Why Companies Are So Different?
Alternative View on the Firms' Financial Design

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Abstract

For years we believed in the sectoral structure of the economy. We believe in similar business models, decision-making processes, risk preferences, and performance for firms in one sector. However, now we observe the structural changes in the global economy. New leaders have different business models, stakeholders, and risk preferences. Today it is more about people, we believe. Decision-makers (investors, CEOs, directors) develop the firm financial design based on their risk preferences, goals, and behavioral biases. We reexamine the links between the financial decisions in the corporates and governance mechanisms. We apply cluster analysis to determine the typical patterns of firm design. We show that there are 9 sustainable patterns of firm design in US market nowadays, and describe the portraits of typical firms in each cluster. We show that performance and risk differ significantly through clusters. Finally, we state that industry factors do not play a crucial role in the firm's risk preferences and performance anymore.

JEL Classification: G32, G34.
Keywords: ownership structure, corporate governance, firm performance, cluster analysis.

1 Introduction

Since the 1930s, one of the most widely discussed topics in corporate finance concerns how to develop the financial design for the company in the most efficient way. With the term 'financial design' we define the system of financial and non-financial mechanisms that determine the

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decision-making processes in the company[3]. There are a lot of research papers on how to develop the best board of directors, how to stimulate managers to behave in the interests of shareholders, how to monitor them effectively, how to deal with different agency conflicts within a firm (Clark and Willson 1961, Lewellen 1969, Mitnick 1974, Fama 1980, Chakravarthy 1984, Bhagat 1985, Oviatt 1988, Jensen 1990, Baladenius 2014, Kim 2014). Agency theory together with behavioral economics makes us think over the construction of efficient mechanisms of decision-making in the corporation (Jensen, Meckling, 1976).

A large number of non-financial characteristics have an impact on company performance, as shown by major empirical studies[4], but the results are mixed. Inconclusive empirical evidence on the performance effect of the ownership structure, capital structure and board composition makes us think over the alternative mechanisms of financial design influence over firm performance. The ambiguous results of empirical studies, in turn, led to the number of meta-analytical investigations on the performance effect of state ownership, insider ownership, ownership concentration, board composition, and other non-financial characteristics (see e.g. Sanchez-Balesta, Garcia-Meca, 2007). Knowledge of the interrelations between these non-financial characteristics remains quite limited. Nevertheless, this knowledge may significantly change policy implications resulted from corporate performance modeling using regression analysis. This motivates us to apply the integrated view on the financial design of the company and refuse to analyse its components separately.

Moreover, in recent years we observe the structural changes in the global economy. By the time of the crisis of 2007-2008 banks and oil companies were the largest companies in the world. The top-5 companies of S&P500 contained three banking conglomerates (*HSBC, Bank of America, JP Morgan Chase*); the top-10 – three oil companies (*ExxonMobil, Royal Dutch Shell, BP*). Now, *Apple, Google, Microsoft, Amazon*, and *Facebook* are the five largest companies in the world. As of today, *Berkshire* owned by Warren Buffett is the only financial company in the top-10, while the banking conglomerates lost their positions[5]. The impact of the global crisis of 2007-2008 is not the only reason for this structural change. The changes in the structure of

[3] We follow S. Myers who uses the terms 'financial architecture' and 'financial design' for the ownership structure, legal form of organization, incentives, financing and allocation of risks (Myers, 1999).

[4] See, for example, Morck, Shleifer and Vishny (1988), Grossman and Hart (1988), Masulis and Mobbs (2011), Dyck and Zingales (2004), Nenova (2000), etc.

[5] Statistics are shown on September 28, 2016 (source - data *Bloomberg*).

consumption and consumer priorities in the world play a crucial role. The social network *Facebook* today is worth more than the company that supplies energy to 180 countries[6].

The ownership structures in the world demonstrate similarly significant changes. Ten years ago the world's top corporations were owned by a large number of small shareholders (*dispersed ownership*) (Helwege 2007), while concentrated ownership was considered the prerogative of continental Europe (Barca 2001, Faccio 2002). However, today we see a new trend towards concentration of *entrepreneurial ownership* (Yin, Zhang 2017), and more concentrated ownership in general (Holderness 2009). The economy of a new type is characterized by a large number of technological start-ups, which led to the fact that it is possible to create a huge company in a few years. This is, for example, the history of *Google*. Nowadays, business founders retain control over key decisions in companies with concentrated ownership and create different classes of ordinary shares with unequal voting rights (Gompers 2008). The capital structure and the board composition alter along with changes in the ownership structure (Morellec 2010, Chang 2014). In many large companies, more than 90% of directors are independent. At the same time, the board of directors becomes more and more diverse, e.g. by involving the women directors into the decisions-making process (Abdullah 2016). The switch of shareholders' risk preferences demonstrates the increase in the proportion of companies who refuse to attract debt capital (Bessler 2013, Dang 2013, Devos 2012).

In this context, we conclude that ownership structure determined by the development of the 'new' sectors influences the governance mechanisms simultaneously with the impact on capital structure and payout policy. At the same time, the level of corporate governance and chosen policies and the company's entire financial design attract the corresponding shareholders (e.g. hedge funds or pension funds). So, we believe in the 'egg and hen' story concerning the mutual influence of ownership structure, capital structure, and governance mechanisms.

