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OWNERSHIP STRUCTURE
ON THE PERFORMANCE OF
INNOVATIVE
COMPANIES IN THE US**

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THE INFLUENCE OF THE OWNERSHIP STRUCTURE ON THE PERFORMANCE OF INNOVATIVE COMPANIES IN THE US⁴

Innovative companies are a major driver of the global economy. The typical major owner is an institutional investor. In recent years the stakes of institutional owners have increased, which should increase the role of institutional investors. Institutional investors, however, differ. Traditional investment managers, banks, insurance companies and hedge funds have different goals and strategies, so their roles in firms differ significantly. In this article we analyze the difference between technology and non-technology companies to find out the reason for the success of fast-growing corporations. This research uses a Generalized Least Square model on a sample of 12,565 firm-year observations 2004–15, to justify the assumption that different types of investors have different effects on the performance of innovative companies. The research reveals a distinction between the type of investor and the investor strategy. By focusing on the concentration of ownership, we demonstrate the performance effect on different blockholders. Our findings suggest, first, that grey investors decrease firm value; second, that passive independent institutions enhance firm performance in virtue of their active monitoring and long-term investment horizons; third, that innovative firms have different ownership patterns to traditional ones.

JEL Classification: G32.

Keywords: ownership structure, institutional investors, innovative companies, ownership concentration

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Introduction

An investigation of ownership and control issues represent a significant part of corporate finance research. A wide range of studies concern the relationship between dispersed shareholder ownership and management control (Fama, Jensen, 1983). However, according to recent research ownership in the US is not as dispersed as it was. Holderness (2009) states that around 89% of S&P 500 firms have blockholders. Besides, the shareholding's of institutional investors, such as equity mutual funds and other, so called "passive" investors, have dramatically increased (Appel et al., 2016).

According to Jensen, Meckling (1976), large stakeholders have incentives to monitor and to control management. Ownership concentration is one way to diminish agency costs and to improve firm performance (Shleifer, Vishny 1986). However, the cross-national research conducted by La Porta, Lopez-de-Silanes, Shleifer (1999) argues that the agency conflict exists both in highly concentrated firms and in those without large shareholders. Bebchuk, Weisbach (2010) argue that a high concentration may lead to the principal-agent problem between major and minor shareholders. Conflict mitigation can be undertaken by both outside members of boards and shareholders of particular types, which follows the release G20/OECD Principles of Corporate Governance 2015, postulating that different types of owners, such as state, family, or organizational institution shape corporate governance characteristics. Taking into account that banks, pension funds, individuals, institutional investors and families have different goals, different interests and strategies with different risk preferences and different time horizons (Aguilera, Crespi-Cladera, 2016), Ma, Yiu and Zhou (2014) use the following classification of outsiders: relational investors, such as families and the state, who focus on long-term profits and growth goals; and transactional investors, who have no relationship with the firm besides their shareholding.

As ownership characteristics influence the agency cost burden and the management-ownership relationship, we have to carefully monitor them in an investigation of firm performance drivers. The type of investor, their preferences and stake could play a crucial role in this relationship. For instance, Chen et al. (2007) documented that pension funds, insurance companies and banks are the type of investors who are short-term goal oriented and more risk-averse with a preference for low dividends. Erenburg et al. (2016) emphasize that traditional investment managers are organizations that manage portfolios on behalf of individuals or public investors (pension fund, endowments etc.), which is why they are characterized as long-term oriented organizations with well diversified portfolios and lower risk preferences. We provide two examples in order to show that innovative firms of similar ages have different capital structures. In the ownership structure of the first firm we see the predominance of active traditional investment managers, while the second is more dynamic and is dominated by passive investors. In Incyte Corp⁵, 2004–15, most of the five major shareholders were active traditional investment managers T. Rowe Price Group Inc., Baker Bros. Advisors LLC, Capital Research and Management Company and FMR LLC. In contrast, Juniper Networks Inc.⁶ was held for four years by T. Rowe Price Group, Inc. (10–15%) (active traditional investment managers) and,

⁵ Pharmaceuticals, Biotechnology & Life Sciences industry, incorporated in 1991 and became public in 1993 with Net Income: US\$186.5 million in 2011

⁶ Hardware and Equipment industry, founded in 1996, incorporated in 1999 with revenue US\$ 4.85 billion in 2015

then, a hedge fund (Elliott Management Corporation – 9%) became the major shareholder in 2015 the next major investor was Vanguard (passive traditional investment managers) with 8%. In this article we apply the basic classification of institutional investors type – the division into grey and independent (Chen et al., 2007; Ferreira, Matos, 2008). Grey institutions are banks, insurance companies, pension funds and others that have a potential relationship with the investee, while independent firms are traditional investment managers, which do not have a direct connection with a firm. Brickley et al. (1988) suppose that grey institutions will follow the “Wall Street Rule” and vote in line with management team, whereas independent institutions without a direct relationship with the investee will vote independently, so be pressure-insensitive (Lin, Fu, 2017). However, in the academic literature the simultaneous influence of both types of owners and the ownership concentration on firm performance has been neglected. In this paper, we observe the influence of ownership in three dimensions: the type of institutional owner (independent, grey), the investor strategy (level of activeness) and the size of the stake. Our first contribution is the examination of the influence of various types of institutional owners on firm performance.

Companies from the sector of innovation technologies have become the leaders of the global economy (Apple, Microsoft, Facebook, Amazon), surpassing oil and gas (ExxonMobil, BP) and finance (HSBC, JP Morgan Chase)⁷. Moreover, start-up activity in the technological sector has been increasing over time (see the rise in the Rate of Startup Growth of the Kauffman index by 11.5% from 2013)⁸. According to the UNESCO Institute of statistics global R&D spending peaked at almost US\$1.7 trillion, where the proportion of the US is 37.9% in 2013, surpassing all other regions⁹. These structural movements prompted the large number of studies devoted to the innovativeness of firms. A separate examination of innovative firms is necessary since these firms differ significantly in asset structure, transparency, the level of intellectual capital involved, and the need for high-speed decision making.

There are a large number of recent studies on innovative companies but they are mostly focused on the relationship between R&D activities and the performance or innovativeness of a firm (Baysinger, Kosnik, Turk, 1991; Hoskisson et al., 2002; Cleyn, Braet, 2012; Choi, Park, Hon, 2012; Rafiq, Salim, Russell, 2016). There is also ongoing debate on the extent to which different characteristics of innovative firms influence their performance. Among the major features are the composition of the board of directors and intellectual capital (Hull, Rothenberg, 2008; Jiménez-Jiménez, Sanz-Valle, 2011; Erisson, Qin, Wang, 2015; Héroux, Fortin, 2016), ownership structure (Gavious, Hirsh, Kaufman, 2015; Hsu, Lai, Li, 2016; Colombo, Croce, Murtinu, 2014), and industry specifications (Chi, Lieu, Hung, 2016). In all these studies little attention was paid to the investigation of the ownership structure of innovative companies in terms of the relationship between the type of owner and ownership concentration. Thus, our second contribution fills this gap in the field of corporate finance.

Our study shows that specific types of investors affect firm performance, measured by Tobin’s Q, ROE, ROA. Using the Ferreira and Matos (2008) classification of “grey-independent” institutions and adding to its two additional types: state and strategic, we found

⁷ See, for example, PwC Global Top 100 Companies by market capitalization, 2016

⁸ See, <http://www.kauffman.org/kauffman-index/profiles?loc=US&name=united-states&breakdowns=startup-activity|overall.main-street|overall.growth|overall#indicator-panel-se-index>

⁹ See, <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

evidence that the type of investor matters. We also found that the strategy (passive, active) and the ownership concentration affect the performance of innovative companies. The empirical analysis shows a positive effect of ownership concentrated in the hands of passive institutional blockholders and the ownership concentration of strategic investors positively related to Tobin's Q and ROA; the presence of grey institutions negatively affected firm performance. As there is little state ownership in innovative US firms, the influence of state ownership was not confirmed in all regression models. The findings of strategic owners differ among high-tech industries. Overall, innovative firms have different ownership patterns from non-innovative ones.

The paper is organized as follows. We start with a literature review and the hypotheses, including the following issues: firm performance and different types of investors, institutional ownership and blockholders. The next section shows the empirical research, including data description, methodology derivation and the presentation and interpretation of the results. Last section contains the conclusion, and the contribution and limitations of this study.

Literature review

Types of investors and corporate performance

In the literature, there are three similar basic classifications of institutional investors: the classification by pressure-insensitive and pressure-sensitive (Cornett et al., 2007; Jafarinejad, Jory, Ngo, 2015; Lin, Fu, 2017), by relational and transactional (David et al., 2010; Aguilera et al., 2013; Ma, Yiu, Zhou, 2014), and by grey and independent (Chen et al., 2007; Ferreira, Matos, 2008). Since we are more interested in the preferences and risk aversion of investors, rather than the data on portfolio turnover, we use the third specification.

Brickley et al. (1988) argue that institutions such as bank trusts, insurance companies and pension funds could have a potential relationship with the firm (relational) therefore they are loyal to corporate management decisions (pressure-sensitive). Such institutions are more likely to follow the "Wall Street Rule" by supporting the management or selling their shares if some disagreements occur. As a consequence, the authors mentioned that outsiders (institutions without a direct relationship with a firm) with a small fraction of shares will be free-riders in the voting process, whereas large shareholders will be more active.

An idea similar to the relationship between investors and management lies in the classification, proposed by Chen, Harford, Li (2007), adopted by Ferreira, Matos (2008). An independent institutional investor potentially has no business relationships with the firm, so they are not subject to pressure from firm management. In contrast, grey institutions are loyal to corporate management because of probable business relations. For 1,815 international completed acquisitions, Chen et al., (2007) found that independent long-term (more than one year) institutions (investment companies and independent investment advisors) are less likely to undertake bad deals, which destroy value, while grey institutions (public pension funds, banks, insurance companies, endowments and foundations) and short-term institutions plausibly have poorer post-merger performance. Bena, Ferreira, Matos (2016) present evidence that long-term foreign investors not only enhance firm performance but are also associated with higher innovation and R&D activities, the growth of fixed assets, and a better quality of human capital. Minettia et al. (2015) confirm a positive relationship between institutional ownership and product innovation, but the authors detect that the concentration is better only for small

companies, with less than 34 employees. Erenburg, Smith, Smith (2016) found both grey and independent institutions reduce their holding in underperforming firms prior to their failure, in contrast to activist pension funds, for which holdings are negatively correlated with the firm performance.

Institutional independent investors effectively monitor and control management by “voting with their feet” in times of dissatisfaction and disagreement (Cornett et al., 2007). There is a large body of academic literature which proposes that some types of investors are better at monitoring firm activity (Elyasiani, Jia 2010). The overall results suggest that the presence of long-term, stable institutional investors is associated with lower risk and higher performance. However, if we assume that some types of investor add greatly to firm performance, how can we measure this activity? One answer is by using investor strategy.

Recent studies consider two institutional investor strategies: active and passive. Passive owners are more likely to earn a return from the market index or from different strategies (small-cap, growth etc.), while active owners, through stock trading, can influence management decisions (Appel et al., 2016). Scholars commonly divide activists into activist pension funds and activist hedge funds. Carleton et al. (1988) provide some evidence that activist pension funds have a positive influence on stock performance, whereas Karpoff (2001) show that this effect is negligible. However, other researchers conclude that the intervention of activist hedge funds leads to operating improvements in the subsequent year (Klein, Zur, 2009) and in the following 3 years (Brav et al., 2008). Studies on developed (Bushee, 1998) and emerging markets (Mehrani et al., 2017) show that an increase in active ownership leads to higher earnings. Other studies are mainly focused on passive ownership or passive mutual funds. Appel, Gormley, Keimb (2016) found that the presence of passive mutual funds reduces the probability of takeover, increases board independence, and encourages long-term performance by virtue of large blocks and the equality of voting rights. Even so, different results were obtained by Schmidta, Fahlenbrach (2017). Using the same technique for the period 1992–2010 the authors detect that the announcement of a new independent director negatively affects the abnormal return, so an endogenous increase in passive ownership leads to a rise in managerial power. Thus, the authors conclude, passive ownership could not have enough capacity to monitor management, especially for M&A deals. These two different findings lead us to conclude that the cost of activity matters: if low-cost governance monitoring takes place, passive owners positively affect firm performance; the opposite is true if costs are high. Nonetheless, the authors have overlooked that the opposite direction has to be taken into consideration – passive owners could alter their holdings after a change in firm performance. Overall, the topic of activism is widely debated, but taking into account different types of institutional ownership, we also consider plausible effects of investor activity.

As mentioned in the literature, grey institutions are loyal to the management because of business relations that they try to maintain. This type of investor is short-term oriented and more risk-averse with a preference for low dividends (Chen et al., 2007). In our paper this type of investor includes banks/investments banks, pension funds, educational endowments, insurance companies, and Family Offices. Banks could support management decisions and be passive to corporate governance in order to establish agreements and useful contracts. In our sample data among the largest shareholders we observe 42 banks with a 16% stake on average in all industries. The leader is Credit Suisse with a 36% ownership in CommVault Systems Inc

(Software & Services) in 2006. Pension funds include corporate, government and union pension funds. They are organizations with a fiduciary duty to pay pension benefits. Because of their well diversified portfolios and long-term horizons, they are less risk-averse, which is why they do not enter into debates with management. There are only 3 firms where the largest shareholder is a pension fund, for instance, 40% of INC Research Holdings Inc (Pharmaceuticals) are held by Ontario Teachers' Pension Plan. Educational endowments could have a potential networking relationship with a firm, where a member of the board of directors is simultaneously an academic professor, for example, Milton Hershey School Trust owns 30% of Hershey Co. (Food Beverage & Tobacco).

Insurance companies are more risk-averse. There are only two observations where an insurance company is the principle investor. First American Financial Corporation possesses an 11% ownership in CoreLogic Inc. (Software & Services) in 2010–11. Finally, Family Offices have potential strategic ties with firms because they serve ultra-high net worth investors. Therefore, they provide benefits to wealth management by assisting in tax and budget planning. They are actively involved in the firm's decision-making process. Among the first major shareholders we observe 61 Family Offices with a 15,7% ownership on average. The most outstanding example is the American Railcar Industries Inc (Capital Goods), where starting from 2006, 55% of equity was held by Icahn Capital L.P., a private company, which is a part of the Icahn Enterprises L.P. conglomerate.

Researchers characterize independent institutions mainly as long-term oriented organizations with well diversified portfolios and lower risk preferences (Erenburg et al., 2016). In our study, we emphasize the role of traditional investment managers and hedge fund managers. Traditional investment managers are organizations that manage portfolios on behalf of their individual or public investors (pension funds, endowments etc.). 7 out of the 10 top asset management firms are U.S. companies: BlackRock, The Vanguard Group, State Street Global Advisors, Fidelity Investments, J.P. Morgan Asset Management, BNY Mellon Investment Management, PIMCO. In our sample there are 152 firms where BlackRock is the first major shareholder with, on average, 15% of stock, 67 firms are held by The Vanguard Group and 47 firms belongs to State Street Global Advisors. These large groups are present in all sectors of the sample. Capital Research and Management Company possess large equity stakes in 83 firms, including Pepsi&Co, General Motors, Boeing Co, Yahoo!, Amgen, Cisco Systems and others. Hedge fund managers are similar to traditional investment managers in their motivations and financial goals, but they have more flexibility in investment strategies (leverage, hedging etc.). In the Technology Hardware & Equipment sector there is an example (ViaSat Inc. founded in 1986, incorporated in 1996), where hedge fund managers are the first and the second major shareholders with a 25% holding (The Baupost Group, LLC) and a 10-12% holding (FPR Partners LLC). According to these examples, traditional investment managers and hedge fund managers can exercise control through “voting with their feet”, though it seems that these companies do not intend to sell their shares.

Because this classification does not include government participation we complement our model with a variable for state-controlled firms held by sovereign wealth funds and state owned companies. There is an example, where 30% of the equity of General Motors was state-owned, then, was reduced to 10% and now is owned by union pension funds.

