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THE IMPACT OF TRADING LIQUIDITY ON THE RATE OF RETURN ON EMERGING MARKETS: THE EXAMPLE OF POLAND AND THE BALTIC COUNTRIES

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Abstract

Each type of investment has its own liquidity, i.e. the speed with which it can be converted into money. This can be seen with respect to various instruments (such as stocks or futures contracts), market segments, or even entire exchanges. The importance of liquidity has been acknowledged for a long time. A considerable number of studies have investigated stock liquidity, providing evidence that more illiquid stocks have higher returns, which may be deemed an ‚illiquidity premium'. In this paper I present various factors which have an effect on liquidity by presenting the results of research concerning relations between liquidity and stock return on the Warsaw Stock Exchange (WSE) and Nasdaq stock exchanges in Tallinn, Riga and Vilnius.

JEL classification: G12, G15, G4, F30, F50
Keywords: illiquidity premium; capital market; liquidity of shares

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Introduction

The liquidity of assets in the financial market is generally understood as costs and the easiest way in which different types of assets can be converted into cash, or to put it simply, sold at the currently available price on the market. For a considerable period of time this category had not been duly considered in the framework of modern finance theory. As a result, a number of basic models constructed within the framework of this theory in its classical form did not include problems with liquidity. This applies to a number of aspects related to liquidity, with one of the more important being the relationship between the liquidity of trading in shares and the results obtained from these rates of return. Trading liquidity has always played important role for practitioners operating in the capital markets, although in the initial phase of the development of modern finance it was not taken into consideration to a proper degree in the theory. The situation has changed since the mid-1980s, when the theory began to analyze the issue of liquidity in the financial market in a formalized way. Of particular importance in this respect are the works by Amihud and Mendelson (see: Amihud & Mendelson, 1986a; Amihud & Mendelson,1986b), who in both theoretical and empirical studies have shown a relationship between the rate of return on shares and liquidity measured by the spread[1] on the US market. The following studies study confirmed the idea contained in their work that liquidity has a significant impact on stock prices and their rate of return (see: Shannon, Reilly & Schweihs, 2000; Chordia & Swaminathan, 2000; Dater, Naik & Radcliffe, 1998; Chan & Faff, 2005; Acharya & Pedersen, 2005). As a result, the problem of liquidity began to be included in the financial models, such as the Capital Asset Pricing Model (CAPM), for which versions were developed to take into account the effects of liquidity (see: Bodie, Kane & Marcus, 2002). One can also commonly encounter the statement that the liquidity of the shares has a significant impact on the rate of return (Cheng, 2007).

Investors choosing where to invest their money take into account a number of factors that characterize assets. Most of these factors affect the liquidity of the investment. Some are dependent on the same company whose assets are purchased, e.g. management policy. There are also macroeconomic factors which are independent of the company, such as the structure of the market, the current economic situation, the situation of the industry, and the competitiveness of other forms of investing money which are on offer at the time of the offer on the financial markets. The following are the main factors which have a significant influence on the liquidity of shares:

1) Transaction costs, such as brokerage fees and taxes on income trading are a major factor limiting the liquidity of the assets. Constantinides (1986), Heaton and Lucas (1996) and Vayanos (1998) analyzed the range aspect of transaction costsin their works. The conclusion in their works is that transaction costs can cause a reduction in the frequency of rotation, which causes a loss of utility.

2) The presence of asymmetric information leading to disturbances in the cash transactions of economic entities, which can lead to making not entirely rational economic decisions at the micro and the macro-levels and leads to the inefficient (Pareto) allocation of resources. In the latter sense asymmetry of information is one of the reasons the market mechanism does not provide the optimal allocation of resources.

3) The pressure of demand is the opportunity to sell large amounts of assets quickly and without any price reduction. The Warsaw Stock Exchange, in order to prevent drops or increases in prices caused by the emergence of trading in large blocks of shares decided to regulate the conclusion of so-called 'block trades'. Block trades are transactions concluded outside the system of trading. The transaction may involve significant packages of each type of securities (except futures). Most often they are concluded by large investors, who prior to their conclusion agree on the details - price, quantity, and date of settlement. Exchange Regulations specify that the conditions for a block trade are the minimum value of the package and the maximum difference between the price of a block trade and the exchange of the paper on the trading session.

