St. Petersburg State University
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IMPACT OF CORPORATE DIVERSIFICATION ON COMPANY PERFORMANCE AND RISK: EVIDENCE FROM RUSSIA

Master's Thesis by the 2nd year student
Concentration - Corporate Finance
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ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

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26 мая 2016

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АННОТАЦИЯ

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Ключевые слова	Диверсификация, корпоративные результаты, корпоративный риск, интернационализация, диверсификация по продукту, диверсификация по географии

ABSTRACT

Master Student's Name	Iskander Shafigullin
Master Thesis Title	Impact of corporate diversification on company performance and risk: evidence from Russia
Faculty	Graduate School of Management
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Academic Advisor's Name	Anna Loukianova, Associate Professor
Description of the goal, tasks and main results	The goal of the research is to determine the relationship between corporate diversification and company performance and risk, using evidence from Russian companies. In order to achieve the goal, we complete the following objectives: to study the theoretical background on corporate diversification; to study existing literature on corporate diversification and performance relationship, and on corporate diversification and risk relationship; to propose an empirical methodology of the analysis on the impact of corporate diversification on performance and risk; to build and describe a sample for the analysis; to conduct an empirical study on the built sample; to interpret results and provide managerial implications based on the findings. Main results: theoretical background on diversification was studied; existing literature on corporate diversification and performance relationship, and on corporate diversification and risk relationship was studied; empirical model for the research was created; data on 64 Russian companies for 2000-2015 time period was collected, forming a sample of 465 observations; the sample was analyzed with regression analysis; results of regression analysis were interpreted and discussed managerial implications were provided.
Keywords	Diversification, corporate performance, corporate risk, internationalization, product diversification, geographical diversification

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INTRODUCTION

In the modern globalized world with increasing international trade and booming information volumes one of the ways available for companies to stay ahead of the competition is diversification, both product and geographical. Theoretically, there is a lot of benefits that are commonly attributed to diversification (Williamson, 1979), however in practice, it is often the case that diversification becomes a value destroying activity (Porter, 2008). While more and more companies make attempts to diversify, it is important to understand what impact such activities can make on two of the most important matters of any company: performance and risk.

It is usually perceived that corporate diversification opens up new opportunities in terms of performance and therefore it is beneficial for companies. However, since 1970s academicians tried to understand the relationship between diversification strategy and firm performance, and in turns out that there is no one single answer; the evidence is mixed, and there are different views on the relationship (Dey & Banerjee, 2011).

Same goes for diversification and risk: there is a common perception that diversification reduces corporate risk, however the empirical results are mixed as well (Anderson et al., 2011). The motivation of reduction of risk by diversification, highlighted in the literature, contributes largely to explain the choice to integrate the notion of risk in this study.

In general, most papers study the impact of diversification on performance and risk separately, however there is lack of empirical studies on these two issues simultaneously. Moreover, as per our knowledge, very few studies were devoted to conducting such analysis with regards to the emerging markets, let alone Russia. With this paper we aim to fill this gap. Also, most studies are concentrated on cross-section analyses. Differently, this research uses a longitudinal data from a sample composed of large Russian firms, in order to analyze the firm activity perimeter evolution effect on its level of risk and performance in a dynamic prospect.

The research goal of the paper is to determine the relationship between corporate diversification and company performance and risk, using evidence from Russian companies.

In order to achieve the outlined research goal, we define the following objectives:

- To identify the theoretical background on corporate diversification;
- To study existing literature on corporate diversification and performance relationship, and on corporate diversification and risk relationship;

- To propose an empirical methodology of the analysis on the impact of corporate diversification on performance and risk;
- To build and describe a sample for the analysis;
- To conduct an empirical study on the built sample;
- To interpret results and provide managerial implications based on the findings.

This master thesis is an empirical research, in order to achieve the goal of the study we conduct quantitative analysis using econometric tools built in the Stata software.

The main sources of information we use for the purposes of this research are academic articles devoted to: theoretical studies of diversification, motivation to diversify, determinants of diversification premium or discount, the effects of corporate diversification on company performance and risk. In order to gather data for our empirical study we use Thomson Reuters Datastream database and annual reports available on official websites of the companies selected for the study.

In order to achieve the defined goal of the research, we structure this thesis as follows: an introduction, three chapters that cover all objectives of the research and a conclusion. The introduction includes goals and objectives of the research, along with the motivation and background of the study. The first chapter covers the first two objectives as is devoted to analysing the theoretical framework of diversification, and the impact of diversification on performance as risk.

The second chapter corresponds to the third and fourth objectives, as there we describe the empirical research methodology, sample selection and variables calculation. In the third chapter we cover the last two objectives, as we present the results of the econometric analysis and then discuss these findings as well as develop managerial recommendations.

Finally, the conclusion summarizes the results of the research in accordance with the goals set. Also, at the end of each chapter we provide a short summary in order to help a reader better catch the main points discussed in the chapter.

CHAPTER 1. LITERATURE REVIEW

1.1. Theoretical background on diversification

One of the approaches companies employ to remain competitive in business is diversification. In the most general classification, there is product diversification, where a company gets revenue from several industry sources; and geographical diversification, where a company gets its revenue from several geographical locations.

Product diversification

According to Nayyar (1992), a company can be called a diversified one if it operates in more than one business. In turn, the level of involvement in different businesses, is called diversification strategy.

To give a definition of diversification strategy, it can be "expanding to new industries and markets which differ from company's main markets or product lines" (Johnson and Scholes, 2002). According to them, there are various drivers and reason why companies choose to diversify, these are all kinds of advantages connected to:

- Higher market power,
- Use of existing capacities and resources in other dimensions,
- Better allotment of assets through internal capital markets,
- Greater debt capacity,
- Decreased performance variation by virtue of a portfolio of imperfectly correlated set of business.

In other words, leveraging company resources in more than one industry creates beneficial synergies between the sectors, and allows the firm to gain benefits connected to cost or differentiation. Other advantage from diversification include tax and general financial benefits. Essentially, these are the main reasons why companies diversify. It is important to note here, however, that diversification advantages are highly dependent to institutional development: in the context of developed institutional economies diversification strategy is more beneficial (Kock & Gulline, 2001).

As product diversification has its advantages, there are also numerous potential costs in place. These include the information asymmetry costs that can emerge between headquarters and divisional managers in diversified companies, where handling information becomes more expensive (Harris et al., 1982). Jensen (1986) claims that decision makers of companies that have untapped borrowing

power and substantial cash at hand are more likely to chase projects and investments that may not be highly valuable. Besides, according to Meyer et al. (1992), there is a common asymmetry between growth and decline for divisions of a diversified company. To sum up, the potential drawbacks of diversification strategy contain existence of abundant cash to make value-decreasing investments, cross-subsidies that allow poor units to suck the capacities from higher-performing units, and unequal division of incentives between HQ and unit managers.

Product diversification can be of two kinds: related and unrelated. If a firm operates in a market that possesses a strategic fit with the core business, then it is related diversification. Otherwise, if there is no direct strategic fit between the two, nor significant interrelationships in the value chain, it is considered unrelated diversification (Allen & Gorgeon, 2002).

When a company decides to diversify in a related manner, the main purpose it has is to leverage the synergies – advantages between the operations in the two related sectors. Synergies occur when the combined outcome of the merged actions becomes bigger than the sum of the individual effects. To put it in another way, a synergistic effect arises when one plus one add up to three. When it comes to synergy, this is not some abstract, created connection, it is selected capabilities (financial, human, technological) and opportunities (R&D, brand management, customer service), which can be transferred between sectors.

Geographical diversification

Geographical diversification and its benefits and costs is quite a well-studied topic in the academic literature. In general, academician divide internationalization by two types: multinational companies and foreign direct investments. Theory of multinational companies involves arguments on shared resources and experience exchange between divisions in different countries (Wernerfelt, 1984), global arbitrage opportunities (Kogut, 1989) and synergies in business process and systems optimization (Fayerweather, 1978). School of foreign direct investment puts that internationalizing companies are able to reduce risk by diversifying their businesses in different locations (Lessard, 1976), and improve performance via economies of scale and resource sharing (Rieck et al., 2005).

Moreover, various authors have argued that international diversification enhances shareholder value by exploiting firm-specific assets, by increasing operating flexibility and by satisfying investors' preferences for holding globally diversified portfolios.

According to Morck et al. (1998), geographical diversification is especially beneficial for companies which possess a significant information-based asset base (it can be connected with R&D

and advertising). This type of assets shows evidence of improving returns of scope and scale although it can be at times challenging at times to sell. Internationalization solves this problem.

Another benefit of geographical diversification is that it enables the company to leverage market conditions, thus adding value through operational flexibility. An international company can choose if it wants to move manufacturing to a location with cheaper costs, or to move distribution to a place with bigger buying potential; plus the difference is the tax system can be leveraged too.

Finally, another advantage of geographical diversification is based on invertor preferences. Theoretically, investors favor companies which are diversified internationally and are more likely to pay a premium for such firms, due to lower cost to have a diversified portfolio, rather than for diversifying as a separate investor.

Similar to product diversification, while internationalization strategy has its advantages, there are also numerous potential costs in place. One of the drawbacks is the same as with product diversification: due to internationalization the divisions that are less profitable can potentially be cross-subsidized inefficiently. Also, there is again information asymmetry in place with concerning divisions and head office (Harris et al., 1982).

Diversification premium and discount

A big question in diversification research which researchers and practitioners try to answer, is whether there is value created for a company when is diversifies across industries and locations. It is said, that if diversification premium is there is indeed excess value creates; on the other hand, diversification discount arises when value is destroyed.

These two concepts, of diversification premium and discount, are aligned with benefits and costs of diversification, respectively; which are in turn explained differently by different researches. For the costs of diversification, Jensen & Murphy (1990), for one, explain it by agency arguments; Gomes & Livdan (2004) argue that one of the costs is company's value maximization behavior; and Choe & Yin (2009) explain it by inefficient investment because of rent-seeking activities. Maksimovic & Phillips (2007) state that one of the reasons for diversification discount is self-selection of companies that have varying financing opportunities to begin with, contradictory to the previous explanations with inefficient internal capital markets. Their findings also are based on the more recent empirical evidence in the research. Another factor they state that can be important for explaining the discount is capital budgeting procedure in companies that target to solely maximize their returns, rather than diversification itself. Moreover, according to a survey by Stein (2003), the discount arises

mostly due to agency issues and information asymmetry. It is worthwhile to notice, that he studied for the most part the body of articles with the focus on internal capital markets and strong capital allocation. Finally, according to the survey by Martin & Sayrak (2003), potential reason for the discount may not be diversification itself, but some kinds of bias and problems with measure management.

As for the advantages (benefits) of diversification, these are explained by economies of scope (Teece, 1892), well-functioning internal capital market (Stein, 1997) and debt concurrence effects (Shleifer & Vishny, 1992). Previous empirical research shows evidence of contradictory points of view on advantages of diversification strategy (Lins & Servaes, 1999; Villalonga, 2004; Rajan et al., 2000; and others), this topic is still in an infancy stagy and discussion is still ongoing.

Since there is open discussion, in order to proceed with discussing diversification, it will be beneficial to understand the theoretical and methodological arguments on the topic.

According to Wan et. al (2011), one of the most important theoretical points of view on diversification from the research is the importance of resources, mainly due to the fact that the way and the outcome of company performing is heavily connected with its resources and its presence in the firm. According to Farjoun (1994), when a company shares resources close to market failure, diversified firms tend to do better that focused ones, this is the key idea behind the Resource-based view.

Some studies also provide another view on diversification strategy, namely through Real Options. For example, Bernardo & Chowdhry (2002) propose an argument that companies are able to make the value of its growth options through diversifying and expanding to different businesses. Based on this theory, a whole new set of arguments arises, where it is possible to explain diversification with strategic flexibility and managerial decision as per real options. According to Bernardo & Chowdhry (2002), analyzing past diversification actions as real options, companies are able to get better information on their capabilities and probability of future success in diversification.

Researchers tend to agree for the most part, that related diversification is beneficial for companies. The following advantages arise: economies of scope (Nayyar, 1992), sharing resources (Ghemawat & Khanna, 1998), synergies in the values chain (Barney, 1997).

1.1.1. Measures of diversification

In order to assess the effects of corporate diversification, it is essential to be able to measure it first. In the previous researches, authors describe and employ a number of various indications to measure company diversification. In the broadest sense, these indicators fall under two main groups, which measure the level of diversification and diversity in a company. Diversification indicators measure the level of company's involvement in various sectors of economy. As for the diversity indicators, they showcase how company's resources and revenue streams are dispelled across these segments.

In this paper we are mostly concerned about measures of diversification, so we do not discuss diversity indicators in detail.

For the diversification indicators, in a broad way they can be classified by being discrete and continuous. There are two main discrete indicators, both rather simple:

- Diversification dummy. It is a binary measure that will equal unity of the company operates in more than one industry and will equal zero if the company is active only in one sector (Lins & Servaes, 2002);
- Number of industries. This one simply measures the number of industries of company operations (Khanna & Palepu, 2000).

It should be noted, that out of the discreet measures, diversification dummy is by far the most frequently used one; it is used by, among others, Lins & Servaes (2002), Anderson et. al (2000), Fleming et. al (2003), Mansi & Reeb (2002). As per whether it provides more accurate results compared to number of segments, it is rather obvious that it provides on the issue whether diversification in the company exists at all, rather than the degree of the diversification. For the empirical research of diversification effects, therefore, it should be noted that this measure is only applicable when the purpose is to learn about the outcome of being diversified. Unlike the number of industries indicator, diversification dummy is not very efficient when studying the effects of higher or lower diversification (Villalonga, 2004).

