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## SUBOPTIMAL INVESTMENTS AND M&A DEALS IN EMERGING CAPITAL MARKETS

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**ABSTRACT:** *This paper focuses on the efficiency of target-company investment decisions before and after Merger & Acquisition deals. We study whether M&A deals help to solve the problem of suboptimal investment after the acquisition. Using a sample of 145 target companies from BRICS countries that were acquired during the period 2004-2014, we outline those that had over- or underinvested before the deal and show that more than half the companies managed to optimize the investment level*

*after the deal. We determine the key factors that improve the inefficiency of investment decisions and demonstrate that the industry and country have an impact on the degree of suboptimal investment.*

**KEY WORDS:** *Corporate Finance, Sub-optimal Investment, Mergers and Acquisitions, M&A deals, Agency Conflict, Investment Policy, Overinvestment, Underinvestment*

**JEL CLASSIFICATION:** G34, G31

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## **1. INTRODUCTION**

One of the main components of company performance is the efficiency of corporate investment decisions. During the last 60 years economic studies have showed that corporate investment is influenced by problems of asymmetric information and agency. Agency conflicts between different groups can lead to various effects on capital budgeting decisions. In fact, conflicts between shareholders, managers, and creditors may lead to a suboptimal level of investment that negatively affects the value of the company (Jensen and Meckling 1976; Jensen 1986; Stein 2003).

Because an abnormal level of investment has a negative impact on company performance, it can lead to various problems, from value destruction to an increase in the probability of bankruptcy. Such ineffectiveness may attract potential buyers. An acquirer will try to fix existing problems and optimize the new subsidiary's operations. The study considers the effect of Merger & Acquisition (M&A) deals on suboptimal investment in acquired companies.

It is predicted that takeovers have a disciplining function and the prior investment policy can be reversed after the deal (Kaplan 1989; Servaes 1994). However, it is not always clear whether cuts in investment reflect poor investment policy or investments that enhance the value of the firm. Different techniques are used to detect suboptimal investment before and after the deal; however, the majority of studies are devoted to the analysis of developed markets, while emerging capital markets remain unstudied. According to Boston Consulting Group research (Kengelbach, Klemmer 2013), emerging capital markets are now the key drivers of the M&A market and their share in the total value of all transactions is increasing rapidly from year to year. In this paper we will focus on analysing the influence of M&A deals on decreasing the level of suboptimal investment in the BRICS countries.

Another feature of this study is that the methodology of the research includes binominal analysis, which allows us to estimate the probability of the problem occurring in target companies. We not only studied standard factors such as financial leverage and the size of the company but also observed the industrial and country-specific effects. Logistic regression allows us to assess the impact of country and industry through rating the marginal effects, in comparison to one basic element used as a benchmark.

In contrast to existing studies, we aligned two research areas, studying both suboptimal investment and M&A deals. Authors Mitchell and Lenn (1990),

Bhagat et al. (1990), and Servaes (1994) considered suboptimal investment in target companies; however, all their research referred to developed countries, whereas we investigated BRICS countries. We not only studied the level of investment in target companies before the deal (as most authors do) but also analysed whether it changed after the takeover. Crucially, we also investigated under- and overinvestment separately, identifying the key factors that influence the probability of each problem occurring.

The rest of the paper is organized as follows. Section 2 describes the existing concepts and summarizes theoretical and empirical studies on the topic. Section 3 contains the main empirical predictions and the methodology. Section 4 is devoted to data and sample description. Section 5 contains empirical results. Finally, Section 6 concludes the paper.

## **2. LITERATURE REVIEW**

### **2.1. Theoretical basis of agency-related suboptimal investment**

A company's value increase depends on an effective and profitable investment policy, which in turn depends on shareholders, managers, and debtholders. Conflicts of interest may cause inefficient managerial decisions and a suboptimal level of investment. These conflicts can lead to one of four effects: debt overhang, risk shifting, risk avoidance, and empire building. These effects are the reasons for existing underinvestment and overinvestment. Underinvestment is expressed in rejecting the projects with positive net present value (NPV), while overinvestment corresponds to the situation where there are lots of investments in different projects, sometimes even in projects with negative NPV.

Risk shifting and empire building effects cause overinvestment, while debt overhang and risk avoidance relate to underinvestment. Risk shifting is the result of conflict between shareholders and creditors, when managers invest in more risky projects on behalf of shareholders. Empire building is a conflict of interest between managers and shareholders. The former are interested in earnings and bonuses so they may invest money in acquiring new companies, as their goal is to build an empire. Underinvestment is caused by debt overhang and risk avoidance. These effects also relate to different conflicts of interest: shareholders vs. creditors and shareholders vs. managers, respectively. Based on La Rocca and Gerace (2008), a short overview of all types of effect is presented in Table 1.

Now we consider over- and underinvestment in more detail. Managerial overinvestment is a consequence of the separation of ownership and control. Overinvestment is based on the hypothesis of managers' opportunistic behaviour (Jensen and Meckling 1976). They consider the firm as tool to increase their own human capital and economic benefit (Jostarndt 2002). Their objective is to gain profits in the short-term, which is why they make inefficient decisions that can damage the shareholders in the long-term. According to the free cash flow theory (Jensen 1986), when there is a lack of profitable projects, managers tend to use the excess cash to make new investments (opportunism) instead of giving it to shareholders in the form of dividends.

Empire building is the other reason for overinvestment. It is also unprofitable for corporations because managers suppose that they are better than average and acquire more and more resources to control, instead of increasing optimally. In this case, managers will invest even in projects with negative NPV until such projects increase the value of the firm and the managers' earnings (Degryse and De Jong 2001). This type of problem depends directly on the personal qualities of the manager. Empire building more often appears at the maturity stage of the company life cycle because then the company has stable growth and access to capital markets and can provide managers with the necessary resources for empire building. Managers that are inclined to empire building usually suppose that the success of the company is directly dependent on their personal skills. They become self-confident and invest in different resources in order to increase control. This is the only type of the problem that remains unanalysed, because it is difficult to measure.

