5, 84)	1.087012	0.3736
Brown-Forsythe	(5, 84)	0.640707	0.6693

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:00
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	2	9.175851	0.0102
Levene	(2, 87)	1.642354	0.1995
Brown-Forsythe	(2, 87)	0.487944	0.6156

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_3
Date: 07/25/15 Time: 18:00
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	21.45394	0.0003
Levene	(4, 85)	5.878285	0.0003
Brown-Forsythe	(4, 85)	3.556959	0.0099

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 18:01
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	5	3.418695	0.6357
Levene	(5, 84)	0.489717	0.7831
Brown-Forsythe	(5, 84)	0.283540	0.9209

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:02
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	2	4.828862	0.0894
Levene	(2, 87)	1.152934	0.3205
Brown-Forsythe	(2, 87)	1.122256	0.3302

Test for Equality of Variances of PROFIT_MARGIN_3
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 18:02
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	5	2.179755	0.8238
Levene	(5, 84)	0.239242	0.9440
Brown-Forsythe	(5, 84)	0.109873	0.9899

Test for Equality of Variances of PROFIT_MARGIN_3
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:03
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	2	14.95621	0.0006
Levene	(2, 87)	6.246531	0.0029
Brown-Forsythe	(2, 87)	4.421953	0.0148

Test for Equality of Variances of PROFIT_MARGIN_4
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:04
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	2	61.30693	0.0000
Levene	(2, 87)	8.146897	0.0006
Brown-Forsythe	(2, 87)	6.508240	0.0023

Small TMT firms

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_2
Date: 07/25/15 Time: 18:06
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	43.90761	0.0000
Levene	(3, 606)	14.17174	0.0000
Brown-Forsythe	(3, 606)	9.886997	0.0000

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_3
Date: 07/25/15 Time: 18:06
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	9.193761	0.0268
Levene	(3, 606)	2.758217	0.0416
Brown-Forsythe	(3, 606)	1.126915	0.3375

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 18:07
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	44.02415	0.0000
Levene	(3, 606)	3.595211	0.0135
Brown-Forsythe	(3, 606)	2.424833	0.0647

Test for Equality of Variances of PROFIT_MARGIN_1
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:08
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	11.57309	0.0090
Levene	(3, 606)	1.900041	0.1284
Brown-Forsythe	(3, 606)	1.116236	0.3418

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_3
Date: 07/25/15 Time: 18:08
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	66.93295	0.0000
Levene	(3, 606)	10.44136	0.0000
Brown-Forsythe	(3, 606)	6.861606	0.0001

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 18:09
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	62.18035	0.0000
Levene	(3, 606)	6.868155	0.0001
Brown-Forsythe	(3, 606)	4.101266	0.0068

Test for Equality of Variances of PROFIT_MARGIN_2
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:10
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	18.26376	0.0004
Levene	(3, 606)	6.296702	0.0003
Brown-Forsythe	(3, 606)	3.994713	0.0078

Test for Equality of Variances of PROFIT_MARGIN_3
Categorized by values of PROFIT_MARGIN_4
Date: 07/25/15 Time: 18:10
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	57.79801	0.0000
Levene	(3, 606)	5.982074	0.0005
Brown-Forsythe	(3, 606)	3.294610	0.0202

Test for Equality of Variances of PROFIT_MARGIN_3
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:11
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	22.56026	0.0000
Levene	(3, 606)	3.141427	0.0249
Brown-Forsythe	(3, 606)	1.185697	0.3144

Test for Equality of Variances of PROFIT_MARGIN_4
Categorized by values of PROFIT_MARGIN_5
Date: 07/25/15 Time: 18:11
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	72.08375	0.0000
Levene	(3, 606)	8.140648	0.0000
Brown-Forsythe	(3, 606)	7.194035	0.0001

