КОРПОРАТИВНЫЕ ФИНАНСЫ, ИНВЕСТИЦИИ, УЧЕТ

JEL: G310

Macro-drivers and Over-investment of Russian Companies

V. A. Cherkasova[1], *Y. M. Piankova*[2]

[1] National Research University Higher School of Economics (NRU HSE),
20, Myasnitskaya ul., Moscow,101000, Russian Federation
[2] UniCredit Bank,
9, Prechistenskaya nab., Moscow, 119034, Russian Federation

For citation: Cherkasova V. A., Piankova Y. M. (2019) Macro-drivers and Over-investment of Russian Companies. *St Petersburg University Journal of Economic Studies*, vol. 35, iss. 4, pp. 658–681.
https://doi.org/10.21638/spbu05.2019.408

A consideration of investment activity in relation to macroeconomic factors suggests that companies have an optimal investment policy. In the majority of studies that analyze companies' investment activities, attention has been focused mainly on the influence of internal factors as they are manageable, and less has been paid to external factors. In the Russian reality, since this may result in bankruptcy, over-investment occurs less frequently than under-investment. Therefore, the main question is: What has a bigger impact on over-investment, macroeconomic factors or internal factors? The goal of our study is to establish macro-drivers as having the strongest impact on the likelihood of over-investment in Russian companies. To measure the influence of macro-drivers, a binary choice regression model is estimated on the basis of panel data. The results reveal that the biggest impact on the probability of over-investment was oil price volatility, decreasing it by 38 %. Exchange rate volatility was second place (–29 %), and GDP growth rate and inflation have an inconsequential influence (7 % and less than –1 % respectively). The analysis of the speed of adjustment to target levels of investment shows that, in the macroeconomic environment Russia experienced in 2012–2017, companies would have target levels of investment, adjustment to which would occur gradually, over a period of around 2 to 5 years, depending on the industry.

Keywords: investment policy, agency conflict, over-investment, under-investment, speed of adjustment, target level of investment.

Introduction

The problem of over-investment has always been considered, as a result of an agency conflict between managers and owners, on the one hand, and shareholders and creditors on the other. Managers in both cases are hasty to excessively increase a company's

© Санкт-Петербургский государственный университет, 2019

investment activity, reducing overall value of the business. However, in most studies these motives are believed to be guided by internal factors and are rarely seen as a result of a macroeconomic influence. Nevertheless, it has been proven that corporate investment and the state of the economy, are closely interrelated. Corporate investment is one of the important factors affecting macroeconomic output growth. Similarly, a stable economy enables firms to recognize the best investment opportunities, and to invest in projects with the highest returns. Thus, the interests, goals and thereby motivesof owners, creditors and managers may change in accordance with the macroeconomic situation as their recognition of investment opportunities changes. In this regard, the degree of abnormal investment and its impact on the value of a company, may also be influenced by a country's macroeconomic situation. Furthermore, since over-investment does not only affect a company's financial stability and development, but may also cause its bankruptcy, it is essential to establish the macroeconomic factors having a major impact on over-investment, so that a company might be able to react to it quickly and prevent it from giving rise to serious agency problems.

In the unstable economic and political environment, with Russia just starting to recover from the recession of the previous years, the like lihood of another economic crisis has already appeared. In these conditions, it is especially important for both companies and their investors, to understand which macro-drivers lead to inefficient investment. While various macroeconomic effects on investment decisions have been the subject matter of many empirical studies, none have been analyzed comprehensively in the context of the Russian realities. In this paper, we attempt to carry out such an analysis.

Thus, the main goal of this paper is to establish the macro-driver which has the biggest influence on the probability of companies' over-investment. The idea of this paper is not only to analyze the influence of macro-drivers on companies' over-investment, but also to figure out the speed of adjustment to the optimal level of investment in Russian companies, which is quite sensitive to a country's macroeconomic environment.

Thus, we make a double contribution to the literature. Firstly, unlike other publications dealing mostly with BRICS en bloc and European countries, our paper is focused on Russia and provides evidence of the impact of macro-indicators on the over-investment of Russian companies. Secondly, we are the first to determine the speed of adjustment to target levels of investment of Russian firms. While the speed of adjustment is quite sensitive to a country's macroeconomic environment, it is interesting to estimate it for Russian companies from various industries, in the macroeconomic situation of Russia.

Of practical importance is the consideration of the factors that may influence investment decisions, in terms of a company's performance, by its management. As mentioned above, agency problems not only affect a company's financial stability and development, but they can also cause its bankruptcy. Therefore, to prevent the emergence of these problems or, at least, to minimize their consequences, a company should understand which macroeconomic factors are their major contributors. This paper seeks to provide such an analysis. Since we analyze both the macroeconomic impact on over-investment and the speed of adjustment to a target level of investment, our work may also help an over-investing company to estimate approximately how long it will take to adjust to its target level in a certain macroeconomic environment.

The structure of this paper proceeds as follows. Sections 1 and 2 present relevant literature and develop our research hypotheses. Sections 3 and 4 describe the methodology,

choice of variables and the data obtained. Section 5 is dedicated to the discussion of the empirical results of the study. Finally, section 6 gives a summary of the main conclusions.

1. Literature review

1.1. Macroeconomic Factors and Investment

During the past few decades the problem of over-investment has been studied in numerous empirical studies. It has been discovered that both internal and external factors influence managers' decisions on investment. It is evident that throughout the years, the effects arising from agency conflicts between lenders and owners, owners and managers, are still found as key reasons for abnormal investment. However, the problem of over-investment cannot be driven only by internal factors; it should be analyzed on a macroeconomic level too.

The influence of a number of macro-drivers on investment decisions has been analyzed by V. Kryachko on a sample of 15 developing countries [Kryachko, 2016]. The author concludes that both Tobin's Q and the return on investments of a previous period, have a statistically significant positive effect on the amount invested at present. As for the macroeconomic factors, both the GCI index (it assesses the favorableness of the investment climate in a country), and the oil price volatility (assumed to allow managers to expect a higher return on their investments in the future), proved to be positively correlated with the volumes invested. What is more, the oil price volatility turned out to have the biggest impact. Saxena and Wongon a sample of companies from Thailand, South Korea and Malaysia, established the dependence of real investment upon the following factors: real capital flows, domestic credit, inflation, GDP growth rate, real interest rate, public expenditure, real exchange rate [Saxena, Wong, 2002]. The study showed that in each country, the indicators' influence was different. An increase in real capital flows, increased the available financing in one country and, at the same time, indicated the vulnerability to a shift in sentiment in another. If public expenditures in a country were productive, and supportive of private investments, they contributed to the investment, whereas in the opposite case investment dropped. And finally, although in most cases the appreciation of the real exchange rate has a negative impact on investment, because it reduces the country's competitiveness, in some countries in the analysis, if the appreciation was caused by higher productivity, it encouraged investment. Nevertheless, the empirical results from all countries showed that the most significant influence on investment had: domestic credit, which eases the liquidity constraints, thereby having a positive impact on investment, real interest rates, indicating borrowing costs, and therefore, decreasing investment, a higher GDP growth ratemaking investment more attractive and a higher inflation rate, affecting investment adversely,as it makes returns on invested capital uncertain. M. Ksantinia and Y. Boujelbènein their research, also proved the inflation rate, public consumption and the interest rates to have the biggest impact on investment [Ksantinia, Boujelbene, 2014]. S. Aarekol presented evidence that a country's transparency level and legal system, have a major impact on private equity investments [Aarekol, 2016]. The author claims that investments are driven by a high transparency level, ensuring a low level of perceived corruption, and that the investments are reduced in a poor legal system. Kima and Leebon a sample of companies of east Asian countries, stated that government subsidies are the main

reason why firms are motivated to over-invest, as they increase available financing [Kima, Leeb, 2002]. D. Kotz , in turn, considers that the major macro-driver of over-investment is consumer spending ,because growth of demand stimulates companies to invest [Kotz, 2011]. Finally, Wang with co-authors using a sample of Chinese firms, concluded that corporate over-investment is mainly due to the inflation uncertainty and to managerial overconfidence: the lower the inflation uncertainty, the higher the over-investment, and the effect is exacerbated by managerial overconfidence [Wang, Chen, Huang, 2016].