All in all, we believe it's time to think deeper and look for other special features that make companies comparable to each other. We believe that today it is more about people. Decision-makers (founders, CEOs, stakeholders) develop the firm financial design, or architecture, depending on their risk preferences, goals, and behavioral biases.

Our paper differs from the previous literature in two major aspects. First, we do not believe in the independence of ownership structure, capital structure, and governance mechanisms. The

[6] See the annual report of *General Electric*: http://www.ge.com/investor-relations/investor-services/personal-investing/annual-reports/.

prior work reports conflicting evidence on the relationship between owners, corporate governance, and capital structure of public companies as well as on the industry-specific drivers of firm performance. We reexamine the links between the financial decisions in the companies and governance mechanisms by applying the inductive approach to the pool of public companies in Russell 3000. We contribute to the methodology of corporate governance research with the application of cluster analysis to model the performance and to catch the interrelations between different firm characteristics.

Second, we determine the sustainable patterns of a firm's financial design. Cluster analysis is useful not only in determining the interrelations between different firm characteristics. It also helps us to choose the proper 'benchmark' companies with comparable financial design. Understanding the pattern of financial design is important for the board of directors and top management for rebuilding the decision-making process in the company to make it as efficient as possible.

We conduct our analysis on the sample of all non-financial companies of the Russell 3000 index. We determine 9 clusters of companies based on ownership, board structure, and capital structure criteria. We also pay special attention to the clusters characterized by high ownership concentration, institutional ownership (both concentrated and dispersed), venture capital participation, and insider ownership. We discuss the patterns of financial design in the frame of main trends in the ownership structure of the largest U.S. companies. Interestingly, we show that performance and firm risk differ significantly for companies with different architecture patterns. Finally, we show that the majority of patterns are not strongly correlated with the industry, and industry factors do not play anymore the crucial role for the firm's risk preferences and performance.

The rest of the paper is organized as follows. Section 2 represents the literature overview and provides some information on the history of Anglo-Saxon traditions of decision-making in the company. The third section is devoted to the data and the methodology of cluster analysis. We discuss the empirical results in Section 4. Section 5 concludes.

2 Historical background and literature review

There are two views in the literature on the question we formulated. First, we can apply the managerial approach through the business model concept; second, we can look at it in terms of corporate governance. In managerial literature, there is an ongoing debate on how the business models are formed. Opinions are divided. Some scientists believe that the business model is primarily based on technology; others believe that it is based on strategy (Wirtz et al. 2016; Zott

and Amit 2010). Technologically-oriented view pushes us towards the sectoral structure of the economy, while if we are looking at a strategy-oriented approach, people play a major role.

However, in this paper which is at the intersection of economics and management, we fit our ideas into the corporate governance framework.

2.1 Decision-makers and ownership structure: background

In the 1930s, Adolf Berle and Gardiner Means attracted the attention of American society to a new phenomenon at the time — *the ownership dispersion* among minority shareholders (Berle, Means, 1932). Until then, most companies remained family-owned, and the owners did not seek to sell part of their business. The rich owners of newly created corporations held large blocks of shares and did not want to part them. The authors show the separation of ownership and control in the case when the company belongs to a large number of shareholders but is managed by a professional manager independent from shareholders (Berle, Means, 1932). The divergence of interests of shareholders and managers became a popular topic of various debates, but at that time, the investigation of the ownership structure remained purely theoretical.

In *1950-1960*, the Western world entered the era of *managed capitalism*[7]. In the United States and Great Britain, this period is also characterized by the growth of dispersed institutional ownership, that is, the ownership of funds and other financial institutions. This led to the fact that by the end of the XX century a significant proportion of shares of large companies belonged to banks, pension and investment funds, and insurance companies. This period is called the period of *money market capitalism*.

Forty years after the publication of the book by Berle and Means, Michael Jensen and William Meckling breathed new life into the concept of "ownership structure" (Jensen, Meckling, 1976), presenting the theory of a firm based on an agency conflict. Since that time the ownership structure was considered as exogenous factor, numerous attempts have been made to optimize it using option schemes for managers, bonus programs with share packages for employees, etc.

Thus, by the end of the millennium, we observed the maximum convergence towards an Anglo-Saxon management model built on dispersed ownership and strategic management through the board of directors. By the end of 1995, 80% of large U.S. companies belonged to minority shareholders and only 20% were family companies (La Porta, Lopez-De-Silanes, and Shleifer

[7] https://www.commentarymagazine.com/articles/will-managed-capitalism-pull-us-throughbalance-sheet-of-two-decades-of-keynes/.

1999), it was a peak of ownership dispersion. Deregulation of many emerging markets has played a large role for the global capital market. In addition, significant changes were caused primarily by the appearance of a new sector of companies with a business model associated with the development of the Internet and further by the *Dotcom* crisis. However, this situation of convergence in a rapidly changing environment proved to be unstable. New sectors have demonstrated the emergence of entrepreneurial ownership, which over time can lead to a return to the model of family ownership or to some other structural change in the economy.

2.2 Decision-makers and ownership structure: today's view

Such a long history of the research problem led to a large number of studies on the performance effect of different aspects of ownership structure, governance mechanisms, and capital structure. In recent studies, they drop the classic assumption of exogenously formed ownership structure. For instance, Demsetz (1983) and later Cho (1998) and Gillan (2006) found strong evidence of endogeneity of ownership structure and highlighted the relationship between insider ownership, investments, and corporate value. Moreover, authors find significant interdependence of corporate governance mechanisms and capital structure decisions (Morellec 2012, Chang 2014).