4) The degree of development of financial markets. Well-developed financial markets allow investors to freely invest in different, even very complex, financial instruments. However, when the market is not well developed, the investor can easily find him/herself in a situation where there is no buyer for their stake. In the world of finance there exists an efficient-market hypothesis. Every market is striving to reach an ideal whereby securities prices reflect all available information at the moment. With regard to the topic of efficiency of

1 Spread is the difference between the best bid and ask price before each transaction, weighted by turnover value administered in basis points.

markets a field of finance called behavioral finance has arisen. The representatives of this trend are trying to prove that markets are not efficient at all.

5) n the analysis of the relationship between liquidity and rate of return one should still include at least one important factor, which is the investment horizon. According to Amihuda and Mendelson (see: Amihud & Mendelson, 1986a; Amihud & Mendelson,1986b) the required rate of return on shares should increase with an increase in liquidity, but the increment should decrease with an increasing investment horizon and decrease in the likelihood of a premature termination of the investment. As a result, investors with different investment time horizons may require different rates of return per unit of time from the same shares. Investors in short-term investments will be willing to pay less for stocks with low liquidity than investors with a long-term horizon, as the latter will be able to make a "depreciation" of liquidity costs in the long run.

6) The decision on the dividend payment date is very important for the functioning of the entire company. A company's dividend policy may be important information not only for the shareholders, but also for future investors, as it gives signals regarding the financial situation and prospects of the company. Typically, in developed countries a company elects to pay dividends accompanied by a declaration that the same will be paid in subsequent years in the amount not less than that declared in the previous year.

The theory of finance also offers a lot to support the claim that the dividend policy which a company applies has an effect on the amount of income earned from shares.

All of these factors contribute to decreasing the liquidity of assets, creating costs for the holder of these assets. Liquidity costs should be reflected in the prices of assets, and investors should demand compensation for them. In addition, the sources of liquidity are variable over time, so liquidity depends on the time factor. Compensation for the costs and risks associated with a lack of liquidity should be included in a higher expected rate of return for investors. The basic concept presented in this research paper is based on the work of Amihud and Mendelson (see: Amihud & Mendelson, 1986a; Amihud & Mendelson,1986b). The main question which they are trying to answer is whether the liquidity of shares has a measurable impact on the rate of return obtainable. There are many measures of liquidity. However, the widely accepted definition of liquidity is the possibility of trading assets in large amounts without affecting the price (see: Holden, Jacobsen & Subrahmanyam, 2014). Hence the natural measure of liquidity is the impact of trading volume on price. Studies using the effects of trading volume on asset prices as a measure of liquidity have been published by, among others: Brennan and Subrahmanyan(1996), Bertsimas and Lo (1998), Amihud (2002), P'astor andStambaugh (2003), Acharya and Pedersen (2005) and Sadka (2006).

Another measure of liquidity is the spread, which was used in the first study, presented by Amihud and Mendelson (2012). The term spread is understood as the difference between the best bid price by which the investor can sell the share, and the best sales offer by which the investor can acquire the share (in English terminology referred to as 'ask' price) before each transaction. In statistics trading is weighted. It is usually the value of turnover and measured in basis points. As measured by the spread in the presented research it is considered as a natural indicator of liquidity costs. In addition to the spread, studies have used other measures of liquidity:

1) turnover ratio - this is simply the average number of shares being traded in a given period, divided by the number of shares outstanding during that period,

2) the number of transactions is understood as an indicator of investor activity with operations to buy or sell a specific financial instrument. The number of transactions is the number of contracts of purchase and sale of a financial instrument made in the period (calculated individually),

3) value (volume) trading – in terms of value this is calculated as the product of the exchange rate and the number of sold and purchased instruments (counted twice), and in terms of volume it is the number of sold instruments (calculated individually),

4) coefficient of illiquidity (ILLIQ) - this indicator shows the daily influence of the size of orders on prices (Amihud, 2002).

There is sample evidence that liquidity affects the profits of assets. One line of scientific view considers liquidity as a feature which affects the profits beyond the costs of trading. Investing in illiquid stocks is compensated for by a higher rate of return (see: Amihud & Mendelson,

1986b; Brennan, Subrahmanyam, 1996; Dater, Naik, Radcliffe, 1998; Brennan, Chordia, Subrahmanyam, 1998). Other studies emphasize the liquidity of the market as a risk factor. Stocks with higher sensitivity to changes in aggregate liquidity have higher expected profits (Pastor & Stambaugh, 2003).