- **Proposition 2 model 3b: Relationship between age and ROA volatility**

Large TMT firms

Test for Equality of Variances of ROA_1
Categorized by values of ROA_2
Date: 07/25/15 Time: 17:02
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	20.66007	0.0004
Levene	(4, 85)	1.939204	0.1113
Brown-Forsythe	(4, 85)	1.629128	0.1744

Test for Equality of Variances of ROA_1
Categorized by values of ROA_3
Date: 07/25/15 Time: 17:03
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	3	63.32143	0.0000
Levene	(3, 86)	5.339351	0.0020
Brown-Forsythe	(3, 86)	3.414470	0.0210

Test for Equality of Variances of ROA_1
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:04
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	3	13.77010	0.0032
Levene	(3, 86)	0.710652	0.5483
Brown-Forsythe	(3, 86)	0.531936	0.6616

Test for Equality of Variances of ROA_1
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:04
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	0.348370	0.9865
Levene	(4, 85)	0.318176	0.8651
Brown-Forsythe	(4, 85)	0.318287	0.8650

Test for Equality of Variances of ROA_2
Categorized by values of ROA_3
Date: 07/25/15 Time: 17:05
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	3	4.137121	0.2470
Levene	(3, 86)	0.599491	0.6171
Brown-Forsythe	(3, 86)	0.402487	0.7516

Test for Equality of Variances of ROA_2
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:06
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	3	16.08072	0.0011
Levene	(3, 86)	1.168592	0.3265
Brown-Forsythe	(3, 86)	1.036827	0.3805

Test for Equality of Variances of ROA_2
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:07
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	11.84847	0.0185
Levene	(4, 85)	3.753613	0.0073
Brown-Forsythe	(4, 85)	2.179331	0.0781

Test for Equality of Variances of ROA_3
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:07
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	3	62.58532	0.0000
Levene	(3, 86)	2.340638	0.0789
Brown-Forsythe	(3, 86)	0.796795	0.4990

Test for Equality of Variances of ROA_3
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:08
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	8.289057	0.0815
Levene	(4, 85)	0.104757	0.9806
Brown-Forsythe	(4, 85)	0.141315	0.9663

Test for Equality of Variances of ROA_4
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:09
Sample: 1 90
Included observations: 90

Method	df	Value	Probability
Bartlett	4	73.19622	0.0000
Levene	(4, 85)	2.308303	0.0645
Brown-Forsythe	(4, 85)	1.552473	0.1945

Small TMT firms

Test for Equality of Variances of ROA_1
Categorized by values of ROA_2
Date: 07/25/15 Time: 17:22
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	0.857904	0.8356
Levene	(3, 606)	0.971793	0.4056
Brown-Forsythe	(3, 606)	0.597414	0.6169

Test for Equality of Variances of ROA_1
Categorized by values of ROA_3
Date: 07/25/15 Time: 17:23
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	3.452784	0.3269
Levene	(3, 606)	0.651949	0.5819
Brown-Forsythe	(3, 606)	0.410975	0.7452

Test for Equality of Variances of ROA_1
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:23
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	5	43.32510	0.0000
Levene	(5, 604)	0.797393	0.5518
Brown-Forsythe	(5, 604)	0.689683	0.6314

Test for Equality of Variances of ROA_1
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:24
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	4	77.12524	0.0000
Levene	(4, 605)	2.912026	0.0210
Brown-Forsythe	(4, 605)	1.645717	0.1612

Test for Equality of Variances of ROA_2
Categorized by values of ROA_3
Date: 07/25/15 Time: 17:25
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	3	12.02097	0.0073
Levene	(3, 606)	4.590619	0.0035
Brown-Forsythe	(3, 606)	2.040254	0.1071

Test for Equality of Variances of ROA_2
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:25
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	5	240.8804	0.0000
Levene	(5, 604)	20.46156	0.0000
Brown-Forsythe	(5, 604)	6.212200	0.0000

Test for Equality of Variances of ROA_2
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:26
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	4	75.23222	0.0000
Levene	(4, 605)	3.695695	0.0055
Brown-Forsythe	(4, 605)	2.408439	0.0483