Now we believe that the ownership structure is just a part of the whole system of decision-making in the corporation, which depends as well on the changes of the other components of the system (Himmelberg et al., 1999; Demsetz and Villalonga, 2001).

Despite a solid base from agency theory concerning the performance effect of insider ownership and ownership concentration, a large number of empirical studies provide us with conflicting evidence (Morck et al., 1988; Demsetz and Villalonga, 2001; Thomsen et al., 2006). Meta-analysis methods allowed making a conclusion on no significant relationship between ownership concentration and firm performance (Sanchez-Balesta, Garcia-Meca, 2007). Empirical model controlling for the endogenous character of insider ownership also helps to conclude, that only the linear performance effect demonstrates weak significance. Nowadays, we know how to measure the impact of agency conflicts on financing decisions based on the dynamic trade-off approach (Morellec, Nikolov, and Schürhoff 2018).

Does that really mean that the ownership structure might have totally different performance effects in different environments? Or we first need to account for more factors to control for the whole system of firm financial design (Figure 1)?

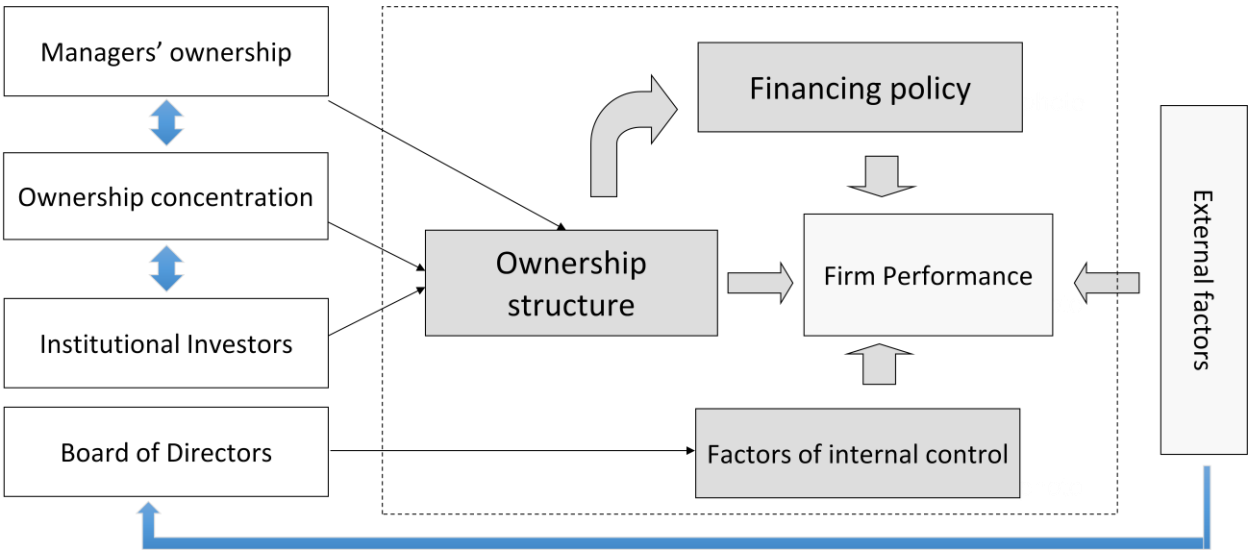

Figure 1. The scheme of interrelations between ownership structure, corporate governance and firm performance

In recent studies, the performance effect of insider ownership and ownership concentration has been developed into a more detailed analysis of concentration in the hands of different types of investors (Lehmann and Weigand 2000; Nashier and Gupta 2016). We continue to believe that group decision making in the company affects its behavior and outcomes (Jeong and Harrison 2017). However, we now understand how different investors are. They are different in terms of (1) their investment horizons (Garel 2017), (2) their risk preferences (McCahery, Sautner, and Starks 2016), (3) the roles that they take on in the firm (Filatotchev and Wright 2011; Muller-Kahle 2013; Nashier and Gupta 2016).

The investment horizon should not affect corporate decisions on the perfect capital market. Investors with short-term preferences and long-term investors who like dividend payments will benefit equally from maximizing the value of the company (Garel 2017). But in the presence of market imperfections (e.g. asymmetry and agency conflicts) decision-making mechanisms might favor either long-term or short-term oriented investors.

Different types of investors demonstrate different risk preferences. For example, pension funds are an example of an investor minimizing risk, while venture funds are maximizing return and ready for a high level of risk.

Roles the investors take on differ in terms of monitoring and advisory functions as well as a willingness to participate in corporate governance (Cornelli, Kominek, and Ljungqvist 2013; Iliev et al. 2015).

There is a large block of studies devoted to the performance effect of institutional shareholders, representing quite a special type of investors with strong risk preferences and good monitoring function (McConnell and Servaes 1990; Nashier and Gupta 2016). Yet, a meta-analysis again has found no consistent link between institutional ownership and firm performance (Dalton et

al., 2003). At the same time, we know that the institutional investors might demonstrate different behavior depending on the investment horizon and other goals (McCahery et al., 2016).