The classification used by Ferreira, Matos (2008) ignores the role of strategic owners, such as individuals/insiders, corporations (public), corporations (private), company controlled foundations and private equity/venture capital firms. These types of owners are distinguished from the previous in terms of their strategic position in relation to the target company. Insiders and individuals include officer and director ownership and those connected to the officer/director groups (former directors, wealthy private individuals). There is a common situation in traditional industries, such as Consumer Goods, where the largest shareholder is an individual. In 2005 Albert H. Nahmad. (Chairman and CEO) acquired 30% of the shares and became the first major shareholder for the next five years. Company controlled foundations are entities that hold their parent company's stock. They are rarer in the data sample. Among 1,085 firms we observe only 3 company controlled foundations. This situation is observable in Food, Beverage & Tobacco; Capital Goods; and Pharmaceuticals: 42% of equity in Hormel Foods Corp (Food Beverage & Tobacco, founded in 1928) are held by The Hormel Foundation; 13% of Crane Co. (Capital Goods, founded in 1942) are held by The Crane Fund; 12% of Eli Lilly & Co stock are held by Lilly Endowment, Inc. Private equity/venture capital firms differ from the others because they are common for start-ups. They are interested in fast growth companies, acquiring them using different strategies such as buyouts, share repurchase. For example, a young company founded in 2001 and incorporated in 2011, Jive Software Inc. (Software & Services), was held for 5 years by the VC/PE Firm Sequoia Capital (17–28%), while Matthew A. Tucker (the co-founder) possesses only 9–10%, and hedge fund managers (Empire Capital Management, LLC) own only 8% of the stock.

Following the theoretical and empirical research, we expect different effects on firm performance for these consolidated types of investors: positive for independent institutions, negative for grey institutions, not significant for state ownership and non-linear for insiders. We also expect that the effect on market-based measures of performance (Tobin Q) will differ from accounting-based (ROE, ROA), because of the difference in the perceptions of market participants.

We postulate that there is a difference in ownership structure between traditional and technological industries. The peculiarities of high-tech corporations are their invisible, potential relationships with different institutions, who they cooperate with through networking. Assuming, that R&D investment is a proxy for technological innovation, Choi, Park, Hon (2012), using a sample of 301 Korean firms, found that ownership concentration does not have an impact on technological performance. However, by dividing the ownership type into state, insider, institutional and foreign, the authors detect a positive and significant relationship between foreign, institutional types and technological innovation. This leads to the fact that the long-term objective of institutional investors and foreign technological knowledge positively affects the R&D performance of a company.

That bring us to the following hypotheses:

Hypothesis 1. There is a positive relationship between independent institutional ownership and the performance of an innovative firm, due to the active monitoring of financial and administrative activity.

Hypothesis 2. There is a negative relationship between grey institutional ownership and the performance of an innovative firm, due to loyalty to management decisions, which are not in line with shareholder interests.

Hypothesis 3. There is no relationship between state ownership and the performance of an innovative firm.

Hypothesis 4. There is a non-linear relationship between strategic institutional ownership and the performance of an innovative firm, due to loyalty to management decisions, which are not in line with shareholder`s interest.

Institutional ownership and blockholders

A number of papers state that the presence of multiple blockholders adds greatly to firm performance. De-la-Hoz, Pombo (2016) found that an increase in institutional ownership leads to an 8% increase in firm performance (Tobin's Q, ROA), whereas the presence of an institutional coalition leads to a 21% increase. Heflin, Shaw (2000) postulate that the comparative advantage of blockholders is the reduction of information asymmetry. A similar conclusion was drawn by Nguyen, Locke, Reddy (2015).

Other researchers suggest that not only the size of ownership matter but that the power they possess is also important. The effect of block ownership on firm value was examined by Ferris, Saensuk (2015), who found that permanent block holders enhance firm performance, this effect is stronger if the block holder is a corporation. Using the Shapley value for measuring the power of shareholders, Basu, Paeglis, Rahnamaei (2016) show that, while the insider ownership is positively associated with firm performance (the alignment effect), the power of insiders can drive the firm value in the opposite direction (the entrenchment effect). Outsider holdings remain efficient both in terms of power and ownership.

We observe a U-shape relationship in the European markets. Lozano, Martínez, Pindadoa (2016) reveal that majority and minority shareholder conflict is weaker for young family-owned business than for non-family-owned or older family-owned businesses. Ducassy, Guyot (2017) for 2,118 observations for French companies 2000–09 show that second-tier shareholders play an important role in the regulation of governance practices, but this effect is negligible with the presence of the first blockholder, because of an increase of principal-principal agency costs. For 28 Central and Eastern European transition economies Balsmeier, Czarnitzki (2010) present similar results with a 50% break point for a positive relationship between a large shareholder and firm performance and with the 55% backwards. These findings are consistent with those in emerging capital markets, where, for 38 Brazil and 40 Russian companies, a significant and negative effect of blockholders on firm performance was revealed (Maslennikova, Stepanova, 2010).

The presence of a dominant blockholder is closely connected with firm specificities and innovativeness. For 20000 Italian manufacturing firms Minettia, Murrob, Paiellac (2015) reverse conflicts between large and minority shareholders and prove that ownership concentration is significantly negatively associated with the probability of R&D expenditure and the percentage of workers involved in R&D activities, as a measure of the innovation diversity of a firm. Risk

aversion induced by a lack of diversification exacerbates the reluctance of large shareholders to innovate. These results and conclusions bring us to the following hypothesis:

Hypothesis 5. Ownership concentration in the hands of major shareholders is negatively associated with the performance of innovative companies.

A significant number of recent papers have been devoted to the investigation of different types of large blockholders. For example, this issue is pivotal for Chinese corporations. Yu (2013) for 10,639 firm-year observations of non-financial Chinese public listed firms 2003–10 indicate that, above a 32% level, state ownership has a positive influence on firm performance. Research on 1,241 Chinese firms 2003–08 show that with a decline in ownership concentration, the influence of board independence on firm performance increases by 29% for privately-controlled firms but not for state-controlled (Li, Lu, Mittoo, 2015). In line with this Huang, Zhu (2015) present evidence that through controlling state-owned corporations, foreign ownership positively impacts firm performance. In European markets, state ownership is not significant, but for emerging capital markets this type of ownership plays an important role because of weaker minority protection (Stepanova, Yakovlev, 2010). In addition, Ivashkovskaya, Stepanova (2009) found that state and affiliated ownership negatively affect firm performance in developed and developing markets. Nashier, Gupta (2016), for 1,392 non-financial firms listed on the Bombay Stock Exchange 2007–14, conclude that both institutional and foreign ownership lead to better firm performance through active monitoring, and, thus, the relationship is endogenous. In our study we will use an instrumental variables approach if we find an endogeneity problem during the empirical part. The results and conclusions above bring us to the following hypotheses:

Hypothesis 6. Concentrated ownership of independent institutional investors is positively associated with firm performance.

Hypothesis 7. Concentrated ownership of grey institutional investors is negatively associated with firm performance.

Methodology and data

We apply a three-step methodology. Firstly, we analyze the relationship between the type of investor and firm performance with an emphasis on investor strategy. Then, we investigate the ownership concentration issue with the addition of activeness and passiveness among first five major stakeholders. Finally, we apply both investor type and strategy in an ownership concentration context to find the drivers of firm performance.

Data and descriptive statistics

We obtained the data from the Bloomberg and Capital IQ databases. Board characteristics and financial data, including performance measures (Tobin's Q, ROA, ROE) was gathered from Bloomberg. The data on investor type, stake size and strategy type was obtained from Capital IQ. Capital IQ also provides data for the first five major shareholders with the percentage of owned share, name, type and strategy. First, we collected all firms from the Russell 3000 index, the most suitable capitalization weighted equity index, which captures approximately 98% of the capitalization of US firms and allows us to compare the results with

the previous studies conducted on the same data (Crane et al., 2014; Appel et al., 2016; Schmidt et al., 2017).

In our sample for innovative companies, we use firms from Pharmaceuticals, Biotechnology & Life Sciences, Software & Services, and Hardware & Technology Equipment industries, as classified by the Bloomberg database. Our sample is represented by 1,085 firms: 642 technology and 443 non-technology firms. We classified technology firms as Pharmaceuticals, Biotechnology & Life Sciences (270 members), Software & Services (250 members) and Technology Hardware & Equipment (122 members), and non-technological as Capital Goods (251 members), Food Beverage & Tobacco (67 members) and Retailing (125 members) industries. The data covers 2004–15.

From the descriptive statistics in Table 1 (see Appendix for all Tables), we observe 12,564 observations for four major investor types: independent, grey, state and strategic. The average percentage of shares held by independent institutions is 45%, by grey institutions 3.7%, by state 0.01%, and by strategic 7.97%. In addition, 53% belong to the total percentage of shares held by active investors, and 10.4% by passive. Taking together investor type and ownership concentration we review the dominant position of active independent institutional investors with a 9% stake on average, and the first five major strategic investors with a 8.6% stake on average. The first five major shareholders (Top5) possess 38% of company equity on average, 64% by Top20 and 77% by Top50. Among the first five major shareholders the first owns 15%, the second 8.4%, the third 6.3%, the fourth 5% and the fifth 4.2%. In comparison with the strategic interest of each major shareholder, we observe a dominant position held by inactive/passive investors with a 19% stake on average. We might consider these investors as potentially strategic because their strategy is not clear, and often unobservable. For the whole sample 11% of board members are women and 77% of directors are independent. Company Age varies from 3 to 145, which means that by exploring the Russell 3000 index we investigate a full range of firms, from the youngest to the oldest. They also differ in their performance characteristics, while non high-tech industries have a higher ROE and ROA, they concede to high-tech corporations in Tobin's Q.

From the descriptive statistics in Table 2 by industry, we observe the difference between high-tech and non high-tech industries. High-tech industries, in comparison with traditional sectors, have on average smaller boards of directors (8 vs. 9), fewer women on the board (10% vs. 12%), a smaller percentage of shares held by active investors (49% vs. 58%), and they are younger firms (26 vs. 63). In terms of ownership concentration, the similarity appears in percentage of shares held by the first five shareholders, Top20 and Top50. However, they have different ownership structures: while among first five major shareholders, independent active institutions are leaders with an 11% stake on average in non high-tech industries, in high-tech firms, strategic investors have a 9% stake on average, and a 7% stake in non high-tech industries.

From the descriptive statistics, we conclude that active independent institutions have a predominant position in the ownership structure, strategic investors have less equity but are concentrated among the first five shareholders. However, we observe differences not only between the two subsamples, but inside the high-tech industry. Thus, we take into consideration these findings in the analysis of the results.

Model specification

In our study we present a 3-step analysis of the relationship between firm performance and institutional ownership. First, to study the effect of different institutional investors on firm performance we use the classification from the literature review. Secondly, we identify the influence of ownership concentration on firm performance. Finally, we allocate investor type by ownership concentration, according to the first five major stakeholdings. This process provides us with comprehensive results on the influence of institutional investors on firm performance.

Following the 3-step procedure we use six basic equations.

Model 1 is dedicated to the proposition that different types of investors matter for firm performance. Following Ferreira, Matos (2008), we use:

$$\text{Performance}_{it} = \beta_0 + \beta_1 * \text{Grey}_{it} + \beta_2 * \text{Indep}_{it} + \beta_3 * \text{State}_{it} + \beta_4 * \text{Strategic}_{it} \\ + \beta_5 * \text{Board}_{it} + \beta_6 * \text{Controls}_{it} + \varepsilon_{it}$$

(1.1)

We further the research of Ferreira, Matos (2008) by also taking into account state and strategic types of investors.

Then, we take into consideration investor activism (Lin, Fu, 2017):

$$\text{Performance}_{it} = \beta_0 + \beta_1 * \text{Active}_{it} + \beta_2 * \text{Passive}_{it} + \beta_3 * \text{Board}_{it} + \beta_4 * \text{Controls}_{it} + \varepsilon_{it}$$

(1.2)

Model 2 concerns the problem of ownership concentration.

First, following Nguyen et al. (2015) and Demsetz, Villalonga (2001), we analyze the ownership concentration in the first five, twenty, fifty shareholders (Top5, Top20, Top50):

$$\text{Performance}_{it} = \beta_0 + \beta_1 * \text{Top}_{ijt} + \beta_2 * \text{Board}_{it} + \beta_3 * \text{Controls}_{it} + \varepsilon_{it}$$

(2.1)

Then, we regard the concern of ownership concentration in the first five major shareholders (Maslennikova, Stepanova, 2010):

$$\text{Performance}_{it} = \beta_0 + \beta_1 * \text{Majors}_{ijt} + \beta_2 * \text{Board}_{it} + \beta_3 * \text{Controls}_{it} + \varepsilon_{it}$$

(2.2)

Finally, following Lozano et al. (2016), we investigate the hypothesis of ownership concentration in major shareholders with different strategies (active, passive, not active/passive):

$$\text{Performance}_{it} = \beta_0 + \beta_1 * \text{Majors}_{\text{Strategy}ijt} + \beta_2 * \text{Board}_{it} + \beta_3 * \text{Controls}_{it} + \varepsilon_{it}$$

(2.3)

Following Appel et al.'s (2016) approach, we construct Model 3, which represents the ownership concentration by types of investors, including the classification of activism and independent-grey:

$$\begin{aligned} \text{Performance}_{it} = & \beta_0 + \beta_1 * \text{Grey Active}_{ijt} + \beta_2 * \text{Grey Passive}_{ijt} + \beta_3 * \text{Grey Not} \frac{a}{p_{ijt}} \\ & + \beta_4 * \text{Indep Active}_{ijt} + \beta_5 * \text{Indep Passive}_{ijt} + \beta_6 \\ & * \text{Indep Not a/p}_{ijt} + \beta_7 * \text{Board}_{it} + \beta_8 * \text{Controls}_{it} + \varepsilon_{it} \end{aligned}$$

(3)

Where i is the number of the firm, t is the year and j is the proportion of shareholding held by the first five major shareholders (%); Performance_{it} is measured by Tobin's Q, ROA, ROE; Grey_{it} is the proportion of shares held by grey institutions (%); Indep_{it} is the proportion of shares held by independent institutions (%); Strategic_{it} is the proportion of shares held by strategic owners; Top is the proportion of shares held by first five, twenty, fifty shareholders (%); Majors is the proportion of shares held by the first, second, third, fourth, fifth shareholders (%); Board_{it} is the vector of board characteristics: Board Size, Independent Director (%), Women Director (%). Controls_{it} is the vector of control variables including firm size, leverage, R&D, company age, Sales growth and EBITDA volatility. We explain and provide examples to prove the adequacy of the model. Definitions of all the variables are presented in Table 4.

We use a GLS model estimation with robust standard deviation. We used both Fixed and Random effects models, using the Hausman test to prove the right specification. In order to avoid outliers, we used winsorized variables at 0.025% in the regression analysis. We also provide some evidence that there is no endogeneity problem. We check endogeneity by the IV 2SLS method. Using a VIF matrix we reject multicollinearity problem (Table 24).

Dependent Variables

Firm performance is measured by both accounting-based and market-based criteria. We use different corporate performance measures in order to examine both the backward-looking and forward-looking perspectives (Shan, McIver, 2011). Tobin's Q is a measure of firm value and could reflect corporate governance decisions as well as liquidity and intangibility (Li et al., 2015), whereas ROA reflects the operating performance. Although Tobin's Q is subject to price fluctuations, investor attitudes (corporate takeover, abnormal returns), it is good at reflecting growth opportunities, whereas ROA is not affected by the market situation, but is focused on the current performance (Cornett et al., 2007). ROE is an important measure for investors to see how their money is used. The difference between ROE and ROA is the presence of debt and liabilities. Technological companies rarely use debt because of the huge risks associated with the rapid change of technology which could make a product irrelevant in a short time. That is why we investigate the divergence between ROE and ROA in our analysis. We expect a difference in the results for different performance measures. This could give us an opportunity to compare the effectiveness of both the operating and the market performance of a firm.

Independent Variables

For Model 1, according to Ferreira, Matos (2008), we divide institutional investor type into grey and independent. However, as there is more and more comprehensive data from the Capital IQ database we propose some modifications to the theory.

For the second specification (1.2) of Model 1 we enlarge the classification above by adding stakeholder strategy. We widen our hypothesis development because of the controversies between passive investors and passive owners. If Hedge Fund Managers hold 25% of firm equity, are they more independent? Thus, this classification misses some important issues: it ignores the fact that different strategies (active, passive) could lead to differences among the presence of institutions, especially, where they are blockholders. Because it is difficult to capture the investment strategies of different investor types we distinguish between how active or passive they are.

In Model 2, we identify whether the concentration of ownership overall matters (2.1). We analyze the equity concentration of the first five major shareholders (2.2). Then, we investigate the effect on firm performance of different types of investor, classified by their strategies for the first five major shareholders (2.3). In Model (3) we incorporate all the previous steps by combining investor type with investor strategy in highly a concentrated context (3).

