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INFLUENCE OF STOCK MARKET DYNAMICS ON EFFICIENCY
OF M&A TRANSACTIONS

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Abstract

With the intensified globalization processes, international mergers and acquisitions (M&A) began to attract economists. Scientists see in M&A transactions one of the features of the market economy: competition in this market ensures that companies are transferred to the hands of the management team, which, in turn, implements a more effective development strategy. Do not forget that the process of mergers and acquisitions also strengthens the competitive position of the expanding company. If we analyze the activity of M&A transactions over a sufficiently long period of time, we can see that the corporate control market is developing in waves, that is, in some periods of time there is a greater number of transactions, and in others - less. This circumstance forces us to look differently at the problem of factors affecting the efficiency of M&A transactions. The purpose of the study is to determine how the stock market dynamics affects the efficiency of M&A transactions. The study provides a retrospective analysis of M&A transactions, identifies factors affecting their efficiency, and estimates the degree of influence of the stock market dynamics on the efficiency of transactions. The stock market dynamics was examined from three sides: the degree of overvaluation and the magnitude of volatility, the rise / fall of the market. In addition to the factors characterizing the stock market dynamics, such parameters as: P / BV multiplier, ROA ratio, company size were studied. Special attention is paid to the specifics of mergers and acquisitions in developed and developing countries.

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1. Introduction

In recent years, mergers and acquisitions have been very popular in the world since they allow companies to diversify risks, ensure access to new markets and increase assets in a fast, low-risk way. The main motive of the M&A transaction is synergy, the interaction of two or more factors that together produce a greater effect than the sum of their independent components. In business combinations, this is the potential additional value that can be created from mergers and acquisitions. This additional value is created from the benefits that arise, which, in turn, are associated with the possibility of reducing the costs or risk of the combined company or increasing its revenue.

A large body of research is devoted to evaluating the efficiency of mergers and acquisitions (Brooks et al., 2018; Yuan et al., 2020). But, unfortunately, there is no consensus among the scientific and business community that mergers and acquisitions always positively influence the development of the company. This is explained by the fact that the efficiency of the transaction depends on many factors, one of the most significant is the stock market dynamics.

2. Problem Statement

The analysis of works devoted to the assessed efficiency of M&A transactions in developed and developing countries showed that interest in this issue is growing from year to year. There is no definite answer which factors that influence efficiency are the key ones, giving positive excess returns. The fact that the efficiency of M&A deals in emerging capital markets is higher than in developed ones is also controversial. The reason for discrepancies in the studies of this problem is very commonplace and is easily explained from the point of view of mathematical science. The authors conduct the analysis with a different number of companies in the sample, different events, time periods and other determinants, which does not allow scientists to come to uniform results; on the contrary, the number of works with completely opposite conclusions is growing. The debatable nature of the problem of the efficiency of M&A transactions makes the search for its solution especially relevant in modern conditions, makes it necessary to analyze factors affecting the efficiency of mergers and acquisitions with special attention. Developed and emerging capital markets differ greatly in terms of volatility of financial assets traded in them. Therefore, stock market dynamics can be considered as one of the most significant parameters that can enhance or weaken the efficiency of the M&A transaction (Maung et al., 2019).

3. Research Questions

The solution to the above problem presupposes conducting a well-structured research with clearly posed research questions at each stage. First, it is required to study the economic nature and topologize M&A transactions. The determination of the main motives for carrying out these transactions and the analysis of organizational and economic mechanisms of mergers and acquisitions should be carried out considering the national specifics of the regulatory framework governing this market segment (Ohrn & Seegert, 2019; Wang et al., 2021). Special attention should be paid to the study of methods for measuring the efficiency of M&A transactions. Secondly, there is a need for a detailed overview of the global M&A market at the present stage. The specifics of transactions in developed countries should be considered, and

the specifics of the market for mergers and acquisitions in developing countries should also be identified. The practical part of the study involves the formation of a sample of Russian mergers and acquisitions, checking for factor correlation, heteroscedasticity and multicollinearity. It provides for the construction of the econometric model to assess the impact of the stock market dynamics on the efficiency of M&A transactions.