**Table 1.** Characteristics, determinants, and consequences of suboptimal investment

Type of problem	Underinvestment		Overinvestment	
Type of effect	Debt overhang	Risk avoidance	Empire building	Risk shifting
Financial leverage	High	High	Low	High
Growth potential	Low	High	Low	Low
Cash Flow	Low	Low	High	Low

Parts of the conflict	Managers and shareholders ↔ creditors; new shareholders ↔ old shareholders	Managers ↔ Shareholders	Managers ↔ Shareholders	Managers and shareholders ↔ creditors
Type of firm	Firms that rarely use debt finance and operate in sectors with good potential	Young firms with high growth potential (start-ups) and mature firms	Low share of debt finance, operating in sectors with scarce growth potential	Rarely use debt finance and operate in high-risk sectors
Articles	Jensen 1986; Jensen and Meckling 1976			
	Myers 1977 Stein 2001	Myers 1977 Berkovitch and Kim 1990	Stulz 1990 Degryse and De Jong 2001	Brito and John 2002 Jostarndt 2002

Source: La Rocca, La Rocca and Gerace, 2008

Problems with overinvestment can be solved through attracting new debt. In fact, the higher the level of debt, the lower the managerial agency resources, such as excess cash, that need to be used for paying interest (Jensen 1986). In such cases debt plays a disciplinary role, controlling the managers of the firm. Hence, cash flow and debt are connected to each other: the higher the debt level the lower the excess cash flow of the firm.

Overinvestment can also be caused by conflict between shareholders and creditors. Managers, who act in the shareholders' interests, encourage investment in projects that are riskier than those proposed before raising the debt. According to Jostarndt (2002), this phenomenon is based on the fundamental difference between debt and equity. The higher the risk, the higher the equity value, while debt value will decrease when the volatility of the firm's activities increases. The latter means that managers will approve projects that are too risky and make inefficient investment decisions.

Underinvestment may occur in two cases: when there is a conflict between shareholders and debtholders and managers act in the interest of the shareholders, and when there is a conflict between new and old shareholders and managers follow the old shareholders. This problem appears when the company has risky debt and managers adopt inefficient investment policies that benefit shareholders

(Myers 1977). This means that the shareholders with risky debt are not willing to take on the costs, which would mostly benefit the creditors. In such a case, because of the project's positive NPV, the debt's market value rises relative to its nominal value without any gains for the shareholders. The project will be approved if the net present value is not only positive but also exceeds the debt's nominal value (Berkovitch and Kim 1990).

The high level of debt can cause two sorts of problem: risk avoidance (underinvestment) and risk shifting (overinvestment). According to Brito and John (2002), growth opportunities have a great impact on the agency costs of risky debt. Risk shifting takes place in mature companies with low growth prospects and high leverage, while risk avoidance has the same characteristics except for the high growth opportunities.

Suboptimal investment significantly influences company performance. There are two types of suboptimal investment: overinvestment and underinvestment. There are four different reasons for these problems: debt overhang, risk avoidance, risk shifting, and empire building. Each is the consequence of agency conflict between either shareholders and managers or shareholders and debtholders.

## **2.2. Empirical studies of suboptimal investment before takeover**

All works on suboptimal investment before takeover can be divided into two groups. The first comprises authors who consider firms that made poor acquisitions and then were themselves taken over. According to Mitchell and Lehn (1990), if the company has poor investment activity in the M&A market it will ultimately become a target. The authors considered takeovers in developed markets and found that the stock prices of non-target companies increased by 3.5% on average when they announced acquisitions, while stock prices of future target companies decreased by 3.5%. On that basis, the authors concluded that takeover is motivated (at least partially) by the need to undo the poor investment policy of the target company. They showed that the probability of becoming a target was highest when the announced return was negative.

Bhagat et al. (Bhagat, Shleifer and Vishny, 1990) studied the influence of suboptimal investment on control premiums. Through analysing the accounting information before and after the deal, the authors identified several companies that had overinvestment problems before being absorbed and managed to solve them after the acquisition. They divided companies with overinvestment into two

groups, companies with temporary and companies with permanent problems. All firms with permanent suboptimal investment were from the oil and gas sector.

The second group consists of studies on all the company's investments (not only investments in the M&A market but also in inventories, employees, etc.). In the first group of authors the event-study method is widely used, and in the second group regression analysis is applied. Servaes (1994) studied American takeovers to investigate the industry effect on suboptimal investment. He used two methods in order to distinguish the companies with suboptimal investment: the ratio of capital expenditure to total assets in comparison with the average industry ratio and the regression model. Both approaches demonstrated that only companies from the oil and gas sector had overinvested before the deal, which may be connected with the specificity of the industry. Investments in this sector are very risky because they are strongly dependent on the quality of the geological prospecting and exploration works. Even if the exploration shows resources in the deposit, after starting production it may be found that there are no reserves. All completed expenditures will turn into sunk costs and can lead to overinvestment.

Apart from the studies considered above, we focus on the impact of M&A deals on solving the problem of suboptimal investment. We not only outline the occurrence of the problem in target companies before the deal but analyse both over- and underinvestment presence after the takeover. We study each type of suboptimal investment separately, outlining influential performance factors in over- and underinvestment.

### **3. EMPIRICAL PREDICTIONS AND METHODOLOGY**

#### **3.1. Hypotheses**

The main questions are whether suboptimal investment is the reason for being absorbed and whether the level of abnormal investment changes after the deal. To answer these questions a set of hypotheses is defined.