There are a lot of classifications of investors depending on their character, legal form, and goals (Muller-Kahle, 2015; Hoskisson et al., 2002). We distinguish between institutional investors (mutual funds, hedge funds, pension funds, insurance companies, etc.); insider investors (e.g. founders, CEO, managers, directors); strategic investors (e.g. families, corporations, private equity funds), etc. We should realize that they interact with each other influencing the decision-making process via governance mechanisms. In other words, we believe that governance, ownership structure, and financial decisions are interrelated.

In this study we focus on four types of investors, namely institutional investors, private equity and venture funds, blockholders, and insiders. We do pay attention not only to the type of investor but also to the ownership concentration in hands of the exact type of investors (e.g. following (McCahery et al. 2016) we believe that institutional investors with small stakes behave differently from large institutional investors).

Myers (1999) states that all the components of the financial design of the company (namely, ownership structure, risk distribution via capital structure and governance mechanisms) are totally integrated, that is, they influence each other and cannot be changed separately. Methodologically that makes us looking for another method of research instead of classic econometric study. We discuss the methodology and data in next section.

2.3 Board mechanisms

From the theoretical point of view, the structure and composition of the board of directors are vitally important for the decision-making process in a corporation. For instance, the quality of the board's monitoring of company managers is influenced greatly by the composition of the board, i.e. who are current members of the board [Fama, 1980, Baldenius 2014, Kim 2014]. There is a common opinion, which is currently incorporated into corporate governance guidelines and requirements of most stock exchanges, that a board of directors should include both insiders and outsiders who are responsible for the monitoring function [Fama, Jensen, 1983]. Outside directors act arbitrarily in case of the disagreement between top-management and company shareholders. Some studies distinguish between two types of outside directors – independent directors and 'grey' directors, which cannot be considered as really independent, and thus their arbitrary functions would be compromised if they have family ties or close relations with one of the company top-managers, consultants or suppliers [Beasley, 1996].

There maybe other reasons behind including independent directors into the board. Firstly, independent directors, in general, experience *less pressure* coming from top-management

(Jiraporn 2016). Secondly, according to the agency theory, the probability of agency conflict between independent directors and shareholders are significantly lower than between shareholders and executives, which, in turn, leads to reduced agency costs [Jensen, Meckling, 1976]. Independent director has similar goals with the shareholders, namely, company capitalization growth, while executive directors might have different priorities, possibly connected to nonmonetary benefits, or the entrenchment effect. Moreover, behavioral factors also come into play, as independent directors have an opportunity to evaluate the company affairs "from outside", more objectively, leading to better strategic decisions and, thus, to the growth of company value in terms of market capitalization.

However, an alternative view appeared in the 2000s. In contradiction to previous theory, it was found that high share of independent board members might influence the efficiency in a negative way. There are several factors behind such influence, including excessive monitoring of executives, lack of motivation to take difficult and risky strategic decisions during the crisis [Klein, 2002]. Moreover, shareholder value may be negatively affected by "busy" and distracted independent directors, who are present in more than one board (Falato 2014). Some researchers even believe that excessive social connectedness of independent directors may harm the firm in a way, that potentially committed fraud will be less likely detected (Kuang 2017). During the last years, researchers were trying to find an optimal degree of board independence, assuming non-linear relation between the share of independent directors and the company's efficiency [Iturriaga, Rodriguez, 2014; Falato et al., 2014].

Moreover, there is an opinion, found in various business press and media that boards of directors have become even too independent in the US. Many large companies have more than 90% of independent directors on their boards (for instance, McDonald's, General Electric, Jonson & Jonson, Coca-Cola Enterprises). The board itself consists of 9 members, on average, which means that in most companies only one director, on average, is an insider, an executive or a shareholder. On the other hand, the "independence" of the directors itself is, often, defined too formally. In reality, an independent director may be affiliated to the shareholders or to the top-management, be it either family ties, or business partnerships. Considering the latest articles' view on non-linearity and optimal share of independent members, the trend of "high independence" we've described above does not appear as an efficient one.

3 Data and Methodology

Our sample is represented by the US companies that form the Russell 3000 index as of the beginning 2016. We restrict the sample by the non-financial sector. The sample financials are

collected from the S&P Capital IQ database. The descriptive statistics of the sample is presented in Table 1.

We apply **cluster analysis** as an agnostic, black-box approach in contrast to the clustering by the exact criteria (age [La Rocca et al., 2011], sector [Jain, Kini, 2006]).

Step 1. We choose 9 firm internal characteristics that **influence the decision-making process** and, in turn, firm design. **Inputs** are governance variables (board size, independence, gender diversity); ownership variables (ownership concentration and the ownership of insiders, PE/ VC, corporations, institutions); capital structure.

The following components of corporate financial architecture were used for data clustering:

- *Capital structure variables*: Assets to total equity ratio;
- *Ownership variables*:
  - Aggregated institutional ownership;
  - ownership concentration calculated as the share of top twenty shareholders;
  - shareholding of blockholders (those shareholders that have stake of 5% and more),
  - insider ownership,
  - venture capital and private equity ownership;
- *Corporate governance variables*:
  - size of board of directors proxied by the total number of the board members;
  - independency rate measured as the ratio of the number of independent directors to the total number of the board members,
  - the percentage of women in the board as a measure of board gender diversity.