4. Purpose of the Study

The purpose of the study is to determine how the stock market dynamics affects the efficiency of M&A transactions. The achievement of this goal presupposes the following object and subject of research. The object of the research is the mechanism of conducting mergers and acquisitions. While the subject of work is to assess the degree of influence of the stock market dynamics on the efficiency of M&A transactions at the time of the transaction. The coverage of information and theoretical material on this issue should not be ignored either. The theoretical basis of the research was made by regulatory legal acts, as well as research by Russian and foreign scientists. The information base of the study is presented by the IMAA data, as well as information from official websites of companies that carried out M&A transactions (IMAA, 2020).

5. Research Methods

The study of the efficiency of mergers and acquisitions has remained a hot topic in the works of economists in many countries. There is a huge body of empirical research (and it grows every year) that studies the efficiency of mergers and acquisitions, that is, examines whether mergers and acquisitions lead to the creation of value for shareholders (Bonaime et al., 2018; Li & Yang, 2020). To answer the question about the efficiency of mergers and acquisitions, researchers mainly use the following methods:

- economic profit studies;
- accounting studies;
- event studies.

The idea behind accounting studies is very simple. This method is based on comparing financial indicators of companies for a certain period before and after the completion of the transaction. That is, this method allows you to determine the operational efficiency of M&A transactions in the long term. As a rule, researchers analyze 2 years or more before and after the completion of the transaction. The main sources of information in this case are not the stock market, as in the case of event studies, but financial statements of companies. The most frequently used indicators within the framework of this method are the return on equity (ROE), return on assets (ROA), the ratio of EBITDA to revenue, and others. These indicators have one significant drawback - the indicators ignore the increase in value. That is, they do not consider the company's capital costs and risks. Therefore, many researchers use such an indicator as economic profit (EP - economic profit). In the framework of economic profit studies, researchers study how economic profit of a company changes in several years before and after the completion of a merger and acquisition transaction.

The basis of the method is the signal concept, according to which the arrival of new relevant information on the company on the market is a signal for the investor and affects the profitability of the

company's shares. In mergers and acquisitions, the announcement of the upcoming M&A deal is a signal to the investor and affects the company's stock performance. That is, within the framework of this method, the change in profitability of the company's shares is studied, that is, the reaction of the stock market to the announcement of a merger and acquisition transaction is studied. Most often, the change in profitability is studied over a short-term time horizon - from several days to several months. Researchers are studying what is known as Cumulative Abnormal Return (CAR), which is the cumulative difference between the returns we see in the market and the returns that would have been if the trade were not announced. To use event studies, it is necessary to define the evaluation period and the event window. To estimate or predict profitability that would be if there were no announcement of the deal, there are many different models: constant mean return model, CAPM, multifactor model. CAPM is based on a one-factor portfolio model of stock returns.

Event studies are implemented in several steps:

- definition of the event, i.e. the date of the announcement of mergers and acquisitions;
- selection of the period (event window) during which the stock prices will be monitored;
- calculation of the actual profitability of each day in the event window.

The CAR calculation is the last step in event studies. If the cumulative excess return yields a positive result, then the transaction is efficient, that is, it creates value. And if the result is negative, the deal is unprofitable and ineffective. In this work, the event window is [-20; +20] days, where 0 is the date the deal was announced, and the estimated period is 150 days before the start of the event window.

6. Findings

If we analyze a sufficiently long period of time, we will notice that the corporate control market is developing in waves. In some periods of time, we observe a greater number of transactions, and in others - less. Since 1897, 7 waves of mergers and acquisitions can be distinguished on the US market. The American market is the most active and has the longest history. M&A transactions play a huge role in the history of the United States, because the structure of American business was transformed due to them, small and medium-sized companies were transformed into transnational corporations (Ahmad, & Lambert, 2019). The last wave began in 2012 and is ongoing. Each wave has its own features, but they all have one common feature - they all ended in a stock market crash.

The largest industry in terms of M&A costs in the United States is healthcare. This sector accounts for 14.2% of all transactions with a total value of more than \$ 3292 billion, which were carried out in the period 2000-2019. The industry with the largest number of transactions is IT. It accounts for almost a fifth (19.9%). In 2019, 1289 M&A transactions were registered in the enterprise software market, compared to 1241 and 1050 a year and two years earlier, respectively. The outbreak of the coronavirus, the oil price war and the stock market crash have all affected the M&A market. In the first quarter of 2020, the US M&A market reached \$ 307.1 billion in volume and 2761 transactions, which represents a significant 50.2% drop over the same period in 2019 (IMAA, 2020).