Thus, macroeconomic factors do play an important role in the appearance of over-investment and cannot be possibly omitted from the analysis. According to the results obtained by the previous studies, as a summary, Table 1 is filled.

Table 1. **Influence of macro-drivers on investment according to previous studies**

Macro-driver	Influence on investment
GCI index	+
Oil price volatility	+
Transparency level	+
Legal system	+
Real capital inflows	+/–
Domestic credit	+
Inflation	–
Inflation uncertainty	–
GDP growth rate	+
Consumer spending	+
Public (government) expenditure	+/–
Real exchange rate	+/–
Real interest rate	–

1.2. Literature Review on the Speed of Adjustment to Target Levels

It is evident that non-optimal investment occurs quite often in the modern world. Several authors revealed that macroeconomic factors have a significant impact on a firm's adjustment to its optimal levels. The empirical results of O. Camara, showed that both macroeconomic factors and macroeconomic conditions have a significant impact on a firm's speed of adjustment to its target capital structure, through influencing firms' financing decisions [Camara, 2012]. The author states that the influence of the Gross Domestic Product (GDP) growth rate, the inflation rate and the commercial paper spread is already included in what a firm determines as its target level. A. Tamirat, A. Trujillo-Barrera and J. Pennings also conclude that the decision of a firm's target capital structure and its speed of adjustment to it, is not only dependent on its own specific characteristics, but partially

also on the macroeconomic environment in which it operates [Tamirat, Trujillo-Barrera, Pennings, 2018]. Finally, H. Hussain with co-authors indicate that the presence of extrinsic limitations itself, influences the speed of adjustment to target leverage, thereby suggesting that macroeconomic factors play an important role in a firm's speed of adjustment to target levels [Hussain et al., 2017]. This proves our analysis of the speed of adjustment to optimal levels of investment to be sensible.

T. Dogru and E. Sirakaya-Turk [Dogru, Sirakaya, 2017] tried to find out whether an optimal level of investment exists on a sample of hotel firms. The results showed that there is an optimal level, which maximizes a firm's value, but it varies across firms according to the quality of their investment opportunities. The authors concluded that the optimal level of investment is lower for firms having over-investment problems and higher with under-investment problems. It has also been established that the speed at which firms adjust to their desired levels of investment, depends on the type of investment, as well as on the number of firm characteristics and on exogenous shocks [Coldbeck, Ozkan, 2018].

For the determination of the speed of adjustment, the Lintner model has been proven to be most efficient. Models on the base of it were presented by many authors. For example, B. Coldbeck [Coldbeck, 2018] used it to investigate the dynamics of R&D and capital investment, S. Orlova, R. Ramesh [Orlova, Ramesh, 2018] to examine the speed of adjustment of cash holdings. L. Maurin and M. Toivanen, in turn, developed a partial adjustment model on the base of the Lintner model, in order to estimate the factors contributing to banks' internal target capital ratio, lending policy and holding of securities [Maurin, Toivanen, 2012]. Finally, the Lintner model was presented in the work of P. Castro with co-authors to analyze the differences in target leverage across three life cycle stages of European listed firms [Castro et al., 2016].

Thus, this proves that the model devised by Lintner can be used to find target levels of various firm's indicators, and justifies the employment of the model for determining the speed of adjustment to the target level of investment in the Russian realities.

2. Hypotheses

To reach the main goal of the paper, based on the literature review the following research hypotheses were formulated for their further verification.

H_1: *The inflation rate has a greater influence on the probability of over-investment than the GDP growth rate.*

The major negative influence of inflation on investment decisions has been proven in numerous empirical studies [Saxena, Wong, 2002; Wang et al., 2016; Ksantinia, Boujelbène, 2014]. Yizhong Wang et al. even point out that inflation uncertainty is the most significant external factor facing firms at a macro-level when investment decisions are made [Wang et al., 2016]. Furthermore, having analyzed a sample of Russian industrial companies,V. Bulgakov states that inflation not only makes long-term investments unprofitable, but also limits the possibility of internal growth of the enterprise in the future [Bulgakov, 2014]. Hence, in view of Russia's exposure to high inflation rates, and to low GDP growth rates, we expect the inflation rate to have a greater impact on companies' over-investment, than the growth of the economy has in the Russian realities.

H_2: The volatility of oil prices has a positive influence on the likelihood of over-investment.

V. Kryachko observes that the volatility of oil prices has a positive influence on investment, as investors hope to get a higher return in the future [Kryachko, 2016]. Furthermore, E. Fedorovaand M. Lazarevstate that the price of oil serves as a strategically important indicator, not only on Russia's macro-scale, but also for an individual investing in the Russian stock market: changes in the market value of an oil company's shares, are directly related to the price of oil [Fedorova, Lazarev, 2014]. The higher the volatility, the greater the number of speculative buyers eager to receive arbitrage profits on its basis. The greater the investment in a company's stock, the greater its net profit and, hence, the higher the probability that managers will use it for excessive investment. Since Russia is an export-oriented country with hydrocarbon feedstock as its main commodity, volatile oil prices should strongly affect investment decisions of companies, especially those in the Oil and Gas industry.

H_3: The country's GDP growth rate has a lower impact on the likelihood of over-investment than the oil price volatility.

Despite the fact that the growth of the economy has been proven to stimulate investment: S. Saxena, K. Wong conclude that in all countries taken under analysis, higher GDP growth rates stimulate the country's investment activity [Saxena, Wong, 2002]. Y. Wang with co-authors also consider a stable economic growth as a possibility for firms to recognize the best investment opportunities and invest in projects with the highest returns [Wang et al., 2016]. Basing on the fact that Russia's whole economy depends on the volatility of oil prices and on the work of V. Kryachko, who provides empirical evidence that the volatility of oil prices has the greatest impact on investment in emerging capital markets, we expect the influence of the latter to be higher [Kryachko, 2016].

H_4: The volatility of the exchange rate has the biggest impact on companies' over-investment in Russia.

A. Klimovets based on the results of her empirical analysis, concludes that the volatility of the ruble increases the vulnerability of investment in Russia [Klimovets, 2015]. The author states, that the weakening of the ruble benefits only those industries, in which a significant part of the financial result is formed due to export operations, and in which the share of imported raw materials and materials in the structure of operating costs is minimal. Companies focused primarily on the domestic market lose profitability as the ruble weakens.S. Saxena, K. Wong also provide evidence that a higher volatility of the exchange rate increases the risks of doing business for investors, exporters and importers, thereby reducing companies' investment [Saxena, Wong, 2002]. Since in the past few years the Russian economy suffered from a highly volatile exchange rate, and due to the fact that most public companies in Russia have a high share of imported raw materials, or are focused primarily on the domestic market, we assume that this factor would have the biggest impact on over-investment, and that the relationship would be negative.

For a more thorough analysis we introduce two additional hypotheses into our study, based on how the literature suggests that macroeconomic influence is already included in what a firm determines as its target level.

$H_{5.1}$: Companies in goods-producing industries would have a slower speed of adjustment to their target levels than those in the service-provision sectors.

$H_{5.2}$: *Companies in service-provision sectors would have a faster speed of adjustment to their target levels than those in the raw-materials industries.*

Finally, basing on the results of the work of T. Dogru and E. Sirakaya-Turk stating that the optimal level of investment varies with firms' investment opportunities, and of work of B. Coldbeck, A. Ozkan indicating that the speed of firms' adjustment to the desired levels of investment, depends on the investment type and on the number of firm characteristics, we assume that firms fromdifferent industries will have different speeds of adjustment to their target levels [Dogru, Sirakaya-Turk, 2017; Coldbeck, Ozkan, 2018]. Moreover, companies in goods-producing and raw-materials industries are expected to have a slower speed than those in the services-provision sectors during 2012–2017: being more capital intensive and having a longer production period, these industries are more exposed to the volatility of oil prices and the exchange rate. This assumption is based on the work of A. Bedrossian and D. Moschos, who proved that the speed of price adjustment is prolonged in sectors with a high industrial concentration and longer production processes, due to the macroeconomic impact on the market structure, and on the work of O. Camara, who stated that the macroeconomic influence is already included in what a firm determines as its target level [Bedrossian, Moschos, 1988; Camara, 2012].