Test for Equality of Variances of ROA_3
Categorized by values of ROA_4
Date: 07/25/15 Time: 17:27
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	5	54.91577	0.0000
Levene	(5, 604)	1.936198	0.0865
Brown-Forsythe	(5, 604)	1.157065	0.3290

Test for Equality of Variances of ROA_3
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:27
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	4	14.93914	0.0048
Levene	(4, 605)	1.272384	0.2795
Brown-Forsythe	(4, 605)	0.438868	0.7806

Test for Equality of Variances of ROA_4
Categorized by values of ROA_5
Date: 07/25/15 Time: 17:28
Sample: 1/01/2004 3/02/2013
Included observations: 610

Method	df	Value	Probability
Bartlett	4	30.71332	0.0000
Levene	(4, 605)	5.028391	0.0005
Brown-Forsythe	(4, 605)	2.334050	0.0545

Appendix 4 – E-views Anova tests on models 6a and 6b

In order to confirm if there is a statistical difference between the performance of firms on the stable and turbulent periods, an Anova analysis was performed comparing the profit margins and the ROA of each firm in each one of the sub-periods.

- **Propositions 21 and 22 model 6a: Relationship between TMT heterogeneity and profit margin**

Series: PROFIT_MARGIN_2007 Workfile: ANOVA HETERO ...

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Test for Equality of Means of PROFIT_MARGIN_2007
Categorized by values of PROFIT_MARGIN_2011
Date: 07/25/15 Time: 17:41
Sample: 1 1068
Included observations: 1068

Method	df	Value	Probability
Anova F-test	(3, 1064)	34.64377	0.0000
Welch F-test*	(3, 13.2976)	12.04930	0.0004

*Test allows for unequal cell variances

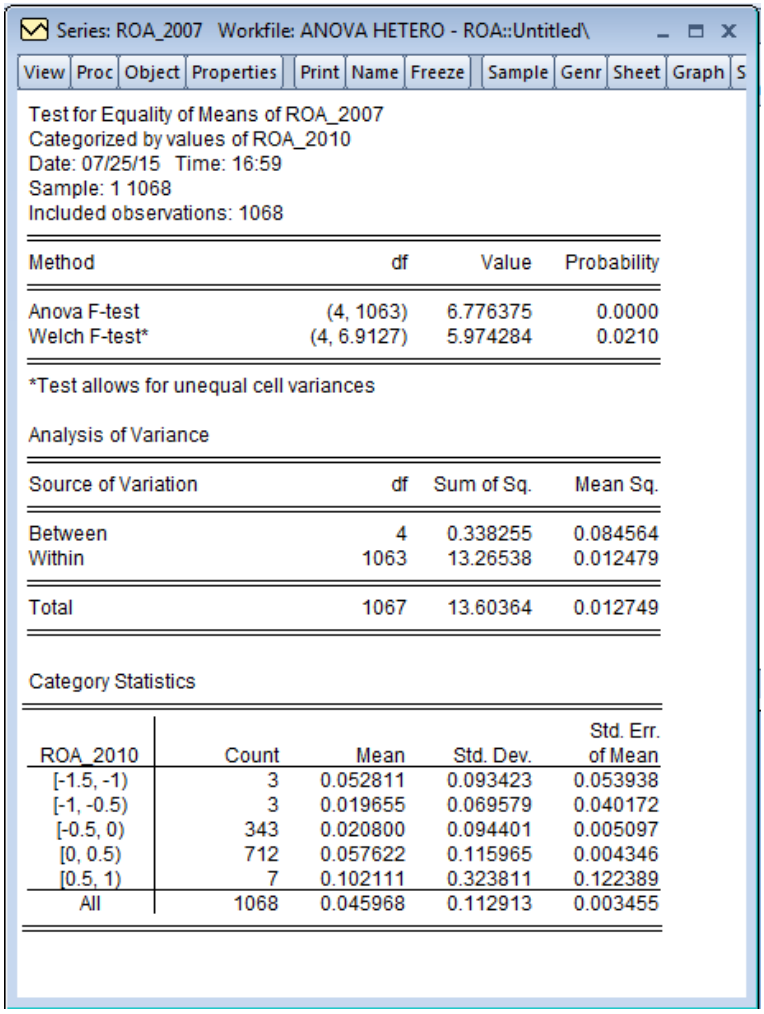
Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	3	0.974865	0.324955
Within	1064	9.980216	0.009380
Total	1067	10.95508	0.010267