As for the continuous indicators of diversification, the most widely used ones in the current body of research are:

- Herfindahl index. This indicator is calculated by summing the squared values of revenues in each revenue segment, and dividing it by company's total revenues. When a company has its revenues only from one industry, i.e. it is not diversified, its Herfindahl index is unity. This indicator was first used with regards to diversification by Berry (1971).

- Entropy index. While the Herfindahl index constitutes for the weighted average of sector's shares in total company revenue, these shares are taken as it is. With the entropy index, the main idea is the same, however the shares are weighted by taking natural logarithms of the its inverses. This indicator was first proposed to be used with regards to diversification by Jacquemin and Berry (1979).

Both of these measures can be employed for company's revenues or assets.

As in the previous section we discussed that diversification can be classified to related and unrelated, it is important to note that the Herfindahl index has one major drawback when comparing it to the entropy index: it can not account for these sub-types of total diversification. The entropy index can be broken down to two different indices: the entropy index of related diversification and the entropy index of unrelated diversification. These indices are perceptive to the level of how the sectors and segments are identified. The industries can be identified broadly, at the two-digit SIC or NAICS levels (internationally accepted standards for industry classification); or in a narrower way, at the four-digit level of SIC or NAICS. The difference here is that in the first case (broader definition) the diversification indicator will be a lot smaller that in the second case. The majority of authors in the current literature is the broad, two-digit SIC or NAICS way to analyze unrelated diversification, and the narrower, four-digit SIC or NAICS level for the related diversification (Palepu, 1985; Khanna & Palelu, 2000; Villalonga, 2004).

Opposing to the more flexible entropy index nature, the Herfindahl index does not possess an ability to differentiate between broad and narrow level, or related and unrelated diversification respectively. As the entropy index can be decomposed in a way that total entropy index equals related entropy index multiplied by unrelated entropy index, the Herfindahl index can not identify the level of relatedness between company's diversified revenue segments (Palepu, 1985).

While both of these indices have some limitations in place, another difference between them is that they have different receptiveness concerning changes in diversification levels. The Herfindahl index not only does not identify the relatedness, it also catches changes in number of industries and its weights more slowly than the entropy index. Also, the entropy index is less receptive to changes in the biggest sector weights, but more sensitive to changes in smaller division weights, rather than the Herfindahl index (Gorecki, 1974).

The survey of diversification measure usage in the current literature in presented in Table 1 below. We should note that for the continuous measures, in recent years the entropy index becomes more and more widely used.

Table 1. Survey of diversification measure usage in existing literature.

Diversification measure		Used by (among others)
Discrete	Diversification dummy	Berger and Ofek (1995) Servaes (1996) Anderson et al. (2000) Fleming et al. (2000) Lamont & Polk (2001) Villalonga (2004) Schmid & Indo (2009)
	Number of segments	Lang & Stulz (1994) Berger & Ofek (1995) Berger & Ofek (1999) Lamont & Polk (2001) Schoar (2002) Villalonga (2004) Schmid & Indo (2009)
Continuous	Herfindahl index	Lang & Stulz (1994) Berger & Ofek (1999) Khanna & Palepu (2000) Schoar (2002) Villalonga (2004) Schmid & Walter (2009) Elsas et al. (2010)
	Entropy index	Khanna & Palepu (2000) Villalonga (2004) Lee et al. (2008) He (2009)

1.2. Corporate diversification and performance

In this section we first review research studies on diversification and performance relationship, and then discuss measures of performance that are frequently used in the diversification context.

1.2.1. Relationship overview in the existing literature

The relationship between corporate diversification and performance is a topic that academicians have been conducting research on since 1970s. The impact of the former on the latter is not a mature topic and is an ingoing subject in the world of economics, finance and corporate strategy; it is far from being exhausted (Palich et al., 2000).

In this sub-section we conduct a survey and analyze what the findings in terms of corporate diversification and performance relationship in the existing literature are. In general, a broad body of papers and articles analyzed this topic in the past, however there does not seem to be one unambiguous

finding and conclusion to fit them all. From the logic and theories described in the previous section we can determine that diversification has a lot of benefits for a company, things such as synergies, economies of scope and scale, decreased risk, steeper learning curve, market power and others. However, as we will see below in this sub-section, there is a lot of evidence on negative relationship as well.

In general, the studies on the topic in the current literature can be categorized to the following types:

- "Plain" linear relationship outcome;
- U-shaped relationship;
- Breakdown to related and unrelated diversification;
- Comparison of relationship between different countries (Boz et al., 2013).

The first group of studies shows a "plain" linear relationship between corporate diversification and performance. In general, studies clearly show mixed evidence. Singh et al. (2001), Piscitello (2004), Khanna & Palepu (2000), Schoar (2002) and others find that corporate diversification impacts the firm's performance positively, be it revenues, profits, or company value. For one, Anil & Narendar (1998) find relatively strong evidence in favor that diversified companies do considerably better than focused ones.

As for the linear negative relationship, it was found existing by Markides & Williamson (1994), Berger & Ofek (1995), Bernardo et al. (2000), Anderson et al. (2000) and others; and we have to notice that this body of research makes up to the majority – most of the studies report a negative linear relationship. In other words, most of the evidence shows that with corporate diversification comes a slowdown of downturn in company's performance (Villalonga, 2001). That said, some authors state that the discount occurs not due to diversification itself, but rather to some side issues. But generally, many researches conclude that diversification brings more drawbacks rather than benefits for companies (Lins & Servaes, 2002). As most of the existing researches report a negative relationship between corporate diversification and performance (Villalonga, 2001), the first hypothesis we use in our empirical study is the following:

H_1: Product diversification is negatively related to firm's performance.

Finally, studies from Montgomery (1985), He (2009) and others report lack of significant relationship between corporate diversification and company performance. Table 2 presents a summary of linear diversification-performance relationship in existing literature.

Table 2. Survey of linear diversification-performance relationship in existing literature.

Finding	Found by (among others)
Positive relationship	Khanna & Palepu, 2000 Singh et al., 2001 Schoar, 2002 Piscitello, 2004
Negative relationship	Markides & Williamson, 1994 Berger & Ofek, 1995 Bernardo et al., 2000 Anderson et al., 2000 Lins & Servaes, 2002 Gary, 2005
Lack of relationship	Montgomery, 1985 He, 2009

Moving on to the second group in the body of research, we see the inverted U-shaped relationship. This kind of nonlinear evidence is found by Kakani (2000), Palich et al. (2000) and others. This evidence suggests that as the level of diversification in the firm rises to some specific level, the organizational results grow as well; but when the diversification grows further on after this peak point, the results will deteriorate. This is explained by that there are numerous inefficiencies and extra costs in terms of organizational management, where the size of the company is out of the maximum level control (Grant et al., 1988), therefore the more a firm diversified after some average point, the less can benefits of diversification play a role, and therefore the discount arises.

As for the third body of research, some of the authors went further and decided to break the total diversification down to related and unrelated diversification and see its impact on performance. The majority of studies in this group find that the companies that diversify in the related sectors perform better than the ones that choose to diversify unrelatedly, as shown by authors such as Markides & Williamson (1994) and Lubatkin & Chatterjee (1994), among others. These studies suggest that resource-based theory and synergy views on diversification hold (Desmond, 2007). Other studies, for example Grant et al. (1988) find no advantage for related or unrelated diversification, stating that both of these methods enhance firm performance and are advantageous for companies to focused companies.

However, the main base point is the superiority of related diversification for the company performance. Palich et al. (2000) conducted an extensive survey of 55 studies with evidence on this topic and what they found is that indeed related diversification is more advantageous comparing to unrelated types. Doukas (2003) provided evidence that firms with related diversification experience a

diversification premium, due to significant positive abnormal returns when operating in related activities.

As discussed in previous section, there is a number of advantages of related diversification for the companies (such as economies of scope, sharing resources, value chain synergies and others); and the empirical evidence suggests that these benefits outweigh the costs, thus we propose the following hypothesis for our study:

H_2: Related product diversification is positively related to firm's performance.

As for the unrelated diversification, for the most part researchers tend to agree that it is negatively related to performance. Some of the reasons are the following: sharing resources and capabilities becomes rather challenging and more expensive, higher costs due to introduced operating inefficiencies of unrelated business operation and lack of synergies regarding existing divisions (Palich et al., 2000). Also, this type of diversification often makes a negative impact on company's operating efficiencies, because unrelated diversifiers can not leverage the benefits of economies of scope and have inefficient internal markets (Doukas, 2003).

To sum up, unrelated diversification often leaves a negative impact on corporate performance due to lack of synergies and focus, and decreased coordination of cohesion. Thus, we propose the following hypothesis:

H_3: Unrelated product diversification is negatively related to firm's performance.

Finally, a lot of studies concentrate on comparing the diversification and performance relationship between different countries. Gullien (2000) found that diversification is more beneficial for companies from emerging countries rather than developed one; Khanna & Palepu (1997) find similar evidence. Speaking of reasons for that, Stijn et al. (2002) argue that the capital markets tend to be less developed, as well as legal systems, and in general there is less information available in the emerging markets, and these factors make diversification more beneficial in these markets.

As for the evidence on the country level, Zhang et al. (2002) studied performance of 72 Chinese firms and found that diversification impacts performance negatively. Li (2004), on the other hand, utilizes a larger sample size of Chinese companies did not find any significant relationship. Fleming et al. (2003) found negative relationship for Australian companies. Lins & Servaes (2002) in their studies conducted an extensive research of a number of different countries and found that the relationship is negative in Hong Kong, UK, Singapore, South Korea and Japan; and in such emerging markets as Indonesia, Malaysia, Thailand and India. Speaking of India, Khanna & Palepu (2000), on the other hand, found a positive relationship for the Indian companies in terms of diversification and

performance. Overall, these at times contradictory results between countries can arise due to institutional variability, different data sources, different research methods and sample selection bias.

In general, we have to note that evidence form developing countries on this topic is still in an infancy stage and very limited. These counties are becoming more and more significant players in the world economy, so this is definitely an open topic interesting to study.

Overall, we see that many researchers tried to study corporate diversification and performance, and their empirical evidence is mixed; there is no consensus on the diversification effects in the current literature.

Moving on to geographical diversification and performance, we see that existing research papers suggest mixed views on the impact (Hitt et al., 1997). Authors such as Tallman & Li (1996) and others provide evidence that internationalization impacts corporate performance positively; others, such as and Lu & Beamish (2004), find negative relationship. However, according to Rieck et al. (2004), the majority of authors find the relationship between internationalization and performance to be positive, thus we define our next hypothesis as the following:

H_4: The relationship between geographical diversification and firm's performance is positive.

1.2.2. Measures of corporate performance

Having reviewed papers on diversification and performance relationship in the previous sub-section and having seen that they yield varying results, it is important to note that these papers use varying diversification and performance measures. As we have reviewed diversification indicators in the first section, this sub-section aims to go through the main performance measures existing in the literature.

In the broadest way, performance measures can be classified in two categories, both of which are extensively used in the literature on the diversification and performance relationship:

- Accounting-based measures;
- Market-based measures (Palich et al., 2000).

Accounting-based measures are generally considered to be the main indicator of firm performance, as they are able to show the result of company operations as per account books. The main feature of these indicators is that they measure company profitability across various dimensions, such as assets, equity, shares, and others. Some of the accounting-based measures used in the past are: Return on assets, Return on equity, Return on sales, Return on Investment, Operating profit, Earnings per share, Return on capital employed and others (Al-Matari et al., 2014).

One of the limitations of accounting-based measures is that they incorporate only the past performance, failing to foresee or in any way account for future prospective. Also, they recognize future events in terms of depreciation and amortization in a limited way. Besides, these measure are subject to be affected by differing accounting methods and practices, and the accountant's personal skills, as he is the one calculating the measures. This especially impacts the calculation of intangible assets (Kapopoulos & Lazaretou, 2007).

Market-based measures, on the other hand, incorporate the forward-looking features in that the investor expectations are included in the dimension too. The investors (the market) have certain expectations regarding the company's potential performance in future, which are reflected in the market-based measures. These measures include, among others, Tobin's Q, Price-to-earnings ratio, Market-to-book value (Wahla et al., 2012).

Return on assets (ROA) is the most widely used accounting-based measure in the diversification-performance literature, due to the reason that this measure is an effective indicator of both operating and financial sides of company performance. It indicates how well the assets are used, which is an important message for shareholders (Klapper & Love, 2002).

As for the market-based measures, Tobin's Q is the most widely used one in the diversification-performance literature, it became so after it was first used by Lang & Stulz in their seminal study from 1994. It is calculated by dividing the total market value of a firm by the book value of its assets, and it has become a common indicator to see the expected long-run performance of a company. The numerator of the formula employs the investor-based opinion on future growth prospective, and the denominator in the asset value depends from past organizational decisions. So the higher the indicator is, the more evident it is that the firm has taken advantage of the investments and proceeded to develop the company efficiently (Bozec et al., 2010).

Khanna & Palepu (2000) in their study employ both of the two most popular measures in Return of assets and Tobin's Q in order to track company performance. Berger & Ofek (1995) only use the Return of assets indicator. Campa & Kedia (2002) in turn, use the assets and sales measures, is in Return on sales. Fleming et al. (2003) and Lee et al. (2008) both use Earnings before taxes. In other words, different researches employ different measures to track the impact of diversification on performance, and it is highly dependent on author's goals and preferences.