3. Methodology

In this research we use several datasets in order to: (1) find the number of companies which over-invested in the period of 2012–2017; (2) determine the influence of macro-drivers on the probability of over-investment; and (3) determine the speed of adjustment to the target level of investment.

3.1. Methodology of Over-investment Identification

To answer the question of whether there was or there was not over-investment, we employ the methodology devised by [Richardson, 2006]. According to [Richardson, 2006] the amount of a companies' total investment is equal to:

$$Investment_{Total,t} = Capex_t + Acquisitions_t + R\&D_t - SalePPE_t, \quad (1)$$

where

$Capex_t$ — the capital expenditures;

$Acquisitions_t$ — the value of assets acquired;

$R\&D_t$ — research and development costs;

$SalePPE_t$ — gains from the sale of property, plant and equipment.

To measure the level of over-investment, Richardson divides the amount of total investment into two parts: the investment expenditure, which is required by the company ($Investment_{Maintenance}$), and the expected investment expenditure on new projects ($Investment_{New}$) [Richardson, 2006]. The latter is then disintegratedinto expected investment in new projects with positive NPVs ($Investment^{*}_{New}$) and abnormal investment ($Investment^{\varepsilon}_{New}$):

$$Investment_{Total} = Investment_{Maintenance} + Investment^{*}_{New} + Investment^{\varepsilon}_{New}, \quad (2)$$

where

$Investment_{Maintenance}$ — investment in the restoration and depreciation of fixed assets to maintain them in place;

$Investment^{*}_{New}$ — expected investment;

$Investment^{\varepsilon}_{New}$ — abnormal investment.

The amount of expected investment is evaluated by the results of a regression, in which the independent variables are the main determinants of investment. Based on previous studies [Hubbard, 1998; Richardson, 2006] we determine the regression equation as following:

$$Investment^{*}_{New\,i,t} = \beta_0 + \beta_1 Cash_{i,t-1} + \beta_2 Leverage_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 ROA_{i,t-1} + \\ + \beta_5 Tangibility_{i,t-1} + \beta_6 \frac{Sales}{Capital}_{i,t-1} + \beta_7 Investment_{Newi,t-1} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where

$Cash_{i,t-1}$ — either the cash and short-term investments to total assets,or the value of free cash flows (FCFF) to total assets in a previous period;

$Leverage_{i,t-1}$ — the amount of short-term and long-term debt to total capital in a previous period;

$Size_{i,t-1}$ — the natural log of total assets in a previous period;

$ROA_{i,t-1}$ — the ratio of net income to total assets in a previous period;

$Tangibility_{i,t-1}$ — the ratio of fixed assets (PPE) to total assets in a previous period;

$Sales/Capital_{i,t-1}$ — the ratio of revenue to the sum of equity and liabilities in a previous period;

$Investment_{Newi,t-1}$ — the amount of the expected investment in a previous period;

$Industry_{i,t-1}$ — avector of dummy variables identifying the industry;

$Year_{i,t}$ — avector of dummy variables identifying the year.

The results of the regression analysis in this case, are an estimate of the value of the expected investment for each observation. Knowing the value of the companies' actual investments in projects, one can calculate the amount of abnormal investments, which are the residuals of the regression:

$$Investment_{New\,i,tactual} - \widehat{Investment}_{New\,i,testimated} = e_{i,t}. \quad (4)$$

A positive value of $e_{i,t}$ indicates that a company invests more than expected and it is the determinant of over-investment, whereas its negative value is indicative of under-investment. In order to avoid any random deviation from the expected investment, the values of $e_{i,t}$ up to + 2.5 % are excluded from the analysis.

As the deviation from the expected or optimal investment volume may still be random (it may be caused by an inaccurate specification of the investment expenditure model, or may be explained by discrete changes in the company's investment policy), it is also necessary to analyze the company's growth potential in order to identify the observations

for which abnormal investments are associated precisely with the emergence of an agency conflict. According to [Degryse, De Jong, 2006], a low Tobin's Q rate can be used as a determinant of over-investment. Thus, we use a low growth potential of the company ($\Delta Tobin Q_{i,tcompany} < -5\%$) to ensure that the positive residuals of our regression model are truly signs of over-investment. Given the fact that different industries have their own growth potentials, the indicator is measured according to the company's industry average:

$$\Delta Tobin Q_{i,tcompany} = Tobin Q_{i,tcompany} - Tobin Q_{i,tindustry}. \quad (5)$$

3.2. Methodology of the Evaluation of the Impact of Macro-factors on the Probability of Over-investment

At the second stage, a regression analysis of panel data is used to analyze, which macro-drivers have the biggest influence on over-investment. The overall binary choice model can be described as follows:

$$I_{i,t}^{\sim} = X_{i,t}^{'}\beta + \alpha_i + \varepsilon_{i,t}, \quad (6)$$

where

$$I_{i,t}^{\sim} = \begin{cases} 1, if\ there\ is\ overinvestment \\ 0, else \end{cases};$$

$X_{i,t}^{'}$ — themacro-drivers and the control variables.

For data acquisition, Bloombergand Capital IQ databasesare used. The description of the indicators used in the binary regression model is presented in Table 2. Both the macro-drivers and the control variables were chosen based on previous studies and due to the main features of the Russian economy. Thus, we take into analysis Russia's inflation rate, as in the past, the country has been exposed to its high rates, oil price volatility due to the high dependence of the country's whole economy on it and the volatility of the exchange rate, as the ruble experienced a steep fall during the analyzed period. We also add the GDP growth rate into the analysis to see how significant its impact is, on over-investment in Russia.

Table 2. **Description of variables used in the binary regression model**

Main macro-driver	Description
Inflation rate	Inflation rate in Russia, CPI index, annual average in period *t*
GDP growth rate	Real annual average GDP growth rate in Russia between period *t*–1 and *t*
Currency changes	Delta in annual average real exchange rate USD/RUB between period *t*–1 and t
Oil price volatility	Delta in annual average oil (Brent) price in USD between period *t*–1 and t
Control variables	*Description*
Tobin's Q	The ratio of a company's value to total assets in period *t*–1
ROI	The ratio of a company's gains from investment to its cost in period *t*–1

The volatility of the real exchange rate is calculated by dividing the difference between the present annual average value of USD/RUB rate, and its previous annual average value by the previous annual average value. The volatility of the oil prices is calculated in the same way. The annual average data on the real GDP growth rate and the inflation rate, are simply taken from the World Bank and Bloomberg databases respectively. Tobin's Q and ROI of each company are taken from the Capital IQ database.

3.3. Methodology of Determination of the Speed of Adjustment to Target Levels of Investment

At the third stage, to estimate which industries would have the fastest speed of adjustment to the target level of investment in Russia's macroeconomic environment, we suggest the following model [Harris, Jalilvand, 1984; Lintner, 1956]:

$$I_{i,t} - I_{i,t-1} = \gamma\left(I^{*}_{i,t} - I_{i,t-1}\right) + u_{i,t}, \tag{7}$$

where

$I_{i,t}$ — is the level of investment at year t;

$I_{i,t-1}$ — the level of investment at year t–1;

γ — the speed of adjustment, which lies between 0 and 1;

$I^{*}_{i,t}$ — target level of investment.

The target levels of investment are taken from model (3). Rearranging (for an easier derivation of the speed from the model) gives us equation (8) and substituting (3) into (8) gives us equation (9):

$$I_{i,t} = \gamma \cdot I^{*}_{i,t} + \left(1-\gamma\right) I_{i,t-1} + u_{i,t} \tag{8}$$

$$I_{i,t} = \gamma\beta_0 + \left(1-\gamma\right) I_{i,t-1} + \gamma\beta_1 Cash_{i,t-1} + \gamma\beta_2 Leverage_{i,t-1} + \gamma\beta_3 Size_{i,t-1} + \gamma\beta_4 ROA_{i,t-1} + \\ + \gamma\beta_5 Tangibility_{i,t-1} + \gamma\beta_6 \frac{Sales}{Capital_{i,t-1}} + \gamma\beta_7 Investment_{Newi,t-1} + \gamma\beta_8 Industry_{i,t} + \gamma\beta_9 Year_{i,t} + u_{i,t}. \tag{9}$$

Finally, we derive the speed of adjustment by subtracting the coefficient next to the lagged independent variable, from 1 as it stands for (1–γ), i.e. (1– the speed of adjustment). Due to the fact that it has been proven that macroeconomic influence is already included in what a firm determines as its target level and due to the adopted specification of the model, we don't add additionally any macroeconomic factors into the model. We build a general model for the whole sample and then divide it and construct a model for goods-producing, raw-materials and service-provision sectors, to compare the speeds of partial adjustments to target levels of investment.