For all three models we also use the same vector of firm characteristics, that could either exacerbate the effect of the ownership structure or greatly improve firm performance. The size of the board of directors is an important measure. It reflects the decision-making process within the firm. As suggested by the scholars the larger the board of directors, the longer and more difficult is the decision making process (Ivashkovskaya et al., 2009). From an alternative point of view, however, the diversification of opinions due to the different ethnical, sexual, geographical, educational, cultural and experiential mix of board members gives the opportunity to solve more sophisticated problems. Thus, there exists a breakpoint of these contradictory influences. The diversity of points of view is beneficial for an innovative company's performance, where professional experience and educational background could matter. Thus, for the board diversification measure we include the presence of women on the board of directors (%Women). Women on the board not only add to the variety of opinions, they are commonly known to be less risk-averse (Terjesen et al., 2016). Independent directors represent one way to mitigate potential agency conflicts between management and shareholders. The independence of the board is commonly viewed as a good signal of corporate governance and is associated with better performance (McConnell et al., 2008). In our analysis the independence of owners plays an important role because of their monitoring activity, thus, the presence of independent directors on the board could potentially enhance firm performance. We predict that a higher percentage of independent directors on the board and a predominant presence of independent institutions enhance firm value.

Control variables

We use several control variables previously applied in the literature. Following Lin et al. (2017) we identify a potential relationship between firm performance and firm size (the natural logarithm of total assets) and leverage (the market value of debt to total market capitalization).

We expect a positive relationship with firm size and negative one with leverage. To measure investment opportunities, we use antecedent growth in sales (De-la-Hoz et al., 2016).

Our research is distinguished by an emphasis on the difference in the ownership structures of high-tech and non-tech industries. Taking into account differences such as in sustainability and growth opportunity preferences, we control for the age of the firm, R&D (lnR&D), and EBITDA volatility (moving average during a three-year period) as a proxy for a risk level measure (Nashie et al., 2016).

Empirical Results

This paper contributes to the literature by examining the relationship between different types of owners, ownership concentration and firm performance. We use a 3-step analysis of a large sample and prove the validity of the results with case studies. Our results could help potential investors to choose a firm with specific characteristics or ownership structure.

First step: investor type identification

The first step of our analysis is to identify the specific types of investors which could possibly affect firm performance, measured by Tobin's Q, ROE, ROA. We adopt Ferreira, Matos (2008) classification of "grey-independent" institutions and add to it two additional types: state and strategic.

Table 5 reports the results of Hypotheses 1 and 2, tested over the full sample period, 2004–15. To investigate the impact of different investor types on firm performance for high-tech and non-high-tech firms, we present 6 models for the 3 main specifications, selected by firm performance measures: Tobin's Q, ROE, ROA. For high-tech firms, grey institutions negatively influence Tobin's Q at the 1% level, but are not significant for other specifications. This means that the presence of grey institutions in the ownership structure of a high-tech company is negatively perceived by the market. The estimation of independent institutions is significantly positive for the high-tech subsample, with a greater influence on ROA. For non-technological firms, state ownership is found to add greatly to firm performance, whereas in high-tech firms strategic ownership is positively correlated with ROA. For all specifications, the crisis of 2008–09 negatively affects all firm performances with a higher effect on accounting measures. Leverage has a significantly negative effect on firm performance for all sectors, especially for high-tech firms, firm size is negative for Tobin's Q, and positive for ROE, ROA. R&D expenditures harm the accounting measures of firm performance (ROE, ROA) and improve Tobin's Q, and company age is positive for the ROE and ROA of high-tech firm.

In order to fully understand the significance of investor type on innovative firm performance we represent results of Hypotheses 1 and 2, testing for innovative industry in Table 6. In general, independent institutions exert a more positive effect than the negative effects of grey institutions on ROA and ROE, with exception of the Software & Services industry, and in the Tobin's Q specification for Biotechnology. State ownership was found to negatively influence ROA in the Hardware industry at the 10% level, but positively on Tobin's Q in Pharmaceutical firms. That is why we reject the 3rd hypothesis. Interestingly, having women on the board becomes significant at 1% and positive in line with the positive effect of independent

institutions in the ROA specification for the Biotechnology industry. This leads to the fact that women are in line with the monitoring activity of independent institutions.

Our results do allow us to reject Hypothesis 1 suggesting a positive influence of independent institutions on innovative firm performance, and we partially reject Hypothesis 2 about the negative effect of grey institutions (the relationship is confirmed only for Tobin's Q).

Overall, we found that for high-tech companies the type of investor matters as does the presence of institutions in the ownership structure. In the literature review we mentioned the importance of investor activism as well as investor type. Thus, we also analyzed the impact on firm performance of two investor strategies: active and passive. Table 7 represents the results for the fixed-effect regression. We observe the most significant positive influence of both passive and active owners on ROA and ROE with higher values for passive investors in the ROA specification. The type of strategy is not related either to Tobin's Q in high-tech industries, or in all models for non-high-tech firms. The effect of control variables confirms the previous results from Table 5. This means that for the performance of high-tech industries, investor strategy matters in contrast to non-tech.

We conclude that both the strategy and the type of investor are important, but, in the regressions above they are presented in consolidated terms. Because the US market has become more concentrated, we pose the following question: does ownership concentration among investor types affect firm performance? The next section is devoted to this question.

Second step: ownership concentration

Next, we test Hypothesis 6 about ownership concentration. For this we developed Model 2.1. We found no significant relationship between ownership concentration and firm performance in terms of Tobin's Q for high-tech or non-high-tech firms. For both subsamples the ownership concentration of the Top5 and Top20 negatively affect firm performance in terms of ROA and ROE at a 5% level of significance. A higher effect is found for Top5 concentration among high-tech firms. Thus, as well as owner type, strategy and ownership concentration are mostly related to ROA. This result occurs in specifications (1) and (2), when the presence of women on the board is positive and significant at the 10% level for both high-tech and non-high-tech industries. This suggests that their presence serves to mitigate agency conflict, which occurs in highly concentrated environments. In Table 22 we have consolidated all significant results. We observe that ownership concentration in the US affects performance. But does the concentration of equity in the first five blockholders matter?

In order to analyze the issue of the Top5 blockholders we build 5 models for the whole sample and two subsamples. Because of multicollinearity (Table 9) among major shareholders we could not run the overall regression for them all. During the empirical analysis we observe no significant relationship between major shareholders and Tobin's Q.

For all other models, major shareholders seem to destroy firm value. The most significant negative major shareholder is the third blockholder in models with a negative impact on ROE for high-tech firms, on ROE and ROA for non-high-tech industries. For innovative firms the fourth major shareholder exerts a larger negative effect on ROE than the first major shareholder on ROA. This verification confirms the previous results for the negative influence of ownership concentration on firm performance, which is higher in innovative industries. There is

a negative effect of board size, which is significant at the 5% level in ROE and ROA models, for non-high-tech companies which in line with the negative influence of the third major shareholder. There is, again, a positive influence of women on the board of directors where ownership is concentrated in the hands of the first major shareholder. All further results concerning control variables reconcile with those previously received (Table 5), viz. the negative and significant influence of leverage and the crisis period, and the positive of firm size and company age on ROE. This also confirms the stability of model parameters and, thus, the validity of the regression analysis. Because ownership concentration is much more significant for high-tech companies we examine this relationship and present only the important results for each industry in Tables 11–13.

We observe different relationships between ownership concentration variables and firm performance, which gives us the opportunity to identify specific peculiarities of innovative industries and for the full sample of the largest US firms from different sectors of the economy. To find out why, in different industries, ownership concentration has different effects on firm performance, we postulate the following research question: does the type of investor-blockholder matter? In other words, is the concentration among investor type and strategy important? We review this problem in the third step.

Third step: ownership concentration by investor type and strategy in high-tech industries

First, we take into consideration both investor strategy (active, passive or not active/passive) and ownership concentration in the first five shareholders (Tables 14–15). This step gives us the potential to subsequently apply both classifications of investor type, and fully recognize the influence of each investor and his/her strategy on firm performance (Table 16). Then, we present a large regression for all investor types without any classification (Table 17) and the descriptive statistics of three innovative industries (Tables 18–20) in order to capture the difference between ownership dispersion and concentration among types. Finally, we group all the results in one table (Table 22) and provide examples to prove the validity of the empirical analysis in practice.

Table 14 provides evidence that not only concentration matters, but concentration among types is important. An important contribution of Tables 14–15 is the evident positive effect of the third major passive shareholder in contrast to the first major passive owner in terms of Tobin's Q. This leads the presence of passive blockholders in the ownership structure of high-tech corporations benefiting firm value. The same holds for the fifth not active/passive owner, which can be also regarded as a strategic investor.

We then verify the previous results for the high-tech sample for three innovative industries (Table 15). Passive owners have more a positive effect on Tobin's Q and ROE in the Pharmaceuticals industry compared to others; in the Hardware industry only the fifth major passive owner positively related to ROA. Active major shareholders are negatively associated with firm performance in terms of Tobin's Q, ROE and ROA for all innovative industries.

The next step integrates the two previous ones by aggregating both investor characteristics (type, strategy) and ownership concentration. We use the modified classification of Ferreira, Matos (2008) and combine it with the active/passive strategy of the investor, and the

size of its stake as a major shareholder. This gives us 7 aggregated types: ownership concentration in the Top5 of grey active, grey not active/passive, independent active, independent not active/passive, independent passive, strategic, and state institutions. All these types of investors have different risk preferences; time horizons and motivation in aligned or entrenched management. For example, among grey active institutions we consider banks, charitable foundations, pension funds, company controlled foundations, educational endowments, family offices, with a defined active strategy. They are managed as active institutions because of their intense strategy to outperform the market benchmark by having superior insights into the stocks that they buy and sell. We define grey not active/passive in the same way, but with an ambiguous strategy, and possible business relations with the target firm. For example, insurance companies, which are often tied to a firm by means of a mutual agreement. Independent institutions are divided into three type: active (traditional investment managers and hedge fund managers with an active strategy), passive (traditional investment managers with passive strategies such as mutual funds which buy and hold in order to incur low expenses and fees), and not active/ passive (traditional investment managers and hedge funds managers with unspecified goals). The most famous passive traditional investment managers are BlackRock Inc., The Vanguard Group Inc. State Street Global Advisors Inc. We also emphasize strategic owners (insiders, public and private corporations and VC/PE firms) because of their strategic interest (growth, benefit, control) in a target company. State ownership is the smallest group of investors, which include sovereign wealth funds and state owned shares. Before we start the full analysis we present the descriptive statistics of first five major shareholders for each industry (Tables 18–20), and Table 21 with a GLS regression of the relationship between firm performance and all investor types in innovative industries.

Software & Services

By comparing the previous results with the descriptive statistics for each industry we uncover some important facts. For instance, the dominant group among the first five shareholders is traditional investment managers – 712 firm-year observations in Software & Services. From Table 18 we see that major positions are held by active traditional investment managers (528) with on average 11% of equity, insiders and individuals (371) with 25% on average and VC/PE firms (<5%) (221) with on average 25%. As previously proved, independent institutions have a positive influence on firm performance in high-tech firms (Table 5). Table 17 shows that traditional investment managers do not influence firm performance as a whole group, and hedge fund managers with >5% of equity are negatively associated with all performance measures. This fact does not contradict other results, because as a large and diverse group of investors traditional investment managers are not significant but as a major shareholder, they could significantly affect firm performance. Among the third major and the fifth major shareholders the most significant are passive traditional investment managers (with on average 5.6% of equity), which, according to Table 16, are positively related to firm performance. In Table 16 we observe different results; concentrated independent passive ownership is significant at 1% for a positive effect on ROA and ROE. Hedge fund managers, as active independent institutions, exert a negative influence on firm performance. Thus, hedge funds managers (concentrated ownership presented by 19 observations with an 11% stake on average), as the first major blockholder, negatively affect firm performance. As do active traditional investment

managers, who represent 528 observations with 11% of equity on average as the first blockholder in Software firms.

Table 11 shows that in the Software industry the most significant influence is exerted by the first major and the fifth major shareholders. Among first major shareholders we also find a large group of strategic investors: private corporations owning 31.7% on average, public corporations with 40% on average, VC/PE firms with 25% on average and insiders/individuals with 25% on average. We see that only VC/PE firms exert a significant and negative influence (Table 17), which could explain the negative influence of Top5 strategic investors on Tobin's Q (Table 16). The concentration of ownership by insiders has a negative effect on firm performance. The opposite result holds for state ownership, where sovereign wealth funds exert a significant and negative influence on Tobin's Q (Table 28), but the ownership concentration in the hands of state owners is not significant (Table 27). The concentration of state ownership does not affect Software company performance, whereas dispersion does. An intriguing question concerns the unclear influence of grey institutions, which have a positive effect on Tobin's Q, ROA and ROE when they have an ambiguous strategy, and a negative effect for Tobin's Q and ROE when they are active. Grey institutions without a specified strategy include banks and investment banks, which control 38% on average, charitable foundations with 11% on average, and ESOPs (employee stock ownership plan) with 17% of equity among first major shareholders.

We recall the results from Table 15 which show that the negative influences of ownership concentration in the hands of active shareholders on firm performance. Table 17 shows that this negative effect could be explained by the presence of insurance companies, family offices and educational cultural endowments. From Table 18, among first major shareholders, we observe the following large institutions: family offices with 13% of equity on average and insurance companies with 9% on average. Because only 2 observations belong to insurance companies, we expect that family offices are responsible for the significant result: for instance, Icahn Capital LP for Xerox Corp, Hain Celestial Group Inc. and Motorola Solutions Inc. Thus, from the analysis above we conclude that different investors, classified by business connections and strategy have an effect on corporate performance. Passive traditional investment managers, and dispersed insider ownership improve firm value, and family offices, active traditional investment managers, dispersed state ownership, and concentrated Insider ownership erode it.

Pharmaceuticals, Biotechnology & Life Sciences

From Table 19 we see that the major positions in Pharmaceuticals, Biotechnology & Life Sciences are held by active traditional investment managers (385) with on average 12% of equity, insiders and individuals (200) with 23% on average and VC/PE firms (<5%) (251) with on average 20%. We observe a larger effect of independent and grey institutions on firm performance in comparison with Software & Services (Table 16). From Table 17 we see a positive effect of traditional investment managers and hedge fund managers, but Table 16 shows that the concentration of this type negatively effects ROE for independent active and independent passive investors. We also found that in ownership concentration models, the Top5 independent institutions without a specified strategy are positively associated with firm performance. As we do not observe a significant presence of hedge fund managers among the

first five shareholders (Table 19), we conclude, that ownership dispersion among hedge fund managers improves firm value, while the concentration of active and passive traditional investors destroys it. Among grey institutions the most significant are educational cultural endowments with a positive effect on Tobin's Q, and family offices, company controlled foundations, insurance companies with a negative effect on Tobin's Q. However, banks are found to add greatly to firm performance in terms of ROE. This multidirectional connection of investors could cancel each other out but, grey institutions with an ambiguous strategy, such as company controlled foundations, charitable foundations (25% as a major shareholder for 2 observations) and family offices negatively effect Tobin's Q at a 1% level of significance.

Strategic investors have a positive effect on ROA (Table 16). Among strategic investors we distinguish VC/PE firms with a negative effect on ROA; individuals with a positive effect on ROA. For ownership concentration, the Top5 strategic investors positively influences ROE. This could be explained by the presence of large blockholders among VC/PE firms as the first and the second major shareholders. Control of 26% and 15% of equity could lead to better firm performance in accounting terms as could the presence of insiders with a 22% stake, private corporations with 26% of equity, and public corporations with 17% of equity. In the descriptive statistics of the first major shareholder we observe 82 sovereign wealth funds with 26% stakes on average. But in the regression analysis they are not significant (Table 17). The example of Pharmaceuticals, Biotechnology & Life Sciences industry is extraordinary because only in this sector do government pension sponsors hold 30% of equity on average as a major shareholder, for example the Ontario Teachers' Pension Plan holds 20% of INC Research Holdings Inc.

Technology Hardware & Equipment

Table 20 shows that the major positions in the Technology Hardware & Equipment industry are held by active traditional investment managers (453) with on average 10% of equity, insiders and individuals (159) with 23% on average, and passive traditional investment managers (154) with on average 8%. The extraordinary case is the largest presence of internally managed pension funds (ESOPs) with a 60% stake. This is a situation when an institution held stock of a parent company: Boeing Co., Voluntary Investment Plan holds 10% of Boeing Co; Veba for Retirees of Kaiser Aluminum holds 25% of Kaiser Aluminum Corp.; Pension Arm of Ford Motor Company hold 7% of Ford Motor Co. As a part of strategic institutions they positively affect firm performance in terms of ROA (Table 20), but ESOPs are insignificant in the large regression in Table 17. From the results in Table 15 we know that the fifth passive major owner is positively associated with ROA. Thus, we analyze the descriptive statistics in order to find the specific institutions which are responsible for this influence. From Table 20 we see that among the fifth major shareholders the dominant place is taken by passive traditional investment managers with 4.5% stake. This information proves that passive independent institutions positively influence firm performance, both for Tobin's Q and ROA.