*H1: In BRICS countries there are more target companies with an overinvestment problem than with an underinvestment problem.*

This is connected to the fact that the reasons for underinvestment can also cause an overinvestment problem. Lyandres and Zhdanov (2005) showed that

debt is positively associated with the probability of bankruptcy. Debt makes the option to wait less valuable and forces shareholders to speed up investment. Shareholders do not want to wait for more profitable projects, and invest in those that are available, as waiting also positively correlates with the probability of bankruptcy. Thus the authors showed that the overinvestment effect dominates the underinvestment effect. As can be seen from Table 1, risk shifting and the debt overhang problem share similar characteristics. The authors found that this set of factors more frequently leads to overinvestment than underinvestment. Note that the authors conducted their study on American firms.

*H2: Large target companies are more prone to overinvest than small and medium-sized companies.*

Large firms have more opportunity to raise funds: they have easier access to short-term and long-term debt markets and special contract conditions such as lower interest rates. All of these are connected with the reputational aspect of large firms, while small and medium-sized firms face more constraints and have a narrower range of sources of additional funds. As they have less beneficial conditions, it is more profitable for such firms to fully use all internal funds before seeking external finance (Acharaya et al. 2007).

*H3: The higher/lower the level of company debt, the lower/higher the probability of overinvestment/underinvestment.*

According to D'Mello and Miranda (2009), the issue of long-term debt reduces the overinvestment problem. If a company never uses debt financing and then issues long-term debt, the degree of overinvestment decreases. This is connected with the theory that such debt plays a disciplinary role and prevents managers from investing spare resources in new projects. Instead, managers focus on paying the interest and repaying the debts. In H3 the conflict is between shareholders and managers.

*H4: Target companies with a higher level of excess cash are more/less prone to overinvestment/underinvestment.*

Excess cash is connected with company debts and H3. The first to study the influence of cash flow on suboptimal investment was Jensen (1976). Later this was shown empirically and many other authors developed the idea. According to Pawlina and Rennebog (2005), when managers have more free resources at their disposal they are eager to invest in new projects in order to increase their

bonuses. As a result, the higher the level of excess cash flow the higher the degree of overinvestment.

*H5: The level of suboptimal investment in target companies decreases after acquisition.*

If the company is absorbed due to suboptimal investment, after the deal the buyer company will normalize the level of investment made by the new subsidiary: decrease the investment in the case of overinvestment and increase it in the case of underinvestment. The new level of investment will become more optimal. This should happen as the buyer company increases the efficiency of the new subsidiary. According to Titman et al. (2004), M&A deals played a disciplinary role for the firms with a suboptimal level of investment during the study period, 1984-1989. The level of investment normalized after the acquisition.

### 3.2. Methodology

Based on the hypotheses the following methodology was developed.

*Step 1. Determine the presence of suboptimal investment in target companies.*

In the literature there are several standard methodologies and proxy variables that empirically determine the presence of the problem.

In this study the historic average level of investments for some period is used as an optimal level of investment that provides stable growth (Titman et al. 2004). As an optimal level we use a 3-year average level of investment before acquisition:

$$CI_{t-1} = \frac{Investments_{t-1}}{(Investments_{t-2} + Investments_{t-3} + Investments_{t-4})/3} - 1 \quad (1)$$

where

$CI_{t-1}$  – company's capital investment in the period  $t-1$  (taking into consideration that  $t$  is the year of the deal);

$Investments_{t, t-1, t-2, t-3}$  – company's investments in different periods of time:  $(t-1)$ ,  $(t-2)$ ,  $(t-3)$  and  $(t-4)$ .

If  $CI$  is equal to zero, then investments of the company in the considered period are equal to the average of 3 years of company investments. If the index is positive it is a signal of the probable presence of an overinvestment problem in the company.

If the index is negative the company has an underinvestment problem. The capital investment index is based on the historic trend of the company's investments.

Such an index is not perfect in determining the presence of a suboptimal investment problem. For example, if the index is positive it is not always connected with overinvestment. In reality, the economic situation in the industry or in the country can improve and, as a consequence, the investment opportunity of the company can rise. The investments in the study period would exceed the historic average level, but it would not be a signal of overinvestment. If the company has a stable investment level but at the same time low investment opportunities (lower than the industry level), this is evidence of overinvestment (Servaes 1994; Titman et al. 2004). To avoid this problem there will be an additional variable to determine the presence of a suboptimal investment problem. For proper analysis the proxy variable of a company's investment opportunities will be compared to the average industry level. It was decided to choose Market-to-Book ratio ( $M/B$ ) as a proxy for investment opportunities and growth potential. Low investment opportunities and a high coefficient of capital investments before the deal indicate the existence of an overinvestment problem, and vice versa:

$$Overinvestment_i = \begin{cases} 1, & \text{if } CI_i > 0 \text{ and } M/B_{company} < M/B_{industry} \\ 0, & \text{in other cases} \end{cases} \quad (2)$$

If the  $CI$  is lower than zero, then, according to the theory of La Rocca and Gerace (2008) it is important to take into account that different investment opportunities correspond to different effects of underinvestment:

$$Underinvestment_i = \begin{cases} 1, & \text{if } CI_i < 0 \text{ and } M/B_{company} < M/B_{industry} \text{ (debt overhang)} \\ 1, & \text{if } CI_i < 0 \text{ and } M/B_{company} > M/B_{industry} \text{ (risk avoidance)} \\ 0, & \text{all other cases} \end{cases} \quad (3)$$

Taking into account historical average investments along with the present company's investment opportunities will allow the determination of the presence of the problem in the studied target companies. The first hypothesis will be tested using this procedure.