However, there continues to be a serious debate over defining the precise role of liquidity. Acharya and Pedersen (2005) show liquidity both as a feature characterizing the expected rate of return (return on investment depends on the level of liquidity) as well as a risk factor. Korajczyk and Sadka (2008) use high-frequency data to confirm that both the liquidity risk and its level has an impact on the valuation of the shares, while Hasbrouck (2006) proposes a new way of estimating effective spreads. However, due to the new way of the estimation of spreads Hasbrouck found only a weak impact of liquidity on the stock price but did not confirm the impact of liquidity risk by the expected rate of return.

Characteristics of the stock markets of emerging countries.

In order to better understand the phenomena occurring in the capital market of a given country one should be familiar with the basic characteristics not only of the country's capital markets, but also of its entire economy.

Nasdaq stock exchanges in Tallinn, Riga and Vilnius form the Baltic Market, the core idea of which is to minimize to the extent possible the differences between the three Baltic markets in order to facilitate cross-border trading and attract more investments to the region. This includes sharing the same trading system and harmonizing rules and market practices, all with the aim of reducing the costs of cross-border trading in the Baltic region.The Baltic exchanges belong to Nasdaq, the world's largest exchange company. Nasdaq delivers trading, exchange technology and public company services across six continents, with over 3,500 listed companies.[2]

The Warsaw Stock Exchange (WSE) is one of the fastest growing exchanges among European regulated markets and alternative markets regulated by the stock exchanges, and the largest national stock exchange in the region of Central and Eastern Europe. The Warsaw Stock Exchange trading system in place is characterized by the fact that the exchange of individual financial instruments is determined based on the orders of buyers and sellers, and therefore it is called an order-driven market. This means that in order to determine the price of the instrument orders are drawn up containing instructions for buying and selling. Pairings of these orders is done according to strictly defined rules, and execution of transactions carried out during the trading sessions. To improve the liquidity of traded instruments, the members of the stock exchange or other financial institutions may act as a market maker, placing (on the basis of an appropriate agreement with Exchange) orders to buy or sell the instrument on its own account. Currently the WSE is implementing a development strategy aimed at strengthening the attractiveness and competitiveness of the Polish market and making Warsaw the financial center of the region of Central and Eastern Europe, and currently the Polish Stock Exchange is an important capital market in Europe and a leader in Central and Eastern Europe, taking advantage of the development potential of the Polish economy and the dynamism of the Polish capital market.[3]

A discussion of the characteristics of the markets surveyed is necessary in order to better understand, in the context of the entire study, the problem of the efficiency of stock markets. It is therefore important to know the depth of the market (capitalization), liquidity (trading volume, number of transactions), the popularity of stock investments among the inhabitants of the country, the ownership structure of the shares, and the structure of the transaction. The following are features of these exchanges:

1) size and importance,
2) structure and openness,
3) the development potential and characteristics of investment.

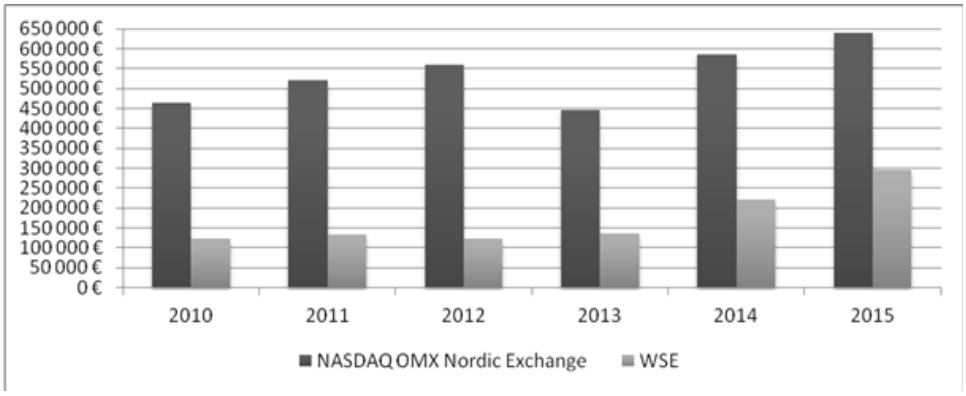
One of the criteria for comparisons of the analyzed markets is the capitalization of domestic companies listed on these markets. Figure 1 shows the change in capitalization over time for all of these markets.