Among the third major and the fifth major shareholders, VC/PE firms lead by stake size. This could prove the significance of results obtained in Tables 16–17. In Table 17, the models show a positive relationship between dispersed ownership held by VC/PE and firm performance, and Table 16 shows the same relationship between concentration and ROA at the 1% level. The concentration of ownership in hands of grey institutions worsens the performance in terms of Tobin's Q. This negative effect is confirmed by the negative effect of insurance companies and

family offices (Table 17). For example, as the fifth major shareholder in Telephone & Data Systems Inc., ESOP possesses a 5% stake. For the first time in the technological industry, active grey institutions play an important role in the ownership structure.

In general, only active independent institutions badly affect firm performance, and passive independent institutions such as traditional investment managers improve firm value. There is practically no state ownership among the first five major shareholders and no relationship with firm performance was detected. Thus, as a peculiarity of the Hardware industry we discover a positive influence of strategic ownership, the absence of state ownership concentration and a positive influence of passive independent institutions. Overall, state owned shares and union pension sponsors are not significant at all because of their small shareholdings in few firms. Leaders of ownership concentration are traditional investment managers, insiders and VC/PE firms.

The size of the stake does not matter. Because the number of grey, independent, and strategic institutions do not significantly vary across industries, we conclude that, there is no dominant group of shareholders with a stable high ownership concentration. This means that either strategy or business relations, or some still invisible ties could enhance or destroy firm value.

Overall, we do not reject Hypothesis 1 about a positive relationship between independent institutions and firm performance; we partially confirm Hypothesis 2 about a negative influence of independent institutions on firm performance; we partially reject Hypotheses 4 and 5; we confirm Hypothesis 6 about a negative influence of ownership concentration on firm performance; we do not reject Hypotheses 7, concerning a positive influence of concentrated institutional investors, and a negative influence of the first five major grey institutions.

Robustness check

We use different measures of firm performance in order to identify the differences among accounting-based and market-based measures. We found, that different characteristics affect Tobin's Q, ROE, and ROA. For instance, the specifications of ROE and ROA show similar results, when Tobin's Q models occasionally demonstrate the opposite. In several specifications the most significant results were associated with ROE. We do not state that ROA and ROE control for each other, the results only state that there is a difference between market accounting perception of the ownership structure in innovative companies.

As in Yu (2013), we adopt two different GLS specifications with firm-fixed effects and robust standard errors, which show the most significant and important results in regard to specific firm features.

We check the multicollinearity problem with variance inflation factors (VIF). With coefficients from 1 to 5 in the VIF matrix we did not detect any collinearity (Table 24). In order to avoid the problem of outliers, we used winsorized variables at the 0.025% level in the regression analysis.

For endogeneity, we check the validity of our results, using the IV 2SLS model specification. Following Lin, Fu (2017), we choose IV as a percentage of Equity Free Float. We

verified the adequacy of this parameter using Durbin and Wu–Hausman tests. We reject the null hypothesis about endogeneity. Table 23 reports 4 estimations of IV 2SLS models. With IV adoption, the sign and significance of relationship was not detected.

Discussion

The empirical research conducted in this study demonstrates a variety of results. We consider three main issues of ownership structure: investor type, investor strategy, and ownership concentration. Building on the literature we adopt a three-step procedure to prove the importance of investor type in the ownership structures of innovative firms. By comparing firms from the technology and traditional sectors, we reveal differences not only in the presence of different institutions in the ownership structure, but the size and direction of the relationship between firm performance and the type of investor.

First, we build our research on the classification of “pressure-sensitive vs. pressure-insensitive” institutions, proposed by Brickley et al. (1988), then modified in “grey vs. independent” by Ferreira, Matos (2008), which we adopted with modifications in the current study. We consider four main types of investor: grey, independent, state and strategic. We explore these four major types because of their different risk-preferences, time horizons and goals. While grey institutions are loyal to management decisions because of business relationships with the firm and, thus, cause declines in firm performance, independent institutions in virtue of their trading portfolio stability exert more monitoring activity and improve firm value. These statements have been debated by various scholars. Manzanegue et al. (2016) conclude that pressure-insensitive investor funds, in a highly concentrated ownership context, are more likely to diminish the risk of failure. We confirmed this result in the empirical part. In Table 14 we present evidence of the positive effect of ownership concentrated in passive institutional blockholders, on firm performance in high-tech industries during crises.

Second, during the hypothesis testing, Independent institutions were found to add greatly to the firm performance in terms of ROE and ROA in high-tech industries. These results correspond to Elyasiani, Jia (2010), who prove using a sample of S&P 500 firms, a positive relationship for pressure-insensitive institutions on Tobin’s Q and ROA-adjusted by industry. This finding gives evidence that this type of investor enhances firm value by monitoring activity and by reducing information asymmetry. Consequently, we found that the influence of ownership concentration in the first five institutional investors varies with investor strategy. While common sense suggests that active independent institutions should improve firm value, the empirical results prove the opposite. Moreover, in most of the empirical models, passive ownership was found to add greatly to firm performance, as a whole, and in a concentrated ownership context. Passive institutional owners are significantly and positively related to all measures of corporate firm performance. These findings are in line with a wide array of recent studies. In virtue of the potential endogeneity problem, Appel et al. (2016), by using a Russell 3000 reconstitution technique, found that the presence of passive independent investors reduces the probability of a takeover. This leads to the fact that in virtue of large holdings, passive investors encourage long-term firm performance.

Third, while independent institutions exert monitoring control through “voting with their feet”, management proposals, voting at the AGM, connecting with executives through letters and so on, and thereby inhibit management poor decisions, grey institutions are less likely

to engage in activism because of their potential to do business within an investee. Thus, in our analysis, grey institutions were found to decrease firm performance in terms of Tobin's Q, but, in an ownership concentration context, they were found to be insignificant in two out of three high-tech industries. Only in the Technology, Hardware & Equipment industry are active grey institutions negatively associated with Tobin's Q. However, in virtue of different strategies, we explore the relationship of grey institutions without a specified strategy, which are potentially more strategic investors, are negatively associated with Tobin's Q in the Pharmaceuticals industry, and are positive in ROA specification in Hardware. This reveals the difference not only between innovative industries, but in investor strategy formation, which differs among industries and relies on the specificity of such firms. This evidence contradicts previous findings, which suggest an increase in firm performance with the intervention of an activist pension fund (Klein, Zur, 2009; Brav et al., 2008).

Fourth, we separate state ownership from all other types because its strategy differs from other types of investors in pursuing more often social goals rather than value maximizing. In line with Ivashkovskaya, Stepanova (2009) we found evidence of a relationship between state ownership and Tobin's Q only in non high-tech corporations. However, as there is only the small presence of state owners in the ownership structure of innovative US firms, the suggestion of Yu (2013) that there is a positive influence of the state ownership above the 32% level was not confirmed in all regression models.

Fifth, the findings of strategic owners also suggest differences among industries. The essential framework of the analysis is agency conflict in the attendant ownership concentration contexts. In our model, we found that insider ownership does not affect firm performance, in consolidated terms. Whether we regard this issue in terms of concentration, we found that overall, in high-tech industries the ownership concentration of strategic investors is positively related to Tobin's Q and ROA, with the exception of Software & Services industry which has a negative effect on Tobin's Q. That is why we fail to reject Hypothesis 4. This view is in line with the alignment effect of ownership concentration (Morck et al., 1988). Because we do not control for non-linear relationships, this investigation remains for future research. The same results about the alignment effect were obtained by Gugler et al. (2004) for marginal Tobin's Q, and by Basu et al. (2016) on a large samples of US firms. According to our results, the strategic investor is important in Hardware industries, when independent investors with an ambiguous strategy add greatly to firm performance. The influence of potential networking relationships among innovative firms are clearly observable in this study.

Sixth, we found practically no evidence concerning board independence and the ownership structure of innovative firms, however, some empirical results show the importance of women on the board of directors. The presence of women was significant in models with a high concentration and negative sign for different investors. Thus, we contribute to the analysis of women as less risk averse. They can mitigate conflict between major and minor shareholders and complement the positive influence of independent institutions. This result supports that previously obtained by Terjesen et al. (2016), and contradicts to the role of independent directors in Chena et al. (2016).

In summary, our evidence suggests that both the type of owner and his/her strategy significantly influence corporate firm performance, especially in a highly concentrated

ownership context. This behavior is influenced not only by different types of controlling investors but, more importantly, by their strategy and the degree of ownership concentration. While statistics for high-tech corporations show bigger stakes held by strategic investors and active independent owners, the presence of grey institutions with smaller stakes, on average, negatively affects firm performance. As proved by Gavious et al. (2015), we found that innovative firms have different ownership patterns. Moreover, the type of investor is pivotal for innovative firms in choosing sources of innovation activity (Hoskisson et al., 2002).

Conclusion

One of the most essential research questions in the last decade is the augmented role of institutional ownership. Empirical research on different types of owner and firm performance demonstrate inconclusive results. Different institutions have shown a variety of results across industries. However, the merger of distinct types of investors, for example, charitable foundations and banks under one unified classification neglect the different intensities and goals of these investors. Thus, complementing our research with the type of investor strategy sheds some light on the interference of ownership structure and corporate performance.

We would like to highlight some important features of this study. First of all, we conducted our analysis on a large sample of US firms, taking into account nearly 90% of the US capital market. Secondly, we use a three-step procedure in modeling the influence of ownership structure on firm performance, using the size of stakes held by different types of blockholders. Thirdly, we supplement the results by real examples from the sample, highlighting the validity of our research.

The policy implications of this study are twofold. First, we contribute to the board or management decision-making process to assist in building a sound ownership structure. Secondly, our results can guide different types of investors in choosing a target investee with specific characteristics.

For future studies, we provide an opportunity to test the non-linear relationship between the types of investor discussed here and firm performance. In our study we stress the hypothesis of a linear relationship of the ownership structure, therefore further evidence was presented on the existence of break-points for positive relationships between large shareholders and firm performance (Balsmeier et al. 2010), and the U-shape relationship (Lozano et al., 2016). We do not consider the time horizon of investor type, which could be an additional measure in the distinction of investor type. The unified classification neglects not only the pivotal difference in strategy, which we identified, but time-horizon planning, which is an important part of investor goals. As we regarded the ownership concentration issue and found evidence of its influence on firm performance, it would be intriguing to further develop the idea of block formation among first five institutional blockholders, not only because the size of the stake matters, but because the power that they exert could be pivotal.

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Appendix

Table 1. Descriptive statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
<i>Tobin Q</i>	9213	2.48	1.71	0.89	8.45
<i>ROE</i>	8724	6.15	19.43	-36.65	29.90
<i>ROA</i>	9703	-2.05	22.23	-83.72	23.88
<i>Independent Institutions</i>	12564	45.64	38.03	0.00	107.98
<i>Grey Institutions</i>	12564	3.70	4.02	0.00	16.31
<i>State</i>	12564	0.01	0.02	0.00	0.08
<i>Strategic</i>	12564	7.97	13.29	0.00	54.13
<i>Sum Active</i>	9010	53.91	25.03	0.00	94.80
<i>Sum Passive</i>	9010	10.44	6.84	0.00	23.52
<i>Top5</i>	9010	38.38	16.41	0.00	78.87
<i>Top20</i>	9010	64.21	20.96	0.00	98.32
<i>Top50</i>	9010	77.33	24.17	0.00	114.42
<i>Major1</i>	8700	15.65	11.49	5.05	55.60
<i>Major2</i>	8700	8.40	3.38	3.32	18.52
<i>Major3</i>	8697	6.28	2.21	2.32	12.42
<i>Major4</i>	8693	5.06	1.70	1.62	9.15
<i>Major5</i>	8689	4.20	1.45	1.19	7.45
<i>PassiveM1</i>	1080	8.34	3.69	0.75	50.85
<i>PassiveM2</i>	1816	6.76	2.25	0.23	47.79
<i>PassiveM3</i>	2064	5.58	1.50	0.12	11.37
<i>PassiveM4</i>	2056	4.86	1.40	0.74	12.21
<i>PassiveM5</i>	1922	4.17	1.34	0.01	9.25
<i>ActiveM1</i>	3417	12.15	7.63	0.02	157.93
<i>ActiveM2</i>	4068	8.20	3.41	0.01	60.95
<i>ActiveM3</i>	4195	6.36	2.47	0.00	50.13
<i>ActiveM4</i>	4481	5.13	1.95	0.00	37.35
<i>ActiveM5</i>	4891	4.21	1.57	0.00	34.76
<i>Not Active/Passive M1</i>	3979	19.75	14.40	0.27	88.00
<i>Not Active/Passive M2</i>	2815	9.92	5.99	0.00	162.40
<i>Not Active/Passive M3</i>	2262	6.92	3.33	0.00	67.25
<i>Not Active/Passive M4</i>	2258	5.25	3.01	0.00	98.10
<i>Not Active/Passive M5</i>	1727	4.39	2.76	0.00	87.48
<i>Top5 Grey (active)</i>	12564	0.36	2.39	0.00	66.98
<i>Top5 Grey (not active/passive)</i>	12564	0.55	3.44	0.00	68.37
<i>Top5 Independent (active)</i>	12564	8.91	11.64	0.00	163.88
<i>Top5 Independent (not active/passive)</i>	12564	2.85	5.25	0.00	82.27

Table 1. Descriptive statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
<i>Top5 Independent (passive)</i>	12564	4.04	5.89	0.00	66.53
<i>Top5 Strategic</i>	12564	8.66	16.74	0.00	164.62
<i>Top5 State</i>	12564	1.02	6.18	0.00	92.30
<i>Board Size</i>	5873	8.81	2.24	1.00	19.00
<i>Women on Board (%)</i>	5851	11.15	10.14	0.00	71.43
<i>Independent Director (%)</i>	5827	77.87	12.23	44.44	91.67
<i>Leverage</i>	10182	23.03	26.65	0.00	106.59
<i>Firm Size</i>	10026	6.73	1.82	2.91	10.60
<i>R&D</i>	5967	3.62	1.83	0.18	8.11
<i>Company Age</i>	12480	42.05	37.89	3.00	145.00
<i>growth of Sales</i>	9115	0.16	0.33	-0.38	1.48
<i>Vol. 3 EBITDA</i>	8119	83.11	167.57	1.18	847.22

Table 2. Descriptive statistics by industry.

Variable	Non High-tech industries					High-tech industries				
	Observation	Mean	Std.Dev.	Min	Max	Observation	Mean	Std.Dev.	Min	Max
<i>Board Size</i>	2671	9.31	2.31	1	19	3202	8.39	2.09	2	18
<i>Women on Board (%)</i>	2658	12.38	10.35	0	71.43	3193	10.13	9.85	0	50
<i>Independent Director (%)</i>	2655	78.07	16.97	0	100	3172	77.52	12.97	0	100
<i>Top5</i>	4262	38.35	16.24	0	78.87	4748	38.41	16.57	0	78.87
<i>Top20</i>	4262	65.21	19.72	0	98.32	4748	63.31	21.97	0	98.32
<i>Top50</i>	4262	79.64	22.29	0	114.42	4748	75.26	25.57	0	114.42
<i>Major1</i>	4142	15.70	11.84	5.05	55.60	4558	15.61	11.16	5.05	55.60
<i>Major2</i>	4143	8.26	3.35	3.32	18.52	4557	8.53	3.41	3.32	18.52
<i>Major3</i>	4142	6.14	2.07	2.32	12.42	4555	6.40	2.32	2.32	12.42
<i>Major4</i>	4139	5	1.58	1.62	9.15	4554	5.11	1.80	1.62	9.15
<i>Major5</i>	4139	4.19	1.36	1.19	7.45	4550	4.21	1.53	1.19	7.45
<i>Sum Active</i>	4262	58.32	22.75	0	94.80	4748	49.96	26.29	0	94.80
<i>Sum Passive</i>	4262	11.21	6.70	0	23.52	4748	9.75	6.89	0	23.52
<i>Company Age</i>	5159	63.67	41.99	3	145	7321	26.82	25.36	3	145
<i>growth of Sales</i>	3998	0.12	0.26	-0.38	1.48	5117	0.20	0.37	-0.38	1.48
<i>Vol. 3 EBITDA</i>	3578	95.83	167.61	1.18	847.22	4541	73.09	166.87	1.18	847.22
<i>ROE</i>	4289	12.10	13.89	-36.65	29.90	4435	0.39	22.11	-36.65	29.90
<i>ROA</i>	4488	5.68	9.05	-83.72	23.88	5215	-8.69	27.45	-83.72	23.88
<i>Tobin Q</i>	4350	1.94	1.15	0.89	8.44	4863	2.97	1.96	0.89	8.44
<i>Firm Size</i>	4378	7.18	1.75	2.91	10.60	5648	6.37	1.79	2.91	10.60
<i>R&D</i>	2203	3.41	1.80	0.18	8.11	3764	3.74	1.84	0.18	8.11
<i>Independent Institutions</i>	5207	55.82	35.69	0	107.98	7357	38.43	37.98	0	107.98
<i>Grey Institutions</i>	5207	4.82	4.25	0	16.31	7357	2.91	3.65	0	16.31
<i>State</i>	5207	0.01	0.02	0	0.08	7357	0	0.02	0	0.08
<i>Strategic</i>	5207	9.12	14.15	0	54.13	7357	7.16	12.59	0	54.13
<i>Top5 Grey (active)</i>	5207	0.47	3.12	0	66.98	7357	0.28	1.67	0	41.46
<i>Top5 Grey (not active/passive)</i>	5207	0.81	3.79	0	68.37	7357	0.36	3.15	0	62.99
<i>Top5 Independent (active)</i>	5207	11.57	13.68	0	104.89	7357	7.02	9.52	0	163.88
<i>Top5 Independent (not active/passive)</i>	5207	2.82	4.94	0	50.94	7357	2.88	5.46	0	82.27

Table 2. Descriptive statistics by industry.