4. Data

The testing of our research hypotheses is based on a sample of Russian companies from the Metals and Mining, Oil and Gas, Telecommunications, Utilities, Retail, Industrial[1] and the Health Care industries. The sampling period of the study is 6 years: 2012–2017. We deliberately include the year of 2014 and do not divide the timeline into 2 periods, to increase the efficiency of our models. At the same time, we mathematically ascertain that our results are not biased. For data acquisition, the Capital IQ database is used.

The initial criteria for sampling were:

— country of establishment: Russia;
— company type: public companies, not state-owned;
— industry: all industries with the exception of financial services as these companies have significant differences in their investments and cash flows.

Thus, the initial sample contained information on 228 companies. To obtain a balanced sample, companies, for which data on the components necessary to identify the values of investment (Capex, investments in R&D, Acquisitions etc.), or on the characteristics used as regressors was not available, were excluded. Elimination of such values is necessary to obtain reliable, unbiased analysis results.

The final sample of companies consists of 104 companies over a period of 6 years, i.e. 624 observations. Such a relatively big number of observations in our final sample, allows us to assume that the indicators are normally distributed, which has a positive effect on the quality of estimates in our regression analysis.

The sectoral structure of our sample is presented in Figure 1. We can see that more than 70 % of the companies are concentrated in the Oil and Gas (13 %), Metals and Mining (20 %), the Industrials (15 %) and the Utilities (24 %) industries. Such a sectoral structure

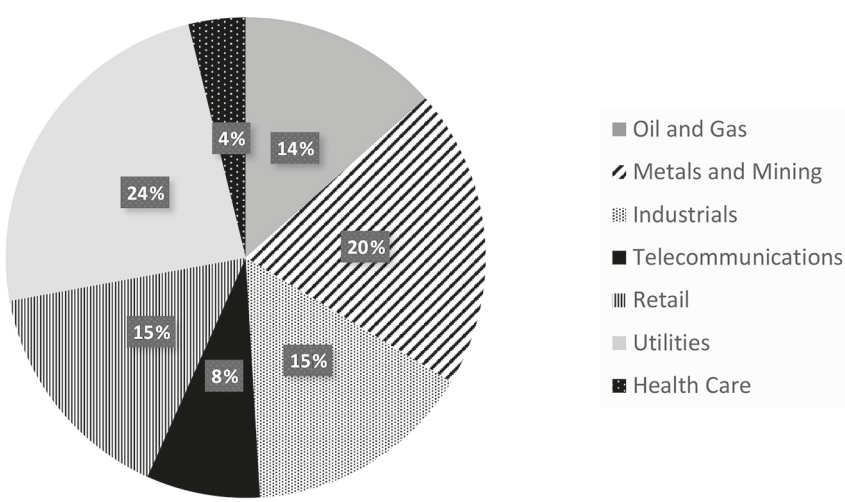

Fig. 1. Sectoral structure of the sample
Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

[1] The Industrial sector consists of companies connected with liquid fuels (e.g. aircraft, diesel production, rocket and space, etc.).

is valid when analyzing companies from emerging capital markets, in particular, Russia, in which the production of goods and raw materials prevails over the service provision sector.

The correlation between the regressors is more than 50 % (see Table 3), and indicates the presence of multicorrelation in our data. Therefore, for analyzing which macro-drivers have the biggest influence on over-investment, we construct two regression models: one excluding the volatility of the exchange rate, and one excluding the volatility of the oil prices from the analysis, as they are closely interrelated.

Table 3. **Correlation matrix for macro-indicators**

	Infl_rate	Gdp_growth	Delta_oil	Delta_exchange
Inflation_rate	1			
Gdp_growth	–0.22115	1		
Delta_oil	0.41755	–0.02012	1	
Delta_exchange	0.441254	–0.2256	0.74071	1

Based on: Bloomberg database. URL: https://www.bloomberg.com/europe (accessed: 20.02.2019).

A preliminary analysis of the data on macro-drivers in the form of descriptive statistics is contained in Table 4.

Table 4. **Variable descriptive statistics**

Variable	Observations	Mean	Standard deviation	Min	Max
Inflation_rate	624	0.07629313	0.3632755	0.025	0.129
Gdp_growth	624	0.00747588	0.995447	–0.028	0.037
Delta_oil	624	–0.018674	0.34398	–0.482581	0.524142
Delta_exchange	624	0.1530826	0.327133	–0.167514	0.792219

Based on: Bloomberg database. URL: https://www.bloomberg.com/europe (accessed: 20.02.2019).

Based on the analysis of the values, we can conclude that the Russian economy during 2012–2017, was peculiar to both high (12.9 %) and low (2.5 %) inflation rates, a rather low average GDP growth rate (less than 1 %), a high volatility of oil prices (from –48 % to +52 %) and a high volatility of the real exchange rate (from –16 % to +79 %).

5. Results

5.1. Over-investment Identification

To determine the size of abnormal investment, we evaluate model (3). The correlation between the regressors is low (less than 40 %). A preliminary analysis of the data in the form of descriptive statistics is contained in Table 5. We use a natural logarithm of investments in order to (1) make the size of its values correspond to the values of the in-

dependent variables, which are presented in shares, and (2) to make its distribution closer to normal. Due to the size of our sample the rest of the variables are initially, normally distributed.

Table 5. **Variable descriptive statistics**

Variable	Observations	Mean	Standard deviation	Min	Max
lninvestment	624	8.521269	2.625095	0.3293037	14.81453
lag1_tobinsq	624	1.121468	0.5229373	0.3015	3.9459
lag1_roa	624	1.294277	0.63821	0.8782	5.101848
lag1_salestocap	624	1.299614	1.661652	0.0000	11.30138
lag1_cashta	624	0.0872937	0.0980124	0.0000	0.9382672
lag1_leverage	624	0.3285375	0.2490881	0.0000	2.031124
lag1_size	624	11.19385	2.129039	6.293049	16.71906
lag1_tangibility	624	0.4909341	0.2480638	0.0000	0.9358162
lag1_roi	624	3.3833	0.55631	0.18119	5.4366
lag1_lninvestment	624	8.558689	2.600049	0.4700036	14.81453

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

When choosing the specification of the regression model, we consider the fixe deffects model the most relevant. The identified problem of heteroscedasticity is solved with the help of robust standard errors. In order to achieve a high explanatory power of the regression, such regressors as the return on assets, the industry dummy and the year dummy, were excluded from the model due to insignificancy. The result of the evaluation of the expected investment model is presented in Table 6.

The impact of the regressors on the dependent variable is consistent with previous research. We expect that a company will invest more, the greater its size, the lower its debt burden, the higher its cash flow, the higher the materiality of its assets (as it increases the cost of collateral when attracting debt financing) and the greater the investment was in a previous period. The sales to capital ratio can be compared to a working capital turnover, which is a ratio that measures the efficiency of a company's use of its working capital to support certain levels of sales. The higher the ratio is, the more efficient is the management in implementing a company's capital for supporting sales. In contrast, a low ratio may be a sign of a business investing too much. Therefore, a possible explanation of a negative influence of a company's sales to capital ratio in our regression, is that the higher this ratio is, the less a business needs to invest in its capital as the amount it has, is already sufficient to reach its target level of sales. Thus, the forecast of the expected investment is sufficiently reliable to measure the size of abnormal investment.

In order to eliminate a random deviation of the actual investment from the expected investment, in accordance with our stated methodology, we exclude small values of the regression residuals. Summary data on the amounts of over-investment and its breakdown by industry, are presented in Figures 2 and 3. Observations, which showed signs of over-investment, were assigned the value of 1, the rest — the value of 0.