Step 2. k-means clustering of the companies EoY 2015 and EoY 2011; We start with k-means clustering of the companies as of 2015. To test the validity of clustering and the dynamics of corporate movements, we also clustered 2011 data.

Step 3. 8-9 clusters are the optimal number for firm design.

Step 4. Cross-cluster analysis of inputs' and outputs' medians.

The clusters obtained were examined from different perspectives. First, we analyzed the measures of firm financial architecture and performance in each cluster: market performance measured as the Tobin's Q coefficient (market value of equity to book value of equity ratio), return on equity (ROE), return on total assets (ROA), growth rates of sales, capital expenditures,

risk measures (beta, WACC), ownership types and concentration, payout. Secondly, we monitored whether the same firms were clustered similarly in 2011 and 2015. Thirdly, we checked whether the firms from one industry were gathered in one cluster or not.

Table 1. Descriptive statistics, 2015

Lnta – natural logarithm of total assets as a measure of size; lnsales – alternative size measure approximated as natural logarithm of sales; ndirpr – board of directors size (number of board members); indditpc – percentage of independent directors in board of directors; wompct – percentage of women in board of directors; atoe – assets to equity ratio as a measure of leverage; institute1 – shares in the hands of institutional owners; top5 – percentage of shares in the hands of top 5 shareholders; top20 – percentage of shares in the hands of top 20 shareholders; top50 – percentage of shares in the hands of top 50 shareholders; sumblock – percentage of shares held by blockholders; insideow – percentage of shares held by individual and inside investors; vcown – percentage of shares held by venture capital or private equity firms; payout – payout ratio; beta – applied beta coefficient; betaindu – mean industry beta; wacc – weighted average cost of capital; shyield – shareholder yield; rdintensity – R&D expenses to sales ratio; capexta – capital expenditures to total assets ratio; gsales – growth of sales (3 year moving average); gcapex – growth of capex (3 year moving average); gr_d – growth of R&D expenses (3 year moving average); gassets – growth of assets (3 year moving average); age – corporate age as the difference between 2015 and the year of foundation; activeness – active to passive shareholder ownership ratio; roe1 – return on equity; roa1 – return on assets; mtb1 – market-to-book ratio; tqe – Tobin-Q measured as the market capitalization to book value of equity ratio; ri - residual income measured as the difference between ROA and required return on equity (Bloomberg estimate); newind – dummy variable equals to 1 for the healthcare and bio-tech, software and technological hardware industries.

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
lnta	2183	7.197	7.169	1.875	1.077	13.107
lnsales	2116	6.891	7.036	2.096	-3.030	13.085
ndirpr	2060	8.889	9	2.227	3	17
indditpc	2061	78.156	83.333	13.516	0	100
wompct	2147	13.599	12.5	11.391	0	100
atoe	2183	3.029	2.029	15.566	-147.171	481.678
institute1	1922	76.571	82.729	25.925	0	141.559
top5	1922	41.222	38.098	14.870	0	106.249
top20	1922	68.475	68.65	16.606	0	120.796
top50	1922	82.342	84.712	17.577	0	136.988
sumblock	1922	37.763	35.633	17.605	0	94.703
insideow	1922	7.169	2.268	11.580	0	77.532
vcown	1922	4.837	0.038	12.682	0	79.615
payout	1541	36.667	12.08	115.304	0	2255.073
beta	2160	1.075	1.036	0.350	-0.261	3.744
betaindu	2212	1.112	1.107	0.102	0.878	1.33
wacc	2160	8.390	8.396	2.566	0.565	28.638
shyield	2132	-2.856	0.842	23.227	-348.013	153.363
rndintensity	2098	1.667	0	20.361	0	505.016
capexta	2173	-0.052	-0.030	0.068	-0.715	0
gsales	2086	0.566	0.064	12.539	-1	544.523
gcapex	2126	1.603	0.100	18.207	-1	494.863
gr_d	1087	0.311	0.093	2.285	-1	59.563
gassets	2148	2.155	0.062	49.905	-0.817	1671.382
age	2203	27.729	20	25.683	0	200
activeness	1907	4.743	3.510	9.099	0.364	306.013
tqe	1903	5.495	2.760	17.967	0.009	441.755
roe1	2041	0.022	0.080	1.488	-44.287	32.727
roa1	2023	-0.035	0.033	0.738	-18.605	9.606
mtb1	1893	3.002	2.040	3.525	0.070	67.738

ri	1176	0.560	3.022	34.025	-391.886	404.431
newind	2053	0.284	0	0.451	0	1

4 Results

Based on 2015 data we obtain 10 clusters of US companies; 9 out of 10 are sustainable. We find that the lower number of clusters lead to unsustainable results, whereas adding additional clusters do not allow forming more clusters[8]. We also found out that there is no industry clustering, thus all the clusters contain the representatives from different industries. However, we can see some differences in the concentration of high-technological industries in several clusters. The major features of the clusters are summarized below, while you could find detailed descriptive statistics in the Appendix[9].