In developing countries such as the BRICS, the value of mergers and acquisitions reached \$ 567 billion in 2019, which is 22.6% less than in 2018. China is the leader in terms of the number of completed transactions (about 75% by the BRICS group of countries). In second place is India (approximately 15%

of transactions). The third place is occupied by Russia, and it accounts for 8% of completed transactions. As for economic sectors in which mergers and acquisitions are most often carried out, these are construction (15% of all transactions), finance and industry, which account for 14% of all completed transactions (IMAA, 2020).

Speaking about the M&A market in Russia, it can be noted that it grew significantly in 2019. In total, since 1992, 422 M&A transactions with the participation of Russian companies have been recorded, which is 26% more than in 2018. However, this indicator is still quite low and does not even reach the level of 2017. The total value of transactions also increased significantly and amounted to \$ 55.71 billion in 2019, exceeding the same indicator by 31.8% on 2018. The most ambitious deal of 2019 on the Russian M&A market was the May merger of two oil and gas companies - Wintershall, owned by the German concern BASF, and Dea Deutsche Erdoel of Russian businessman Mikhail Fridman for \$ 7.18 billion. Sberbank of Russia sold its subsidiary bank in Turkey, Denizbank, to Emirates NBD for \$ 5 billion in June. The third largest deal was the acquisition of 99% in MagicLab by the American investment fund Blackstone, which owns one of the largest dating services Badoo, for \$ 3 billion and it was completed in November 2019 (KPMG, 2020).

The fuel and energy complex became the leader in the volume of M&A transactions among industries in 2019. The number of transactions in the industry grew by 53.9% compared to 2018, to 20 transactions. The second place in the rating of industries was taken by financial institutions with 15 transactions for 7.9 billion dollars (14.2% of the market volume). The third place was taken by information technology (IT), where the volume of transactions amounted to 6.74 billion dollars (12.1% of the market), having increased by 83.7% over the year. At the same time, their number increased by 46.2% year-on-year to 38 transactions (KPMG, 2020).

In general, at the end of 2019, a decrease in the overall level of M&A activity was noted in the extraction of minerals (except for fuel), the food industry, agriculture, trade, media and insurance. The growth was shown by metallurgy, mechanical engineering, sports, as well as the electric power industry. Thus, the history of the formation of the Russian market for M&A transactions has a certain specificity, which is associated with the emergence of the market and processes of transformation in the economy. Over a relatively short period of its existence, the Russian M&A market has developed to high values for developing countries.

To form the econometric model, it is necessary to understand what factors influence the efficiency of M&A transactions. There is no definite answer about specific determinants that affect the efficiency. The factors that are often found in the literature are the following:

1. Overvalued / undervalued stock market.
2. Stock market volatility (high, low).
3. Market growth / decline.
4. Return on assets (ROA).
5. P / BV multiplier.
6. Company size.

The stock market dynamics must be considered from two sides: the degree of market overvaluation, the magnitude of volatility (Song et al., 2021). To understand the state of the stock market in a month, you

need to compare the P / E multiplier with threshold values for all the months under consideration. So, if the multiplier refers to the 30 percent of P / E multipliers for which the values are minimum, then in this case the market is defined as undervalued. If the situation is the opposite, when the indicator is included in the 30% of multipliers having the highest value, then there is overestimation. Accordingly, in the remaining situations, the months of multipliers that do not fall within these intervals are considered neutral.

Considering the overvalued / underestimated stock market, this study will define three types of volatility: strong, medium and low. Acting in the same way as with revaluation, we calculate the average coefficient of variation for the required month and for the two preceding ones. Accordingly, 30% of the months with the lowest coefficient are assigned to the low volatility group, 30% of those months with the highest volatility are assigned to the highest volatility group, the remaining months are characterized as medium volatility.