Variable	Non High-tech industries					High-tech industries				
	Observation	Mean	Std.Dev.	Min	Max	Observation	Mean	Std.Dev.	Min	Max
<i>Top5 Independent (passive)</i>	5207	5.07	6.40	0	66.53	7357	3.32	5.39	0	39.54
<i>Top5 Strategic</i>	5207	8.91	16.69	0	100.23	7357	8.48	16.77	0	164.62
<i>Top5 State</i>	5207	1.41	7.34	0	92.30	7357	0.74	5.19	0	86.83

Table 3. Investor`s classification

Type of investors	Definition (CIQ)	Classification
Banks/Investment Banks	makes non-strategic investments in its own capacity and has no legal Investment Firm subsidiary, S&P Capital IQ creates an 'Asset Management Arm' record as an Investment Firm to its investment criteria and investment activities.	Grey active, not active/passive
Traditional Investment managers	firms managing "traditional" portfolios of stocks and bonds on behalf of either their individual investors or large "asset owners" such as pension funds, foundations, or endowments. These firms manage assets either through mutual funds or through separately managed investment accounts or a combination of both category excludes Hedge Fund managers, Private Equity/Venture Capital managers, and other "non-traditional" portfolios managers, such as commodities, currencies etc.	Independent active, passive, not active/passive
Company Controlled Foundations	This entity is normally designated as a "Foundation/Endowment (Internally Managed)" Institution type. In cases where this entity holds the target stock, and the target stock is also the parent of the foundation, the holder changes to this type. In other words, a foundation's holdings are not strategic, except for the case where it holds its parent company's stock.	Strategic
Hedge Fund Managers (<5% stake)	A hedge fund manager is an entity that manages hedge fund(s). The investment manager, which will have organized the establishment of the hedge fund, raises funds from qualified investors (high net worth individuals/entities) with a common financial goal. Hedge funds invest in various securities such as stocks, bonds, commodities, currencies, and derivatives. Hedge funds (as compared to mutual funds) have more flexibility to incorporate different strategies and techniques that may include: short selling, arbitrage, hedging, and leverage.	Independent active, not active/passive
Hedge Fund Managers (>5% stake)	Hedge Fund Managers who own 5% or more stake in a company are considered strategic for that specific company. The Hedge Fund Manger will be a strategic owner for any companies in its portfolio for which they own 5% or greater. For those that they own less than 5% of, they will be considered a non-strategic (Institutional) owner.	Independent active, not active/passive
Government Pension Sponsors	A Government Pension Plan Sponsor is an investment manager that designs, negotiates, and normally helps to administer an occupational pension plan to pay the pension benefits to its retired/ existing workers/general public. This includes firms managing their investments for the said objective, regulated under public sector law, with a structure as above wherein the parent is a Government Institution or has the sponsorship of a government institution.	Grey active
Family Offices/Trusts	Family Offices are wealth management firms that serve ultra-high net worth investors. They provide personal services and access to alternative investments. In addition to wealth management services, they also assist in tax planning, estate planning, charitable giving, foundation, and budget issues.	Grey active, not active/passive
Charitable Foundations	Foundation Fund Sponsors are institutions that manage investments for charitable institutions or grant/humanitarian organizations. This also includes legal firms managed by a charitable institution to fund the charitable and humanitarian activities of a company. The institutions set up foundation funds in which regular withdrawals from the invested capital are used for ongoing operations or other specified purposes. Foundation funds are funded by donations.	Grey active
Educational/Cultural Endowments	Endowment Fund Sponsors are institutions that manage investments for foundations such as Universities, Educational Institutions, Religious Institutions, Art Institutions, etc. The institutions set up endowment funds, are used to fund ongoing operations or other specified purposes. Endowment funds are funded by donations.	Grey active

Table 3. Investor`s classification

Type of investors	Definition (CIQ)	Classification
Corporate Pension Sponsors	A Corporate Pension Plan Sponsor is an investment manager that designs, negotiates, and normally helps to administer an occupational pension plan to pay the pension benefits to its retired/ existing workers/ management. These firms include ESOPs, Employee benefit Trusts, 401 K plans, Profit Sharing Plans, Retirement plans, etc.	Grey not active, not passive
Corporation Private	Private Company ownership in the target company. This specifically excludes Private Investment Firms, and is reserved for strategic private companies' ownership. Many times, information is scarce on whether an entity is a private firm or private company. We tend to assume company so that the position is float affecting, unless other information counters that assumption.	Strategic not active, not passive
REITs	This category is for Equity REITs, as S&P Capital IQ is only going to have holdings for these firms. Equity REITs are operating companies that engage in a wide range of real estate activities, including leasing, development of real property, and tenant services. One major distinction between REITs and other real estate companies is that a REIT must acquire and develop its properties primarily to operate them as part of its own portfolio rather than to resell them once they are developed.	Grey
ESOP	This entity is normally designated as a "Pension Fund (Internally Managed)" Institution type. In cases where this entity holds the target stock, and the target stock is also the parent of this entity, the holder changes to this type. Almost all ESOPs hold one stock, and it will be the parent of the ESOP firm - so this definition is just for clarity.	Grey
Insurance Companies	When an Insurance Company makes non-strategic investments in its own capacity and has no legal Investment Firm subsidiary, S&P Capital IQ creates an 'Asset Management Arm' record as an Investment Firm to capture its investment criteria and investment activities.	Grey
Sovereign Wealth Funds (<5% stake)	A government investment vehicle that manages investment funds and assets separately from the official reserves of the monetary authorities.	State not active, not passive
Sovereign Wealth Funds (>5% stake)	The same logic is used for Sovereign Wealth Funds as for Hedge Fund Managers	State not active, not passive
VC/PE Firms (<5% stake)	A Venture Capital firm invests new money for growth investments in companies ranging from Incubation to Growth Capital stages. A Private Equity firm acquires or purchases companies through a variety of investment strategies including leveraged buyouts, recapitalization, industry consolidation, mezzanine/sub debt, turnaround, PIPES etc.	Strategic not active, not passive
VC/PE Firms (>5% stake)	The same logic is used for VC/PE Firms as for Hedge Fund Managers.	Strategic not active, not passive
Corporation Public	Public Company ownership in the target company. This specifically excludes Public Investment Firms, and is reserved for strategic positions.	Strategic

Table 3. Investor`s classification		
Type of investors	Definition (CIQ)	Classification
Union Pension Funds	A Union Pension Plan Sponsor is an investment manager that designs, negotiates, and normally helps to administer an occupational pension plan to pay the pension benefits to its members. This includes firms managing their investments with a structure as above wherein the parent is a Labor Union or Trade Association.	Grey
Individuals/Insiders	Includes Officer and Director ownership as well as non-Officer/Director 'people' (which may include former directors or wealthy private individuals who do not have an investment vehicle).	Strategic
State Owned Shares	Shares owned by a Government Institution directly. This doesn't not include Government Pension plans, or general Sovereign Wealth Fund ownership.	State

Table 4. Definition of variables

Dependent variables	
<i>Tobin Q</i>	Ratio of Market Capitalization to Total Assets
<i>ROE</i>	Net Income to Total Shareholder Equity
<i>ROA</i>	Net Income to Total assets
Independent Variables	
Ownership structure	
<i>Independent Institutions</i>	Institutional ownership held by independent institutions (traditional Investment Managers, Hedge Funds Managers) as a percentage of market capitalization
<i>Grey Institutions</i>	Institutional ownership held by grey institutions (Banks, Pension Funds, Educational/Cultural Endowments, Insurance companies, REITs, Family Offices) as a percentage of market capitalization
<i>State</i>	Institutional ownership held by state institutions (Sovereign Wealth Funds, State Owned Shares) as a percentage of market capitalization
<i>Strategic</i>	Institutional ownership held by strategic institutions (Individual/Insiders, Corporations (public), Corporations (private), Company Controlled Foundations, VC/PE firms) as a percentage of market capitalization
<i>Sum Active</i>	The percentage of corporate shares held by investors with Active strategy
<i>Sum Passive</i>	The percentage of corporate shares held by investors with Passive strategy
<i>Top5</i>	The percentage of corporate shares held by first five major shareholders
<i>Top20</i>	The percentage of corporate shares held by first twenty major shareholders
<i>Top50</i>	The percentage of corporate shares held by first fifty major shareholders
<i>Major1</i>	The percentage of corporate shares held by the first major shareholder
<i>Major2</i>	The percentage of corporate shares held by the second major shareholder
<i>Major3</i>	The percentage of corporate shares held by the third major shareholder
<i>Major4</i>	The percentage of corporate shares held by the fourth major shareholder
<i>Major5</i>	The percentage of corporate shares held by the fifth major shareholder
<i>PassiveM1</i>	The percentage of corporate shares held by the first passive major shareholder
<i>PassiveM2</i>	The percentage of corporate shares held by the second passive major shareholder
<i>PassiveM3</i>	The percentage of corporate shares held by the third passive major shareholder
<i>PassiveM4</i>	The percentage of corporate shares held by the fourth passive major shareholder
<i>PassiveM5</i>	The percentage of corporate shares held by the fifth passive major shareholder
<i>ActiveM1</i>	The percentage of corporate shares held by the first major active shareholder
<i>ActiveM2</i>	The percentage of corporate shares held by the second active major shareholder
<i>ActiveM3</i>	The percentage of corporate shares held by the third active major shareholder
<i>ActiveM4</i>	The percentage of corporate shares held by the fourth active major shareholder
<i>ActiveM5</i>	The percentage of corporate shares held by the fifth active major shareholder
<i>Not Active/Passive M1</i>	The percentage of corporate shares held by the first not active/passive major shareholder
<i>Not Active/Passive M2</i>	The percentage of corporate shares held by the second not active/passive major shareholder
<i>Not Active/Passive M3</i>	The percentage of corporate shares held by the third not active/passive major shareholder
<i>Not Active/Passive M4</i>	The percentage of corporate shares held by the fourth not active/passive major shareholder
<i>Not Active/Passive M5</i>	The percentage of corporate shares held by the fifth not active/passive major shareholder
<i>Top5 Grey (active)</i>	The percentage of corporate shares held by first five grey institutions with active strategy (Banks, Educational/Cultural Endowments,

Table 4. Definition of variables

	Family Offices)
<i>Top5 Grey (not active/passive)</i>	The percentage of corporate shares held by first five grey institutions with not active/passive strategy (Banks, Educational/Cultural Endowments, Family Offices, Insurance Companies, Pension Funds, REITs)
<i>Top5 Independent (active)</i>	The percentage of corporate shares held by first five independent institutions with active strategy (Traditional Investment Managers, Hedge Funds Managers)
<i>Top5 Independent (not active/passive)</i>	The percentage of corporate shares held by first five independent institutions with not active/passive strategy (Traditional Investment Managers, Hedge Funds Managers)
<i>Top5 Independent (passive)</i>	The percentage of corporate shares held by first five independent institutions with passive strategy (Traditional Investment Managers)
<i>Top5 Strategic</i>	The percentage of corporate shares held by first five strategic institutions (Individual/Insiders, Corporations (public), Corporations (private), Company Controlled Foundations, VC/PE firms)
<i>Top5 State</i>	The percentage of corporate shares held by first five state institutions (Sovereign Wealth Funds, State Owned Shares)
Corporate Governance	
<i>Board Size</i>	The number of directors in the board of directors
<i>Women on Board (%)</i>	The percentage of women in the board of directors
<i>Independent Director (%)</i>	The percentage of independent directors in the board of directors
Control Variables	
<i>Firm Size</i>	The natural logarithm of Total assets
<i>R&D</i>	The natural logarithm of R&D spending
<i>Company Age</i>	The difference between the year of foundation and 2015
<i>Leverage</i>	Total long-term debt divided by total assets
<i>growth of Sales</i>	The percentage change of the average sales volume year by year
<i>Vol. 3 EBITDA</i>	Three-year standard deviation of EBITDA

Table 5. Investor type and firm performance. GLS with firm-fixed effects.

	(1) High-tech	(2)Non high- tech	(3) High-tech	(4) Non high- tech	(5) High-tech	(6) Non high-tech
VARIABLES	TobinQ	TobinQ	ROE	ROE	ROA	ROA
Grey	-0.0541*** (0.0205)	-0.000779 (0.00889)	0.286 (0.265)	0.413 (0.264)	0.183 (0.167)	0.114 (0.0796)
Independent	0.00903* (0.00512)	0.00380 (0.00240)	0.0766 (0.0539)	-0.0436 (0.0452)	0.165*** (0.0309)	-0.00546 (0.0146)
State	1.239 (1.792)	1.928* (1.033)	1.937 (37.18)	22.12 (26.90)	-19.62 (19.15)	9.267 (9.568)
Strategic	0.00362 (0.0109)	0.000768 (0.00448)	-0.0353 (0.109)	0.0122 (0.140)	0.130* (0.0695)	-0.0125 (0.0319)
Board Size	-0.0360 (0.0309)	0.00628 (0.0182)	0.0667 (0.558)	-0.887** (0.449)	0.0222 (0.290)	-0.149 (0.153)
Women %	-0.00901 (0.00891)	0.00213 (0.00337)	0.201 (0.203)	-0.0310 (0.111)	0.0840 (0.0761)	-0.00768 (0.0252)
Independent D%	0.00652 (0.00850)	0.00531 (0.00484)	-0.0916 (0.110)	0.138 (0.102)	-0.101* (0.0540)	-0.0107 (0.0375)
Firm Size	-0.462*** (0.149)	-0.242*** (0.0877)	6.780*** (1.744)	-7.825*** (2.440)	3.629*** (1.040)	0.483 (0.386)
R&D	0.203* (0.114)	0.145* (0.0803)	-3.314** (1.456)	2.953 (2.060)	-1.371* (0.823)	0.0334 (0.265)
Leverage	-0.00687** (0.00291)	0.00202 (0.00226)	-0.295*** (0.0651)	-0.0946 (0.0904)	-0.107*** (0.0278)	-0.0788*** (0.0164)
DummyCrisis	-0.699*** (0.0945)	-0.360*** (0.0346)	-5.464*** (1.994)	-5.145*** (1.310)	-3.623*** (0.993)	-1.529*** (0.491)
Vol.3 EBITDA	0.000516* (0.000294)					
Age			0.336*** (0.0583)		0.265*** (0.0376)	0.000940 (0.00930)
Constant	5.078*** (1.245)	2.495*** (0.535)	-45.98*** (11.92)	66.90*** (17.61)	-38.22*** (6.535)	6.803** (3.433)
Observations	1,868	1,316	1,773	1,276	1,967	1,327
R-squared	0.070	0.091	0.061	0.053	0.060	0.043
Number of Firms	382	211	362	209	393	212

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations

Table 6. Investor Type and Firm Performance for High-Tech industries. GLS with firm-fixed effect.