Table 6. **Estimates of the expected investment model**

Variable	lninvestment
R^2	0.782
Prob > Chi^2	0.0000
lag1_size	0.406*** (0.112)
lag1_tangibility	0.651** (0.326)
lag1_cashta	0.541* (0.446)
lag1_salestocap	–0.0767* (0.0417)
lag1_leverage	–0.0602*** (0.0165)
lag1_lninvestment	0.571*** (0.0907)
Intercept	–1.127* (0.670)
Observations	624
Number of companies	104

Notes: robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

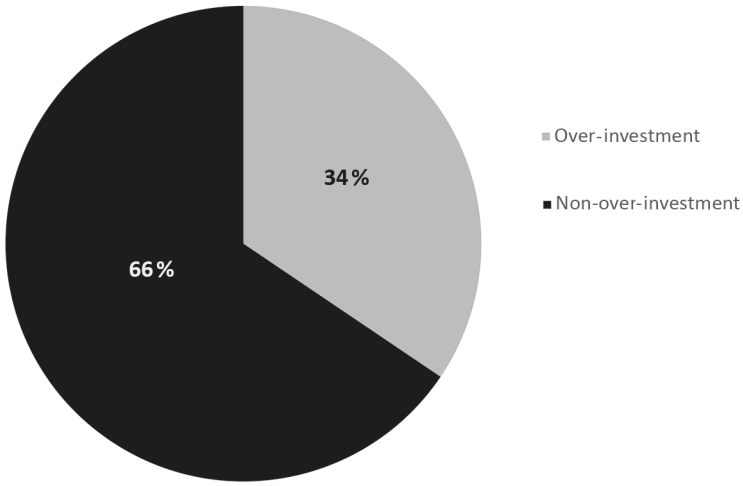

Fig. 2. Over-investment identification

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

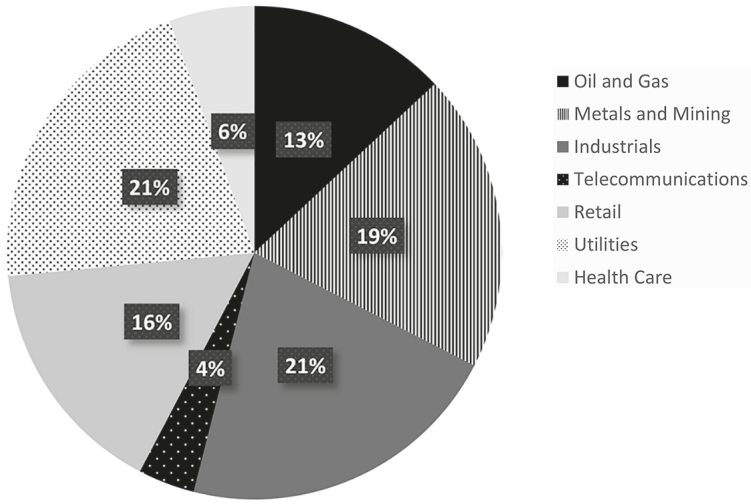

Fig. 3. Sectoral breakdown of over-investment cases

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

On the basis of the figure above, it is evident that Russian companies are more prone to under-investment, or close to optimal investment, than to over-investment. The share of observations, for which over-investment was revealed, is equal to 34%. This conclusion is consistent with the results obtained by N. Liu and D. Bredin, who also used the methodology devised by Richardson, to measure over-investment but on a sample of Chinese listed companies [Liu, Bredin, 2010]. As a result of their research, the authors concluded that only 36.9% of their sample were over-investment firms and the rest 63.1% were under-investment firms.

The highest percentage of over-investment cases appeared to be the Industrial (21%), the Utilities (21%) and the Metals and Mining (20%) industries. The possible reason for this is that these companies invest heavily in diesel manufacturing, aircraft and railway construction, energy creation and distribution and the construction of mines. Due to a high number of necessary investments to be made, the likelihood of over-investment may be higher. The Oil and Gas industry has lower estimates of over-investment, as there are not as many companies from this industry as from the above-mentioned, in the sample. Referring to the Retail industry, its main drivers during the last couple of years have been rising urbanization and the development of E-commerce, both of which stimulated companies to invest more. However, the percentage distribution of the over-investment cases corresponds to the percentage of companies from each industry in the sample, which is why no solid conclusions can be drawn regarding the industry breakdown.

5.2. Evaluation of the Impact of Macro-factors on the Probability of Over-investment

For testing the main hypotheses of our study, we evaluate the binary regression model designated by formula 6. Regarding the specification, we select the probit model as most preferable. As oil prices and the exchange rate are closely interrelated, we divide the model

into two parts to eliminate the multicorrelation in our data (see formula 10). Based on previous studies, we also add control variables into our regression to eliminate their effects from the equation. The results of the evaluation of the two binary regression models are contained in Table 7.

$$P\left(over\text{-}investment=1\right)=F\left(Z\right)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{z}e^{\frac{-t^2}{2}}, \quad (10)$$

where in the first case:

$$Z=\beta_0+\beta_1 TobinsQ_{i,t-1}+\beta_2 roi_{i,t-1}+\beta_3 inflationrate_t+$$
$$+\beta_4 GDP\ growth_t+\beta_5 oilpricevolatility_t.$$

In the second case:

$$Z=\beta_0+\beta_1 TobinsQ_{i,t-1}+\beta_2 roi_{i,t-1}+\beta_3 inflationrate_t+$$
$$+\beta_4 GDP\ growth_t+\beta_5 exchangeratevolatility_t.$$

Table 7. **Estimates of the probit-model**

Variable	Over-investment without the exchange rate volatility	Over-investment without the oil price volatility
Pseudo R^2	0.0486	0.0462
Prob >Chi^2	0.0000	0.0000
lag1_tobins_q	0.175* (0.102)	0.204** (0.102)
lag1_roi	0.0219* (0.0134)	0.0252* (0.0134)
gdp_growth	0.176*** (0.0642)	0.214*** (0.0642)
delta_oil	–0.829** (0.382)	
inflation_rate	–0.0392* (0.0238)	–0.0297* (0.0238)
delta_exchange		–0.686* (0.411)
Constant	–1.252*** (0.404)	–1.334** (0.404)
Observations	624	624

N o t e s: standard errors in parentheses;
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

B a s e d o n: Bloomberg database. URL: https://www.bloomberg.com/europe (accessed: 20.02.2019).

Based on Table 7 we can see that all the obtained signs of our betas are economically interpretable. Higher growth of the economy stimulates the country's investment activity, as it makes investment more attractive under adaptive expectations. During the period taken under analysis, the volatility of the Russian ruble was so high and

unpredictable that it made investments too risky and unprofitable. The inflation rate is also once again proven to have a negative influence on the invested volumes, due to the increases in uncertainty of the returns on investment. The signs of our control variables are consistent with the results of the previous studies, which has a positive effect on the quality of estimates of our regression analysis. Although our 2nd hypothesis, stating that companies from emerging capital markets invest more under volatile oil prices [Kryachko, 2016; Fedorova, Lazarev, 2014], has been proven wrong, the negative sign can be explained in the following way. During the period taken under analysis, the volatility of oil prices was so high, and the fall of them so steep, that it made risky investments, especially short-term (speculative) capital investments, meaningless, as the chances of making a profit were equal to the chances of losing everything. Moreover, as a result of a high dependence of the Russian economy on oil prices, the collapse of the oil market has been recorded three times in the country's new history, and each time it led to financial crises, during which it became too difficult and risky for companies to do business and make a lot of investments.

As we cannot rely on the values of betas in a prob it regression model, to quantify the influence of macro-drivers on the probability of over-investment we have to look at their marginal effects. As both regressions showed close marginal effects, Table 8 presents the average value of marginal effects on over-investment of each macro-factor.

Table 8. **Marginal effects of the macro-factors on the probability of a company's over-investment**

Variable	dy/dx
lag1_tobins_q	0.0695768*
lag1_roi	0.008677*
gdp_growth	0.0779993***
delta_oil	–0.3819191**
delta_exchange	–0.2953383*
inflation_rate	–0.0037875*

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Based on: Bloomberg database. URL: https://www.bloomberg.com/europe (accessed: 20.02.2019).