Category Statistics

PROFIT_M...	Count	Mean	Std. Dev.	Std. Err. of Mean
[-1, -0.5)	4	0.023918	0.019831	0.009915
[-0.5, 0)	345	0.007850	0.094607	0.005093
[0, 0.5)	707	0.041603	0.092644	0.003484
[0.5, 1)	12	0.275224	0.276432	0.079799
All	1068	0.033258	0.101327	0.003101

- **Propositions 21 and 22 model 6b: Relationship between TMT heterogeneity and ROA**



Series: ROA_2007 Workfile: ANOVA HETERO - ROA::Untitled\

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Test for Equality of Means of ROA_2007
Categorized by values of ROA_2010
Date: 07/25/15 Time: 16:59
Sample: 1 1068
Included observations: 1068

Method	df	Value	Probability
Anova F-test	(4, 1063)	6.776375	0.0000
Welch F-test*	(4, 6.9127)	5.974284	0.0210

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	4	0.338255	0.084564
Within	1063	13.26538	0.012479
Total	1067	13.60364	0.012749

Category Statistics

ROA_2010	Count	Mean	Std. Dev.	Std. Err. of Mean
[-1.5, -1)	3	0.052811	0.093423	0.053938
[-1, -0.5)	3	0.019655	0.069579	0.040172
[-0.5, 0)	343	0.020800	0.094401	0.005097
[0, 0.5)	712	0.057622	0.115965	0.004346
[0.5, 1)	7	0.102111	0.323811	0.122389
All	1068	0.045968	0.112913	0.003455

Appendix 5 – Classification rules for acquisitions and functional background

➢ Corporate acquisition classification

The initial database comprised almost five thousand corporate acquisitions which had to be classified according to their nature, either being related or unrelated businesses. A business was considered to be related if its base sector descriptions were similar.

The table below provides a sample of the classification of related businesses by sector:

Table 28 - Sample of classification by base sector

Sector	Different base sectors
Financial services and banking sector	Financial consulting
	Asset management
	Banking services
	Accountancy
Specialized consultancy	Web and graphic design
	Product development
	Advertizement
	Architectural services
Farmaceutical and life sciences	Biotechnology
	Farmaceutical company
	Hospital Management
Hospitality, travelling and transportation	Air transport companies
	Hotel management
	Logistics and transport services
	Aircraft manufacturing
Telecomunications	TV, internet and cable services
	Comunication services
	Mobile gaming
Real Estate and Contruction	Real Estate development and Management
	Construction companies
	Building materials production and distribution
Aggriculture	Food retailers
	Pesticides
	Aggricultural machinery
Electricity and other comodities	Cooling systems
	Power plants
	Electric machinery
Minning	Mineral minning
	Metals minning
	Coal minning

- **Functional background classification**

In order to perform the functional background classification a simple rule was used, output functions were considered to be mainly associated with innovation, growth, inter-company relationships, and sales.

Therefore, the following sample table allows to understand the types of functions associated with the output and throughput functional backgrounds:

Table 29 - Functional background classification

Function	Job role
Output	Marketing and Public relations
	Top Management
	Supply chain management (sales and distribution)
	R&D
	Legal services
	Strategy development
	Asset management
	Politics and Diplomacy
	Human Resources
Throughput	Engeneering and internal development
	Accounting and financial controling
	Operational management
	Input processing
	Production management
	Equipment instalation
	Internal and external audit