Cluster 1 – Dominance of institutional blockholders

Cluster 1 is defined by the high involvement of institutional ownership. Due to the peculiarities of institutional ownership reporting, the sum of stakes exceeds 100% for several companies, which is the usual case for database applied. In particular, the cluster ownership is represented by traditional investment management funds (85% of equity on average versus 61% for the whole sample) and hedge funds (with 16.5% versus 10.2% for the whole sample). The concentration of institutional ownership is also high, which could be seen from the ownership stakes of top 5, 20 and 50 owners and the sum of blockholders' equity – 54%. Thus, we expect the activeness of investors to be rather high: we see that the mean is slightly higher whereas the median level of activeness (4.33) exceeds that of the whole sample (3.51). The role of venture capital and private equity shareholders, as well as insiders/individual owners, is insignificant for these companies. The board of directors' characteristics (board size, independence, percentage of women on board) do not differ from the sample means. The payout ratio is much lower than average which corresponds to the clientele theory, that is the dominant types of institutional investors in this cluster prefer high risk and return (e.g. look at average WACC) rather than stable cash inflows.

In performance context, Cluster 1 is not the most efficient one comparing to others. The average measures of performance (ROE, ROA, MTB, Tobin's Q) and residual income exceed the sample means but very similar to the medians (3.088 vs 3.02), while the risk measures of the cluster are higher than average.

[8] Results of the testing different number of clusters, as well as other robustness checks, are available by request to the authors.

[9] To look at the Appendix follow the link https://ssrn.com/abstract=3301829.

Cluster 2 – Dependent Boards

Cluster 2 has the lowest level of board independency comparing to the entire sample (59.9% versus 78%); the comparison on medians is also convincing (62.5% versus 83.3%). At the same time, we could see one of the lowest representations of women on board. Both features could lead to not so popular today conservative board, which is at the same time smaller than average. The majority of stocks are still in hands of the institutional shareholders (in line with Cluster 1), but the owner is not as concentrated. The companies have a lower proportion of blockholders, however, they have their representatives on board. At the same time, the companies of Cluster 2 have significant insider ownership, again reinforcing the board dependence. The payout ratio is significantly higher than in Cluster 1.

The performance of this cluster is lower than average in market terms (MTB and Tobin's Q), although the book measurers (ROE, ROA) are slightly higher. The residual income shows lower figures; thus, we could state that the market requires more from the firms included in Cluster 2 that they actually provide.

Cluster 3 – Insiders

Cluster 3 contains companies with high individual and insider ownership. This stake is the highest among other clusters and accounts for 42.95% versus 7.17% on average. With this level of insider ownership, we see the predicted high level of shareholder activeness. Inside shareholders keep the level of independent directors on the average level, although the boards are not so large in this cluster and push the companies to pay higher dividends, although the balance measures of corporate performance are much lower than average. On the other hand, the perception of this cluster by the market is slightly lower than the average level (if we look at Tobin's Q) or even higher for MTB (3.5 versus 3.00 on average). The residual income is one of the lowest (-15.69 vs. 0.56 on average) and is only close to Cluster 7. Thus we could state that this type of financial architecture nowadays does not provide excess benefits to the stakeholders, showing one of the lowest results under mean risks.

Cluster 4 – Young venture capital companies

Young companies (the median age is just 6 years) were gathered in the Cluster 4, where we could see the dominance of the venture capital and private equity ownership (these categories hold 36% of equity). As soon as the representatives of VC or PE firms keep seats in the board, the independence level is lower than average; the young age of the firms lead to smaller board size. We could see the lowest level of women's presence on board, which corresponds to the lifecycle phase of high growth since the process of board optimization is not yet launched. As is

it predicted for young companies that face financial constraints, the payout is the lowest within clusters as well the financial leverage (which is the second-lowest in the sample).

The corporations in this cluster have almost reached the mean ROE and ROA, but their MTB estimate is significantly higher than the sample mean. At the same time, the residual income is negative showing that the returns of the firms have not yet reached the required rates of return. However, this negative value is much more prospective than in clusters 7 or 3, even though the rate of high-tech industries in this cluster is also high (0.34) and the debt policy is a conservative one. Thus we could state that this cluster has many more opportunities for greater performance in the future than clusters 3 and 7.

Cluster 5 – Strategic investors' ruled firms

Cluster 5 has a slightly higher level of public corporate ownership in this cluster. The board is closer to the sample characteristics; the payout is rather high that is a common situation for firms with public corporate ownership. The leverage is rather high but volatile for this cluster, which is the reflection of the further stage in the life cycle rather than Cluster 4 firms.

Performance measures show average figures for ROE, ROA, MTB and Tobin's Q even with such aggressive debt policy; still we could see the reflection of this policy in residual income which is higher than average, but medians show that this cluster cannot overcome sample figures (0.05 for Cluster 5 vs 3.02 for the whole sample). Taking into account that this cluster (just as Cluster 4) shows greater stake of hi-tech firms, we could suppose that these firms already moves from start-up positions and lost their market attractiveness for presumably lower than expected results. It's worth saying that the firms try to reach greater results by using the opportunities of a greater access to the external financing, although the results are not so striking yet.

Cluster 6 – Dispersed institutional ownership

Cluster 6 gathered companies with clear dominance of institutional ownership, but, compared to cluster 1, the ownership in Cluster 6 is much more dispersed. We could see much lower stake of blockholders (34.74% versus 54.07% in cluster 1) and lower concentration on each stage (37% versus 48% for top-5 owners, 69% versus 86% for top-20 and 88.7% versus complete institutional ownership for top-50). This cluster has some more representative features – high R&D intensiveness with slightly higher beta and WACC. At the same time, book returns, residual income and market performance are on average levels making it quite unprofitable in terms of risks and returns.