Thus, we can see that in terms of our regression even such internal factors as the Tobin's Q (7 %), and the return on investment of a company (less than 1 %) didn't have as much impact on over-investment as had the oil price volatility and the volatility of the exchange rate, during the period taken under analysis. The reason of such a high degree of influence, is that the fall of the oil price was so steep and the volatility of the ruble so sharp, that it outweighed the positive impact of companies' internal factors. Inflation turned out to have an inconsiderable influence (less than 1 %) on over-investment during the analyzed period. This is indicative of the fact that Russian companies adjust to its influence quickly and make investments irrespective of it. The company's internal

growth potential, as well as the growth rate of the economy as a whole, had an approximately equal impact on the company's likelihood of over-investment. Nevertheless, the GDP growth rate had a much greater influence (8 %) on over-investment than the inflation rate during the analyzed period, which indicates that in the Russian realities, its positive impact outweighs the adverse effects of the latter. What is more, the biggest impact on companies' over-investment in Russia had the volatility of oil prices (–38 %). It appears that, as a result of a high dependence of the Russian economy on oil prices, even companies not primarily related to the purchase or sale of oil, are strongly influenced by the volatility of its prices. As regards the volatility of the exchange rate, it has the second highest influence (–29 %), andmakes Russian companies focused primarily on the domestic market, unsure of their future revenues. However, this result is not consistent with our 4th hypothesis, stating that the volatility of the exchange rate has the biggest impact on over-investment in the Russian realities. We also reject our 2nd hypothesis, the sign of the oil price volatility influence on the likelihood of over-investment, which turned out to be negative, and hypothesis 1, stating that the inflation rate has a bigger impact on over-investment than the GDP growth rate. According to the obtained results, as a summary, Table 9 is filled.

Table 9. **Hypothesis results**

Hypothesis	Result
H_1: *The inflation rate has a greater influence on the probability of over-investment than the GDP growth rate.*	Rejected
H_2:*The volatility of oil prices has a positive influence on the likelihood of over-investment.*	Rejected
H_3: *The country's GDP growth rate has a lower impact on the likelihood of over-investment than the oil price volatility.*	Not rejected
H_4: *The volatility of the real exchange rate has the biggest impact on companies' over-investment in Russia.*	Rejected

5.3. Evaluation of the Speed of Adjustment to Target Levels of Investment

Finally, to analyze the speed of adjustment to the target level of investment of Russian companies in the macroeconomic situation in Russia during 2012–2017, we additionally evaluate several dynamic panel models. For this purpose, we use the Arellano-Bond estimator as the model as it includes a lagged level of the dependent variable as one of its regressors. We build a general model for the whole sample and then divide it and construct a model for each industry, to compare the speeds of partial adjustments to target levels of investment. For simplicity, we combine the Industrial, Oil and Gas and Metals and Mining industries into raw-materials industries, the Health Care, the Telecommunications and the Retail industries into the service-provision sector and rename the Utilities industry to the goods-producing industry. Tables 10, 11 present the outputs of these regressions.

Table 10. **Arellano-Bond model for partial adjustment**

Variable	Overall lninvestment
lag1_lninvestment	0.213*** (0.0345)
lag1_cashta	1.794** (0.9146)
lag1_size	0.262*** (0.0547)
lag1_tangibility	1.614*** (0.491)
lag1_salestocap	–0.211*** (0.0404)
lag1_leverage	–0.101* (0.0597)
Constant	2.006*** (0.6632)
Observations	624
Number of companies	104

Notes: standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

The coefficient next to the lagged independent variable is equal to 0.2, which means that in Russia's macroeconomic environment in 2012–2017, the approximate speed of partial adjustment to target investment of companies, would be equal to 80 %. The sample consists of annual data, therefore, if a company closes around 80 % of the difference within a year, it will cover the entire gap in less than a year and a half. Thus, overall, Russian companies would adjust to their target levels of investment rather quickly. This conclusion is consistent with the results of V. Anisimova [Anisimova, 2016], who showed that a greater part of the sampled Russian companies had a very high speed of adjustment (nearly 100 %), as well as with the results of M. Kokoreva stating that average levels of the speed of adjustment for cumulative national samples, are much higher than those for the companies from the developed markets, and range from 38 to 71 % over a period [Kokoreva, 2012]. It is noteworthy that the obtained results correspond to reality. Our sample comprises of, mainly, large Russian public companies, generally, with a good corporate culture and ahigh-quality management system, therefore, with investments initially close to their targets and which eliminate deviations instantly, if occurred.

Based on the data presented in Table 11, we can conclude that companies from different industries would adjust to their target levels at different speeds It depends on the capital intensity of an industry, on the frequency of a company's investment in order to adapt to technological changes, on its dividend policy etc. Based on the results, the service-provision industries would be the fastest to adjust partially: in a year they would cover

Table 11. **Arellano-Bond model for partial adjustment. Breakdown of industries**

Variable	Raw-materials sector	Service-provision sector	Goods-producing sector
	lninvestment	lninvestment	lninvestment
lag1_lninvestment	0.784*** (0.136)	0.397** (0.174)	0.553*** (0.134)
lag1_cashta	1.362 (2.767)	9.237** (3.911)	0.419 (2.802)
lag1_size	0.338* (0.216)	0.585* (0.328)	0.361* (0.290)
lag1_tangibility	0.239* (0.199)	1.604* (1.338)	2.270* (1.320)
lag1_salestocap	–0.151 (0.402)	–1.840* (1.416)	0.0441 (0.0974)
lag1_leverage	–0.0272* (0.0161)	–0.0203* (0.0129)	–0.0283* (0.0164)
Constant	0.6043 (1.282)	–3.051* (1.815)	2.031 (2.362)
Observations	306	168	150
Number of companies	51	28	25

Notes: standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Based on: Capital IQ database. URL: https://www.capitaliq.com (accessed: 20.02.2019).

the difference at a speed of over 70 %. This can be explained in the following way. The Telecommunications industry presently receives maximum funding, which, in conjunction with an effective management system, permits it to reach target levels quickly, irrespective of the macroeconomic influence. As regards the Retail industry, in the past few years, the investment risks of its companies have been mostly connected with the development of E-commerce, concentrating just on which, enabled the management to adjust to target levels faster. The second place are the companies from the goods-provision industry, with yearly coverage exceeding 50 %. This can be attributed to the fact that these companies follow a less strict dividend policy, as compared to thosein the raw-materials sector, and they are independent of the oil price. The slowest (about 20 %) speed of adjustment is observed in the raw-materials sector as it includes companies, the revenue of which is highly dependent on the oil price. We assume that since, over the period in question, the latter dropped, these companies suffered from an unexpected plummet of their revenues and failed to efficiently manage their investment, thereby slowing the speed of adjustment down.

Thus, in the macroeconomic environment Russia experienced in 2012–2017, companies would have target levels of investment, adjustment to which would occur gradually, over a period of around 2 to 5 years depending on the industry. Bearing in mind that significantly slower speeds were characteristic of companies dependent on the price of oil, we conclude that slower speeds were mainly caused by the steep fall of the price. This once again proves that this macro-indicator has the biggest impact on Russian

companies in terms of investment. The results are fully consistent with the assumptions laid down by hypotheses 5.1 and 5.2 and, therefore, there is no reason to reject them (see Table 12).

Table 12. **Hypothesis results**

Hypothesis	Result
$H_{5.1}$: *Companies in goods-producing industries would have a slower speed of adjustment to their target levels than those in the service-provision sectors.*	Not rejected
$H_{5.2}$: *Companies in service-provision sectors would have a faster speed of adjustment to their target levels than those in the raw-materials industries.*	Not rejected

Conclusion

This paper employs a data set of Russian companies for the period of 2012–2017 to investigate the relationship between macro-indicators and companies' over-investment. The descriptive statistics show that the companies in our sample have, on average, a high growth potential and rather high returns on investment. Nevertheless, our further analysis reveals that only 34 % of observations show signs of over-investment. Based on the estimates of the binary regression model, we find empirical evidence that the volatility of oil prices has the biggest impact on companies' over-investment in Russia, leaving the volatility of the exchange rate in second place. These results may explain the low percentage of over-investment cases in our sample, as both factors have a negative impact on it. The GDP growth rate appears to have a higher influence on the likelihood of a company to over-invest than the inflation rate, which is indicative of a rather quick adjustment of Russian companies to the levels of the latter. Finally, the estimated partial adjustment model shows that in the macroeconomic environment Russia experienced in 2012–2017, companies would have target levels of investment, adjustment to which would occur gradually, over a period of around 2 to 5 years depending on the industry. What is more, companies from the service-provision industries would have a faster speed of adjustment than those from the goods-provision and raw-materials industries. All of the conclusions are strongly supported by robust tests, which make them reliable.