1.3. Corporate diversification and risk

In this section we first review research studies on diversification and risk relationship, and then discuss measures of risk that are frequently used in the diversification context.

1.3.1. Relationship overview in the existing literature

The general view in the finance and strategy literature and theories that corporate diversification is associated a lower corporate risk profile. Although it is a usual perception, there is lack of relevant evidence in the existing body of research that shows the clear relationship between corporate diversification and corporate risk (Anderson et al., 2011). In this sub-section we review the polarizing views on the relationship and possible reasons on why diversification might reduce and increase corporate risk.

The majority of papers follow the popular opinion that there is risk reduction associated with higher diversification. One of the arguments for why that happens is related to the real options view of diversification discussed above: when diversifying, companies execute their growth options. In other words, by diversifying, firms transform these growth opportunities into assets and by that reduce the risk, as the options consist of future economics conditions, which is risky (Carlson et al., 2006).

Another argument, as proposed by Amihud & Lev (1981), consists of the assumption that by diversification activities decision makers in companies follow the incentives to reduce risk, so they choose to pursue investment projects that help to lower the variations in company's revenues. Also, there is another argument why diversification reduces the risk, and it is based on the similarity between corporate diversification and portfolio diversification. According to Anderson et al. (2011), it is possible to conclude that corporate diversification reduces company's risk since corporate and portfolio diversification are analogous since both hinge on investments in different segments or sectors. The dominant focus in portfolio diversification is on risk management, and it is possible to related the concept to corporate diversification as well, according to the author.

On the other hand, although it is the most popular, the opinion that corporate diversification is associated strictly with reduction of company risk is not the only view. There are several factors concerning why corporate diversification impacts corporate risk positively.

Consistent with the first argument of negative diversification and risk relationship above, the first argument here also concerns real options. According to Zhang et al. (2002), it is possible that growth options actually possess smaller amount of risk comparing to actual assets. The reason being, that companies that have more growth options tend to have lower adjustment expenses and therefore

tend to keep their investments; which therefore leads to the conclusion that the counter-cyclical price for these expensive and risky assets cause reversibility in place, more difficult to reduce than the growth option is therefore a high risk, especially during the economic downturns with high price of risk. The bottom line is that diversification increases risk of the company when assets have a higher risk profile than these growth options.

The next argument concerns decision maker preference that tends to determine the risk profile. As Hermalin & Katz (2003) state, when making decisions on whether to diversify or not, it is usually shareholders rather than manger who decide. Since shareholders tend to be less risk-averse than managers, as managers prefer to to secure their salaries and bonuses with safer business decisions, shareholders are more likely to pursue riskier solutions. Therefore, when decisions on diversification are done by shareholders, it is more likely for the risk profile of the company to increase. It is important to note that this argument is based on the opinion that managers tend to be more risk averse than shareholders. However, it is not a unanimous case. According to Agrawal and Mandelker (1987), when managers have shares or options of the company, they tend to be more willing to pursue risky decisions. Generally, there are two main outcomes of risky diversification decisions that affect the responsible people: value of the company grows, or human capital of decision makers deteriorates. If decision makers in managers have shares in the company, the first outcome might win and be more important – therefore risk-increasing choices are more likely.

The final argument is based on the similarity between corporate and portfolio diversification. It is important to note that risk reduction is the main reason for portfolio diversification, but is not necessarily the main reason and factor for corporate diversification. There are other reasons for corporate diversification that do not reduce risk and can even lead to risk growth, such as well-functioning internal capital markets, economies of scale and managerial benefits (Denis et al., 1997).

Although the issue of corporate diversification and risk relationship is not as frequently studied in literature as the issue of corporate diversification and performance relationship, it is still an issue worth of research and it is being studied in the current literature. For example, Anderson et al. (2011) provide evidence that diversified firms do not tend to have lower risk, although some of them indeed have lower risk profiles. They studied the effects through the analysis of diversifying acquisitions. Comment & Jarrell (1995) find that there is indeed negative relationship between corporate diversification and systematic risk, using evidence from public companies both diversified and focused, between 1978 and 1988. Same finding goes per Chan & Steiner (2000), where diversification negatively impacts total and market risk. On the other hand, Thomas (2002) appears to find out that

diversified and focused firms have similar risk profiles. Still, the majority of researchers seems to find that diversification impacts corporate risk negatively, thus we propose the following hypothesis:

H_5: Product diversification is associated with reduction of firm's risk.

Companies bear not only market risk, but also an internal financial one, which can be measured in financial leverage. According to Low & Chen (2004), companies with more diversification tend to have higher leverage; and in general studies show that diversified companies tend to exhibit higher leverage ratios.

As for internationalization, existing literature shows for the most part that geographical diversification increases risk profiles. Fatemi (1984) finds that firms that diversify internationally have lower risk that focused domestic companies, same evidence is reported by Borde et al. (1994); both of these studies use companies from the US as a base and expanding internationally, primarily in Europe. Madura & Rose (1989) find a diminishing negative effect in increased proportion of foreign sales, Goldberg & Herflin (1995) report similar results. On the other hand, some other studies, such as Doukas & Kan (2006), report increased risk for firms with higher degree of internationalization. Rather interesting evidence is provided by Kwok & Reeb (2000), who analyze international companies from 32 countries and find that companies from emerging markets experience lower risk profiles and vice versa.

As in our study we analyze companies for an emerging market – Russia, and since the majority of previous findings show that there is negative relationship between geographical diversification and risk, we define our last hypothesis as the following:

H_6: Geographical diversification is associated with reduction of firm's risk.

The question of diversification and risk relationship does not get sufficient consideration in the research, and due to not enough evidence the opinion on diversification effect on risk is not unanimous and is still ambiguous. With this study we are looking to contribute to the existing body of research on the topic and possible find some worthy evidence from Russian companies.

1.3.2. Measures of corporate risk

Having reviewed papers on diversification and risk relationship in the previous sub-section and having seen that they yield varying results, it is important to note that these papers use varying diversification and risk measures. As we have reviewed diversification indicators in the first section, this sub-section aims to go through the main risk measures existing in the relevant literature.

Similar to the performance measures, we divide the risk measures to the following two categories:

- Accounting-based measures;
- Market-based measures (Ecker et al., 2009).

From the accounting-based view, an important objective of the analysis of financial statements in general and that of ratios in particular is an assessment of the risk inherent in a firm's operations. Two sub-types of risk exist there: credit risk and equity risk. One indicators used to forecast financial risk measures is firm's earnings variability. The variance of a firm's earnings is a direct measure of the uncertainty and therefore risk of its earnings stream. A smooth earnings stream is assumed to be desirable by firms, their creditors, and the financial markets. To the extent that accounting earnings mirror a firm's economic well-being, the variance in that measure would be expected to measure a firm's risk (Toms, 2011).

Earnings volatility is primarily related to the underlying uncertainty of demand for the firm's output and thus the variability of its sales. The effect of sales variability on earnings variability is a function of the firm's operating and financial leverage. Earnings variability generally has a systematic as well as unsystematic component; the systematic component is referred to as the accounting beta.

From the accounting-based view, it is recognized that there is operating and financial risk. Operating leverage is the percentage of fixed operating costs in a firm's overall cost structure and financial leverage is the percentage of fixed financing costs in a firm's overall cost structure. The higher the percentage of fixed costs, the greater the variation in income as a result of variation in sales. Another financial leverage used in the literature is debt and equity ratio. That said, financial leverage can use other surrogates such times interest earned or debt and assets (Konchitchki et al., 2016).

Other frequently accounting-based measures include earnings variability, contribution margin ratio (percentage of revenues that is available to cover a company's fixed costs, fixed expenses, and profit), operating leverage effect ratio (how much income will change given a percentage change in sales volume), financial leverage ratio (the amount of debt held by the business firm that they use to finance their operations; debt creates additional business risk to the firm if income varies because debt has to be serviced), combined leverage ratio.

As for the market-based measures of risk, two types are recognized:

- Unsystematic risk: factors specific to the firm. Diversification eliminates unsystematic risk.

- Systematic risk: factors common across a wide spectrum of firms. The only risk measure that remains relevant. Beta is the measure of systematic risk (Beaver et al., 1970).

Beta has become one of the most common indicators, and it is important due to the following reasons. To construct investment portfolios with the desired risk and return characteristics, one must know the beta of individual characteristics. Discounted cash flow valuation models require an estimate of the firm's expected rate of return, beta can be used to estimate that return. Management in making capital budgeting decisions needs to know the firm's cost of capital.

In the broadest way, beta is defined as the speed or relation to which company's stock and market return move together. If beta equals one, that means that the returns of the security have the same move patter as market returns. If beta is positive, that means that the stock and market returns move in the same direction, and the opposite holds for a negative beta (Beaver et al., 1970).

A tremendous amount of research has been conducted on the beta. Ball & Brown (1968) found a high degree of association between the accounting beta and market beta. Lev (1973) found that the lower the variable cost, the higher the total variance of returns and the higher the beta are. Beaver et al. (1970) found that dividend payout, financial leverage, earnings variability, and accounting beta have significant correlations with market beta. Fama & French (1992) found, however, that alternative measures of risk tend to be more closely related to returns while returns are not related to the beta.

1.4. Summary of Chapter 1

In this chapter we review the theoretical background on diversification first and then survey the literature on corporate diversification and performance and risk relationship. We also discuss the indicators commonly used to measure diversification, performance and risk.

In the broad way, diversification is classified to product diversification, where a company gets revenue from several industries; and geographical diversification, where a company gets its revenue from several geographical locations. Product diversification can be of two kinds: related and unrelated. If a firm operates in a market that possesses a strategic fit with the core business, then it is related diversification. Otherwise, if there is no direct strategic fit between the two, nor significant interrelationships in the value chain, it is considered to be unrelated diversification (Allen & Gorgeon, 2002). Diversification can be measured by discrete (diversification dummy, number of industries) and continuous (Herfindahl and entropy indices) measures; the entropy index can be decomposed to related and unrelated entropy (Palepu, 1985).

Reviewing the literature, we note that most of the existing researches report a negative relationship between corporate diversification and performance. Possible reasons for that include agency costs, inefficient investments because of rent-seeking activities, inefficient internal capital markets. These drawbacks, however, diminish for the related diversification: the majority of studies in this group find that the companies that diversify in the related sectors perform better than the ones that choose to diversify unrelatedly; these studies suggest that resource-based theory and synergy views on diversification hold and companies are able to gain significant positive abnormal returns when operating in related activities. As for the unrelated diversification, for the most part researchers tend to agree that it is negatively related to performance. Finally, the majority of authors find the relationship between internationalization and performance to be positive.

Moving on to diversification and risk relationship, the majority of researchers seem to find that diversification impacts corporate risk negatively. The factors here include real growth options, decision maker incentives and similarities with portfolio management. As for internationalization and risk, existing literature shows for the most part that geographical diversification increases risk profiles; this better applies to emerging markets rather than developed ones.

Based on theoretical review conducted in this chapter we outlined six hypotheses which will be checked in the empirical part of this study; summary of the hypotheses is provided in Table 3.

Table 3. Summary of the hypotheses to be tested.

H	Description
H_1	*Product diversification is negatively related to firm's performance*
H_2	*Related product diversification is positively related to firm's performance*
H_3	*Unrelated product diversification is negatively related to firm's performance*
H_4	*The relationship between geographical diversification and firm's performance is positive*
H_5	*Product diversification is associated with reduction of firm's risk*
H_6	*Geographical diversification is associated with reduction of firm's risk*

CHAPTER 2. RESEARCH DESIGN

This chapter aims to establish the methodological basis for analysing the impact of corporate diversification on company risk and performance. Our empirical study is a regression analysis, therefore we describe the sample, variable calculation, and then outline the econometric models used to conduct the analysis.

2.1. Diversification definition

In order to proceed with the empirical analysis, it is necessary to define how exactly we measure related and unrelated diversification. In this section we establish that, providing examples of companies used in the study.

We employ the approach of Khanna & Palepu (2000), where the index of related diversification is based on the various revenue sources within a company that come from the same two-digit SIC equivalent industry, and is calculated as a function of all such instances within the company. The index of unrelated diversification is a function of different revenue sources within the company operating in different two-digit SIC equivalent industries. Each index is a weighted average of the ratio of firm sales to segment sales in that two-digit category (for related diversification) or a weighted average of the ratio of sales within a particular two-digit industry to total firm sales (for unrelated diversification), with the weights given by the logarithm of the reciprocal of the ratio.

We provide some examples of related and unrelated diversification using companies from Russia used in this study, the summary is provided in Table 4 below.

Table 4. Examples of related/unrelated diversification in the company data used.

Company	Related diversification	Unrelated diversification
AFK Sistema	Telecommunications	High technology, finance, retail, pulp and paper, utilities, pharmaceuticals, healthcare, railway transportation, media, agriculture, tourism and drilling
Irkustkenergo	Electricity	Metallurgy, coal, railroad services
Udmurtneft	Crude oil extraction, crude oil distribution, oil refining	Electricity, construction, rental services
GAZ	Vehicle manufacturing, buses manufacturing, trucks, autocomponents, engines,	-

Source: company annual reports

As a primary example we take a look at AFK Sistema, which is a major Russian group operating in various industries. The company reports that it is active across many different segments: telecommunications, high technology, finance, retail, pulp and paper, utilities, pharmaceuticals, healthcare, railway transportation, media, agriculture, tourism and drilling. All of these would be factors of unrelated diversification, except for the main sector of telecommunications.