*Step 2. Identify the significant factors in the target companies and their influence on the level of suboptimal investment.*

A binominal model will be tested in the second step of the study. We use a logit model to assess the probability of a suboptimal investment problem, as was used

by Kim and Arbel (1998), Lehto and Lehtoranta (2004), and Owen and Yawson (2010) to investigate M&A deals. A probit model was used to check the robustness of the results and its marginal effects appeared to be the same. The instrumental variable for the probit model showed that there is no endogeneity problem in the data.

The existence of under- or overinvestment will be taken as a dependent variable, with 1 indicating the presence of the problem and 0 the optimal investment level. Thus two models will be constructed for the two types of suboptimal investment. The general equation will be as follows:

$$P_{i,t} = F(Z_{i,t}) = \frac{1}{1 + e^{-Z_i}} \quad (4)$$

$$Z_i = \frac{\text{over}}{\text{under}} \text{investment}_i = \alpha_0 + \alpha_1 \text{Size}_i + \alpha_2 \frac{\text{LT \& ST Debt}}{\text{Total Assets}_i} + \alpha_3 \text{ECF}_i + \alpha_4 \text{Industry}_i + \alpha_5 \text{Country}_i + \alpha_i X_i \quad (5)$$

where

$\frac{\text{over}}{\text{under}} \text{investment}_i$  – binary variable indicating the presence of overinvestment or underinvestment depending on the type of model in  $i$  target company;

$\text{Size}_i$  – variable indicating the size of the  $i$  target company, calculated as the natural logarithm of the total assets of the target company;

$\frac{\text{LT \& ST Debt}}{\text{Total Assets}_i}$  – total debt of the  $i$  target company (the sum of both short-term and long-term debt);

$\text{ECF}_i$  - excess cash flow of the  $i$  target company;

$\text{Industry}_i$  – sector of the  $i$  target economy in which the company operates;

$\text{Country}_i$  – the country of the  $i$  target company;

$X_i$  – optional factors, which will be included after the analyses of the correlation matrix.

It is important to note that all independent variables are performed for one company for the year before the deal. To analyse the impact of the studied factors on the probability of the existence of abnormal investment, a marginal effects calculation should be carried out. This indicates the marginal impact of independent variables on the expected value of the dependent variable.

The calculated coefficient will indicate the extent to which the probability of suboptimal investment will increase or decrease when the study factor changes by one unit. The second, third, and fourth hypotheses will be tested in this step.

*Step 3. Analyse the change in the level of investments after the deal.*

The fifth hypothesis will be tested in the last step of the study. According to the theory, if the suboptimal investment problem was around before the takeover it should lean to the optimal level after the takeover. If it does, then the takeover solved the problem: moreover, it is possible that the existence of the problem was the reason for the takeover.

To test the fifth hypothesis only companies with investment problems will be left in the sample. In this step there will be used the capital investments and the investment opportunity indicators of target company after the deal.

$$CI_{t+1} = \frac{Investments_{t+1}}{(Investments_{t-1} + Investments_{t-2} + Investments_{t-3})/3} - 1 \quad (6)$$

where

$CI_{t+1}$  – the indicator of capital investments after the takeover,

$Investments_{t+1}$  – company's investments in the first year after the takeover,

$Investments_{t-1, t-2, t-3}$  – target company's investments in the year prior to takeover, two years before takeover and three years before takeover.

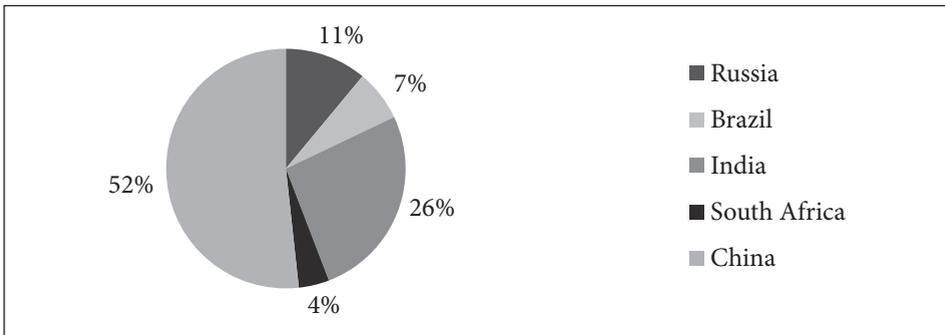
The companies that were taken over in 2014 will be excluded from the sample because there is no information on their performance in the year following the deal. Based on the industry average level of M/B, a conclusion as to whether the problem was solved or not will be made.

#### **4. DATA AND SAMPLE DESCRIPTION**

The sample consists of non-financial target companies that were taken over in the period 2004-2014. The interconnection between M&A deals and under- and overinvestment is studied on the basis of target companies from the BRICS countries: Brazil, Russia, India, China, and South Africa. Only completed deals were taken into account. Crucially, only acquirement or sale of the control stake or assets of strategic importance were considered. The study includes only target

companies that were taken over by BRICS companies and continued to be a separate legal entity after the takeover. Takeovers conducted by two or more acquirers were also excluded from the sample.

**Figure 1.** The distribution of target companies by country



**Source:** Authors' calculation

The final sample consists of 145 public target companies from the Bloomberg database. Descriptive analyses of the final sample are presented in Tables 2 and 3 and Charts 1 and 2. The country distribution of the target companies is as follows: 75 companies from China, 6 from South Africa, 16 from Russia, 10 from Brazil, and 38 companies from India.