Our paper adds to the literature by concentrating on Russian firms, while estimating the speed of adjustment to target levels of investment, and by providing evidence on the impact of macro-indicators on companies' over-investment during the latest economic crisis, while previous studies have only analyzed these effects mostly in the countries of BRICS en bloc, and in the countries of Europe.

These empirical findings have some important implications too. Of practical importance is the consideration of the factors that may influence investment decisions, in terms of a company's financial performance in the unstable economic and political environment of Russia, by a company's management, in order to help a company adapt to them quickly and prevent them from giving rise to serious agency problems. Moreover, our work may also help an over-investing company to estimate approximately how long it will take to adjust to its target level of investment in a certain macroeconomic environment.

However, the research regarding companies' over-investment in Russia, is by no means complete. There are still several issues that have not been examined. For instance, there is still no empirical evidence on the impact of macro-indicators on under-investment in Russia. Nor is there any relating to the form of dependence between macro-indicators and inefficient investment with the consideration of a specific type of agency conflict, or on how the target levels of investment and the speed of adjustment to them changed over time in Russia, and many others. All of these issues are worthy of future research.

References

Aarekol S. W. (2016) *The Impact of Macroeconomic Factors on Private Equity Investments*. Master theses in Business Administration, University of Adger, pp. 1–64.

Anisimova V. S. (2016) Analysis of the determinants and the speed of adjustment to the target capital structure on developing markets. *Science Time*, no. 3, iss. 27, pp. 56–63. (In Russian)

Bedrossian A., Moschos D. (1988) Industrial structure, concentration and the speed of price adjustment. *The Journal of Industrial Economics*, no. 26, iss. 4, pp. 459–475.

Bulgakov V. N. (2014) The effects of inflation on the sustainable development of industrial enterprises. Inflation matrix. *Ekonomika i upravlenie*, no. 24, iss. 351, pp. 19–28. (In Russian)

Camara O. (2012) Capital Structure Adjustment Speed and Macroeconomic Conditions: U.S MNCs and DCs. *International Research Journal of Finance and Economics*, pp. 106–120.

Castro P., Fernández M. T. T., Amor-Tapia B., de Miguel A. (2016) Target leverage and speed of adjustment along the life cycle of European listed firms. *Business Research Quarterly*, no. 19, iss. 3, pp. 188–205.

Coldbeck B., Ozkan A. (2018) Comparison of adjustment speeds in target research and development and capital investment: What did the financial crisis of 2007 change? *Journal of Business Research*, no. 84, pp. 1–10.

Degryse H., De Jong A. (2006) Investment spending in the Netherlands: Asymmetric Information or Managerial Discretion? *International Journal of Industrial Organization*, 24 (1), 125–147.

Dogru T., Sirakaya-Turk E. (2017) Investment and Firm Value: Is There an Optimal Investment Level in Hotel Firms? *The Journal of Hospitality Financial Management*, no. 25, iss. 1, pp. 17–26.

Fedorova E. A., Lazarev M. P. (2014) The influence of oil prices on the financial market of Russia in the crisis period. *Finansy i kredit*, no. 20, pp. 14–22. (In Russian)

Harris R. S., Jalilvand A. (1984) Corporate Behavior in Adjusting to Capital Structure and Dividend Targets: An Econometric Study. *The Journal of Finance*, no. 39, iss. 1, pp. 127–145.

Hubbard R. G. (1998) Capital-market Imperfections and Investment. *Journal of Economic Literature,* no. 36, iss. 1, pp. 193–225.

Hussain H. I., Shamsudin M. F., Hasim M. A., Salem M. A., Gadar K., Ali A., Abdullah A. M. (2017) Speed of Adjustment and Macroeconomic Growth. *Advance Science Letters*, no. 23, iss. 4, pp. 2947–2950.

Kima Y. J., Leeb J-W. (2002) Overinvestment, inflation uncertainty, and managerial overconfidence: Firm level analysis of Chinese corporations. *Japan and the World Economy*, no. 14, iss. 2, pp. 181–201.

Klimovec A. V. (2015) Analysis of the impact of the weakening ruble on certain types of activities in the Russian economy. *Den'gi i kredit*, no. 8, pp. 33–36. (In Russian)

Kokoreva M. S. (2012) The choice of capital structure by companies of the BRIC countries and Eastern Europe: An Empirical Analysis. *Korporativnye finansy*, no. 2, iss. 22, pp. 58–70. (In Russian)

Kotz D. M. (2011) Over-Investment and the Economic Crisis of 2008. *World Review of Political Economy*, no. 2, iss. 1, pp. 5–25.

Kryachko V. S. (2016) Determining the Optimal Amount of Capital Investment for Business Valuation. *Ekonomika. Nalogi. Pravo,* pp.152–156. (In Russian)

Ksantinia M., Boujelbène Y. (2014) Impact of Financial Crises on Growth and Investment: An Analysis of Panel Data. *Journal of International and Global Economic Studies*, no. 7, iss. 1, pp. 32–57.

Lintner J. (1956) Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes. *The American Economic Review*, no. 46, iss. 2, pp. 97–113.

Liu N., Bredin D. (2010) *Institutional Investors, Over–investment and Corporate Performance*. University College Dublin. Working Paper, pp. 35. URL: http://www.ceauk.org.uk/2010-conference-papers/full-papers/Ningyue- Liu-CEA-final.pdf (accessed: 14.03.2019).

Maurin L., Toivanen M. (2012) Risk, Capital Buffer and Bank Lending: A Granular Approach to the Adjustment of Euro Area Banks. *European Central Bank Working Paper Series,* no. 1499, pp. 1–26.
Orlova S. V., Ramesh P. R. (2018) Cash holdings speed of adjustment. *International Review of Economics and Finance*, no. 54, C, pp. 1–14.
Richardson S. (2006) Over–investment of free cash flows. *Review of Accounting Studies*, no. 11, iss. 2, pp. 159–189.
Saxena S. C., Wong K. (2002) *Economic Growth, Over-investment, and Financial Crisis*. Working Paper, 23 p. URL: https://faculty.washington.edu/karyiu/papers/invest-crisis.pdf (accessed: 14.03.2019).
Tamirat A. S., Trujillo-Barrera A., Pennings J. M. E. (2018) Farm Level Risk Balancing Behavior and the Role of Latent Heterogeneity. *Agricultural & Applied Economics Association 2018 AAEA Annual Meeting.* Washington, D.C., 51 pp. URL: https://pdfs.semanticscholar.org/dd40/05283337363d5d934c2b7099e0e3b22485fa.pdf (accessed: 14.03.2019).
Wang Y., Chen C. R., Chen L., Huang Y. S. (2016) Overinvestment, inflation uncertainty, and managerial overconfidence: Firm level analysis of Chinese corporations. *The North American Journal of Economics and Finance*, no. 38, C, pp. 54–69.