Moving on to the next example in Irkustkenergo, the related diversification for this company would be electric power operations, and unrelated diversification consists of divisions operating in coal, metallurgy and railroad services.

If we consider Udmurtneft, the related diversification for it would be crude petroleum extraction and crude petroleum distribution operations and services, and unrelated diversification consists of electricity services, construction services, rental services.

If we consider GAZ, the related diversification segments for it would include car manufacturing, buses manufacturing, trucks, autocomponents, and the company does not have any unrelated diversification segments.

2.2. Sample description

As our empirical study is based on regression analysis, we gather a sample of data for it.

Companies included in the sample had to meet two criteria. Firstly, firms had to be listed in the Moscow Exchange in Russia. Secondly, a firm should be active in any industry other than the financial service industry (SIC codes 6000-6999). Financial firms follow different diversification patterns and usually have different operating strategies. Also, the debt-like liabilities of financial firms are not strictly comparable to the debt issued by non-financial firms (Rajan & Zingales, 1995). For these reasons, it was decided to exclude financial firms from the analysis.

The data was derived from Thomson Reuters Datastream database. The sample for the study is a set of 64 public Russian companies that diversified over the last 15 years and operating in non-financial sector. The sample includes companies from 10 industries: manufacturing (11% of companies in the sample), oil & gas (17%), construction (2%), metals & mining (16%), chemicals (6%), real estate (2%), retail (8%), telecommunications (6%), transportation (6%), electric power (27%). The industry classification follows the SIC standard. The summary of the sample in terms of companies and observations is provided in Table 5.

Table 5. Sample composition by industry.

Industry	Companies	%	Observations	%
Electric power	17	*27%*	111	*24%*
Oil & Gas	11	*17%*	102	*22%*
Metals & Mining	10	*16%*	72	*15%*
Manufacturing	7	*11%*	54	*12%*
Retail	5	*8%*	36	*8%*
Chemicals	4	*6%*	21	*4%*
Telecommunications	4	*6%*	26	*6%*
Transportation	4	*6%*	31	*7%*
Construction	1	*2%*	4	*1%*
Real Estate	1	*2%*	8	*2%*
Total	**64**	***100%***	**465**	***100%***

All chosen companies are public and disclose all the key information which is used in the study. As we wanted to analyze the impact in the biggest companies on the market, we have collected data for 64 companies which have the biggest revenue in the year 2015. The data has been collected for a time span from year 2000 to year 2015, and since different companies have not only a different age but also have become public in a different time, the yearly data is unbalanced (yearly observation composition is provided in Figure 1 below).

Overall we have an unbalanced panel of 465 observations.

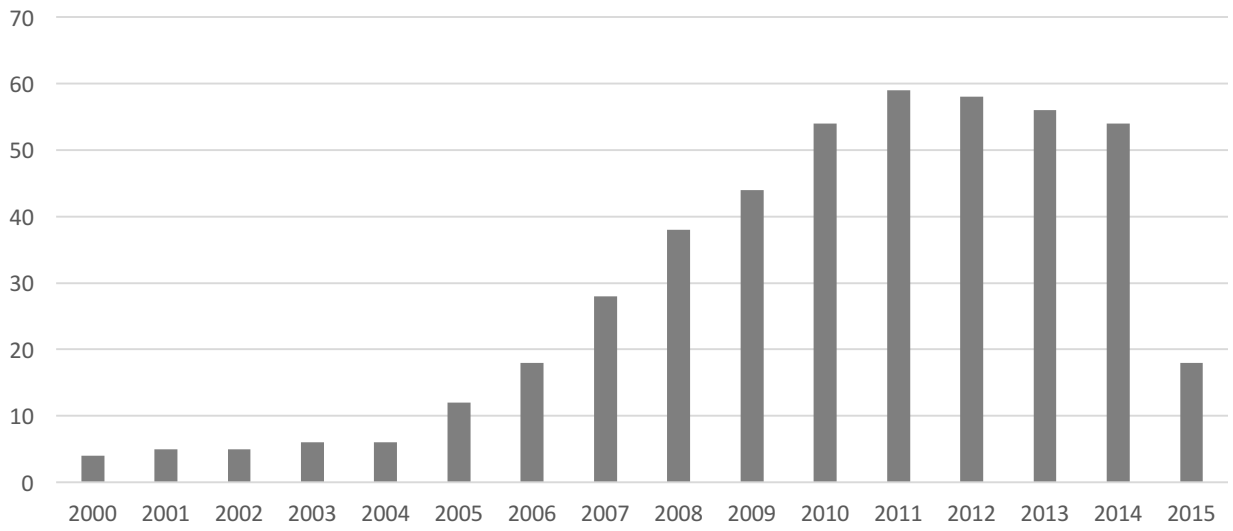

Figure 1. Sample composition by year.

2.3. Methodology

For the purposes of this research we will use regression analysis.

As noted above, in this study we are dealing with unbalanced panel data. It is worthwhile to note that panel data have advantage comparing to the time series of cross-sectional data. It allows to analyze the inferences of the models more accurately, better controls for omitted variables which allows to capture the complexities of the data incontinency (Hsiao, 2005).

The main concern with unbalanced panel data is the question why the data is unbalanced. If observations are missing at random then this is not a problem. If the attrition of firms in the data over time is not random, i.e. it is related to the idiosyncratic errors, then this sample selection may bias the estimates (Wooldridge, 2012). In our sample the missing data is random, therefore it is not a problem and we can continue.

There are several estimators that can be applied to panel data analysis, we will apply each of them for this study and then with the help of specialized tests we will choose the most appropriate one for each analysis.

In total we conduct 12 analyses, two per each dependent variables we have, doing it separately for total and related and unrelated diversification. We have to do it this way because related and unrelated and total diversification variables are correlated.

2.3.1. Models

Since we have panel data in this study, we will employ panel data estimators commonly used in research. These estimators have certain advantages, as they are able to study group and individual-specific effects and time effects, and can deal with heterogeneity. These effect generally can be fixed and random. The fixed effect model is used to analyze whether intercepts very across groups or time periods, while with the random effect model one can analyze the variations in error variance components (Greene, 2008). In other words, panel data models describe the individual behavior both across time and across entities. In general, there are three types of models: the pooled ordinary least squares model, the fixed effects model, and the random effects model and in this research we will use all of them:

Pooled OLS model

The pooled model specifies constant coefficients, the usual assumptions for cross-sectional analysis (Park, 2011).

$$y_{it} = \alpha + X'_{it}\beta + \varepsilon_{it}$$

Fixed Effects model

The Fixed Effects model allows the individual-specific effects u_i to be correlated with the regressors; u_i is included as intercepts (Park, 2011).

$$y_{it} = (\alpha + u_i) + X'_{it}\beta + \varepsilon_{it}$$

Random Effects model

The Random Effects model assumes that the individual-specific effects u_i are distributed independently of the regressors; u_i is included in the error term (Park, 2011).

$$y_{it} = \alpha + X'_{it}\beta + (u_i + \varepsilon_{it})$$

The following carcasses of models will be used in the study with adjustments based on conducted tests of fit for the estimators described above:

Models for accounting-based performance:

$$ROA_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$ROA_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

$$ROE_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$ROE_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

Models for market-based performance:

$$Tobin'sQ_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$Tobin'sQ_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

$$PE_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$PE_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

Models for accounting-based risk:

$$Leverage_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$Leverage_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

Models for market-based risk:

$$Beta_{t,i} = \alpha_0 + \alpha_1 Entropy_{total} + \alpha_2 Internationalization + \alpha_3 Size + \alpha_4 Growth + \alpha_5 Profitability + \varepsilon_{t,i}$$

$$Beta_{t,i} = \alpha_0 + \alpha_1 Entropy_{related} + \alpha_2 Entropy_{unrelated} + \alpha_3 Internationalization + \alpha_4 Size + \alpha_5 Growth + \alpha_6 Profitability + \varepsilon_{t,i}$$

2.3.2. Tests

In order to determine which estimator to use for each analysis, we will check whether there are fixed or random effects present; for this purposes we will use F-test and Breusch and Pagan Lagrange multiplier (LM) test respectively. If there are both effects present, we will compare them with the help of Hausman test.

F-test

We use this test to check whether there are fixed effects present in the data. According to this test, the null hypothesis here is that all dummy parameters except for the dropped one are all zero, $H_0: \mu_1 = \ldots = \mu_{n-1} = 0$. Accordingly, the alternative hypothesis is that at least one of these parameters is not zero (Park, 2011). If with this test we reject the null (meaning that at least one specific intercept u_i is not equal to zero), we will conclude that there is a significant fixed effect or significant increase in goodness-of-fit in the fixed effect model . If this is the case, the fixed effect model is preferred for the analysis. Otherwise, we will use the Pooled OLS.

Breusch-Pagan LM Test

With this test we will check whether there are random effects present. This is a test for the random effects model based on the OLS residual. The null hypothesis in this test is that specific variance components are equal to zero, $H_0: \sigma_u^2 = 0$. If we reject the null, we will conclude that there is a significant random effect in the panel data, therefore using the random effect model is preferable, as it will handle heterogeneity better than the pooled OLS (Park, 2011).

Hausman Test

Finally, in case if both fixed and random effects are present, we will use the Hausman Test in order to determine which model is better to use. It tests whether there is a significant difference between the fixed and random effects estimators by comparing fixed and random effect estimators under the null hypothesis that individual effects are uncorrelated with any regressor in the model (Park, 2011). If as a result we reject the null hypothesis, we will conclude that using the random effect model is problematic. Therefore, we will to go for the fixed effect model.

2.4. Variables

In this section we describe the variables used in this study. Table 6 provides an overview and classification of all variables that are included in the research.

Table 6. Classification of variables used in the research.

Type	Measure of	Based on	Variable	Name
Independent	Diversification	Product	Total entropy index	*ent_tot*
			Related entropy index	*ent_rel*
			Unrelated entropy index	*ent_unrel*
		Geographical	Degree of internationalization	*inter*
Dependent	Performance	Accounting	ROA	*roa*
			ROE	*roe*
		Market	Tobin's Q	*tob_q*
			PE	*pe*
	Risk	Accounting	Leverage	*lev*
		Market	Beta	*beta*
Control			Size	*size*
			Growth	*growth*
			Profitability	*op_mar*

Calculation of independent variables

As in this study we analyze the impact of product and geographical diversification, we use both product and geographical diversification measure variables, and these are in fact our independent variables.

For product diversification we use Entropy indices. For the Entropy indices we use three different measures: total entropy, related entropy and unrelated entropy, which measure total diversification, related diversification and unrelated diversification, respectively.

The Entropy measure is computed as follows:

$$Total\ Entropy\ index = \sum_{i=1}^{n} w_i \ln(1/w_i),$$

where w_i is weight of segment *i* revenue. This measure considers the weighted average importance of each segment or industry a firm is active in (Palepu, 1985).

A significant advantage of the entropy measure over other continuous measures is that its total diversification can be decomposed into related and unrelated diversification. Henceforth, Total diversification = Related diversification + Unrelated diversification (Palepu, 1985). Related diversification is defined as:

$$Related\ Entropy\ index\ = \sum_{j=1}^{n} w_j \ln(1/w_j),$$

where w_j is weight of segment *j* revenues; these *j* segments include revenues from all operations within the main 2-digit SIC industry group of the company (Palepu, 1985).

Unrelated diversification is defined as:

$$Unrelated\ Entropy\ index\ = \sum_{m=1}^{n} w_m \ln(1/w_m),$$

where w_m is weight of segment *m* revenues; these *m* segments include revenues from all operations in different 2-digit SIC segments comparing to the main SIC industry of the company (Palepu, 1985).

As for the measure of geographical diversification, we use the degree of internationalization, which is defined as:

$$Degreee\ of\ internationalization = \frac{Foreign\ sales}{Total\ sales}$$

It is the most frequently used measure of internationalization, even though it does not allow for a separation between sales by foreign subsidiaries and sales attributed to exports from the parent company. We also use it in our study due to data availability reasons.

Calculation of dependent variables

As in this study we analyze the impact of the above outlined measures of diversification on firm's performance and risk, we use various measures of performance and risk as our dependent variables.

As outlined in the first chapter of this study, performance can be captured by a wide variety of measures, both accounting and market-based, to measure operating and market-based performance respectively. To better analyze the impact of diversification on the performance, in this study we use two accounting measures and two market-based measures, making it four performance variables in total. For the accounting-based measures we use ROA and ROE, which are calculated as follows:

$$ROA = \frac{Net\ income}{Total\ assets}$$

$$ROE = \frac{Net\ income}{Total\ equity}$$

As outlined in the first chapter, ROA is the most widely used accounting-based measure in the diversification-performance literature, due to the reason that this measure is an effective indicator of both operating and financial sides of company performance. For this reason, we use it as our main performance measure. We also employ ROE, due to the reason that it shows how efficient a company is in term of equity usage.

As for market-based variables, we use Tobin's Q and Price to earnings ration which are calculated as follows:

$$Tobin's\ Q = \frac{Total\ market\ valuee}{Total\ assets}$$

$$PE = \frac{Price\ per\ share}{Earnings\ per\ share}$$

As outlined in the first chapter, Tobin's Q is the most widely used one in the diversification-performance literature. So the higher the indicator is, the more evident it is that the firm has taken advantage of the investments and proceeded to develop the company efficiently. We also use the PE ratio in order to track investor expectation of the companies.