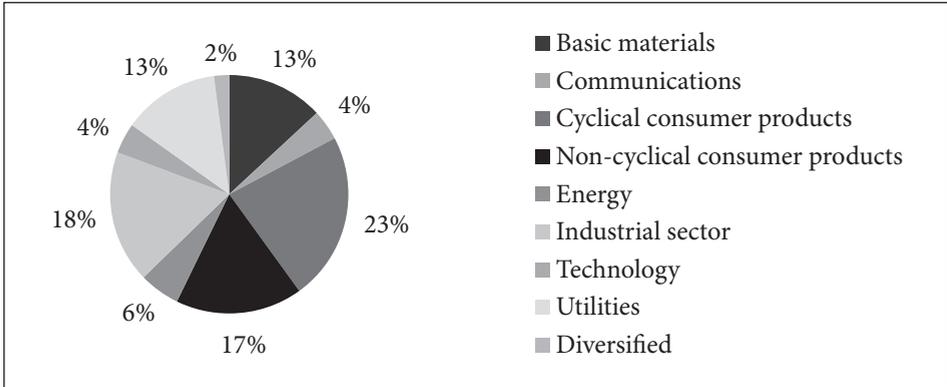
**Table 2.** Target companies' distribution over the studied period

Year	Number of target companies	Year	Number of target companies	Year	Number of target companies
2014	9	2010	17	2006	18
2013	7	2009	18	2005	22
2012	8	2008	19	2004	1
2011	9	2007	17	Total	145

**Source:** Authors' calculation

The results of sector distribution show that the majority of M&A deals were carried out in cyclical and non-cyclical consumer goods (35 and 25 target companies respectively) and the industrial sector (26 companies). The communications, technological, and energy sectors appeared to show the lowest rates of takeover during the considered period.

**Figure 2.** Distribution of target companies by industry



**Source:** Authors' calculation

In the next table we present summary statistics of the explanatory variables that are used in the paper.

**Table 3.** Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Sales to Total Assets	145	0.853	0.718	0	4.04
Cash Flow	145	8.225	7.364	0	67.99
M/B ratio	145	5.199	11.315	0.063	92.45
LT&ST Debt to Total Assets	145	12.054	14.457	0	58.79
Retained Earnings to Total Assets	145	1.881	0.309	0	2.57
Capital Expenditure	145	3.717	0.502	-0.01	3.88
Excess Cash Flow	145	1.806	1.075	0	13.57
Ln (Total Assets)	145	6.525	1.974	-0.399	13.55

**Source:** Authors' calculation

## 5. EMPIRICAL RESULTS

### 5.1. The presence of the problem in target companies

In the first step we figure out the companies with underinvestment and overinvestment. 74 out of the 145 studied companies were determined to have a suboptimal investment problem. Table 3 demonstrates the distribution of this problem across the studied countries.

Underinvestment can be caused by two problems: debt overhang and risk avoidance. A low level of investment opportunity corresponds to the debt overhang effect, whereas a high level of investment opportunity represents risk avoidance. It was found that 19 companies had underinvestment due to the effect of debt overhang and 29 due to risk avoidance.

**Table 4.** Target companies' distribution according to investment level

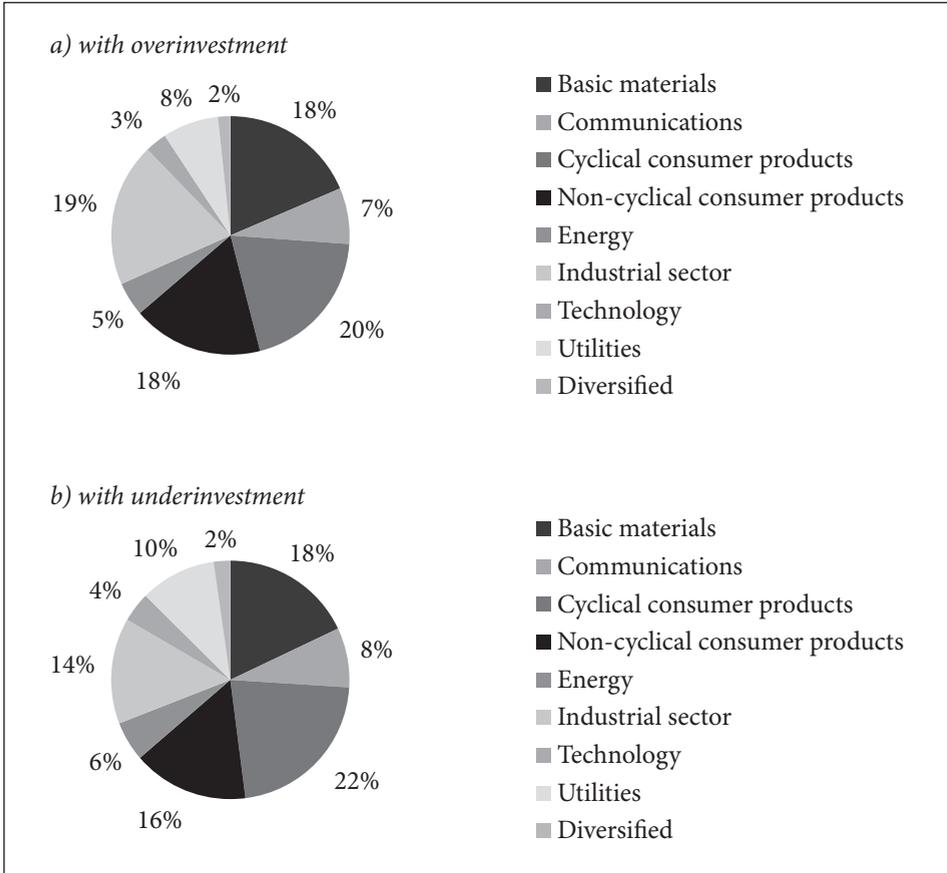
Investment level	Brazil	Russia	India	South Africa	China	Total
Overinvestment	3	4	14	4	1	26
Underinvestment	2	9	16	2	19	48

**Source:** Authors' calculation

The number of companies with underinvestment exceeds the corresponding number of companies with the reverse problem. Overinvestment was only found in 35% of companies that faced the problem of suboptimal investment. It can be assumed that the first hypothesis is rejected, because there were more underinvesting companies taken over (48 acquisitions) than overinvesting companies (26 acquisitions). In the cross-country analyses this hypothesis will be rejected in Russia, China, and India.