Another way of describing the importance of the exchange is the size of transactions carried out on the measured value rotation. The turnover value indicates the amount of the bought (or sold) shares on the stock market, so it is the sum of the amount of purchased

2 http://www.nasdaqbaltic.com/en/exchange-information/about-us/

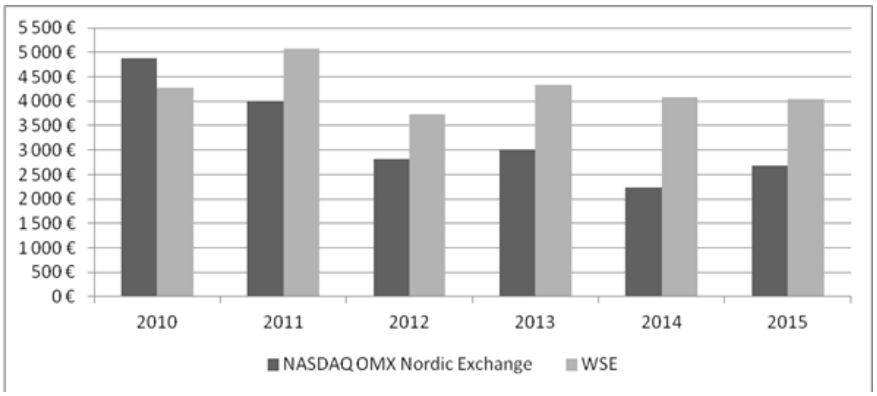
3 https://www.gpw.pl/o_spolce

Figure 1: Domestic market capitalization (in millions)



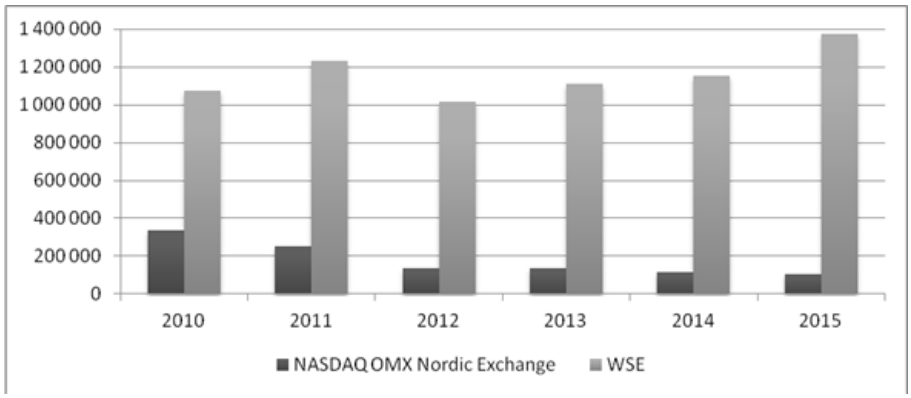
Source: own study based on data from WFE, www.world-exchanges.org

Figure 2: Value of share trading (in millions)



Source: own study based on data from WFE, www.world-exchanges.org

Figure 3 - Value of share trading (in millions)



Source: own study based on data from WFE, www.world-exchanges.org

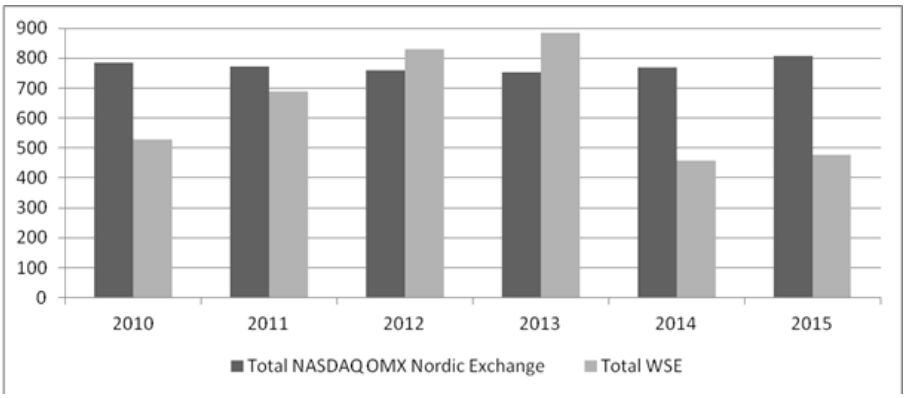
(sold) shares and their prices. WFE relies on transactions conducted through electronic orders, i.e. the (EOB) trading system - most of the transactions carried out in this way are block trades and transactions reported. In addition, the transactions are divided into the actions carried out on domestic and foreign markets. As shown in Figure 2, it accounts only for electronic orders, both for national and foreign markets.