It will be important to analyze the periods of growth and decline in the stock market - in this case, you can trace the dynamics. To identify growth or decline, you need to take 3 points of the index. The first is the index quote as of the date of the trade announcement, the second is the value of the index quote 45 days before the event, and the third is 90 days before the trade is announced. If with each subsequent point there is an increase in quotations, and on the day when the deal is announced, the value of the index quotation is the highest, then the market is in the growth stage. If, on the contrary, each of the points under consideration is lower than the previous ones, and on the day the trade is announced, the index has the lowest quotation, then this is a market decline (Teerikangas & Colman, 2020).

Return on assets (ROA) is a measure of the company's profitability in relation to its total assets. ROA gives investors an idea of how efficiently the company is converting the money invested into net income. The higher ROA, the better, because the company makes more money with less investment. ROA for public companies can vary significantly and will be highly industry dependent. Therefore, when using ROA as a benchmark, it is best to compare it to company's previous ROA or ROA of a similar company. In general, ROA is most useful for comparing companies in the same industry, as different industries use assets differently. For example, ROA for service-oriented firms like banks will be significantly higher than ROA for capital-intensive companies like construction or utilities.

Some analysts also believe that the basic ROA formula is limited in its applications, being the most appropriate for banks (Teti & Tului, 2020). Bank balance sheets better reflect the real value of their assets and liabilities because they are recorded at market value (through accounting at current market prices) rather than historical value. R / BV ratio means the amount of net profit received per one ruble of equity capital. The gap between the required rates of return and the actual working rate is the higher, the more efficiently own funds work. The P / BV ratio is forecast by determining the ratio of stable ROE to r , and BV as the balance sheet value can be used to calculate the value of shares directly for the forecast year. If the organization is expected to have significant ROE above r , then the P / BV ratio may well be higher than the industry average. This is a normal situation. This fact only indicates that the funds invested by shareholders work more efficiently than those of competitive organizations.

The above factors are often discussed in empirical research, but it should be noted that there are other determinants (Gao et al., 2020). In this regard, it is worth noting that in this study only some factors were selected as variables for constructing the econometric model. When forming the sample, the dates of

the announcement of M&A transactions, the values of the Moscow Exchange stock index, as well as financial indicators of companies were used. For the assessment, a sample of Russian M&A transactions was formed. When selecting deals, the following criteria were used:

- the deal was announced in the period from 01.01.2009 to 31.12.2019;
- the deal must be completed;
- financial indicators were expressed in rubles;
- the company acquiring the target company must be from Russia.

Thus, 35 transactions carried out on the Russian market were selected. To describe the stock market dynamics, the Moscow Exchange index was used. The correlation analysis was carried out, since there is an assumption that overestimation and volatility do not depend on each other. The correlation analysis revealed that, with a 95% probability, there is no relationship between factors. Heteroscedasticity test was carried out using White's test. The result showed that the null hypothesis of the absence of homoscedasticity is rejected, and heteroscedasticity is present.

The multivariate regression model was built to assess the impact of the stock market dynamics on the efficiency of M&A transactions. The regression model equation looks like this:

$$CAR_i = \beta_0 + \beta_1 * Over + \beta_2 * Under + \beta_3 * Lvolat + \beta_4 * Hvolat + \beta_5 * Growth + \beta_6 * Fall + \beta_7 * ROA + \beta_8 * LNTA + \beta_9 * P/BV + \varepsilon_i$$

where Over - a variable equal to 1 if the stock market is overvalued, 0 in any other case;

Under - a variable equal to 1 if the stock market is undervalued, 0 - in any other case;

Lvolat - a variable equal to 1 if the market is low volatility, 0 - in any other case;

Hvolat - a variable equal to 1 if the stock market is highly volatile, 0 in any other case;

Growth - a variable equal to 1 if the stock market is growing, 0 - in any other case;

Fall - a variable equal to 1 if the stock market falls, 0 - in any other case;

ROA is the return on assets of the company;

LNTA is the natural logarithm of assets representing the size of the company;

P / BV - price / book value multiplier.

When excluding insignificant variables, the model was obtained where the following factors are significant: high volatility, ROA, company size are significant at the 5% level; P / BV at 1% level. (Table 1).