The distribution of target companies across sectors is presented in Charts 3 and 4.

**Figure 3.** Cross-industry distribution of target companies



Source: Authors' calculation

## 5.2. Key factors analysis

In this stage the logit regression will be tested. The correlation matrix, presented in Table 5, will determine which factors cannot be used in the model simultaneously.

The following model was formed according to the correlation matrix figures:

$$P_{i,t} = F(Z_{i,t}) = \frac{1}{1 + e^{-Z_i}}$$

$$Z_i = \frac{\text{over}}{\text{under}} \text{investment}_i = \alpha_0 + \alpha_1 \text{Size}_i + \alpha_2 \frac{\text{LT \& ST Debt}}{\text{Total Assets}_i} + \alpha_3 \text{ECF}_i + \alpha_4 \frac{M}{B}_i + \alpha_5 \text{Industry}_i + \alpha_6 \text{Country}_i \quad (7)$$

Where

$\frac{\text{over}}{\text{under}} \text{investment}_i$  – binary variable, which indicates the presence of the overinvestment or underinvestment problem depending on the type of the model in the  $i$  target company;

$\text{Size}_i$  – The variable that indicates the size of the  $i$  company, calculated as the natural logarithm of total assets;

$\frac{\text{LT \& ST Debt}}{\text{Total Assets}_i}$  – total-debt-to-total-assets ratio of  $i$  target company;

$\text{ECF}_i$  – excess cash flow of  $i$  target company;

$\text{Industry}_i$  – the sector of economy where the  $i$  company operates;

$\text{Country}_i$  – the country of the  $i$  target company;

$\frac{M}{B}_i$  – the ratio of the market share price to the book value per share (Market-to-Book ratio) calculated by Bloomberg for  $i$  target company;

The remaining indices (Market Value of Equity, Revenue, Capital Expenditures, Cash Flow) will be estimated after the analysis of the extended regression model (1).

**Table 5.** Correlation matrix

	Revenue	Market Value of Equity	Sales to Total Assets	Cash Flow	Market to Book ratio	LT&ST Debt/TA	Retained Earnings	CAPEX	Excess Cash Flow	Ln (Total Assets)
Revenue	1									
MV of Equity	0.847	1								
Sales to TA	0.029	-0.186	1							
Cash Flow	0.833	0.844	-0.164	1						
M/B ratio	-0.082	-0.060	-0.057	-0.103	1					
LT&ST Debt/TA	0.136	0.137	-0.320	0.257	-0.146	1				
Retained Earnings	0.666	0.810	-0.160	0.755	-0.096	0.022	1			
CAPEX	-0.697	-0.721	0.155	-0.806	0.084	-0.277	-0.632	1		
ECF	0.791	0.796	-0.097	-0.777	-0.057	0.129	0.659	-0.435	1	
Ln (Total Assets)	0.584	0.563	-0.166	0.553	0.093	0.296	0.466	-0.530	0.337	1

Source: Authors' calculation

**Table 6.** Regression results

Studied factor	Overinvestment				Underinvestment			
	Coef.	Std.Err.	Z	Marginal effect	Coef.	Std.Err.	Z	Marginal effect
Size	0.3229	0.1884	1.71	3.94%*	-0.2733	0.1094	-2.50	- 6.015%**
LT&ST Debt/TA	-0.0238	0.0219	1.09	- 0.015%	0.0137	0.0029	1.04	0.302%**
ECF	-0.002	0.0004	-0.71	- 0.0000%	0.001	0.0004	2.20	0.021%*
M/B ratio	-0.934	0.3168	-1.29	- 0.6%***	-0.003	0.0205	-0.15	- 0.068%*
Intercept	-0.2424	1.5993	-0.15	-	0.6247	0.6835	0.91	-
Pseudo R <sup>2</sup>			0.3599		Pseudo R <sup>2</sup>			0.2187

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

The obtained results allow us to accept the second hypothesis. It was expected that the probability of overinvestment would be greater for large companies as they have access to additional financing. The bigger the company, the higher the level of overinvestment. When total assets increase by one percentage point the probability of overinvestment increases by 4%, but the probability of underinvestment drops by 6% as a reaction to the same change. This result appears because large companies have to use control separation, which leads to agent conflict and provides the sources with additional capital, which in turn becomes an incentive for opportunistic behavior. This ultimately leads to overinvestment. This allows us to accept the second hypothesis.

**Table 7.** Results of testing the 2nd hypothesis (Size of a company)

	Coefficient	Standard deviation	Z	Marginal effects	Pseudo R <sup>2</sup>	Log Likelihood
Overinvestment	0.3229	0.1884	1.71	3.94%*	0.3599	-32.8458
Underinvestment	-0.2733	0.1094	-2.50	- 6.02%**	0.2187	-69.9934

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

It was assumed that debt has a disciplinary impact on managers and thus they are less likely to deviate. So the level of overinvestment should decrease with the rise of debt. The results are presented in Table 8.