Another important characteristic is the number of transactions carried out by the stock exchange. On the Warsaw Stock Exchange, we can especially observe volatility, but the number of transactions in general is growing from year to year. In contrast, in the market of the Baltic countries the number of transactions has begun

to decline steadily.

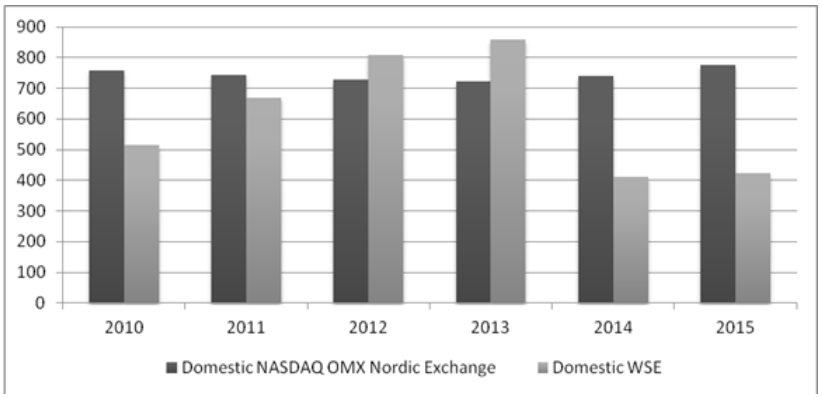
Each of the analyzed stock markets has shown different trends in terms of the number of companies listed on them. From 2010 to 2012 the number of companies listed on the WSE grew, while in the years 2014 and 2015 the number of listed companies on the same Stock Exchange plummeted, which was caused by a decrease in the number of domestic companies listed on this market. In turn, the stock market of the Baltic countries is characterized by a stable number of companies. These features are shown in Figure 4. In contrast, Figure 5 shows only the number of domestic companies listed on both markets, and Figure 6 shows only the number of foreign

Figure 4: Total number of listed companies



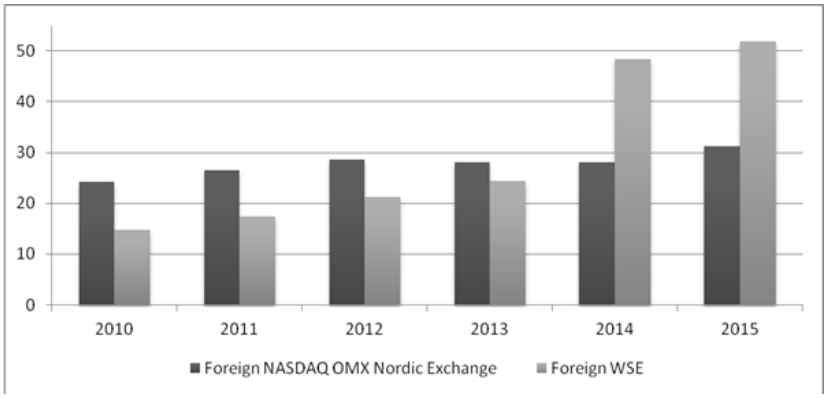
Source: own study based on data from WFE, www.world-exchanges.org

Figure 5: Number of listed domestic companies



Source: own study based on data from WFE, www.world-exchanges.org

Figure 6: Number of listed foreign companies



Source: own study based on data from WFE, www.world-exchanges.org

companies listed on both markets.