Again, as outlined in the first chapter of this study, risk can be measured by a variety of measures, both accounting and market-based, to measure financial and market-based risk respectively. To better analyze the impact of diversification on the risk, in this study we use both accounting-based and market-based measures of risk. The accounting measure we use is leverage ratio, which is calculated as:

$$Leeverage = \frac{Total\ Debt}{Total\ Equity}$$

As for market-based risk, we use the systematic risk measure of beta, which is calculated as follows:

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)},$$

where R_i represents stock returns, and R_m stands for market returns.

Calculation of control variables

We use several control variables in order to more clearly determine the effect of diversification strategies on performance and risks by isolating other influences on firm variables. To isolate the relationship between diversification and performance, an adequate control of other independent variables affecting performance is required. Therefore, this study controls for firm size, growth and profitability, the measures which have shown to affect performance in prior research (Palich et al., 2000).

We measure firm size by taking a natural logarithm of firm's revenues:

$$Size = \ln(Revenue)$$

For the growth control measure we use yearly percentage change in revenues:

$$Growth = \frac{Rev_n - Rev_{n-1}}{Rev_{n-1}}$$

As finally for the profitability control measure we use the operating margin:

$$Opperating\ margin = \frac{Operating\ income}{Total\ revenue}$$

2.5. Summary of Chapter 2

In this chapter we establish the methodology of the research, explain how we define related and unrelated diversification providing examples of companies studied, outline variables and their measurement, and explain which quantitative instruments we use in the empirical study.

For calculating related and unrelated diversification for the purposes of our study, we employ the approach of Khanna & Palepu (2000), where the index of related diversification is based on the various revenue sources within a company that come from the same two-digit SIC equivalent industry, and is calculated as a function of all such instances within the company. The index of unrelated diversification is a function of different revenue sources within the company operating in different two-digit SIC equivalent industries. Each index is a weighted average of the ratio of firm sales to segment sales in that two-digit category (for related diversification) or a weighted average of the ratio

of sales within a particular two-digit industry to total firm sales (for unrelated diversification), with the weights given by the logarithm of the reciprocal of the ratio.

In order to conduct the empirical analysis of the objectives of the study, we employ quantitative instruments, namely regression analysis on a certain data sample. Overall, the sample for the study is a set of 64 public Russian companies that diversified over the last 15 years and operating in non-financial sector. As we wanted to analyze the impact in the biggest companies on the market, we have collected data for 64 companies which have the biggest revenue in the year 2015. The data has been collected for a time span from year 2000 to year 2015, and since different companies have not only a different age but also have become public in a different time, the yearly data is unbalanced. Overall we have an unbalanced panel of 465 observations.

For the purposes of this study we use 13 variables in total: 4 independent (3 on product diversification and 1 on geographical diversification), 6 dependent (2 on accounting-based performance, 2 on market-based performance, and 1 for accounting and market-based risk), and 3 control variables.

There are several estimators that can be applied to panel data analysis, we will apply each of them for this study and then with the help of specialized tests we will choose the most appropriate one for each analysis. The estimators we employ are: pooled OLS model, fixed effects model, and random effects model; and the tests we conduct are: F-test, Breusch and Pagan LM test and Hausman test.

In total we conduct 12 analyses, two per each dependent variables we have, doing it separately for total and related and unrelated diversification.

CHAPTER 3. RESEARCH FINDINGS

3.1. Descriptive statistics

In order to provide the reader with a comprehensive overview of the data, in this section we provide descriptive statistics of the variables used in this study; the summary statistics is presented in Table 7 below.

Table 7. Summary statistics.

Variable	Mean	Std. Dev.	Min	Max	Observations
year	2010.237	3.201	2000	2015	465
roa	0.065	0.087	-0.308	0.483	465
roe	0.118	0.225	-1.287	1.536	465
tob_q	0.757	1.123	0.002	7.323	465
pe	14.671	20.668	0.543	190.245	465
lev	1.016	2.422	0	35.680	465
beta	0.707	0.250	0.103	2.110	465
ent_tot	0.526	0.414	0	1.867	465
ent_rel	0.451	0.417	0	1.867	465
ent_unrel	0.075	0.139	0	1.006	465
inter	0.235	0.304	0	1	465
size	11.962	1.213	9.700	15.536	465
growth	0.195	0.389	-0.481	5.825	465
op_mar	0.130	0.173	-1.847	0.592	465

Based on the summary statistics we can make several remarks. If we take a look at accounting based measures of performance used in this study, we see that companies in the sample on average have Return on Assets of 6.5%, Return on Equity of 11.8%. It is only normal that ROA is significantly smaller that ROE, that shows that companies in our sample are on average in a healthy shape. The fact that ROE is almost twice as high as ROA tells us that on average the companies in the sample have debt more or less equal to equity. This is proved by the average Leverage variable of 1.02, which means that companies in the sample indeed have on average equal liabilities and equity.

Now moving on to the market based performance measures: if we take a look at Tobin's Q, we see that on average it is 0.71, meaning that cost to replace firm's assets is greater than firm's stock, which in turn means that a stock is undervalued. We also see that there are extreme cases with Tobin's Q of 7.32 (maximum value in the sample). As for PE ratios, we see that on average it is 14.67, which means that on average investors in these companies are ready to pay 14 times more for $1 of earnings.

As for the risk measures, we already discussed leverage of 1.01 on average, which showed that companies in the sample on average have equal liabilities and equity. Apart from that, in the sample

there are companies with zero debt (and therefore 0 leverage) and as much as 35 times debt compared to equity (maximum in the sample). As for the beta, we see its average is 0.71 – meaning that stocks in the sample are theoretically 29% less volatile than the market. However, in our sample we have both low and high betas of 0.1 and 2.1 respectively, meaning that different risk profiles are represented.

In terms of diversification measures, we see that average total diversification is 0.53, which means that companies in the sample are moderately diversified. However, there are companies in the sample with no diversification and highly diversified, as showed by minimum and maximum values of 0 and 1.87 respectively. Also, as average related diversification is 0.45 and average unrelated diversification is 0.08, it can be concluded that there is much more related diversification going on in the sample than unrelated diversification. As for geographical diversification (or internationalization, how it is defined in this study), we see that on average it is 0.23, meaning that companies in the sample are more skewed to being domestic rather than international. However, there are cases of both completely domestic and completely international, as shown by minimum and maximum values of zero and one.

The correlation coefficients between performance, risk and diversification variables employed in the regression model are reported in Table 8.

Table 8. Correlation matrix.

	roa	**roe**	**tob_q**	**pe**	**lev**	**beta**	**ent_tot**	**ent_rel**	**ent_unrel**	**inter**
roa	1	-	-	-	-	-	-	-	-	-
roe	0.740	1	-	-	-	-	-	-	-	-
tob_q	0.225	0.185	1	-	-	-	-	-	-	-
pe	-0.202	-0.136	0.033	1	-	-	-	-	-	-
lev	-0.236	-0.100	-0.053	0.024	1	-	-	-	-	-
beta	0.157	0.040	-0.066	-0.097	-0.022	1	-	-	-	-
ent_tot	-0.063	-0.073	-0.194	-0.055	0.025	0.069	1	-	-	-
ent_rel	-0.086	-0.087	-0.127	-0.035	0.030	-0.021	0.944	1	-	-
ent_unrel	0.071	0.043	-0.196	-0.058	-0.016	0.267	0.146	-0.189	1	-
inter	0.402	0.238	-0.057	-0.069	-0.041	0.429	0.008	-0.008	0.046	1

The results show that total diversification is negatively correlated to both accounting based and market based performance measures and positively correlated to both risk measures. As for related diversification, we see that it repeats the pattern for all performance measures, however there is negative correlation with beta. As for unrelated diversification, it is positively correlated to ROA and ROE and negatively correlated to both market based performance measures. Besides, there is negative correlation with leverage and positive correlation with beta. Finally, geographic diversification repeats the same pattern as unrelated diversification: it is positively correlated to both accounting based

performance measures and negatively correlated to both market based performance measures, and there is negative correlation with leverage and positive correlation with beta.

3.2. Model findings

In this section we describe the output the models provide for the analysis. Here we analyze each regression with all three models (Pooled OLS, Fixed Effects and Random Effects) and describe preliminary results. In the next session we will conduct tests necessary to chose one most fitting model for each regression and describe final results.

Diversification/ROA

The results of regression run for ROA using all three estimators are presented in Table 9. We see that increased total diversification leads to decreased ROA in OLS and the relationship is not significant in Fixed effects and Random Effects models. The same pattern is in place for related diversification: there is negative influence on ROA in OLS and there is no significant relationship in Fixed effects and Random Effects models. As for unrelated diversification, the relationship is only significant in the Fixed Effects model where positive relationship in 1 percent level is evident. Finally, internationalization relationship is significant in all three models, and we see that in all of these model the increased internationalization leads to increased ROA.

Table 9. The effects of total and related/unrelated diversification on ROA.

roa	OLS	FE	RE	roa	OLS	FE	RE
ent_tot	-0.0161**	0.0065	-0.0058	ent_rel	-0.0162**	0.0074	-0.0071
				ent_unrel	-0.0148	0.1340***	0.0302
inter	0.0449***	0.1355**	0.0499***	inter	0.0450***	0.1420**	0.0503***
size	0.0056**	-0.0018	0.0039	size	0.0055**	-0.0022	0.0031
growth	0.0370***	0.0389***	0.0370***	growth	0.0370***	0.0392***	0.0373***
op_mar	0.2790***	0.2634***	0.2734***	op_mar	0.2789***	0.2622***	0.2719***
_cons	-0.0476	0.0092	-0.0356	_cons	-0.0472	0.0027	-0.0291
F-test	87.26***	44.89***		F-test	72.56***	40.45***	
R2	0.4877	0.4369	0.4844	R2	0.4873	0.4144	0.4813

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

Diversification/ROE

Now moving on to our next accounting-based measure of performance, ROE. The results of regression run using all three estimators are presented in Table 10. From this table we can conclude the following: increased total diversification leads to decreased ROE in OLS model and the relationship is not significant in Fixed effects and Random Effects models. The same pattern is in place for related diversification: there is negative influence on ROA in OLS and there is no significant

relationship in Fixed effects and Random Effects models. As for unrelated diversification, it is not significant using any of the estimators. Finally, geographic diversification relationship is significant only in the Random Effects model, and it exerts positive influence on ROE.

Table 10. The effects of total and related/unrelated diversification on ROE.

roe	OLS	FE	RE	roe	OLS	FE	RE
ent_tot	-0.0452**	0.0102	-0.0072	ent_rel	-0.0458**	0.0116	-0.0086
				ent_unrel	-0.0355	0.2018	0.0931
inter	0.0551	0.0945	0.1395**	inter	0.0556	0.1042	0.1410**
size	0.0062	0.0010	-0.0005	size	0.0060	0.0003	-0.0021
growth	0.1016***	0.0905***	0.0976***	growth	0.1018***	0.0910***	0.0979***
op_mar	0.5205***	0.5589***	0.5362***	op_mar	0.5197***	0.5571***	0.5336***
_cons	-0.0339	-0.0116	0.0132	_cons	-0.0311	-0.0214	0.0252
F-test	30.14***	19.73***		F-test	25.06***	16.93***	
R2	0.2472	0.2346	0.2353	R2	0.2472	0.2225	0.2328

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

Diversification/Tobin's Q

Proceeding to the market-based measures of performance, we start with Tobin's Q. The results of regression runs using all three estimators are presented in Table 11. As in cases with ROA and ROE, increased total diversification again leads to decreased performance indicator, in this case Tobin's Q. The relationship is not significant using Fixed Effects and Random Effects estimators. Related diversification exerts negative influence on Tobin's Q too; again using OLS, as the relationship is not significant using Fixed Effects and Random Effects estimators. Same effect goes for unrelated diversification; negative relationship is evident. To conclude with Tobin's Q, we see that for internationalization there is again negative relationship with Tobin's Q, and again it is significant only using OLS.

Table 11. The effects of total and related/unrelated diversification on Tobin's Q.

tob_q	OLS	FE	RE	tob_q	OLS	FE	RE
ent_tot	-0.5331***	0.1817	0.0784	ent_rel	-0.4520***	0.1784	0.0745
				ent_unrel	-2.1598***	-0.2492	-0.5448*
inter	-0.5772***	0.3131	-0.0454	inter	-0.6631***	0.2913	-0.0589
size	0.0849**	0.1568***	0.1381***	size	0.1321***	0.1582***	0.1427***
growth	0.0751	-0.0211	-0.0197	growth	0.0481	-0.0222	-0.0214
op_mar	0.9976**	0.0569	0.0954	op_mar	1.145***	0.0610	0.1068
_cons	0.0124	-1.2919	-0.9146*	_cons	-0.4620	-1.2698**	-0.9208*
F-test	6.82***	2.62**		F-test	9.47***	2.48***	
R2	0.0691	0.0017	0.0004	R2	0.1104	0.0000	0.0149

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

Diversification/PE

To analyze diversification relationship with the last market-based measure in the study, namely PE ratio, we look at the Table 12, where results of regression runs are presented. We see that increased total diversification leads to decreased PE in Fixed Effects and Random Effects models and the relationship is not significant in OLS. Same applies for related and unrelated diversification: both of them exert negative influence on PE ratio, relationship is significant using both effect estimators. Finally, internationalization relationship is not significant in any of the models, so we can not make conclusions about the relationship.