Cluster 7 – One dominant owner firms

Cluster 7 shows a rather interesting ownership picture: we see the high level of insider ownership with the highly dispersed ownership in total and the lowest level of institutional ownership. Thus it seems that this cluster gathered the firms with either family or entrepreneurial

ownership and dispersed the rest of the stake, which is to be investigated further. The financial policy is the most conservative within the whole sample that also goes in line with our hypothesis. The activeness of the shareholders is the highest one, which again goes in line with the presence of a dominant shareholder.

Book returns are low while the MTB and Tobin's Q show higher performance than average. The performance of this cluster is close to that of cluster 3, where we also saw a dominant owner, although for Cluster 3 we know the type of the owner (insider/individual one). The most interesting think about Cluster 7 is that this cluster has the highest stake of high-technological firms. Hi-tech firms, in turn, demonstrate usually high level of business risks. We suppose that the stakeholders of the companies in this cluster try to mitigate these risks partially by conservative debt policy. We suppose that this cluster provides a slightly better risk-return pattern than Cluster 3 for showing higher market estimates, almost the same book returns and residual income with lower risk estimates under the industries of higher risk levels.

Cluster 8 – Transition

Cluster 8 could be regarded as a transition cluster between cluster 3 and cluster 4, when venture capital and private equity together with inside ownership is at the stage to either move to dispersed ownership or to fix more inside owners. Companies are not as young as in the cluster 4 (median age is 10 years). The board is closer to the sample characteristics; and the payout is rather high.

The performance results are predictably lower than average as compared based on residual income and quite close to the average results if measured by ROE, ROA, MTB and Tobin's Q.

Cluster 9 – Blue Chips

Although clustering did not suppose to use age measures for cluster formation, Cluster 9 gathered the oldest and the largest companies of the sample. This cluster is represented by the blue chips of the market, taking all the top firms from Russell 3000. These companies demonstrate a developed Anglo-Saxon model of corporate governance. Independence level is 84%; the boards are large, with the highest level of women presence (20% versus 13.5% on average). The payout is the highest in the sample (the median is 47% versus 12% for the whole sample).

Shareholder yield is higher on average, but the median level is higher significantly (2.07%). This cluster is the only one where median beta is lower than unit level, although leverage is rather high. Not surprisingly, that ownership is highly dispersed and the activeness of shareholders is low. We state that this is the optimal cluster if we consider performance, especially risk-adjusted measure. All the measures of performance (Tobin's Q, ROE, ROA, MTB) are higher than average; moreover the median levels are also higher than for the sample (3.28; 0.13; 0.04 and

2.93 respectively). As for the residual income, this cluster provides the highest return of 6.97 (median 7.69) versus 0.56 (3.02) on average respectively. Thus, companies in this cluster manage to show greater returns with lower risk measures. This cluster contains Facebook, Google, Microsoft.

Cluster 10 – Mature companies

Cluster 10 keeps very close to cluster 9. Still, the major striking features of cluster 9 are moved to average figures in cluster 10. We could see the priority of institutional investors, very low level of inside ownership, and high level of board independence. This cluster shows high leverage. However, as soon as we see stable and mature companies here, this does not lead to any negative effects. On contrary, we see high levels of ROA, ROE. The growth rates of these companies are too low and the payout is high, reflecting the mature status. Still companies in this cluster lose leading positions if we compare performance with Cluster 9 companies. Although ROA, ROE, MTB differ insignificantly, the perception of these companies' equity (Tobin's Q) and residual income are much lower. Keeping in mind that this cluster is characterized by higher leverage and beta (compared to Cluster 9) we conclude that this cluster provides less attractive risk-performance pattern. Macy's and PVH Corporations are the examples of this cluster.

Robustness checks

For the robustness check we clustered our sample for 2011. We receive that the clusters described above still matter, and the major differences reflect the overall economy changes. As we could see from Table 2, although the size of board of directors remains the same on average, the developed corporate governance started to matter more which is reflected in increased independency level and the higher women representation in 2015. Companies became less leveraged as a result of a general trend to lower leverage as well as because of the structural changes that led to the greater role of innovative firms that prefer lower level of debt financing. We see the greater presence of institutional ownership together with higher ownership concentration levels. All of these trends could be seen in the clusters of 2011. The tendencies for higher ownership concentration, closer monitoring of the companies resulted in the huge increases in number of members in the following clusters from 2011 to 2015: cluster 2 with dependent board; cluster 4 with VC and PE firms as a reaction of economic structural changes.

Table 2. Summary statistics, 2011

Lnta – natural logarithm of total assets as a measure of size; lnsales – alternative size measure approximated as natural logarithm of sales; ndirpr – board of directors size (number of board members); indditpc – percentage of independent directors in board of directors; wompct – percentage of women in board of directors; atoe – assets to equity ratio as a measure of leverage; institute1 – shares in the hands of institutional owners; top5 – percentage of shares in the hands of top 5 shareholders; top20 – percentage of shares in the hands of top 20 shareholders; top50 – percentage of shares in the hands of top 50 shareholders; sumblock – percentage of shares held by blockholders; insideow – percentage of shares held by individual and inside investors; vcown – percentage of shares held by venture capital or private equity firms; payout – payout ratio; beta – applied beta coefficient; betaindu – mean industry beta; wacc – weighted average cost of capital; shyield – shareholder yield; rdintensity – R&D expenses to sales ratio; capexta – capital expenditures to total assets ratio; gsales – growth of sales (3 year moving average); gcapex – growth of capex (3 year moving average); gr_d – growth of R&D expenses (3 year moving average); gassets – growth of assets (3 year moving average); age – corporate age as the difference between 2015 and the year of foundation; activeness – active to passive shareholder ownership ratio; roe1 – return on equity; roa1 – return on assets; mtb1 – market-to-book ratio; tqe – Tobin-Q measured as the market capitalization to book value of equity ratio; ri - residual income measured as the difference between ROA and required return on equity (Bloomberg estimate); newind – dummy variable equals to 1 for the healthcare and bio-tech, software and technological hardware industries.