Table 1. Result of the regression model

Indicator	Coefficient	P-value	Significance
Const	-2,28162	0,0234	**
Hvolat	-0,385767	0,0310	**
ROA	-4,48233	0,0449	**
LNTA	0,0832695	0,0177	**
PBV	0,0234128	0,0065	***

** - the coefficient is significant at the 5% level

*** - the coefficient is significant at 1% level

Source: authors.

A significant variable of high volatility has a negative impact on excess returns. The Russian market, like other developing countries, can be characterized by high volatility. The largest negative excess return with high volatility was -1.68. More often, volatility rises when the stock market and the national currency

fall and decrease when quotes add in price. This situation is disadvantageous to investors because their assets are losing value. High volatility can be caused by unexpected statistics, changes in the monetary policy of the leading Central Banks, geopolitical conflicts, natural disasters, etc.

ROA variable has a negative effect on CAR. A high indicator indicates the competence of managers in the management of company assets. But it should be borne in mind that this indicator depends on the industry in which the company operates. The sample of companies was drawn mainly from transactions in the oil and gas and industrial sectors of the economy. It follows that for such industries the return on assets will be lower than for transactions from the financial industry. The size of the company (LNTA) has a positive effect on cumulative return. The Russian market is characterized by the presence of a small number of player companies in the financial market, therefore M&A deals help to capture the market share and increase the competitiveness. The P / BV multiplier has a positive effect on CAR if its multiplier value does not exceed 1.4. The high value of this multiplier indicates that the company has many intangible assets, the price of which is understated in the balance sheet; the negative value indicates the company's financial difficulties. After identifying the anomalies in the data distribution, outliers were excluded, that is, observations that stand out from the general sample, which made it possible to obtain more accurate data (Table 2) and build a new regression model (Table 3).

Table 2. Correlation coefficients of model factors

CAR	Over	Under	Lvolat	Hvolat	
1,0000	-0,1822	0,0551	0,1938	-0,1129	CAR
	1,0000	-0,2901	-0,2831	0,2727	Over
		1,0000	-0,0055	0,2669	Under
			1,0000	-0,5577	Lvolat
				1,0000	Hvolat
Growth	Fall	ROA	LNTA	PBV	
-0,1638	0,0083	-0,2691	0,4621	0,1479	CAR
0,1869	-0,0306	-0,1692	0,0580	0,0604	Over
-0,3145	0,1887	-0,0667	0,0044	-0,0994	Under
-0,1683	0,1780	-0,1355	-0,2239	-0,0798	Lvolat
-0,0849	-0,1937	-0,1653	0,2114	0,0016	Hvolat
1,0000	-0,6000	-0,1684	-0,0959	0,1444	Growth
	1,0000	0,2481	-0,0231	-0,0652	Fall
		1,0000	-0,2435	0,2649	ROA
			1,0000	-0,0368	LNTA
				1,0000	PBV

Source: authors.

Table 3. Regression model

Indicator	Coefficient	P-value	Significance
const	-2,87747	0,0006	***
Lvolat	-0,385767	0,0310	*
LNTA	0,0881733	0,0022	***

* - significant at 10% level

*** - significant at 1% level

Source: authors.

The result of the regression model showed that low volatility and company size were significant factors. As mentioned above, the size of the company has a positive effect on cumulative profitability, which contributes to the competitiveness of the buying company. A variable of low volatility negatively affects CAR. The reason for low cumulative profitability of shareholders of the buying company with low market volatility can be explained by the large premium paid to shareholders of the company - the goal, since the country's stock market is considered stable. The study showed that the highest CAR (1.25%) was achieved during the growth of the index and average volatility. The unfavorable time for the announcement of the deal was the overvalued market and high volatility; in this situation, the lowest CAR was -1.068%.

7. Conclusion

Summing up, we can say that 14% of Russian M&A transactions were carried out during the time of low volatility, which may be more optimal stock market dynamics, since most transactions showed positive excess returns. However, Russian economists did not come to a consensus on the optimal level of volatility. Therefore, it makes sense to consider a larger number of transactions in the sample with other factors. Volatility negatively affects the efficiency of M&A deals. The reason for low cumulative profitability of shareholders of the buying company in the presence of low market volatility can be explained by the large premium paid to shareholders of the target company. In addition to volatility, the return on assets ratio turned out to be significant variables. The rest of the indicators of the stock market were not significant.

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