Received: 04.06.2019
Accepted: 11.09.2019

Authors' information:

Victoria A. Cherkasova — PhD in Economics, Associate professor; vcherkasova@hse.ru
Yana M. Piankova — Master of Economic Sciences, Senior Analyst; yanap97@gmail.com

Макродрайверы и чрезмерное инвестирование российских компаний

В. А. Черкасова[1], *Я. М. Пьянкова*[2]

[1] Национальный исследовательский университет «Высшая школа экономики»,
Российская Федерация, 101000, Москва, ул. Мясницкая, 20
[2] ЮниКредит Банк,
Российская Федерация, 119034, Москва, Пречистенская наб., 9

Для цитирования*:* Cherkasova V. A., Piankova Y. M. (2019) Macro-drivers and Over-investment of Russian Companies. *Вестник Санкт-Петербургского университета. Экономика*. Т. 35. Вып. 4. С. 658–681. https://doi.org/10.21638/spbu05.2019.408

Рассмотрение инвестиционной активности компаний в привязке к макроэкономическим факторам позволяет сделать вывод о наличии у них оптимальной инвестиционной политики. В большинстве работ, посвященных анализу инвестиционной активности компаний, внимание акцентируется на влиянии внутренних факторов, так как именно они поддаются управлению. В меньшей степени исследованы внешние факторы, так как они являются экзогенными и компании не могут на них повлиять, учитывая их как данность при принятии управленческих решений. В российских реалиях переинвестирование случается реже, чем недоинвестирование, потому что именно оно может быть причиной банкротства компаний. Это является причиной приоритетного исследования данного вопроса: стимулирует ли нестабильная экономическая обстановка компании осуществлять избыточные инвестиции или на переинвестирование в большей степени влияют внутренние факторы нежели внешние? Цель исследования состоит в выявлении макродрайверов, оказывающих наиболее сильное воздействие на вероятность переинвестирования российскими компаниями. Для измерения их влияния на переинвестирование компаний используется регрессионная модель бинарного выбора на основе панельных данных. Результаты

показали, что наибольшее воздействие на вероятность переинвестирования компаний имеет волатильность цен на нефть, снижая ее на 38 %; волатильность обменного курса по степени своего воздействия занимает второе место (–29 %); темпы роста ВВП и уровень инфляции оказывают незначительное влияние (7 % и менее –1 % соответственно). Кроме макрофакторов в статье измерена скорость приспособления к оптимальному уровню инвестирования с акцентом на отрасли. Модель показала, что в макроэкономической среде, свойственной России в 2012–2017 гг., компании достигли бы целевого уровня инвестиций постепенно, примерно в течение двух — пяти лет, в зависимости от отрасли. Наиболее быструю скорость приспособления имели бы компании из сферы услуг.

Ключевые слова: инвестиционная политика, агентский конфликт, переинвестирование, недоинвестирование, скорость приспособления, оптимальный уровень инвестиций.

Статья поступила в редакцию 04.06.2019
Статья рекомендована в печать 11.09.2019

Контактная информация:

Черкасова Виктория Артуровна — канд. экон. наук, доц.; vcherkasova@hse.ru
Пьянкова Яна Михайловна — магистр экон. наук, старший аналитик; yanap97@gmail.com

Corrigendum

Мотовилов О. В., Самылов И. О., Сеидова М. Ш. (2019) Выбор биржевой площадки для IPO инновационно-ориентированной компании. Вестник Санкт-Петербургского университета. Экономика. Т. 35. Вып. 3. С. 419–447. https://doi.org/10.21638/spbu05.2019.305

№	Страница	Напечатано	Следует читать
1	С. 429, табл 3, Гипотеза 1	Основные площадки: подтверждена, коэффициент корреляции — 74 %, эмпирический *t*-критерий Стьюдента — 2,12	Основные площадки: подтверждена, коэффициент корреляции — 74 %, эмпирический *t*-критерий Стьюдента — 7,43
2	С. 429, табл. 3, Гипотеза 1	Альтернативные площадки: частично подтверждена, коэффициент корреляции — 38 %, эмпирический *t*-критерий Стьюдента — 7,43	Альтернативные площадки: частично подтверждена, коэффициент корреляции — 38 %, эмпирический *t*-критерий Стьюдента — 2,12
3	С. 429, табл. 3, Гипотеза 2	Основные площадки: не подтверждена, коэффициент корреляции — 28 %, эмпирический *t*-критерий Стьюдента — 1,41	Основные площадки: не подтверждена, коэффициент корреляции — 28 %, эмпирический *t*-критерий Стьюдента — 1,58
4	С. 429, табл. 3, Гипотеза 2	Альтернативные площадки: не подтверждена, коэффициент корреляции — 27 %, эмпирический *t*-критерий Стьюдента — 0,92	Альтернативные площадки: подтверждена, коэффициент корреляции — 58 %, эмпирический *t*-критерий Стьюдента — 2,22
5	С. 429, примечание к табл. 3	*Примечания:* * для гипотез 2,3 для проверки значимости использовался теоретический *t*-критерий Стьюдента 1,77 для $n = 13$ и уровня значимости 90 %, для гипотезы 1 — для $n = 13$ и теоретического *t*-критерия 2,042 при уровне значимости 90%; ** исходные данные см. в табл. 2.	*Примечания:* * для гипотез 2,3 для проверки значимости использовался теоретический *t*-критерий Стьюдента 1,77 для $n = 13$ и уровня значимости 90 %, для гипотезы 1 — для $n = 30$ и теоретического *t*-критерия 2,042 при уровне значимости 95%; ** исходные данные см. в табл. 2.
6	С. 441, формула 9	БОj — балльная оценка биржевой площадки под номером j, n — количество критериев отбора (количественных и качественных), i — количество критериев отбора k — коэффициент значимости i-го критерия[18], b — балльная оценка i-го критерия.	БОj — балльная оценка биржевой площадки под номером j, n — количество критериев отбора (количественных и качественных), i — количество критериев отбора k_i — коэффициент значимости i-го критерия[18], b_i — балльная оценка i-го критерия.

Motovilov, O. V., Samylov, I. O., Seidova, M. Sh. (2019) Selection of a stock exchange for an IPO of a technology-based company. *St Petersburg University Journal of Economic Studies*, vol. 35, issue 3, pp. 419–447. https://doi.org/10.21638/spbu05.2019.305 (In Russian)

N	Page	Printed	Should be read
1	P. 429, table 3, hypothesis 1	Основные площадки: подтверждена, коэффициент корреляции — 74 %, эмпирический *t*-критерий Стьюдента — 2,12	Основные площадки: подтверждена, коэффициент корреляции — 74 %, эмпирический *t*-критерий Стьюдента — 7,43
2	P. 429, table 3, hypothesis 1	Альтернативные площадки: частично подтверждена, коэффициент корреляции — 38 %, эмпирический *t*-критерий Стьюдента — 7,43	Альтернативные площадки: частично подтверждена, коэффициент корреляции — 38 %, эмпирический *t*-критерий Стьюдента — 2,12
3	P. 429, table 3, hypothesis 2	Основные площадки: не подтверждена, коэффициент корреляции — 28 %, эмпирический *t*-критерий Стьюдента — 1,41	Основные площадки: не подтверждена, коэффициент корреляции — 28 %, эмпирический *t*-критерий Стьюдента — 1,58
4	P. 429, table 3, hypothesis 2	Альтернативные площадки: не подтверждена, коэффициент корреляции — 27 %, эмпирический *t*-критерий Стьюдента — 0,92	Альтернативные площадки: подтверждена, коэффициент корреляции — 58 %, эмпирический *t*-критерий Стьюдента — 2,22
5	P. 429, note to the table 3	*Примечания:* * для гипотез 2,3 для проверки значимости использовался теоретический *t*-критерий Стьюдента 1,77 для $n = 13$ и уровня значимости 90 %, для гипотезы 1 — для $n = 13$ и теоретического *t*-критерия 2,042 при уровне значимости 90%; ** исходные данные см. в табл. 2.	*Примечания:* * для гипотез 2,3 для проверки значимости использовался теоретический *t*-критерий Стьюдента 1,77 для $n = 13$ и уровня значимости 90 %, для гипотезы 11 — для $n = 30$ и теоретического *t*-критерия 2,042 при уровне значимости 95%; ** исходные данные см. в табл. 2.
6	P. 441, formula 9	БО*j* — балльная оценка биржевой площадки под номером *j*, *n* — количество критериев отбора (количественных и качественных), *i* — количество критериев отбора *k* — коэффициент значимости *i*-го критерия[18], *b* — балльная оценка *i*-го критерия.	БО*j* — балльная оценка биржевой площадки под номером *j*, *n* — количество критериев отбора (количественных и качественных), *i* — количество критериев отбора k_i — коэффициент значимости *i*-го критерия[18], b_i — балльная оценка *i*-го критерия.