VARIABLES	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
Grey	-0.0397 (0.0309)	0.227 (0.423)	0.326 (0.203)	-0.110** (0.0499)	0.108 (0.767)	-0.244 (0.493)	-0.00766 (0.0217)	-0.361 (0.379)	0.0122 (0.196)
Independent	0.00806 (0.0103)	-0.0223 (0.116)	0.0902* (0.0464)	0.0136 (0.00895)	-0.0880 (0.129)	0.144** (0.0660)	0.00423 (0.00378)	0.132 (0.0988)	0.122** (0.0515)
State	-0.749 (2.455)	-13.70 (38.79)	-29.43 (18.64)	5.961* (3.466)	47.81 (79.44)	19.32 (36.46)	-4.498** (1.931)	-69.06 (52.64)	-36.48 (27.89)
Strategic	-0.000598 (0.0210)	0.0488 (0.171)	0.0715 (0.0939)	0.00332 (0.0203)	-0.200 (0.343)	0.141 (0.167)	-0.00412 (0.0119)	0.0435 (0.147)	0.241 (0.148)
Board Size	-0.00446 (0.0474)	0.0503 (0.815)	-0.257 (0.346)	-0.110* (0.0662)	0.731 (1.092)	-0.125 (0.635)	0.0259 (0.0351)	-0.183 (1.004)	0.436 (0.414)
Women %	-0.00843 (0.0113)	0.132 (0.140)	0.0490 (0.0663)	-0.00673 (0.0210)	0.956* (0.558)	0.382*** (0.119)	-0.0204* (0.0123)	0.209 (0.222)	0.0410 (0.109)
Independent D%	-0.00115 (0.0139)	0.0982 (0.145)	0.0383 (0.0597)	0.00854 (0.0185)	-0.127 (0.351)	-0.256* (0.132)	0.0111 (0.00709)	0.113 (0.185)	0.0391 (0.0789)
Firm Size	-0.632** (0.300)	-8.280** (3.361)	-4.905*** (1.794)	-0.457* (0.273)	5.796 (5.654)	3.256 (2.842)	-0.502** (0.198)	-5.565 (4.319)	-3.614 (2.469)
R&D	0.0765 (0.275)	1.199 (2.580)	1.208 (1.433)	0.598*** (0.215)	-1.181 (4.986)	-1.373 (2.643)	0.00698 (0.146)	-3.316 (3.423)	-0.816 (1.757)
Leverage	-0.00911* (0.00481)	-0.305** (0.128)	-0.0941*** (0.0336)	-0.00450 (0.00516)	-0.216* (0.117)	-0.0868* (0.0489)	-0.00640** (0.00295)	-0.261*** (0.0789)	-0.0922** (0.0456)
DummyCrisis	-0.888*** (0.156)	-10.97*** (3.555)	-4.804*** (1.373)	-0.724*** (0.176)		-3.404 (2.206)	-0.385*** (0.112)	-10.40*** (3.232)	-5.006*** (1.238)
Growth of Sales	0.544* (0.291)					3.449* (1.995)	0.119 (0.201)		
Vol.3 EBITDA	0.000536 (0.000392)	-0.0116 (0.00717)	-0.00615 (0.00417)	0.000540 (0.000498)					0.00281 (0.00315)
Constant	7.307*** (1.909)	57.64*** (20.85)	25.46*** (8.934)	4.160 (2.563)	-45.39 (34.59)	-21.20 (15.91)	4.813*** (0.998)	52.20* (28.45)	18.73 (16.37)
Observations	713	691	736	664	592	691	479	480	489
R-squared	0.151	0.144	0.146	0.077	0.088	0.085	0.123	0.138	0.143
Number of Firms	148	143	150	152	137	144	81	82	81

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations

Table 7. Investor activism. GLS with firm – fixed effect.

VARIABLES	(1) High-tech TobinQ	(2) Non high- tech TobinQ	(3) High-tech ROE	(4) Non high- tech ROE	(5) High-tech ROA	(6) Non high- tech ROA
Sum Active	-0.000189 (0.00571)	0.00149 (0.00271)	0.154* (0.0809)	0.0709 (0.0725)	0.138*** (0.0375)	0.0117 (0.0302)
Sum Passive	0.0197 (0.0142)	0.0107 (0.00785)	0.336* (0.198)	-0.0558 (0.170)	0.251*** (0.0946)	-0.0542 (0.0678)
Board Size	-0.0404 (0.0316)	0.0126 (0.0191)	-0.216 (0.538)	-0.883* (0.488)	0.0131 (0.277)	-0.325* (0.167)
Women %	-0.0122 (0.00811)	0.00226 (0.00331)	0.0159 (0.107)	0.0229 (0.124)	0.00756 (0.0581)	-0.0322 (0.0312)
Independent D%	0.00918 (0.00833)	0.00518 (0.00502)	-0.0703 (0.104)	0.120 (0.103)	-0.0987* (0.0552)	-0.0122 (0.0450)
Firm Size	-0.466*** (0.167)	-0.254*** (0.0928)	5.435*** (1.828)	-8.947*** (2.822)	3.206*** (1.036)	-1.190 (0.981)
R&D	0.156 (0.117)	0.142* (0.0826)	-2.343 (1.496)	2.983 (2.311)	-2.022** (0.830)	0.468 (0.614)
Leverage	-0.00787*** (0.00288)	0.00147 (0.00235)	-0.294*** (0.0712)	-0.0590 (0.0992)	-0.123*** (0.0310)	-0.0799*** (0.0212)
DummyCrisis	-0.593*** (0.0835)	-0.330*** (0.0386)	-4.203** (1.964)	-5.565*** (1.424)	-3.100*** (0.966)	-2.289*** (0.564)
Growth of Sales	0.000501 (0.000312)	-8.69e-05 (9.42e-05)				7.84e-05 (0.00155)
Company Age			0.334*** (0.0560)		0.259*** (0.0355)	
Vol.3 EBITDA			4.422 (2.734)	5.917* (3.258)		
Constant	5.278*** (1.264)	2.628*** (0.511)	-45.79*** (11.50)	72.33*** (19.16)	-29.72*** (6.349)	21.28*** (5.665)
Observations	1,765	1,249	1,634	1,204	1,809	1,249
R-squared	0.062	0.086	0.059	0.056	0.068	0.064
Number of Firms	362	204	329	199	369	204

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations.

Table 8. Ownership concentration and firm performance. GLS with firm-fixed effects.

VARIABLES	(1) High-tech ROE	(2) High-tech ROE	(3)Non high-tech ROA	(4)Non high-tech ROA
Top5	-0.218** (0.0961)		-0.0823*** (0.0308)	
Top20		-0.182** (0.0874)		-0.0756* (0.0407)
Board Size	0.159 (0.566)	0.164 (0.565)	-0.334* (0.174)	-0.313* (0.173)
Women %	0.239* (0.126)	0.237* (0.125)	-0.0343 (0.0326)	-0.0375 (0.0322)
Independent D%	0.0888 (0.121)	0.0981 (0.121)	-0.0265 (0.0456)	-0.0260 (0.0449)
Firm Size	-1.956 (3.361)	-1.930 (3.369)	-1.964* (1.006)	-1.946* (1.015)
R&D	-0.243 (2.638)	-0.208 (2.634)	0.451 (0.652)	0.451 (0.658)
Leverage	-0.239*** (0.0766)	-0.238*** (0.0779)	-0.0781*** (0.0207)	-0.0812*** (0.0204)
DummyCrisis	-7.464*** (2.122)	-7.462*** (2.130)	-2.251*** (0.495)	-2.264*** (0.495)
Growth of Sales	4.283 (2.905)	4.349 (2.886)	2.458** (1.109)	2.425** (1.147)
Vol.3 EBITDA	-1.95e-05 (0.00652)	-0.000175 (0.00644)	-0.000200 (0.00150)	-0.000219 (0.00153)
Constant	18.14 (19.86)	20.65 (19.99)	31.34*** (6.366)	32.84*** (6.696)
Observations	1,613	1,613	1,232	1,232
R-squared	0.060	0.061	0.084	0.085
Number of Firms	326	326	202	202

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations.

Table 9. Collinearity of ownership concentration.

	Major1	Major2	Major3	Major4	Major5	Top5	Top20	Top50
Major1	1.0000							
Major2	0.3126	1.0000						
Major3	0.0562	0.6924	1.0000					
Major4	0.1010	0.4957	0.7907	1.0000				
Major5	-0.1764	0.3674	0.6501	0.8594	1.0000			
Top5	0.8553	0.6781	0.5105	0.3520	0.2373	1.0000		
Top20	0.5397	0.6191	0.6247	0.6101	0.5974	0.8181	1.0000	
Top50	0.3263	0.4792	0.5498	0.5957	0.6292	0.6040	0.9315	1.0000

Source: authors calculations

Table 10. Ownership concentration in hands of TOP5. GLS with firm-fixed effects.

VARIABLES	(1) High- Tech ROE	(2) High- Tech ROE	(3) Non High-Tech ROE	(4) High- Tech ROA	(5) Non High-Tech ROA
major1	-0.0942 (0.0713)	-0.110 (0.0696)		-0.0985** (0.0464)	-0.0226 (0.0290)
major2					
major3	-1.498*** (0.495)		-1.172** (0.472)	-0.300 (0.302)	-0.652*** (0.230)
major4		-1.338** (0.559)			
Board Size	-0.362 (0.528)	-0.318 (0.528)	-0.962** (0.471)	0.230 (0.284)	-0.371** (0.171)
Women %	0.0740 (0.109)	0.0796 (0.109)	-0.0134 (0.115)	0.146** (0.0660)	-0.0376 (0.0328)
Independent D%	-0.0158 (0.0999)	-0.0233 (0.101)	0.125 (0.0989)	0.0177 (0.0632)	-0.0147 (0.0448)
Firm Size	5.830*** (1.843)	5.834*** (1.877)	-8.032*** (2.444)	0.103 (1.791)	-1.321 (0.948)
R&D	-2.201 (1.531)	-2.065 (1.553)	3.305 (2.065)	-1.652 (1.387)	0.431 (0.620)
Leverage	-0.264*** (0.0721)	-0.270*** (0.0729)	-0.0758 (0.0974)	-0.108*** (0.0371)	-0.0799*** (0.0205)
DummyCrisis	-5.777*** (2.071)	-5.728*** (2.085)	-5.552*** (1.400)	-4.994*** (1.042)	-2.305*** (0.515)
Company Age	0.307*** (0.0568)	0.316*** (0.0577)			
Growth of Sales	3.050 (2.710)	3.362 (2.685)			
Vol.3 EBITDA	0.00172 (0.00625)	0.00147 (0.00625)		0.00123 (0.00303)	1.27e-05
Constant	-27.44** (11.84)	-30.50** (11.90)	75.45*** (16.19)	5.157 (9.854)	27.18*** (5.651)
Observations	1,609	1,609	1,206	1,762	1,231
R-squared	0.059	0.060	0.063	0.057	0.086
Number of firms	326	326	199	361	202

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1 Source: authors calculations

Table 11. Ownership concentration in Software & Services industry. GLS with firm-fixed effect.

VARIABLES	(1) Tobin Q	(2) ROE	(3) ROA	(4) Tobin Q	(5) ROE	(6) ROA	(7) Tobin Q	(8) ROA	(9) ROE	(10) ROA
major1	-0.0285*	-0.304	-0.248**							
	(0.0164)	(0.274)	(0.101)							
major5		-2.547*	-1.226**							
		(1.342)	(0.503)							
Top5				-0.0159*	-0.309**	-0.177***				
				(0.00910)	(0.143)	(0.0554)				
Top20							-0.0175**	-0.152***		
							(0.00721)	(0.0463)		
Top50									-0.250*	-0.0818*
									(0.133)	(0.0460)
Board Size	-0.0103	0.200	-0.168	-0.0280	0.155	-0.233	-0.0297	-0.250	0.0224	-0.328
	(0.0480)	(0.913)	(0.353)	(0.0497)	(0.906)	(0.353)	(0.0499)	(0.353)	(0.914)	(0.357)
Women %	0.00186	0.198	0.0755	0.00161	0.164	0.0609	0.00155	0.0621	0.201	0.0534
	(0.0104)	(0.166)	(0.0755)	(0.0102)	(0.165)	(0.0733)	(0.0100)	(0.0736)	(0.165)	(0.0721)
Independent D%	-0.00169	-0.00239	0.0337	0.00154	3.37e-05	0.0556	0.00240	0.0695	0.0437	0.108**
	(0.0134)	(0.156)	(0.0669)	(0.0137)	(0.145)	(0.0605)	(0.0142)	(0.0580)	(0.133)	(0.0532)
Firm Size	-0.609**	-9.297***	-4.755***	-0.612**	-9.343***	-4.752***	-0.592**	-4.593***	-8.659**	-5.429***
	(0.250)	(3.047)	(1.657)	(0.256)	(3.049)	(1.652)	(0.264)	(1.672)	(3.499)	(1.813)
R&D	0.0219	1.670	0.833	0.0169	0.911	0.646	0.00673	0.751	1.906	2.086
	(0.226)	(2.712)	(1.462)	(0.235)	(2.692)	(1.470)	(0.242)	(1.510)	(3.141)	(1.597)
Leverage	-0.0100**	-0.291*	-0.108**	-0.00913*	-0.299**	-0.105***	-0.00892*	-0.104**	-0.309**	-0.104**
	(0.00503)	(0.153)	(0.0429)	(0.00488)	(0.144)	(0.0400)	(0.00481)	(0.0417)	(0.142)	(0.0420)
Company Age	-0.825***	-11.94***	-5.399***	-0.851***	-11.43***	-5.193***	-0.854***	-5.228***	-11.42***	-5.167***
	(0.157)	(3.654)	(1.484)	(0.159)	(3.752)	(1.499)	(0.158)	(1.512)	(3.832)	(1.526)
Growth of Sales	0.600**			0.563*			0.556*		8.590**	2.319*
	(0.301)			(0.300)			(0.303)		(4.160)	(1.367)
Vol.3 EBITDA	0.000582			0.000559			0.000540		-0.0115	
	(0.000376)			(0.000392)			(0.000416)		(0.00696)	
Constant	8.089***	83.88***	43.20***	8.211***	84.66***	40.60***	8.619***	41.35***	81.28***	35.33***
	(1.803)	(23.66)	(9.930)	(1.802)	(24.32)	(9.922)	(1.822)	(9.632)	(23.02)	(9.199)
Observations	658	645	676	659	646	679	659	679	630	669
R-squared	0.162	0.156	0.171	0.160	0.151	0.163	0.167	0.165	0.169	0.162
Number of Firms	134	135	129	134	129	135	134	135	128	134

Note: DummyCrisis was omitted because of multicollinearity.
 Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1
 Source: authors calculations

Table 12. Ownership concentration in Pharmaceuticals, Biotechnology & Life Sciences industry. GLS with firm-fixed effect.

VARIABLES	(1) ROA	(2) ROE	(3) ROE	(4) ROA
Top20	-0.129* (0.0822)			
Major1			-0.168* (0.0964)	-0.0933* (0.0535)
Major2		-1.409* (0.793)		
Major3			-1.798 (1.112)	
Board Size	0.324 (0.599)	0.0715 (0.956)	0.321 (0.969)	0.173 (0.590)
Women %	0.266** (0.130)	0.314 (0.285)	0.382 (0.289)	0.310** (0.137)
Independent D%	-0.159 (0.156)	-0.0123 (0.304)	0.00301 (0.307)	-0.187 (0.171)
Firm Size	4.014 (2.862)	5.811 (5.716)	5.971 (5.656)	3.878 (2.823)
R&D	-1.916 (2.778)	-0.115 (5.031)	-0.343 (4.984)	-2.083 (2.228)
Leverage	-0.0704 (0.0548)	-0.217* (0.128)	-0.222* (0.126)	-0.0933 (0.0616)
Company Age	3.546* (2.062)			
Vol.3 EBITDA	0.00136 (0.00435)			
Constant	-15.04 (17.19)	-39.39 (33.63)	-41.55 (33.05)	-16.58 (18.31)
Observations	618	568	568	650
R-squared	0.060	0.051	0.054	0.053
Number of Firms	137	134	134	151

Note: DummyCrisis was not significant for all model specifications.
 Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1
 Source: authors calculations.

Table 13. Ownership concentration in Technology Hardware & Equipment industry. GLS with firm-fixed effect.