The Polish stock market and the Baltic market can still be regarded as "emerging" given the developed market in terms of liquidity, size, or popularity among the public stock investments. The analyzed stock markets are characterized by a relatively low liquidity and "depth". A significant concentration of trading takes place in them. The differences in the valuation of theoretical and futures markets may indicate the presence of frictions such as high transaction costs, low liquidity, and lack of institutional infrastructure in comparison to the highly developed markets (short selling). All these factors increase the likelihood of difficulties and/or prevent effective arbitration. We observed a significant rate of economic progress in the emerging markets measured in terms of GDP per capita as well as measures relating to quality of life: access to the Internet, life expectancy, decreased unemployment and stable price growth. This rapid economic growth in these emerging markets does not, unfortunately, go hand in hand with increased spending on research and development, resulting in a lower number of patents and less innovative economies. Additionally, the societies in the emerging markets in Poland and the Baltic countries are more likely to save and consume less compared to the population of the United States or Japan. The problem of an aging population is increasingly important for all the analyzed markets - this involves the extension of the average life expectancy, especially in emerging economies.

Data source and selection of the research sample

Gathering relevant data is obviously a very important part of any research project. In the case of developed financial markets access to data is easier, whereas in the case of emerging markets the existing state of affairs is not always ideal. Thus,in order to obtain the most accurate and relevant data I took advantage of a number of databases, concerning both public institutions (e.g. The Warsaw Stock Exchange, NBP, GUS, PAP, Eurostat, World Bank, WFE) and private ones (e.g. Bloomberg, Reuters, Amadeus, Notoria). In each case the method used for calculating the selected data was analyzed and its quality carefully checked.

This article examines companies from the Warsaw Stock Exchange (WSE) which were included in the WIG20 index in the last quarter of 2015. As regards the market of the Baltic countries the companies analyzed are included in the index OMXBBGI listed on the Nasdaq stock exchanges in Tallinn, Riga and Vilnius, which also form the Baltic Market at the end of 2015. The source of data on prices and characteristics of companies (market indices, capitalization, volume and the value of trading) is based on a Bloomberg database.[4] The problem of "thin trading" raised by, among others, Dimson (1979) or long periods in which there are no quotations for the action can cause, for example, load estimation. Parameter beta or sensitivity to macroeconomic variables was solved by eliminating the study of the companies concerned,[5] and ultimately the study on the Polish market covered 13 companies and in the Baltic market 28 companies.

The survey was conducted on a group of companies listed on the Warsaw Stock Exchange and Nasdaq stock exchanges in Tallinn, Riga and Vilnius from the Baltic Market period: 01.01.2006 - 31.10.2015. Prices have been adjusted for changes in equity-type subscription rights, dividends and splits. The study was conducted at monthly rates calculated on the basis of the prices of the last day of each month. EURIBOR was chosen for the rate of return on risk-free assets.

Thus, for each share a beta coefficient was calculated according to the formula:

$$R_i = \alpha_i + \beta_i * RM + u_i \quad (1)$$

The calculations were made using the method of least squares (OLS): the dependent variable (R) was the surplus monthly average rate of return on shares,the explanatory variable (RM) the average excess return from the WIG20 for the Polish market or the average excess return on OMXBBGI for the market of the Baltic countries for 60 months (five years) preceding that year and including the year (T-4 to T, and $T \in (2002, 2015)$). EURIBOR was used as the rate of return on risk-free assets. Table 1 shows the basic statistics of the data used in this study.

4 Prices of shares and ratios have been adjusted for any transactions that could artificially affect the rate of return, such as splits, subscription rights, dividends, share buybacks, etc., according to the methodology data provider.

5 Excluded companies were those for which a break in exchange quotations lasted longer than 15 trading sessions (3 weeks) accounted for more than 1% of the total trading sessions of the company during the period from the beginning of trading of the company (or the beginning of the study, when the company was listed before the beginning of the study period) until the end of the period test, i.e. Oct. 2015.