Table 12. The effects of total and related/unrelated diversification on PE.

pe	**OLS**	**FE**	**RE**
ent_tot	-2.5491	-9.1695**	-4.5732*
inter	4.8376	-17.3310	4.7278
size	-3.8232***	-5.3426***	-3.9444***
growth	0.4201	-1.6230	-0.6680
op_mar	-10.5515*	-15.1726**	-12.1480**
_cons	61.9019***	89.7653***	64.7081***
F-test	5.18***	3.55***	
R2	0.0534	0.0337	0.0518

pe	**OLS**	**FE**	**RE**
ent_rel	-2.5676	-9.4078**	-4.3379*
ent_unrel	-2.1768	-40.3454***	-12.8484*
inter	4.8573	-18.9104	4.5133
size	-3.8340***	-5.2440***	-3.7626***
growth	0.4263	-1.7049	-0.7556
op_mar	-10.5853*	-14.8800**	-11.7672*
_cons	62.0105***	91.3657***	63.0433***
F-test	4.3***	4.05***	
R2	0.0534	0.0318	0.0493

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

Diversification/Leverage

Moving on to analyzing relationships between diversification and risk, we start with the accounting-based measure of risk used in this study, namely Leverage, we look at the Table 13, where results of regression runs are presented. Relationship between total diversification and leverage is significant at a 10 percent level using all three estimators and there are contradictory results: with OLS the relationship is positive and using Fixed Effects and Random Effects we get negative relationship. For the related diversification the we see significant at 5 level percent negative relationship using Fixed Effects model. As for unrelated diversification, results are contradictory again: using OLS increased unrelated diversification increases leverage and using Fixed Effects increased unrelated diversification decreases the leverage, both relationships significant at 1 percent level. Finally, the geographical diversification exerts positive influence on leverage using OLS models; relationship is significant at 1 percent level.

Table 13. The effects of total and related/unrelated diversification on Beta.

lev	OLS	FE	RE	lev	OLS	FE	RE
ent_tot	0.0360*	-0.0532*	-0.0402*	ent_rel	0.0223	-0.0550**	-0.0388
				ent_unrel	0.3124***	-0.2926***	-0.1153*
inter	0.1546***	-0.2039*	0.0857	inter	0.1692***	-0.2160*	0.0906*
size	0.0882***	0.0244**	0.0508***	size	0.0802***	0.0251**	0.0529***
growth	-0.0140	-0.0104	-0.0101	growth	-0.0094	-0.0110	-0.0105
op_mar	0.1415**	-0.0309	0.0014	op_mar	0.1165**	-0.0286	0.0049
_cons	-0.4197***	0.4962***	0.0939	_cons	-0.3391***	0.5085***	0.0726
F-test	46.78***	2.33***		F-test	43.23***	3.36***	
R2	0.3376	0.0491	0.2962	R2	0.3616	0.1046	0.2698

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

Diversification/Beta

Finally, we take a look at the relationship between diversification and market-based risk measure of the study, namely beta. Results of regression runs are presented in Table 14. Relationship between total diversification and beta is not significant using none of the estimators, therefore we do not make any conclusions here. Same applies for related and unrelated diversification, no significant relationship. And the same effect for geographical diversification. Overall, we do not make any conclusions regarding diversification-beta relationship.

Table 14. The effects of total and related/unrelated diversification on Leverage ratio.

beta	OLS	FE	RE	beta	OLS	FE	RE
ent_tot	0.1675	0.2829	0.2766	ent_rel	0.1550	0.2871	0.2795
				ent_unrel	0.4191	0.8285	0.7566
inter	0.4744	0.1556	0.6777	inter	0.4877	0.1832	0.6874
size	-0.2272**	-0.0701	-0.0824	size	-0.2345**	-0.0718	-0.0844
growth	-0.0458	-0.1151	-0.1017	growth	-0.0417	-0.1137	-0.1006
op_mar	-1.7390**	-1.0046**	-1.0477***	op_mar	-1.7619**	-1.0097***	-1.0522***
_cons	3.7697***	1.8228	2.4898*	_cons	3.8431***	1.7948	2.4761*
F-test	2.45***	2.03**		F-test	2.05***	1.8***	
R2	0.026	0.0206	0.0135	R2	0.0262	0.0179	0.0120

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

To sum up, we see that the results are for the most part contradictory. For this reason, we run some tests in order to determine which estimator works best for which model.

As discussed above, for each analysis we conduct three tests in order to distinguish the most appropriate estimator for each regression model. With the F-test we examine presence of fixed effects. If the null hypothesis is rejected, we may conclude that there is significant fixed effect or significant increase in the goodness of fit in the fixed effect model. The presence of random effects is checked by Breusch-Pagan Lagrange multiplier (LM) test. If the null hypothesis is rejected, we may conclude

that there is significant random effect in the data, therefore random effects estimator is preferred rather than polled OLS. Finally, to determine which effect is more relevant and significant in each of the models, we conduct Hausman test. Under this test, if the null hypothesis is rejected, then the fixed effects model is preferred. Otherwise, we go for random effects estimator.

The results of null hypotheses check for each of the models are provided in Table 15. As we can see, we have varying results for different analyses. For both total diversification-ROA and related/unrelated diversification-ROA models we see that F-test null hypothesis is accepted, meaning that there is no fixed effect in the model, therefore pooled OLS estimator is the most appropriate one. Same applies to both ROE models, F-test null hypotheses are accepted and we choose Pooled OLS estimator.

Table 15. Summary of tests conducted.

Measure	**Diversification**	**Tests**		
		F-Test	**Breusch-Pagan LM Test**	**Hausman Test**
ROA	Total	H_0 accepted	H_0 accepted	H_0 rejected
	Related/unrelated	H_0 accepted	H_0 accepted	H_0 rejected
ROE	Total	H_0 accepted	H_0 accepted	H_0 accepted
	Related/unrelated	H_0 accepted	H_0 accepted	H_0 accepted
TOB_Q	Total	H_0 rejected	H_0 rejected	H_0 rejected
	Related/unrelated	H_0 accepted	H_0 accepted	H_0 rejected
PE	Total	H_0 accepted	H_0 accepted	H_0 rejected
	Related/unrelated	H_0 accepted	H_0 accepted	H_0 rejected
LEV	Total	H_0 rejected	H_0 rejected	H_0 rejected
	Related/unrelated	H_0 rejected	H_0 rejected	H_0 rejected
BETA	Total	H_0 rejected	H_0 rejected	H_0 accepted
	Related/unrelated	H_0 rejected	H_0 rejected	test not conclusive

Moving on to regressions with market-based measures of performance. For the total diversification-Tobin's Q model, we see that F-test null hypothesis is rejected, which indicates presence of fixed effects. Using the Breusch-Pagan LM test, the null hypothesis is rejected as well, meaning that there is significant random effect. Now, as for Hausman test, the null hypothesis is rejected again, indicating that the fixed effect estimator is preferred, therefore we choose this one for this particular regression. As for the related/unrelated diversification-Tobin's Q model, F-test null hypothesis is accepted, meaning that there is no significant fixed effect in the model and we go for the Pooled OLS estimator. Same pattern applies for both models in diversification-PE ratio analysis, in

each regression there is no evidence of significant fixed effect and we go for the Pooled OLS estimators.

Finally, we take a look at the test for diversification-risk analysis. In both total diversification and related/unrelated diversification leverage models we reject both F-test and Breusch-Pagan LM test null hypotheses, indicating that there are both fixed and random effects in these models. In the total diversification-beta model we accept the null hypothesis in Hausman test, meaning that random effect estimator is preferred. For related/unrelated diversification-beta model the Hausman test is not conclusive, therefore we also choose the random effect estimator. Finally, for both model in the diversification-leverage relationship we see the same pattern: there is evidence of significant fixed effects and significant random effects, and with the help of Hausman test we see that fixed effect estimator fits better in both of these models.

Having conducted these test, we now know what are the best fitting estimators for each model; as it is summarized in Table 16 below.

Table 16. Summary of best fitting estimators.

Measure	Diversification model	Best fitting estimator
ROA	Total	Pooled OLS
	Related/unrelated	Pooled OLS
ROE	Total	Pooled OLS
	Related/unrelated	Pooled OLS
TOB_Q	Total	Fixed Effects
	Related/unrelated	Pooled OLS
PE	Total	Pooled OLS
	Related/unrelated	Pooled OLS
LEV	Total	Fixed Effects
	Related/unrelated	Fixed Effects
BETA	Total	Random Effects
	Related/unrelated	Random Effects

3.3. Results

Now that we know which estimator is the best-fitting for each model, we can gather final results which are outlined in this section. In the next section these results will be discussed. The summary of the results is provided in the Table 17.

Diversification-ROA

In the diversification-ROA analysis, the best fitting model (pooled OLS) gives us the following results. Increased total diversification leads to decreased return on assets: for one-tenth of a unit

increase in the total diversification index, ROA is expected to decrease by 0.16 percentage points, holding other variables constant. Related diversification exerts negative influence on ROA: whenever related diversification increases by one-tenth of a unit, ROA again will decrease by 0.16 percentage points, holding other variables constant. No significant relationship between unrelated diversification and ROA is found, so we make no inferences here.

Finally, internationalization exerts positive influence on ROA: if the geographical diversification index increases by one-tenth of a unit, a company will see a 0.45 percentage point increase in its ROA, holding other variables constant.

The significant results have 1 to 5 percent significance level and overall this Pooled OLS model fits the data well at 1 percent significance level. R-squared of 0.49 says that this model accounts for 49 percent of the total variance in return of assets of the companies in the sample.

Diversification-ROE

In the diversification-ROE analysis, the best fitting estimator is again the Pooled OLS, and using it we obtain the following results. Increased total diversification leads to decreased return on equity: for one-tenth of a unit increase in the total diversification index, ROE is expected to decrease by 0.45 percentage points, holding other variables constant. Related diversification exerts negative influence on ROE: whenever related diversification increases by one-tenth of a unit, ROE will decrease by 0.46 percentage points, holding other variables constant.

As in the case with ROA, no significant relationship between unrelated diversification and ROE is found, so we make no inferences here. Finally, there is no significant relationship between geographical diversification and ROE.

The significant results have 5 percent significance level and overall this Pooled OLS model fits the data well at 1 percent significance level, as shown by p-value of less than 0.0000. R-squared of 0.25 says that this model accounts for 25 percent of the total variance in return of equity of the companies in the sample.

Diversification-Tobin's Q

In the diversification-Tobin's Q analysis, the best fitting estimator for total diversification is Fixed Effects, and for related/unrelated diversification it is the Pooled OLS. Using these estimators we obtain the following results. If the company is more totally diversified comparing to its own average, it has a higher Tobin's Q: whenever total diversification index increases by one-tenth of a unit, Tobin's Q will increase by 0.018, holding other variables constant. Related diversification exerts negative influence on Tobin's Q: for one-tenth of a unit increase in the related diversification index,

Tobin's Q is expected to decrease by 0.045, holding other variables constant. Unrelated diversification exerts negative influence on Tobin's Q as well: if the unrelated diversification index increases by one-tenth of a unit, a company will see a 0.216 decrease in its Tobin's Q, holding other variables constant. Finally, increased geographical diversification leads to decreased Tobin's Q: for one-tenth of a unit increase in the internationalization index, Tobin's Q is expected to decrease by 0.066 percentage points, holding other variables constant.

The significant results in this output have 1 percent significance level. Overall, the Fixed Effects model fits the data for the total diversification analysis at 5 percent significance level, and the Pooled OLS model fits the data for the related/unrelated diversification analysis well at 1 percent significance level, as shown by p-value of less than 0.0000. R-squared of 0.03 says that Fixed Effects model accounts for 3 percent of the total variance in Tobin's Q of the companies in the sample, and R-squared of 0.11 says that OLS model accounts for 11 percent of the total variance in Tobin's Q of the companies in the sample.

We also see that the rho for the Fixed Effects model is around 0.83, which means that over 83% of the variation in beta is due to individual-specific terms, and the rest is due to idiosyncratic errors. This means that the models are good, as we may not know where the variation is coming from but it is possible to assign it to a particular company.

Diversification-PE

Moving on to the diversification-PE analysis, we see that the best fitting estimator for total diversification is Pooled OLS, and for related/unrelated diversification it is the Fixed Effects model. Using these estimators, we obtain the following results. No significant relationship between total diversification and PE ratio is found, so we make no inferences here. As for related diversification, we see that higher related diversification comparing to company's own average exerts negative influence on PE: for one-tenth of a unit increase in the related diversification index, PE ratio is expected to decrease by 0.941, holding other variables constant. Same applies to unrelated diversification, higher unrelated diversification comparing to company's own average exerts negative influence on PE: whenever the unrelated diversification index increases by one-tenth of a unit, PE ratio will decrease by 4.034, holding other variables constant. Finally, no significant relationship between internationalization and price to earnings ratio is found.