Variable	Obs	Mean	Std. Dev.	Min	Max
lnta	1832	6.973632	2.036936	-3.3697	13.48449
lnsales	1881	6.730451	2.14429	-3.9739	13.0102
ndirpr	1548	8.890181	2.221324	3	17
indditpc	1549	77.31493	13.33691	0	100
wompct	1723	10.55648	10.07672	0	55.556
atoe	1925	5.347252	110.9153	-124.844	4802.129
institute1	1558	70.76294	30.15331	0	145.531
top5	1558	38.00889	16.44926	0	98.514
top20	1558	64.0711	20.51391	0	127.778
top50	1558	76.74441	23.29689	0	137.089
sumblock	1558	33.23131	19.01054	0	92.953
insideow	1558	8.221521	12.58887	0	85.254
vcown	1558	3.465386	10.89076	0	73.982
payout	1421	52.32456	549.7842	0	14414.51
beta	1788	1.129135	0.381922	-0.2238	3.377
betaindu	2196	1.111859	0.102661	0.878	1.33
wacc	1788	10.17568	3.281641	0.2222	44.6709
shyield	1630	-1.59795	22.84769	-398.665	92.1843
rndintensity	1832	1.316386	29.87433	0	1207.301
capexta	1825	-0.04845	0.072111	-1.37481	0
gsales	1824	1.005169	23.11778	-1	922.9956
gcapex	1787	2.090455	36.00039	-1	1029.257
gr_d	884	0.180123	0.575254	-1	11.27228
gassets	1775	0.308279	3.21747	-0.73119	96.62828
activeness	1480	13.01646	214.2426	0.263711	8168.667
tqe	1406	4.323107	12.34334	0.00293	245.8245
roe1	1685	0.112554	2.341224	-49.5238	74.91304
roa1	1530	-0.69769	29.80559	-1164.02	19.57464
mtb1	1398	2.782497	4.715612	0.007098	88.89573
ri	1482	-3.00083	34.75627	-317.701	519.742
newind	1717	0.226558	0.418726	0	1

5 Conclusion and discussion

The analysis conducted allowed us to develop an original classification of financial architecture patterns in the US market. We determined 10 clusters of firm financial design in the United States in 2015. A further thorough analysis of dynamic cluster results will allow deriving the recommendations concerning the optimization of corporate financial design to achieve sustainable growth of nonfinancial companies in developed markets.

Our cluster analysis resulted in finding out 9 sustainable types of the financial architecture of large US nonfinancial companies. We can see the significant difference between patterns of financial design for companies with mostly institutional investors (Clusters 1, 2, 6, 10) and the companies with insider and family ownership (Clusters 3 & 7). We demonstrate that the blue chips and other conservative mature companies (Clusters 9 and 10 correspondingly) have their distinguished financial design with the highest possible quality of corporate governance. Finally, there is a specific type of financial design for companies with a venture fund on board (Cluster 4).

First, we found that the 'blue chips' represent a separate cluster in the US market. Google, Microsoft, Amazon rather look like each other, than like a small comparable company. This cluster also contains the oldest companies with the best corporate governance traditions, extremely high payout ratio and still high performance, while the average beta coefficient is similar to the market.

Second, we demonstrate that the institutional investors dominating the US market behave differently depending on the presence of other large stakeholders and the entire financial design of the company. They can hold the block in the company (see Cluster 1, 2, 6) or the holding that is less than 5% (Cluster 10) giving a picture of totally dispersed ownership. The concentrated blockholdings motivate institutional investors to behave much more accurately in terms of risks, e.g. they prefer moderate leverage. Companies with significant participation of insiders differ from those where the only potential investors are institutions. Insiders prefer to participate in the decision-making process via the dependent board (see Cluster 2). We also determine the cluster of quite mature companies, that could be the 'blue chips' if they were lucky.

Third, we found a specific cluster for the companies with significant participation of venture funds or private equity. These are young companies with high reinvestment rates and not the best traditions of governance.

We also demonstrated that the chosen type of financial architecture is crucial for market-based performance, as well as for the shareholders' return and firm profitability. One more significant

difference between different clusters is the preferred risk level together with the financial policy and gender diversity.

So, we achieved our initial goal to analyze not the separate influence of some company's characteristics over performance but the system of company's financial design that could be more efficient or less efficient as a whole in the US business environment.

We see a lot of limitations for this research; however, we managed to take into account several financial design characteristics simultaneously and to catch the sustainable patterns of financial design in US. Further research will be concentrated on (1) risk-adjusted methods of shareholders' return in US market; (2) intracluster analysis that allows demonstrating good and bad strategies inside one cluster.

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