**Table 8.** Results of testing the 3<sup>rd</sup> hypothesis (Total debt)

	Coefficient	Standard deviation	Z	Marginal effects	Pseudo R <sup>2</sup>	Log Likelihood
Overinvestment	- 0.0238	0.0219	1.09	- 0.015%	0.3599	-32.8458
Underinvestment	0.0137	0.0029	1.04	0.302%**	0.2187	-69.9934

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

This model analyses a company's total debt and studies its disciplinary effect on managers. The results correspond to the expected effect and theory described above. When the level of debt financing increases, the probability of underinvestment increases and the probability of overinvestment decreases. The speed of growth of the underinvestment probability is higher than the decline of the overinvestment probability. The marginal effect is modest. In the model there was a debt-to-total-assets ratio in order to make the comparison between the companies in the sample. If the company's debt ratio increases by 1 point, it is expected that the underinvestment probability will grow by 0.3% and the overinvestment probability will drop by 0.015%. The hypothesis of debt's disciplinary role is accepted. Based on this we can say that there is a debt overhang effect. In accordance with the characteristics of the different effects by La Rocca and Gerace (see Table 1), debt plays a disciplinary role only in one case out of four: empire building. The higher the level of debt financing, the higher the effect of debt overhang.

Testing the fourth hypothesis showed that the higher the level of excess cash flow in the company, the lower the probability of overinvestment and the higher the probability of underinvestment.

**Table 9.** Results of testing the 4<sup>th</sup> hypothesis (Excess Cash Flow)

	Coefficient	Standard deviation	Z	Marginal effects	Pseudo R <sup>2</sup>	Log Likelihood
Overinvestment	-0.002	0.0004	-0.71	-0.0000%	0.3599	-32.8458
Underinvestment	0.001	0.0004	2.20	0.021%*	0.2187	-69.9934

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

This result may be connected to the fact that in the studied target companies the level of financial leverage was high. We can assume that the excess cash in these companies is not related to managers' opportunistic behaviour but creates the

flow of sources that are used for paying the interest. The fourth hypothesis was rejected.

As an additional factor we investigated the influence of growth opportunities on the suboptimal investment problem. In each case we can see that the higher the growth opportunities the lower the probability of the problem occurring.

To understand the impact of suboptimal investment on target companies in more detail we carry out cross-country and cross-industry analysis. This was done to test whether or not country and industry contribute to suboptimal investment. There are missing values in the table, because in these industries there were no target companies with the studied problem.

**Table 10.** Cross-industry analysis

Studied factor	Overinvestment			Underinvestment		
	Coef.	Z	Marginal effect	Coef.	Z	Marginal effect
Communications	0.0337	0.03	0.242%	0.1719	0.15	- 19.668%
Cyclical consumer products	-0.1670	-0.12	- 0.081%	-0.4098	-0.48	- 12.858%
Non-cyclical consumer products	0.2306	0.19	0.468%	-0.2991	-0.33	- 12.431%
Energy	1.1834	0.84	1.069%*	-1.4573	-1.47	- 27.581%*
Industrial sector	0.8815	0.86	0.775%	-0.5706	-0.75	- 15.525%
Technology	4.8565	3.74	2.349%**	-	-	-
Utilities	-1.7438	-1.00	- 0.347%	0.7888	0.98	10.465%
Diversified	-	-	-	0.6985	0.57	- 0.030%

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

As it is a logit model, the regression can only help us to range the industries according to one basic sector. According to Stata default parameters the industry that is labelled first is chosen as the basic one. In this case, the basic materials sector was chosen. The grades were detected through marginal effects.

- According to the results, the technology sector has the highest level of overinvestment. This coefficient is higher than the basic sector by c. 2.5%.
- The energy sector is in second place. The probability of overinvestment here is higher than in the basic industry by 1%.

- Communications, non-cyclical consumer products, and the industrial sector are more or less equal. The probability of overinvestment is higher than in the basic materials sector but the coefficients are not very big.
- The lowest level of overinvestment was detected in utilities and cyclic consumer products.

This analysis outlined the sectors with the highest probability of overinvestment, the technology and energy sectors. We now consider the results concerning underinvestment in the same manner.

- The highest level of underinvestment was detected in the utilities sector. In this sector the probability of overinvestment is the lowest and the probability of underinvestment in the highest.
- Cyclical and non-cyclical consumer products and the industrial sector are approximately on the same level relative to basic materials.
- In the communications sector the probability of underinvestment is about 20% lower than in the basic materials sector.
- The lowest probability of underinvestment was detected in the energy sector. This sector has the lowest underinvestment probability and the highest overinvestment probability.

The country effect was studied in the same way as the industry effect. China was chosen as the basic country.

**Table 11.** Cross-country analysis

Country	Overinvestment			Underinvestment		
	Coef.	Z	Marginal effect	Coef.	Z	Marginal effect
Brazil	2.1144	1.43	3.174%**	-0.5099	-0.68	- 6.421%
India	2.8564	1.88	6.346%***	0.3984	0.60	24.218%**
Russia	1.0156	0.64	3.101%**	1.4009	2.00	34.236%**
South Africa	2.8185	1.59	4.283%***	0.5119	0.48	11.143%

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

The results show that the probability of overinvestment in all the studied countries is higher than in China. With underinvestment the situation is different. Apart from Brazil, the probability of underinvestment in the studied countries is higher than in China. It is possible to range the countries based on the coefficients in Table 11.

- The lowest probability of underinvestment is detected in Brazilian target companies.
- The third place goes to South Africa, where the probability of underinvestment is 11% higher than in China.
- The greatest probability of underinvestment was detected in Indian and Russian target companies. The probabilities are 24% and 34% greater, respectively, than in China.

In overinvestment-case countries, marginal effects are very close to each other:

- The highest probability of overinvestment was detected in Indian target companies.
- In South Africa the probability is 4% higher than in China.
- Russia and Brazil are approximately on the same level, where the probability of overinvestment is c. 3% higher than in China.

Now we return to the factors that were not included in the analysis due to their strong correlation, or were not considered earlier. None of them showed significant results during the underinvestment analysis. However, during the overinvestment study practically all the coefficients were significant.