Table 17. Best fitting estimator results for each model.

var	**roa**		**roe**		**tob_q**		**pe**		**lev**		**beta**	
divers	total	rel/unrel	total	rel/unrel	total	rel/unrel	total	rel/unrel	total	rel/unrel	total	rel/unrel
model	1	2	3	4	5	6	7	8	9	10	11	12
estimator	OLS	OLS	OLS	OLS	FE	OLS	OLS	FE	FE	FE	RE	RE
ent_tot	-0.016**	-	-0.045**	-	0.182***	-	-2.549	-	-0.053*	-	0.277	-
ent_rel	-	-0.016**	-	-0.046**	-	-0.452***	-	-9.408**	-	-0.055**	-	0.279
ent_unrel	-	-0.014	-	-0.035	-	-2.160***	-	- 40.345***	-	-0.293***	-	0.757
inter	0.045***	0.045***	0.055	0.056	0.313	-0.663***	4.838	-18.910	-0.204*	-0.216*	0.678	0.687
size	0.006**	0.005**	0.006	0.006	0.157***	0.132***	-3.823***	-5.244***	0.024**	0.025**	-0.082	-0.084
growth	0.037***	0.037***	0.102***	0.102***	-0.021	0.048	0.420	-1.705	-0.010	-0.011	-0.102	-0.101
op_mar	0.279***	0.279***	0.520***	0.520***	0.057	1.145***	-10.551*	-14.880**	-0.031	-0.029	-1.048***	-1.052***
_cons	-0.048	-0.047	-0.034	-0.031	-1.292	-0.462	61.902***	91.366***	0.496***	0.508***	2.490*	2.476*
F-test	87.26***	72.56***	30.14***	25.06***	2.62**	9.47***	5.18***	4.05***	2.33***	3.36***	-	-
DF	459	458	459	458	396	458	459	395	396	395	-	-
R2	0.487	0.487	0.247	0.247	-	0.110	0.053	-	-	-	-	-
R2 within	-	-	-	-	0.032	-	-	0.058	0.029	0.048	0.024	0.026
R2 between	-	-	-	-	0.001	-	-	0.043	0.004	0.059	0.066	0.053
R2 overall	-	-	-	-	0.002	-	-	0.032	0.049	0.105	0.013	0.012
sigma_u	-	-	-	-	1.064	-	-	15.488	0.255	0.270	4.306	4.344
sigma_e	-	-	-	-	0.472	-	-	17.972	0.122	0.120	0.991	0.992
rho	-	-	-	-	0.836	-	-	0.426	0.815	0.834	0.950	0.950
N	465	465	465	465	465	465	465	465	465	465	465	465

Note: (***), (**), (*) indicate that coefficients are significant at 1, 5 and 10 percent level respectively

The significant results in this output have a 5 percent significance level. Overall, both the Pooled OLS for the total diversification analysis and the Fixed Effects estimator for the related/unrelated diversification analysis fit the data well at a 5 percent significance level, as shown by p-values of less than 0.0000. R-squared of 0.05 says that OLS model accounts for 5 percent of the total variance in PE of the companies in the sample, and R-squared of 0.03 says that the Fixed Effects model accounts for 3 percent of the total variance in PE of the companies in the sample.

We see that the rho for the Fixed Effects model is around 0.43, which means that over 43% of the variation in beta is due to individual-specific terms, and the rest is due to idiosyncratic errors. This means that the models are good, as we may not know where the variation is coming from but it is possible to assign it to a particular company.

Diversification-Leverage

In the diversification-leverage analysis, we see that the best fitting estimator for both total and related/unrelated diversification beta analysis is Fixed Effects. Using this estimator, we obtain the following results. Higher total diversification comparing to company's own average leads to lower Leverage: whenever the total diversification index increases by one-tenth of a unit, leverage will increase by 0.0053, holding other variables constant. Higher related diversification comparing to company's own average exerts negative influence on leverage: for one-tenth of a unit increase in the related diversification index, leverage is expected to decrease by 0.0055, holding other variables constant. Higher unrelated diversification comparing to company's own average also exerts negative influence on leverage: if the unrelated diversification index increases by one-tenth of a unit, a company will see a 0.03 decrease in its leverage, holding other variables constant. Finally, internationalization exerts negative influence on leverage too: for one-tenth of a unit increase in the geographical diversification index, leverage is expected to decrease by 0.021, holding other variables constant.

We see that the rho for both of these Fixed Effects models is around 0.83, which means that over 83% of the variation in leverage is due to individual-specific terms, and the rest is due to idiosyncratic errors. This means that the models are good, as we may not know where the variation is coming from but it is possible to assign it to a particular company.

Diversification-Beta

Finally, moving on to the diversification-beta analysis, there is presence of random effects in the data, so the best fitting estimator for both total and related/unrelated diversification beta analysis is Random Effects. We see that using this estimator the results are not significant for any of the

analyses regarding diversification and beta: total, related, unrelated diversification and internationalization.

We see that the rho for both of these Random Effects models is around 0.95, which means that over 95% of the variation in beta is due to individual-specific terms, and the rest is due to idiosyncratic errors. This means that the models are good, as we may not know where the variation is coming from but it is possible to assign it to a particular company. However, as the coefficients are not significant, we can not make any inferences regarding diversification and beta.

Summary of diversification influence on performance and risk measures is provided in Table 18 below.

Table 18. Summary of independent variable's influence on dependent variables.

	ROA	ROE	Tobin's Q	PE	Leverage	Beta
Total diversification	Negative	Negative	Positive	-	Negative	-
Related diversification	Negative	Negative	Negative	Negative	Negative	-
Unrelated diversification	-	-	Negative	Negative	Negative	-
Internationalization	Positive	-	Negative	-	Negative	-

Note: (-) indicates that no significant relationship is found

As we can see, we can conclude the following: total diversification has negative relationship with ROA, ROE and Leverage; positive influence on Tobin's Q; and there is no significant evidence concerning PE and Beta.

Related diversification exerts negative influence on ROA, ROE, Tobin's Q, PE and Leverage; and there is no significant evidence concerning Beta. Unrelated diversification has negative relationship with Tobin's Q, PE and Leverage; and we did not get any significant evidence concerning ROA, ROE and Beta. Finally, internationalization exerts negative influence in Tobin's Q and Leverage; positive influence on ROA; and no evidence of significant relationship with ROE, PE and Beta.

The summary of our hypotheses check results in presented in Table 19 below. Each of the hypotheses we check separately for accounting based measures and market based measures of both performance and risk, for this reason we sometimes get conflicting results. As can be seen, we accept most our hypotheses, rejecting H_1 and H_4 for market-based measures and H_2 for both accounting and market-based measures. Also, we do not accept nor reject hypotheses H_3 for accounting-based measures, and H_5 and H_6 for market-based measures due to lack of significant evidence.

Table 19. Summary of the hypotheses checks.

H	Description	Accounting measures	Market measures
H_1	Product diversification is negatively related to firm's performance	Accepted	Rejected
H_2	Related product diversification is positively related to firm's performance	Rejected	Rejected
H_3	Unrelated product diversification is negatively related to firm's performance	-	Accepted
H_4	The relationship between geographical diversification and firm's performance is positive	Accepted	Rejected
H_5	Product diversification is associated with reduction of firm's risk	Accepted	-
H_6	Geographical diversification is associated with reduction of firm's risk	Accepted	-

Note: (-) indicates that no significant evidence is found

3.4. Discussion

3.4.1. Discussion of the findings

In this section we discuss and explain the received results, and also provide managerial implications on the findings.

As can be seen from the previous section, the results of conducted analysis confirm the existence of significant relationship between diversification and the majority of analyzed measures. We will take a look at each analyses separately and try to explain it and see how it compares to previous research findings.

To start with accounting-based measures of performance, total product diversification has a negative relationship with ROA, or in other words, increased total diversification leads to decreased return on assets. ROA can decrease due to the following reasons: (1) decreased returns, (2) increased assets, (3) faster growing assets rather than returns. Usually in order to diversify into different product or industry, a company needs to make capital investments, which tend to be rather big. In other words, a diversified company has a much more asset-heavy profile compared to an undiversified corporation (Villalonga, 2004). However, the returns the company gets do not necessarily match the old undiversified profile, therefore a diversified firm tends to have a lower return on assets than an undiversified firm, although its absolute return amount might very well be bigger.

Similar logic applies to diversification-ROE relationship, which is also negative in this study. In order to diversify into different product or industry, a company needs to make capital investments which are often financed by equity. Therefore, a more diversified company tends to have more equity

on its account, and this attributes to lower return on equity. There are outliers that despite the higher equity have higher return on equity due to much higher returns comparing to other firms, but this is not a common case.

In this study we analyze total and related/unrelated diversification impact on firm performance separately and find that related diversification also exerts negative relationship on both ROA and ROE. This is contradictory to our hypothesis 2 which states that related diversification is positively related to firm performance. Usually it would be expected that related diversification allows a firm with capabilities around a particular input to leverage that capability in more that one sector where the same thing is relevant to performance, thus improving financial performance of the firm (Rumelt, 1982).

To compare our result to the previous research, there are varying results in previous studies: among others, Miller (2006) found that there is positive relationship between related diversification and accounting-based measures of performance, which they explained by technological synergies. Anderson et al. (2000), in turn, found an opposing result - a diversification discount, which they tried to explain through corporate governance structures. Finally, Diestre & Santalo (2013), although failed to provide evidence of significant relationship and performance, found that there are critical contingencies affecting this relationship.

In general, if we try to explain why there is negative relationship between related diversification and accounting-based performance, there can be various reasons: for one, value loss might occur due to a "new toy" (even though related) effect and rent dissipation by a company. Also, as argued by Berger & Ofek (1995), overinvestment and cross-subsidization can contribute towards the value loss of diversification. As a matter of fact, this value loss can be decreased by the tax benefits of diversification. Overall, there can be numerous explanation for the phenomena, and this could potentially be an interesting topic for future research.

As for the unrelated diversification and accounting-based measures of performance, our empirical results failed to provide any significant relationship there, both for ROA and ROE, so we make no conclusions here.

Moving on to market-based measures of performance, what is quite interesting is that although total diversification has negative relationship with accounting-based measures of performance, it is related positively with the market-based measure of performance used in this study: Tobin's Q. As we see from the results, increased total diversification leads to a higher Tobin's Q. Since this indicator is calculated by dividing total market value of the firm by its assets, there can be the following reasons

of the increase: (1) increased market value, (2) decreased assets, (3) faster growing market value rather than assets. As discussed above, usually with diversification comes an increase in assets, therefore we can make a conclusion that the most likely reason of Tobin's Q increase is that diversified firms tend to have higher market value rather than undiversified firms. Now, what could be a possible reason for this?

Khanna & Palepu (2000) in their study have a similar result using evidence from Indian companies. They suggest that diversified firms replicate functions or institutions that are missing in the emerging market. Diversified firms are able to back up and justify the capital investment required for diversification due to that they tend to be bigger and have to scope for it. Another factor here is that the biggest and most diversified companies have political connections which they can leverage for their benefit; it is a big factor in an economy where state regulation plays a big role. By these factors Khanna & Palepu (2000) explain diversification premium in India. Although Indian and Russian markets are different in context, they are both emerging markets, so we can apply these explanations to our research as well.

Another factor to explain why more diversified firms tend to be higher valued is investor expectations. Among other things, by diversified their businesses, companies want to avoid "having all eggs in one basket", in other words conduct better risk control in order to not be reliant one a single market. This allows to spread the risk through several sectors of economy and not be exposed to dangers of one sector declining. For investors, they view this as a productive risk management activity and react positively to it, therefore company value goes up. A valuable note for a to-be-diversified company here is that it is crucial to identify sectors where market slowdown will not coincide with downturns in the main business if the firm.

Moving on, we also conducted analysis on total diversification and price to earning ratio, however no signification relationship was found.

Related and unrelated diversification both have negative relationship with Tobin's Q. One of the reasons for that could be that relative to focused firms, diversified companies tend to invest more and therefore have lower marginal return to capital, which in turn lowers the Q's. The result is similar to findings of Lang & Stultz (1994), who state that average Q for diversified firms is over one because their market value capitalizes the contribution to shareholder wealth of the reduction in informational asymmetries. Hence, we can conclude that diversification discount may occur due to inefficiencies such as influence costs and agency costs.

As for another market-based ratio we employ in the study, PE ratio, we see evidence that, like on Tobin's Q, increased related and unrelated diversification exerts negative influence on the measure. As we again follow a pattern similar to one employed in above in order to explain this, there can be the following reasons for PE ratio decreasing with higher diversification: (1) decreased share price; (2) increased earnings per share; (3) faster growing earnings per share compared to price per share. As is evident from discussion above, price per share can both be increased or decreased with higher diversification. As for increase in earnings per share, this also can be true, because because essentially the undergoing motive for diversification is to increase the bottom line – so, when successful, diversification attributes to higher earnings and therefore higher earnings per share.

Overall, our results for diversification discount coincide with numerous results of previous researchers. Bernardo et al. (2000) found that diversified firms trade at a discount in the US, Fleming et al. (2003) found the same evidence for Australia. However, it is not only the case for developed markets: Lins & Servaes (1999, 2002) found that, besides UK, Singapore and Japan, the discount existed in India, Thailand, Malaysia and Indonesia. The international evidence suggests that the existence of discount could result from institutional differences between markets, data analysis method differences, varying data sources or sample selection bias. One difference between markets could be that investors in Russian companies do not favor diversification attempts by companies and prefer them to stay focused.

It should be elaborated on the fact that Tobin's Q produced partially contradicting results compared to ROA. This puzzle might be explained by the fact that ROA captures realized performance, whereas Tobin's Q is a more future oriented measure, reflecting investors' expectations on the (long-term) future of the firm. Henceforth, in the light of the conclusions it is importance to notice that investors seem to relate superior performance effects to unrelated diversification which is in turn beneficial for the value of the firm. However, it should be noted that these expectations are speculative in nature, and therefore do not have to mean that actual performance equals expected performance. The fact that ROA provides best insight in real, achieved performance underscores the conclusions drawn in this section.

Now, having discussed the results for product diversification and performance relationships, we move to geographical diversification evidence. We see that increased internationalization has positive effect on accounting based measure of performance, ROA, and negative effect on market-based measure of performance, Tobin's Q. As for the case with ROA, it seems that for the companies in the sample going international is beneficial and they are able to increase the returns without a

dramatic increase in assets. This shows that there is demand for Russian companies' products abroad, and that these products are of high enough quality to be sold to foreign consumers.