Table 1: Basic statistics - collected monthly data for the Polish market

	Number of transactions	Beta coefficient	Rate of return (EUR)	Capitalization (EUR mil)	Turnover ratio (%)
Average	1479.9920	25.1420	4788.0920	0.9640	-0.1610
Mediana	1081.5000	11.2000	3976.3950	0.6000	0.0130
Minimum	0.0000	0.0000	710.0000	-43.0500	-8.6630
Maksimum	11000.000	173.30000	14508.000	28.9900	2.5900
Variance	2029804	1054	11586201	58.0000	2.0000
Standard deviation	1424.7120	32.4680	3403.8510	7.5920	1.4200
Coefficient of variation	96.2650	129.1370	71.0900	787.4790	-880.5040

Source: author's own calculations on the basis of the statistics listed, https://www.gpw.pl/analizy_i_statystyki

Table 2: Basic statistics - collected monthly data for the market of the Baltic countries

	Number of transactions	Beta coefficient	Rate of return (EUR)	Capitalization (EUR mil)	Turnover ratio (%)
Average	321.2665	0.0035	4.2466	132.3479	7.5092
Mediana	203.0000	0.0016	0.0000	86.8050	1.2750
Minimum	0.0000	-0.0258	-36.0000	2.8700	0.0000
Maksimum	3825.000	0.0920	186.2400	700.7700	148.000
Variance	121996.3	0.0000	599.1000	20962.2000	524.5000
Standard deviation	349.2796	0.0117	24.4764	144.7833	22.9019
Coefficient of variation	108.7196	329.8621	576.3829	109.3960	304.9860

Source: author's own calculations on the basis of the statistics listed, www.nasdaqbaltic.com/market/?pg=bulletins&lang=en

Methodology

The main objective of the study was to determine whether there is a statistically significant relationship between the trading liquidity of the shares and the evolution of the rate of return on these shares.

The applied research methodology is similar to that described by Dater, Naik and Radcliff (1998) in their work: "Liquidity and Stock Returns: An Alternative Test". For calculations the generalized least squares method was used, which allows one to observe the rate of return under the influence of changes in the turnover ratio (see: Kandel & Stambaugh, 1995; Shanken, 1992). In particular, Iused the methodology of Litzenberger and Ramaswamy (1979), which is improving the model of Fama and MacBeth (1973). This methodology is commonly used in the analysis of cross-section of expected returns from shares. However, this methodology must be modified accordingly due to the nature of emerging markets, i.e. the small number of listed companies, short time series, the incidence of problems associated with low activity of investors in the market, and the lack of easy access to information and market data. The original model of Fama and MacBeth (1973) is based on the analysis of equity portfolios constructed according to the methodology they proposed. However, in the study presented in this

article Iencountered the problem of an insufficient creation of large and numerous portfolios according to the methodology proposed by Fama and MacBeth (1973), i.e. the small number of securities listed on the Warsaw Stock Exchange and the Nasdaq stock exchanges in Tallinn, Riga and Vilnius forming the Baltic Market. For these reasons this article uses a methodology based on the individual rate of return, based on the work criticizing the portfolio approach (see: Litzenburger & Ramaswamy, 1979; Shanken, 1992).

A study described by Dater, Naik and Radcliff (1998) in their work "Liquidity and Stock Returns: An Alternative Test" aimed at checking the relationship between the rate of return and systematic risk measured by the beta coefficient, the size of the company measured as the logarithm of the capitalization and turnover ratio based on individual actions. The survey was repeated using the logarithm of the number of transactions as another measure of liquidity. In the case of capitalization and liquidity Iapplied the logarithm suggested by the literature (see: Fama & French, 1993; Amihud & Mendelson, 1986b) i.e. the non-linear relationship between these variables and rates of return. The model estimation was performed according to the formula:

$$R_{it} = \gamma_{0t} + \gamma_{1t}\beta_{it} + \gamma_{2t}L_{it} + \gamma_{3t}\ln(CAP)_{it} + \varepsilon_{it} \quad (2)$$
$$i=1,2,\ldots\ldots,Nt, \quad t=1,2,\ldots\ldots,T$$

where:

R_{it} - the rate of return on shares in the month t;

β_{it} - beta coefficient in the month t;

L_{it} - the liquidity of the stock in the month t;[6]

$\ln(CAP)_{it}$ - the size of the company measured as the natural logarithm of the capitalization of the month t;

ε_{it} - the random component.

The results of the study

Using the methodology described by Dater, Naik and Radcliff (1998) in their work "Liquidity and Stock Returns: An Alternative Test", Ifirst examined the relationship between the rate of return and systematic risk measured by the beta coefficient and company size measured by the logarithm of market capitalization and turnover ratio (model 1) for the data collected, and obtained the results described in Table 3. In the casecapitalization Iused the logarithm suggested by the literature (see: Fama & French, 1993; Amihud & Mendelson, 1986b), i.e. the non-linear relationship between this variable and the rate of return.