VARIABLES	(1) ROA	(2) ROA	(3) ROA
Top5	0.123* (0.0755)		
Top20		0.122** (0.0540)	
Top50			0.152*** (0.0443)
Board Size	0.250 (0.390)	0.260 (0.388)	0.278 (0.386)
Women %	0.0896 (0.110)	0.0802 (0.112)	0.0755 (0.111)
Independent D%	0.00873 (0.0821)	0.0130 (0.0832)	0.0182 (0.0843)
Firm Size	-4.221* (2.445)	-4.077* (2.444)	-4.172* (2.411)
R&D	-0.405 (1.688)	-0.462 (1.676)	-0.420 (1.664)
Leverage	-0.0899** (0.0440)	-0.0918** (0.0426)	-0.0931** (0.0423)
DummyCrisis	-5.112*** (1.357)	-5.000*** (1.356)	-4.848*** (1.357)
Growth of Sales	2.718* (1.534)	2.685* (1.524)	2.723* (1.531)
Constant	31.00* (17.18)	26.67 (17.34)	22.46 (17.39)
Observations	464	464	464
R-squared	0.130	0.137	0.148
Number of Firms	79	79	79

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations.

Table 14. High-tech industries. Ownership concentration in hands of passive/active owners. GLS with firm-fixed effects.

VARIABLES	(1) Tobin Q	(2) Tobin Q	(3) Tobin Q	(4) Tobin Q	(5) Tobin Q	(6) Tobin Q	(7) ROA	(8) ROA
ActiveM1	0.00422 (0.103)							
ActiveM2	-0.218* (0.113)	-0.0273 (0.0298)						
ActiveM3	-0.0385 (0.168)						-0.0961 (0.595)	
ActiveM4		0.0761 (0.0804)					-1.139* (0.653)	
ActiveM5		-0.150* (0.0892)						
PassiveM1			0.177** (0.0656)	-0.0590 (0.0636)				
PassiveM2			0.0714 (0.125)					
PassiveM3			0.0855 (0.133)	0.279** (0.124)				
Not active/passive M2						0.120** (0.0554)		0.382 (0.718)
Not active/passive M5					0.264** (0.105)	-0.000384 (0.292)		3.026*** (1.059)
Board Size	0.0901 (0.135)	-0.00202 (0.0503)	0.0530 (0.0424)	-0.00848 (0.0376)	0.108 (0.146)	0.246 (0.251)	-0.777 (0.938)	2.323 (1.692)
Women %	0.0311 (0.0295)	-0.0139* (0.00773)	0.00960 (0.00896)	0.0142 (0.0103)	-0.0696*** (0.0235)	-0.113*** (0.0314)	0.176 (0.178)	0.210 (0.244)
Independent D%	-0.0562 (0.0431)	-0.000779 (0.00568)	-0.00947 (0.00781)	-0.00523 (0.0150)	0.0278 (0.0221)	-0.0429 (0.0443)	-0.115 (0.182)	0.647** (0.317)
Firm Size	-0.652 (1.076)	-0.135 (0.121)	3.944*** (1.103)	0.0768 (0.276)	-0.404 (0.450)	-0.536 (0.590)	2.523 (3.102)	9.961*** (3.243)
R&D	1.071 (0.868)	0.000593 (0.128)	-9.219*** (1.909)	0.357 (0.401)	0.514* (0.293)	0.793* (0.417)	-1.701 (3.405)	-6.194** (2.465)
Leverage	-0.0208	0.00367	-0.0245**	-0.0217***	0.00246	-0.00155	-0.226**	-0.257*

Table 14. High-tech industries. Ownership concentration in hands of passive/active owners. GLS with firm-fixed effects.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tobin Q	Tobin Q	Tobin Q	Tobin Q	Tobin Q	Tobin Q	ROA	ROA
	(0.0135)	(0.00372)	(0.0112)	(0.00697)	(0.00709)	(0.0101)	(0.0942)	(0.156)
DummyCrisis	-0.900*	-0.298***	0.0356	0.222*	-0.711***	-1.929*	0.000140	
	(0.452)	(0.0905)	(0.180)	(0.128)	(0.266)	(1.047)	(0.00891)	
Company Age		-0.00596**					5.475	
		(0.00291)					(3.421)	
Growth of Sales		-0.0205					-7.641***	
		(0.232)					(2.128)	
Constant	8.924	3.902***	28.16***	-0.481	0.433	5.319	14.39	-147.4***
	(6.400)	(1.040)	(6.860)	(2.476)	(3.548)	(4.337)	(19.94)	(43.39)
Observations	124	127	45	121	276	130	356	200
R-squared	0.463	0.523	0.713	0.345	0.162	0.389	0.234	0.346
Number of Firms	68	77	19	62	168	90	165	123

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations.

Table 15. High-tech industries. Ownership concentration in hands of passive/active owners. GLS with firm-fixed effects.

VARIABLES	Technology Hardware & Equipment industry					
	Tobin Q	Tobin Q	Tobin Q	ROA	ROA	ROA
ActiveM3		-0.0970*** (0.0331)				
PassiveM1			-0.0481 (0.0361)			
PassiveM2				-2.205* (1.223)		
PassiveM3			-0.165 (0.100)			
PassiveM4				1.521 (1.179)		
PassiveM5					2.320* (1.379)	
Not active/passive M1	0.0453** (0.0161)					
Not active/passive M2	-0.116 (0.104)					-2.159*** (0.529)
Not active/passive M3	0.189** (0.0869)					0.338 (0.378)
Board Size	0.647*** (0.165)	-0.0486 (0.0352)	0.161*** (0.0281)	1.326** (0.484)	0.505 (0.994)	4.023*** (1.288)
Women %	-0.136*** (0.0137)	-0.00829 (0.0116)	0.0314*** (0.00701)	-0.144* (0.0835)	0.498** (0.245)	-0.354** (0.127)
Independent D%	-0.137** (0.0489)	0.0159 (0.0101)	-0.0144* (0.00735)	0.0453 (0.163)	-0.0136 (0.135)	0.200 (0.234)
Firm Size	-0.562 (0.618)	-0.601*** (0.187)	0.608*** (0.182)	-0.0186 (1.766)	-8.860* (4.880)	6.728*** (2.336)
R&D	1.791** (0.814)	0.0436 (0.142)	-0.235 (0.147)	-2.869** (1.120)	-5.425* (3.065)	-19.93*** (5.551)
Leverage	-0.00373 (0.00834)	-0.00585 (0.00550)	-0.00988*** (0.00308)	-0.0343 (0.0621)	-0.206*** (0.0412)	-0.318*** (0.0622)
DummyCrisis	-0.0356 (0.423)	-0.429*** (0.142)	0.679*** (0.105)	-0.600 (2.836)	-2.006 (2.759)	3.937 (2.536)
Growth of Sales			-0.501*** (0.120)	1.110 (3.154)		
Vol.3 EBITDA				0.0110 (0.0117)		
Constant	5.682	5.976***	-0.654	12.52	79.18**	9.752

Table 15. High-tech industries. Ownership concentration in hands of passive/active owners. GLS with firm-fixed effects.

VARIABLES	Technology Hardware & Equipment industry					
	Tobin Q	Tobin Q	Tobin Q	ROA	ROA	ROA
	(4.284)	(1.232)	(1.512)	(17.94)	(30.78)	(13.38)
Observations	25	205	48	65	123	35
R-squared	0.990	0.203	0.781	0.378	0.454	0.665
Number of Firms	14	69	23	32	50	21

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: authors calculations.

Table 16. High-tech industries. Investor type, strategy, ownership concentration and firm performance. GLS with firm-fixed effects.

VARIABLES	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment.		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
Top5 Grey (active)	-0.0427** (0.0201)	-0.438* (0.242)	-0.135 (0.138)	0.0375 (0.0905)	0.0199 (1.258)	0.395 (1.089)	-0.101*** (0.0374)	-0.887 (0.902)	0.0201 (0.390)
Top5 Grey (not active/passive)	0.0878*** (0.0266)	2.194** (0.893)	1.058** (0.509)	-0.0636*** (0.0122)	-0.131 (0.198)	0.147 (0.112)	0.00578 (0.0426)	0.0617 (0.363)	0.343 (0.241)
Top5 Independent (active)	-0.0348*** (0.00998)	-0.400** (0.191)	-0.0778 (0.0649)	-0.00805 (0.00893)	-0.284** (0.118)	-0.0465 (0.0640)	-0.0176* (0.00887)	-0.0520 (0.133)	0.108 (0.0702)
Top5 Independent (not active/passive)	0.0226 (0.0154)	-0.286 (0.230)	-0.00521 (0.102)	0.0425** (0.0166)	-0.289 (0.374)	0.307 (0.230)	0.0303** (0.0123)	-0.133 (0.329)	-0.0576 (0.176)
Top5 Independent (passive)	0.0213 (0.0182)	0.441 (0.283)	0.340*** (0.126)	0.0216 (0.0199)	-0.667** (0.327)	0.169 (0.167)	0.0147 (0.0104)	0.161 (0.220)	0.182 (0.121)
Top5 Strategic	-0.0151 (0.0120)	-0.0629 (0.140)	-0.0291 (0.0625)	-0.0131 (0.0114)	-0.180 (0.246)	0.131* (0.0771)	0.0118 (0.0147)	0.127 (0.112)	0.241*** (0.0815)
Top5 State	0.0197 (0.0155)	-0.0935 (0.156)	-0.0525 (0.0474)	0.0356 (0.0313)	-0.515 (0.557)	-0.0900 (0.276)			
Board Size	0.0295 (0.0439)	0.331 (0.843)	-0.166 (0.374)	-0.102 (0.0672)	1.041 (1.071)	0.0510 (0.648)	-0.00403 (0.0352)	-0.535 (1.038)	0.155 (0.411)
Women %	-0.0118 (0.0110)	0.0678 (0.140)	0.0250 (0.0640)	-0.00190 (0.0203)	0.988* (0.528)	0.356*** (0.118)	-0.0157 (0.0113)	0.270 (0.223)	0.112 (0.101)
Independent D%	-0.00577 (0.0125)	0.0344 (0.141)	0.0409 (0.0550)	0.00497 (0.0194)	-0.0103 (0.342)	-0.248* (0.137)	0.0121* (0.00711)	0.0783 (0.185)	-0.00505 (0.0838)
Firm Size	-0.697*** (0.252)	-9.522*** (3.150)	-4.369*** (1.671)	-0.535* (0.292)	7.976 (5.480)	3.749 (2.898)	-0.541*** (0.156)	-6.484 (4.810)	-4.345* (2.562)
R&D	0.00415 (0.190)	0.0365 (2.522)	-0.0251 (1.344)	0.675*** (0.231)	-1.178 (5.058)	-0.981 (2.616)	0.0743 (0.152)	-3.423 (3.514)	-0.279 (1.817)
Leverage	-0.00796 (0.00495)	-0.293** (0.131)	-0.109*** (0.0344)	-0.00375 (0.00496)	-0.197* (0.114)	-0.0861* (0.0492)	-0.00617** (0.00277)	-0.268*** (0.0769)	-0.102** (0.0442)
Company Age	-0.749*** (0.122)	-8.167*** (3.045)	-3.563*** (1.094)	-0.749*** (0.187)	-0.187 (3.469)	-2.982 (2.181)	-0.369*** (0.0892)	-9.823*** (3.098)	-4.214*** (1.187)
Growth of Sales	0.625** (0.287)					3.231 (1.995)	0.0943 (0.190)		3.096* (1.685)
Vol.3 EBITDA		-0.0161** (0.00723)	-0.00789** (0.00398)	0.000654 (0.000541)					
Constant	8.859*** (1.789)	77.55*** (23.25)	33.25*** (9.638)	4.777* (2.702)	-67.68* (35.23)	-22.50 (17.31)	4.987*** (1.230)	70.13** (33.59)	32.79* (17.61)
Observations	722	691	736	664	592	691	479	480	486
R-squared	0.221	0.191	0.169	0.085	0.103	0.081	0.198	0.134	0.165
Number of Firms	148	143	150	152	137	144	81	82	81

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1 Source: authors calculations.

Table 17. High-tech industries. All Investor type and firm performance. GLS with firm-fixed effects.

VARIABLES	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment industry		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
Traditional Investment Managers	0.00705 (0.00634)	-0.0540 (0.109)	0.0279 (0.0440)	0.0141*** (0.00541)	-0.0206 (0.0957)	-0.000707 (0.0556)	0.00946 (0.00612)	0.254** (0.118)	0.210*** (0.0535)
Banks/ Investment Banks	-0.190*** (0.0479)	-0.608 (0.841)	-0.0816 (0.347)	-0.0960 (0.0756)	2.829** (1.376)	0.438 (0.793)	-0.0168 (0.0419)	0.770 (0.902)	0.0497 (0.414)
Government Pension Sponsors	0.0138 (0.0864)	1.964 (1.475)	1.438** (0.626)	0.00796 (0.117)	-2.559 (2.154)	-1.348 (1.216)	0.0740 (0.0697)	-0.341 (1.478)	0.287 (0.705)
Hedge Fund Managers <5% stake	-0.0181 (0.0136)	-0.0667 (0.246)	-0.0189 (0.0980)	-0.0228 (0.0187)	-0.488 (0.337)	-0.176 (0.196)	0.00696 (0.0143)	0.726** (0.296)	0.355** (0.140)
Family Offices	0.0326 (0.0273)	0.410 (0.466)	0.115 (0.197)	-0.119* (0.0716)	-0.249 (1.279)	-0.177 (0.752)	-0.0710** (0.0314)	-1.157* (0.666)	-0.258 (0.318)
Corporate Pension Sponsors	-0.117 (0.218)	-4.149 (3.836)	-2.513 (1.584)	0.935** (0.463)	-2.449 (7.976)	-0.000273 (4.833)	-0.165 (0.145)	-0.561 (3.030)	-0.695 (1.465)
VC/PE Firms <5% stake	0.00768 (0.0357)	-0.398 (0.724)	0.0729 (0.253)	-0.0571 (0.0438)	-0.777 (0.867)	-0.812* (0.458)	-0.107 (0.0654)	-0.149 (1.460)	0.0570 (0.649)
Insurance Companies	-0.454 (0.282)	-1.083 (4.742)	-0.674 (2.050)	-3.284*** (1.114)	3.084 (19.55)	2.756 (11.67)	-0.492 (0.598)	-25.17** (12.69)	-9.460 (6.065)
Educational Cultural Endowments	-0.484 (0.302)	-7.577 (5.140)	-3.396 (2.196)	1.913*** (0.488)	-3.046 (13.48)	-5.717 (5.108)	-0.145 (0.303)	-9.541 (6.367)	-4.554 (3.078)
Sovereign Wealth Funds <5 stake%	-3.726* (1.982)	-27.54 (33.56)	-18.51 (14.40)	0.128 (0.377)	-8.286 (6.469)	-4.680 (3.950)	-0.181 (0.374)	-6.789 (8.532)	-5.276 (3.778)
REITs	0.0427 (0.230)	4.840 (3.865)	3.216* (1.676)	-2.500 (1.582)	-113.6 (114.2)	-4.757 (16.61)	-15.46 (44.68)	-263.7 (932.4)	-421.1 (452.1)
Unclassified	0.232	0.00825	0.397	-0.0768**	0.580	0.250	0.0168	0.425	0.395

Table 17. High-tech industries. All Investor type and firm performance. GLS with firm-fixed effects.

VARIABLES	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment industry		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
	(0.316)	(5.371)	(2.302)	(0.0388)	(0.693)	(0.404)	(0.0241)	(0.505)	(0.245)
Charitable Foundations	0.125	1.496	1.052	-0.308	-7.980*	-4.018	-0.437	-10.87	-5.212
	(0.149)	(9.551)	(1.083)	(0.276)	(4.708)	(2.897)	(0.441)	(9.236)	(4.479)
VC/PE Firms >5% stake	-0.0187*	-0.134	-0.183**	-0.00754	-0.300	-0.193	0.0477***	0.626*	0.436***
	(0.0110)	(0.227)	(0.0784)	(0.0120)	(0.235)	(0.125)	(0.0125)	(0.319)	(0.119)
Union Pension Sponsors	14.24	-0.476	-13.69	5.468	574.6	327.5	36.86***	-58.24	34.81
	(12.03)	(202.2)	(87.61)	(29.90)	(513.8)	(314.2)	(9.243)	(193.5)	(93.70)
Hedge Fund Managers >5% stake	-0.0403***	-0.531**	-0.262**	-0.0160	0.602*	-0.0720	-0.00881	0.389*	0.273***
	(0.0145)	(0.264)	(0.105)	(0.0178)	(0.340)	(0.179)	(0.0124)	(0.220)	(0.0915)
ESOPs	-0.0405	-0.176	-0.114	-2.018	21.86	41.99	0.0405	0.187	0.132
	(0.150)	(2.518)	(1.089)	(6.368)	(115.3)	(66.90)	(0.139)	(2.919)	(1.416)
Individuals/Insiders	0.0222	0.0652	-0.139	-0.0191	1.123**	0.477	-0.00327	0.0918	0.165
	(0.0179)	(0.286)	(0.113)	(0.0285)	(0.543)	(0.292)	(0.0132)	(0.270)	(0.128)
Public corporations	-0.00484	0.199	0.159	0.0146	-0.325	-0.103	0.0385	0.0780	0.0282
	(0.0140)	(0.251)	(0.100)	(0.0294)	(0.578)	(0.305)	(0.0325)	(0.702)	(0.330)
Private corporations	0.0207	0.145	0.0612	0.0155	-0.920	-0.377	-0.0180	-0.0486	0.0465
	(0.0165)	(0.289)	(0.117)	(0.0226)	(0.663)	(0.237)	(0.0190)	(0.391)	(0.187)
Company Controlled Foundations	3.470*	-17.83	-12.02	0.946	-10.67	-0.786			
	(1.851)	(31.17)	(13.48)	(1.487)	(25.36)	(15.63)			
Board Size	-0.0127	-0.179	-0.404	-0.0788	0.233	0.417	0.00520	-0.751	0.110
	(0.0498)	(0.859)	(0.363)	(0.0728)	(1.306)	(0.762)	(0.0427)	(0.897)	(0.431)
Women %	0.00959	0.219	0.0636	-0.00701	0.327	0.314**	-0.0112	0.477***	0.154*
	(0.00835)	(0.140)	(0.0599)	(0.0151)	(0.283)	(0.158)	(0.00817)	(0.171)	(0.0811)
Independent D%	0.00976	0.233	0.144**	0.0165	0.159	-0.130	0.0171**	0.160	0.0456

Table 17. High-tech industries. All Investor type and firm performance. GLS with firm-fixed effects.