The findings here are consistent with the results of Contractor et al. (2007), who found a positive relationship for another emerging market – India; and more importantly, the results are consistent with findings of Shcherbakov (2012), who used evidence from Russian companies, similar to our study. Shcherbakov found that geographical diversification and accounting-based performance have positive relationship which follows a U-shaped curve, meaning that in the initial stage of internationalization the performance declines and in deeper stages of internationalization performance improves. We do not have such detailed evidence in this study, however in general our findings coincide.

As for our findings regarding Tobin's Q, they are the opposite to ROA. In other words, Tobin's Q tends to decrease with higher geographical diversification. Since this indicator is calculated by dividing firm's market value by its assets, we can make a conclusion that in more internationalized companies total assets tend to grow faster than the market value, if there is any growth at all.

Moving on to diversification-risk relationship, we did not achieve any significant relationship between any type of diversification and our market-based risk measure expressed in beta. Diversification-beta relationship is not very frequently studied in the literature, one example of prior evidence could be the research by Montgomery & Singh (1984), where it was found that betas for unrelated diversifiers were significantly higher than those of other firms. As for the international diversification and beta relationship, Kwok & Reeb (2000) found that internationalization reduces systematic risk. Our findings fail to provide any significant evidence, so we make no inferences here.

As for our accounting-based risk, namely leverage, we see that for all types of diversification studied, there is evidence of negative relationship, where the increased diversification comes with decreased leverage, thus confirming our hypothesis. Leverage ratio can decrease due to the following reasons: (1) decreased debt amount, (2) increased equity amount, (3) faster growing equity rather than debt amount. Based on our results, we conclude that Russian companies prefer to finance their diversification efforts with equity rather than debt. Another interesting inference we can make here is that Russian companies prefer to use equity financing for unrelated diversification activities, and debt financing in a bigger extent for related diversification efforts.

Our results contrast to some of the previous studies, for example Barton & Gordon (1988), where is was found that firms developing a strategy of unrelated diversification have the highest debt ratio; or Kochhar & Hitt (1998), which also explored the linkage between the characteristics of a

firm's diversification strategy and its capital structure. According to their findings, equity financing is preferred for related diversification and debt financing for unrelated diversification. Our results are partially consistent with La Rocca et al. (2009), where they found that a related-diversification strategy has a negative influence on leverage; however, unrelated diversification, has a positive effect on debt.

As for our results of internationalization-leverage analysis, they are consistent with those of the majority of previous research: a big body of literature shows that corporate leverage is negatively related to internationalization. For example, Kwok & Reeb (2000) found that there is a debt reduction associated with internationalization, as did Low & Chen (2004) and others. It appears that with internationalization activities get higher earnings for the companies, which then use these increased earnings for debt repayment. All in all, internationalization benefits outweigh the costs for Russian companies.

3.4.2. Managerial implications

Our findings indicate a number of managerial implications for both decision makers in companies and investors.

First and foremost, both our theoretical survey and empirical analysis suggest that managers should be aware that diversification can cause both positive and negative effects. Although theoretically diversification can result in a premium, we see that in the Russian context product diversification almost always yields value losses. In order to be able to predict potential outcomes of diversification, managers should be informed of what creates and destroys value when diversifying across industries. A risky move can be to diversify across segments where the the initial position of a firm is not very well established, and moreover, even though a firm has a well established starting point but the industry potential is not as high. On the other hand, when diversification is carried into the segments where existing resources and capabilities can be used and leveraged, the potential of positive value created is high. Therefore, even when a firm is not diversified yet, but potentially thinks of doing so in the future, managers should keep in mind the importance of developing capabilities and resources in a way that can potentially bring value across other segments in future.

As can be inferred from our research, diversification is not a safe route and managers should be aware of that. Diversification targets should be picked really carefully, because of the results will be highly dependent on a number of factors. Lubatkin & Chatterjee (1994) put it the following way: the companies should "diversify in such a manner that all of its eggs are in similar baskets - not in the same basket or in different baskets." Managers need to make sure that their companies have all the

necessary skills, capabilities and resources to operate across all these "similar baskets". If it is not the case, then the companies are better off by operating across different baskets all along.

In general, current business landscape becomes increasingly more focused of having core capabilities. It seems that for a large number of companies that have expertise only in their core sectors, it is better to focus on this core sector to achieve better and more stable results, unless they are confident that they have the right capabilities that can be leveraged in different sectors and industries.

An important implication for decision makers in Russian companies concerns geographical diversification. Our findings imply that going international is beneficial for both performance and risk profile of the company. There is demand for Russian companies' products abroad, and that these products are of high enough quality to be sold to foreign consumers, therefore managers should pay more attention to export possibilities. This is especially relevant during the current economic situation, where domestic currency in Russia is rather cheap.

3.4.3. Limitations and directions for further research

There are several limitations associated with this study; these limitations, in turn, create suggestions for further research. First limitation is the general nature of our research. In this study we analyze companies from several industries across one emerging market country. Due to different particularities of market conditions in different countries (developing and emerging), and due to different particularities of different industries, a more specific approach would be beneficial. Future research could conduct the similar analysis across various markets and industries and then compare the results; this would allow to make industry and market specific conclusions and implications.

Another limitation of this study is a rather limited amount of performance, risk and control variables. Future research could include and test more dependent variables not included in this study, and also a bigger number of control variables as well. Examples of potential performance measures could include Return on capital employed, Operating profit and others; examples of potential risk measures to include could be credit ratings or different types of operating risk. Including more of dependent variables would enable to track diversification impact on different parts of corporate performance and risk and give more comprehensive results. Including more control variables, in turn, would allow to improve the results of the empirical analysis by better controlling for more aspect of company operations.

In a broad sense, as a process, companies can conduct diversification via a number of activities including M&A, greenfield, joint ventures. An interesting topic for future research would be to compare and contrast how diversification activities conducted via these methods differ from each other in terms of their impact of company performance and risk. The results of such a study would be beneficial for managers responsible for diversification decisions in companies, as it would allow them to better understand potential costs and benefits associated with each diversification mode.

Finally, we discussed in this study how important initial capabilities and resources a company possesses are before it decides to diversify. In this regard, a very interesting topic for future research would be to analyze how companies could quantify these initial capabilities and resources, and compare them. These quantified assessments could be in a form of scorecards or more complex models, and would be tremendously useful in helping predict diversification results. At the end of the day, whenever a company decides to diversify, it brings itself a tremendous amount of uncertainty, and any tools to help reduce this uncertainty would be extremely useful.

3.5. Summary of Chapter 3

In this chapter we outline how we conduct the empirical analysis, provide results and then discuss the findings.

Based on the summary statistics we make several inferences about the data: companies in our sample are on average in a healthy shape; their stocks on average are undervalued; they on average have equal liabilities and equity; they are moderately diversified; there is much more related diversification going on in the sample than unrelated diversification; the companies in the sample are more skewed to being domestic rather than international.

With the help of the three tests we determine which estimator is more appropriate for each of our 12 models. We see that all three estimators (pooled OLS, fixed effects, random effects) appear as best-fitting several times, therefore we use all three of them selectively. Conducting the appropriate analyses, we get the results; we receive significant result for the majority of relationships, with most of them being negative.

After getting the results and checking the hypotheses, we discuss and explain the received findings. A diversified firm tends to have a lower return on assets than an undiversified firm due to the higher asset profile and the problem that the returns the company gets do not necessarily match the old undiversified profile, although its absolute return amount might very well be bigger.

Diversification-ROE relationship is also negative. In order to diversify into different product or industry, a company needs to make capital investments which are often financed by equity.

We find a negative relationship between related diversification and accounting-based performance, and the reasons could include: "new toy" effect, rent dissipation, overinvestment and cross-subsidization. As a matter of fact, this value loss can be decreased by the tax benefits of diversification. Overall, there can be numerous explanation for the phenomena, and this could potentially be an interesting topic for future research.

One of the few positive relationships we find is the one between total diversification and Tobin's Q, for which we infer that diversified firms tend to have higher market value rather than undiversified firms. Possible reasons include: ability to back up and justify the capital investment required for diversification, political connections in an emerging market, and investor expectations, who see corporate diversification as a productive risk management activity. However, it seems that it is different for the Russian market, investors in Russian companies do not favor diversification attempts by companies and prefer them to stay focused.

Another result is that increased internationalization has positive effect on accounting based measure of performance, ROA, and negative effect on market-based measure of performance, Tobin's Q. As for the case with ROA, it seems that for the companies in the sample going international is beneficial and they are able to increase the returns without a dramatic increase in assets. This shows that there is demand for Russian companies' products abroad, and that these products are of high enough quality to be sold to foreign consumers. As for our Tobin's Q, it tends to decrease with higher geographical diversification. Since this indicator is calculated by dividing firm's market value by its assets, we can make a conclusion that in more internationalized companies total assets tend to grow faster than the market value, if there is any growth at all.

As for our accounting-based risk, namely leverage, we see that for all types of diversification studied, there is evidence of negative relationship. Based on our results, we conclude that Russian companies prefer to finance their diversification efforts with equity rather than debt. Another interesting inference we can make here is that Russian companies prefer to use equity financing for unrelated diversification activities, and debt financing in a bigger extent for related diversification efforts. As for our results of internationalization-leverage analysis, there is a negative relationship. It appears that with internationalization activities get higher earnings for the companies, which then use these increased earnings for debt repayment. All in all, internationalization benefits outweigh the costs for Russian companies.

There is a number of managerial implications that can be extracted from the study. Managers should be aware that diversification can cause both positive and negative effects and should keep in mind the importance of developing capabilities and resources in a way that can potentially bring value across other segments in future. Resource and capability management is crucial, if it is not managed properly for diversification, then it is better to not diversify at all. Also, it seems that for a large number of companies that have expertise only in their core sectors, it is better to focus on this core sector to achieve better and more stable results. An important implication for decision makers in Russian companies concerns geographical diversification. Our findings imply that going international is beneficial for both performance and risk profile of the company. There is demand for Russian companies' products abroad, and that these products are of high enough quality to be sold to foreign consumers, therefore managers should pay more attention to export possibilities. This is especially relevant during the current economic situation.

Finally, we also discuss limitations and suggestions for further research. The suggestions include: including more markets and industries to the analysis and then comparing the results; including more variables; comparing results of diversification via different modes; and analyzing how companies could quantify the initial capabilities and resources, and compare them with regards to diversification.

CONCLUSION

This thesis was devoted to studying corporate diversification and how if affects companies and their businesses. The research goal of the paper was to determine the relationship between corporate diversification and company performance and risk, using evidence from Russian companies. We accomplished this goal, and achieved all of the research objectives stated.

As a first step of the study, we investigated the theoretical framework of diversification and outlined commonly used indicators to measure diversification. We also reviewed the existing literature on diversification performance relationship and diversification risk relationship, which allowed us to make preliminary conclusions and define the hypotheses to be tested. As a second part of the study, we conducted empirical analysis which allowed us to determine the impact of diversification on risk and performance. As we measured company performance and risk by using both accounting and market based indicators, we managed to test our hypotheses separately for these types of measures.

We found that a diversified firm tends perform worse than an undiversified firm in terms of ROA and ROE, due to the higher asset and equity profile and the problem that the returns a company gets do not necessarily match the old undiversified profile, although its absolute return amount might very well be bigger. On the other hand, when analyzing the relationship between total diversification and Tobin's Q, we found that diversified firms tend to have higher market value rather than undiversified firms; investors see corporate diversification as a productive risk management activity. Also, as per our findings, both related and unrelated diversification yield a decrease in performance. Overall, there can be numerous explanation for the phenomena, and this could potentially be an interesting topic for future research.

As for internationalization, we found that it has a positive effect on an accounting based measure of performance, ROA, and negative effect on a market-based measure of performance, Tobin's Q. We inferred that when the companies in the sample go international, they are able to increase the returns without a dramatic increase in assets. We also concluded that in more internationalized companies total assets tend to grow faster than the market value.

As for the diversification and risk relationship, we found it to be negative for both accounting and market-based measures. Also, we concluded that Russian companies prefer to finance their diversification efforts with equity rather than debt. Another inference we made is that Russian companies prefer to use equity financing for unrelated diversification activities, and debt financing in

a bigger extent for related diversification efforts. As for our results of internationalization-risk analysis, we found a negative relationship. We inferred that internationalization activities get higher earnings for the companies, which then use these increased earnings for debt repayment. All in all, internationalization benefits outweigh the costs for Russian companies.

Based on our findings, we developed a set of managerial implications. Managers should be aware that diversification can cause both positive and negative effects and should keep in mind the importance of developing capabilities and resources in a way that can potentially bring value across new segments in future. Resource and capability management is crucial; if it is not managed properly for diversification, then it is better to not diversify at all. An important implication for decision makers in Russian companies concerns geographical diversification: our findings imply that going international is beneficial for both performance and risk profile of the company. Also, it seems that there is demand for Russian companies' products abroad, therefore managers should pay more attention to export possibilities. This is especially relevant during the current economic situation.

In order to conduct a thorough analysis, we used 116 references; and the contribution of this study is the coherent investigation of diversification relationship with performance and risk. However, there is clearly a scope for future research: besides of including more markets and industries to the analysis and then comparing the results, what could be valuable is to compare results of diversification via different modes such as M&A, greenfield or joint venture. Also, analyzing how companies could quantify the initial capabilities and resources, and comparing them with regards to diversification could also be a promising topic to study.

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