**Table 12.** Analysis of supplementary factors

Studied factor	Overinvestment				Underinvestment			
	Coef.	Std.Err.	Z	Marg. effect	Coef.	Std.Err.	Z	Marg. effect
Capital Expenditure	-0.0025	0.0013	-1.95	0.01377%**	-0.0001	0.0006	-0.18	-0.00258%
Cash Flow	-0.0034	0.0014	-2.49	-0.1282%*	0.0752	0.0875	0.86	1.8748%
Retained Earnings	0.0012	0.0005	2.58	0.0674%***	-0.0002	0.0002	-0.92	-0.00453%
Revenue	0.0000	0.0001	0.00	0.00000%	-0.0001	0.0001	-0.90	-0.00135%
Market Value of Equity	-0.0017	0.0006	-2.88	-0.094%***	0.0002	0.0001	1.49	0.00375%

**Note:** \*\*\* significant at 1% level, \*\* significant at 5% level, \* significant at 10% level

**Source:** Authors' calculation

The capital expenditure results correspond to the theory. The higher the level of capital expenditure, the higher the probability of overinvestment. The higher the level of capital expenditure the closer the company gets not only to the optimal

level of investment but also to overinvestment. Thus, when the capital expenditure index increases by one unit, the probability of overinvestment goes up by 0.013%.

The influence of cash flow also corresponds to the theory. According to La Rocca and Gerace (2008), an overinvestment problem (that appeared due to risk shifting) is characterized by low cash-flow level. The higher the company's cash flow, the lower the probability of overinvestment. The effect of empire building is characterized by a high level of cash flow. We can assume that among the studied target companies the risk-shifting effect dominates the empire-building effect. So, with the growth of the company's cash flow, the probability of overinvestment decreases by 0.13%.

Retained earnings are an additional source of money fuelling managers' opportunistic behavior. According to the theory, the higher the level of retained earnings the higher the probability of opportunistic behavior, and consequently the higher the probability of overinvestment. The results show that if retained earnings increase by one unit, the probability of overinvestment grows by 0.07%.

The last factor here is the market value of equity. When the market value of equity grows, the probability of overinvestment decreases. Both under- and overinvestment negatively influence the market value of the company and if the company is operating as a well-oiled machine it is a signal that there are no problems with the investment policy. When investment decisions do not contradict financial decisions there are no incentives that can lead to suboptimal investment.

### **5.3. Change in investment level after the deal**

The initial sample consists of 145 target companies. But because for our third stage we need to take into account investments in the period after the acquisition we had to get rid of deals done in 2014, as the data for 2015 is not yet available. This reduced the sample from 145 to 125 companies. We then concentrate on target companies with suboptimal investment problems. Thus the final sample contains 58 target companies, 36 with underinvestment and 22 with overinvestment. The methodology is the same as in the first stage of the study. The capital investment index is calculated for each company in the sample. The Market-to-Book ratio is compared with the average industry indicator in order to assess the acquired company's new investment opportunities.

**Table 13.** Change in investment level after the deal

Type of problem	Before the deal	Got rid of suboptimal investment	%	Change for the worse	Without changes
Overinvestment	22	13	59%	0	9
Underinvestment	36	19	53%	6	11
Total	58	32	55%		20

**Source:** Authors' calculation

The results are presented in Table 13. Fifty-five percent of all target companies that have a suboptimal investment problem improve the situation. The problem was solved in 32 out of 55 of the acquired companies. More companies with underinvestment got rid of the problem after the deal. To sum up, the deals helped companies to solve ineffective investment policy problems. There are 6 companies that had an underinvestment problem before the deal where the calculations showed the presence of an overinvestment problem after acquisition.

Thus the fifth hypothesis is accepted. M&A deals positively influence the suboptimal investment problem and lead to the solution of the problem. This can be evidence that suboptimal investment prior to the deal contributed a lot to the acquisition and the new owner was aware of the problem. In this context the new management was eager to solve this problem as soon as possible.

## 6. CONCLUSION

Investment policy is one of the pivotal issues of a company's governance. The wrong investment decision can lead to dramatic consequences, from value destruction to threat of bankruptcy and thus hostile acquisition. Previous studies have revealed that suboptimal investment is caused by asymmetric information and agency conflict. While substantial research has investigated suboptimal investment in developed markets, our research focuses on emerging capital markets, particularly the BRICS countries. Previous research has contributed greatly to the question of suboptimal investment; however, this phenomenon is practically unstudied in connection with M&A deals. We contribute to the existing studies by analysing:

- 1) suboptimal investment in the context of M&A deals in emerging capital markets,

- 2) the level of investments after takeover in order to determine the deal's role in finding the solution to the problem,
- 3) over- and underinvestment problems separately,
- 4) the influence of key factors on the probability of suboptimal investment problems in target companies.

We find evidence that industry and country have a significant influence on the degree of suboptimal investment. Our analysis allows us to determine that the technology and energy sectors have the highest probability of overinvestment, while underinvestment probability is highest in the utilities sector. We have shown that the degree of suboptimal investment differs across countries. The highest probability of overinvestment was detected in Indian companies, followed by South Africa. Russia and India have the highest probability of underinvestment, while investments in Brazilian companies appeared to be the most optimal.

Our analysis revealed that most companies in our study solved the problem of suboptimal investment. Based on our results, it was determined that suboptimal investment can be a reason for becoming a target. M&A deals help to solve the problem of suboptimal investment in acquired companies. Our tested hypotheses show that M&A deals increase the efficiency of capital markets.

These findings should be helpful to top management when making corporate decisions and approving deals. As suboptimal investment can lead to absorption, M&A deals can result in increasing in a company's market value.

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