VARIABLES	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment industry		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
	(0.00807)	(0.146)	(0.0578)	(0.0149)	(0.267)	(0.150)	(0.00768)	(0.161)	(0.0776)
Firm Size	-0.544***	-7.148**	-4.755***	-0.343*	8.070**	4.939**	-0.376***	-7.631***	-3.399**
	(0.176)	(3.171)	(1.275)	(0.188)	(3.617)	(1.974)	(0.136)	(2.875)	(1.375)
R&D	0.377*	3.150	1.763	0.637***	0.942	-1.298	-0.0137	-0.336	-0.0461
	(0.200)	(3.470)	(1.422)	(0.215)	(4.389)	(2.252)	(0.126)	(2.624)	(1.257)
Leverage	-0.00739**	-0.272***	-0.0886***	-0.00575	-0.154*	-0.0797**	-0.00443	-0.312***	-0.103***
	(0.00357)	(0.0681)	(0.0259)	(0.00374)	(0.0852)	(0.0386)	(0.00298)	(0.0663)	(0.0284)
Company Age	0.577***	9.631**	2.739*	-0.178	7.347**	4.192***	0.0394	1.563	1.852
	(0.209)	(3.927)	(1.509)	(0.154)	(2.927)	(1.613)	(0.164)	(3.360)	(1.588)
Growth of Sales	0.000652	-0.0136	-0.00743**	0.000880	0.00256	0.00320	-5.41e-05	0.0100	0.00440
	(0.000509)	(0.00856)	(0.00369)	(0.000594)	(0.0102)	(0.00624)	(0.000426)	(0.00908)	(0.00432)
Vol.3 EBITDA				-0.563*	-0.822	1.325			
				(0.291)	(5.000)	(3.064)			
DummyCrisis	-0.7954546***								
	(.1791534)								
Constant	4.415***	31.81	20.82**	2.021	-84.62***	-32.75*	2.989***	37.97	6.955
	(1.207)	(21.20)	(8.264)	(1.729)	(32.24)	(17.73)	(1.118)	(23.10)	(10.83)
Observations	659	630	661	613	537	618	455	446	459
R-squared	0.175	0.134	0.190	0.161	0.107	0.086	0.198	0.152	0.172
Number of Firms	134	128	134	135	120	137	78	78	78

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1
Source: authors calculations.

Table 18. Ownership concentration and investor type for Software&Services industry.

Variable	Major1.		Major2.		Major3.		Major4.		Major5.	
	Obs	Mean								
Traditional Investment managers (active)	528	11.90572	645	7.955524	5	5.426	712	5.134541	2	4.0245
Traditional Investment managers (passive)	182	7.594648	370	6.734595	381	5.609617	397	4.892814	398	4.15541
Traditional Investment managers (not active/passive)	212	12.49575	191	7.454534	202	5.863851	169	4.554331	99	3.838576
Banks/Investment Banks (active)	3	19.90133	14	9.104714	14	6.401143	13	4.182308	16	4.819187
Banks/Investment Banks (not active/passive)	3	38.87167	2	8.465	5	6.7442	2	3.8435	2	5.6525
Government Pension Sponsors (active)	0		0		3	.0736667	1	4.346	0	
Family Offices/Trusts (active)	18	13.64294	17	7.925353	14	6.080143	6	4.322333	10	4.1084
Charitable Foundations (not active/passive)	9	10.19433	1	10	5	4.3305	1	4.835	2	2.2995
Corporation Private (not active/ passive)	52	31.72681	25	11.68512	16	7.308812	19	5.134684	31	4.488065
Hedge Fund Managers (active)	4	4.355	4	2.923	33	3.575636	80	3.603838	106	3.364726
Hedge Fund Managers (<5% stake) (not active/passive)	2	1.412	2	3.708	8	4.3305	11	2.561273	12	3.048833
Hedge Fund Managers (>5% stake) (not active/passive)	19	11.31605	20	8.69975	14	7.292	13	6.289846	7	5.693286
Family Offices/Trusts (not active/passive)	3	8.222333	0		0		0		0	
ESOP (not active/passive)	10	17.1488	0		0		1	2.514	0	
Educational/Cultural Endowments (not active/passive)	0		1	8.683	2	6.6285	1	5.134	0	
Insurance Companies (not active/passive)	2	9.704	2	9.7205	2	9.7205	2	9.7205	2	9.7205
Sovereign Wealth Funds (<5% stake) (not active, not passive)	52	31.72681	25	11.68512	16	7.308812	19	5.134684	31	4.488065
Unclassified	9	24.25978	11	11.20264	7	8.170286	1	10.578	1	3.77
VC/PE Firms (<5% stake) (not active, not passive)	221	25.20068	150	13.4477	89	8.881124	62	7.551468	30	6.5046
VC/PE Firms (<5% stake) (not active, not passive)	0		0		10	3.6149	19	4.449053	32	3.877781
Corporation Public	43	40.26998	19	9.967947	13	8.930692	8	5.789875	4	6.22625
State Owned Shares	0		0		0		1	5.239	0	
Individuals/Insiders	371	24.7289	179	10.07497	175	6.479977	190	5.226289	145	3.986579

Table 19. Ownership concentration and investor type for Pharmaceuticals, Biotechnology & Life Sciences industry.

Variable	Major1.		Major2.		Major3.		Major4.		Major5.	
	Obs	Mean								
Traditional Investment managers (active)	385	11.8524	450	8.676338	0		504	5.108774	0	
Traditional Investment managers (passive)	148	8.484372	248	6.389081	303	5.376667	334	4.832976	367	4.103531
Traditional Investment managers (not active/passive)	294	12.12447	220	9.655127	155	6.772839	138	4.675007	125	4.227064
Company Controlled Foundations (active)	12	12.61267	0		0		0		0	
Banks/Investment Banks (active)	7	7.676429	8	8.2105	15	6.286467	10	3.3502	18	3.177222
Banks/Investment Banks (not active/passive)	0		1	9.694	1	5.422	1	4.409	3	4.777
Government Pension Sponsors (active)	2	30.356	1	3.149	3	2.091333	2	.613	0	
Family Offices/Trusts (active)	0		4	5.9295	5	7.006	10	5.062	13	3.992308
Charitable Foundations (active)	0		0		0		2	4.629	2	2.0305
Charitable Foundations (not active/passive)	2	24.012	3	7.431333	3	2.093	2	3.715	0	
Educational/Cultural Endowments (active)	2	9.357	3	8.609667	1	1.496	2	9.781	0	
Corporate Pension Sponsors (not active, not passive)	0		0		1	5.129	2	7.3405	0	
Corporation Private	82	26.86328	26	15.75858	32	9.019938	24	5.507583	11	4.460636
Hedge Fund Managers (active)	2	4.05	8	3.47075	37	3.774459	75	3.721173	127	3.339047
Hedge Fund Managers (<5% stake) (not active/passive)	4	9.357	5	4.0342	9	2.842778	19	3.279842	20	2.6472
Hedge Fund Managers (>5% stake) (not active/passive)	13	12.04254	18	11.58522	20	7.20385	9	7.773555	9	5.893333
REITs (not active/passive)	0		0		2	2.772	0		3	2.866667
Family Offices/Trusts (not active/passive)	1	8.727	1	10.205	1	10.131	0		0	
Educational/Cultural Endowments (not active/passive)	2	9.357	0		1	6.24	2	3.809	1	4.012
Sovereign Wealth Funds (<5% stake) (not active, not passive)	82	26.86328	26	15.75858	32	9.019938	24	5.507583	11	4.460636
Sovereign Wealth Funds (>5% stake) (not active, not passive)	1	11.995	2	15.75858	0		1	7.075	1	6.123
Unclassified	9	19.81322	6	11.2265	6	9.8	11	4.134818	8	4.293625
VC/PE Firms (<5% stake) (not active, not passive)	251	19.4322	216	11.0327	208	8.749286	161	7.840679	95	6.83962
VC/PE Firms (<5% stake) (not active, not passive)	4	4.74175	13	4.124692	22	3.446909	44	3.569773	72	3.875083
Corporation Public	53	17.54564	52	10.4705	40	10.50787	19	6.905947	20	7.1453
State Owned Shares	1	9.034	0		0		0		0	
Individuals/Insiders	200	22.40485	189	8.797122	177	6.614695	143	4.74	151	3.351603

Table 20. Ownership concentration and investor type for Technology Hardware & Equipment industry.

Variable	Major1.		Major2.		Major3.		Major4.		Major5.	
	Obs	Mean								
Traditional Investment managers (active)	453	10.89164	512	7.856018	1	5.771	548	5.13577	9	2.312889
Traditional Investment managers (passive)	154	8.208961	256	6.998453	291	5.904866	286	5.089885	226	4.366164
Traditional Investment managers (not active/passive)	197	11.18567	143	8.74	123	5.799382	107	4.571981	113	4.099991
Banks/Investment Banks (active)	3	11.14633	4	12.349	4	7.72175	16	4.325063	12	3.68475
Government Pension Sponsors (active)	0		1	8.479	2	7.2505	0		0	
Family Offices/Trusts (active)	4	10.4905	8	8.326375	9	7.507111	5	5.5766	6	4.624833
Charitable Foundations (not active/passive)	0		0		1	5.718	0		0	
Corporate Pension Sponsors (not active, not passive)	0		0		0		0		1	3.218
Corporation Private	6	25.44867	25	12.53152	20	8.73245	10	5.2443	7	4.897429
Hedge Fund Managers (active)	1	4.735	12	3.766917	19	3.733474	34	3.599765	46	3.401239
Hedge Fund Managers (<5% stake) (not active/passive)	2	3.2525	4	3.5595	3	3.763333	6	2.5185	8	3.035125
Hedge Fund Managers (>5% stake) (not active/passive)	9	9.227444	15	9.652667	5	6.6242	6	6.725333	3	6.164333
REITs (not active/passive)	2	8.2105	0		0		1	5.189	1	4.79
Family Offices/Trusts (not active/passive)	0		0		0		1	4.394	0	
ESOP (not active/passive)	10	59.6383	4	5.275	0		3	4.647667	0	
Educational/Cultural Endowments (not active/passive)	0		0		1	9.619	0		0	
Unclassified	17	19.958	3	14.08367	0		2	6.114	0	
VC/PE Firms (<5% stake) (not active, not passive)	51	23.40853	25	13.212	20	8.8535	19	7.029526	9	6.964556
VC/PE Firms (<5% stake) (not active, not passive)	0		0		2	4.737	3	3.781667	9	4.012778
Corporation Public	26	43.29808	6	8.8515	2	6.2365	2	8.9975	4	5.41175
Individuals/Insiders	159	22.49218	91	9.852637	88	7.619114	75	5.311907	66	3.632788

Table 21. Classification of owner type by industry.

	Grey	Independent	Strategic	State
All	8539	8619	8428	1984
Soft	1743	1768	1741	475
Pharma	1579	1601	1598	231
Hardware	1160	1166	1125	203
Capital				
Goods	2290	2312	2241	443
Food	655	660	642	244
Retail	1168	1169	1135	388

Table 22. Consolidation of empirical results from GLS regressions.

	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment.		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
Grey	-	+	+	-	+	+	+		+
Banks							+		+
Pension Funds								+	+
ECE	-	+ (Charitable)	+	+	+	+			
			(Charitable)		(Charitable)	(Charitable)			
IC	-								
FOT	-								
CCF	+								
REITs				+	-	-			
Independent	+	+	+	+	+	+	-		+
TIM active	-						-	-	
TIM passive		+	+					+	+
TIM not active/passive			+						
Hedge Funds Managers	-			-	+		-		
Strategic	-	-				+			+
Private corporations	+		+	+					+
Public corporations						+	-		+
Insiders/Individuals	+					+	+	+	+
VC/PE firms		-	-		-	-	+		
State		-	-	+					
SWF		-						-	-
GPS		+	+	+	+	+			
Board Size	-					-	-	-	-
Women	+	-	-	+					

Table 22. Consolidation of empirical results from GLS regressions.

	Software & Services			Pharmaceuticals, Biotechnology & Life Sciences			Technology Hardware & Equipment.		
	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA	Tobin Q	ROE	ROA
Independent						-		+	
Firm Size	-	+	+	-	+	+	-	+	+
R&D	+	-	-		-	-	+	-	
Leverage	-	+	+	-	+		-	+	+
Company Age	-	-	-	-	-	-	-	-	-
Growth of Sales	+					+	+		
Vol. 3 EBITDA	+	+	+						+

Table 23. Endogeneity check.

VARIABLES	(1) All	(2) All	(3)High-Tech	(5) Non High-Tech
	ROA (IV=Indep)	ROA (IV=Grey)	Tobin Q (IV=Ind)	ROE (IV=Ind)
Grey	-0.182 (0.202)	-0.0809 (0.109)	-0.113** (0.0514)	-0.0638 (0.0768)
Independent	1.409** (0.547)	6.768** (2.669)	0.257* (0.153)	0.247* (0.146)
State	-36.74 (22.36)	-167.7** (65.80)	1.948 (5.375)	1.398 (13.72)
Strategic	-0.0908 (0.0949)	0.192*** (0.0714)	-0.0650** (0.0307)	-0.0587 (0.0426)
Board Size	-1.417*** (0.373)	-2.072*** (0.591)	0.0174 (0.0608)	-0.0549 (0.210)
Women %	-0.0570 (0.0538)	-0.0763 (0.0673)	-0.0146 (0.0170)	0.0506* (0.0284)
Independent D%	-0.0335 (0.0735)	-0.134** (0.0539)	0.0256 (0.0161)	0.0314 (0.0364)
Firm Size	5.688*** (0.626)	3.876*** (0.685)	-0.464*** (0.142)	0.859*** (0.303)
R&D	-1.616*** (0.380)	-1.101** (0.476)	0.493*** (0.0967)	-0.219 (0.286)
Company Age	0.0566*** (0.0177)	-0.0356 (0.0514)	-0.0223*** (0.00521)	-0.00842 (0.00857)
Leverage	-0.0802*** (0.0181)	-0.0967*** (0.0255)	0.00609 (0.00469)	-0.0613*** (0.0160)
DummyCrisis	0.0575 (1.214)	-1.505 (1.658)	-0.460 (0.306)	-1.607** (0.724)
Constant	-13.93* (7.952)	-19.66*** (5.691)	9.751*** (1.883)	3.888 (4.686)
Observations	2,387	2,387	1,360	986
Number of YEAR	12	12	12	11

Table 24. VIF matrix for Model 1.

Variable	VIF	1/VIF
Firm Size	4.81	0.208109
R&D	3.82	0.262122
Vol.3 EBITDA	2.37	0.422569
State	1.95	0.511622
Board Size	1.90	0.525646
Grey	1.53	0.653565
Independent	1.50	0.667059
Strategic	1.44	0.694864
Company Age	1.44	0.695146
Independent Director	1.37	0.727642
Women on Board	1.28	0.784228
Leverage	1.07	0.935077
Dummy Crisis	1.05	0.953268
Mean VIF	1.96	

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