As follows from the information presented in Table 3, part A and B, both of the calculations on data from the markets of the Baltic countries and Poland to

6 Liquidity can be expressed as a turnover ratio or a logarithm of the number of transactions.

Table 3: Estimations of model 1 and their corresponding values of p-value and statistics t-student

	Estimators	Statistics t-student	p-value
BALTIC COUNTRIES			
A			
free term	2.3924	2.55060	0.010860
turnover ratio	0.9863	83.16849	0.000000
beta coefficient	-43.5994	-1.88338	0.059857
ln(CAP)	-2.9182	-5.92965	0.000000
POLAND			
B			
free term	0.6488	0.2366	0.8131
turnover ratio	-0.0093	-1.0867	0.2775
beta coefficient	0.2654	1.3588	0.1746
ln(CAP)	0.1669	0.2163	0.8288

Source: author's own calculations

estimate a parameter relating to the beta coefficient is not statistically significant at the 0.05 level. It is therefore apparent that, at least for the analyzed periods, contrary to the predictions of the basic models of the theory of finance, systematic risk measured by beta factor does not have a significant impact on the formation of the rate of return.The fact of this here will not be subject to detailed considerations, because it is not a systematic risk analysisin the context of CAPM or the Sharpe model, however it is of interest. From the calculations made from the data from the Stock Exchange in Warsaw it can be concluded that the estimation of the parameters relating to turnover ratio and size of the company measured by the logarithm of capitalization are also not statistically significant at the 0.05 level, which shows that liquidity measured by the turnover ratio and the size of the company does not significantly affect the rate of return obtainable on the market. On the other hand, as shown in Table 3, Part A, the calculations performed on data from the markets of the Baltic countries variables expressing liquidity and the size of the company are important in shaping the return on the shares of a company.

As seen in the data presented in Table 3, part A and B, calculation of the sign parameters for all the variables studied in both markets are different, e.g. a sign of the parameter estimated for the indicator of liquidity on the Polish market is negative, that is an increase in liquidity should be accompanied by a decrease in the rate of return, while the sign of the estimated parameter for the indicator of liquidity in the markets of the Baltic countries is positive, i.e. an increase in liquidity should be accompanied by an increase in the rate of return. Such a relationship can also be observed for the other estimated parameters.

The fit of the model estimated on data from the markets of the Baltic countries to the actual data, as measured by the coefficient R2, is 0.834. The fit of the model estimated using data from the Stock Exchange in Warsaw to the actual data, as measured by the coefficient R2, is 0.004.

The next stage of the study was to determine whether liquidity, measured by the number of transactions, has a significant impact on the rate of return in the markets of the Baltic countries and Poland (model 2). The results of these tests are presented in Table 4. In the case of capitalization and liquidity expressed by the number of transactions Iused the logarithm suggested by the literature (see: Fama & French, 1993; Amihud & Mendelson, 1986b) i.e. a non-linear relationship between these variables and the rate of return.

As follows from the data presented in Table 4,

Table 4: Estimations of model 2 and the corresponding values of p-value and statistics t-student

	Estimators	Statistics t-student	p-value
BALTIC COUNTRIES			
A			
free term	-5.4654	-1.69677	0.089964
log(LT)	3.5569	2.10774	0.035232
beta coefficient	171.2790	3.03387	0.002459
ln(CAP)	0.5297	0.36120	0.718002
POLAND			
B			
free term	0.36371	0.13393	0.893492
log(LT)	-1.89008	-3.29894	0.001016
beta coefficient	0.28645	1.48542	0.137853
ln(CAP)	1.74896	1.93273	0.053646

Source: author's own calculations

Part A and B, both of the calculations on data from the markets of the Baltic countries and Poland to estimate a parameter relating to the number of transactions is statistically significant at the 0.05 level. Just as was the case in previous results, the parameters standing for all the variables studied in both markets are different, e.g. the sign of the parameter estimated for the number of transactions on the Polish market is negative, that is an increase in liquidity should be accompanied by a decrease in the rate of return; while the sign of the parameter estimated for the number of transactions on the markets of the Baltic countries is positive, that is, an increase in liquidity should be accompanied by an increase in the rate of return. However, in the case of this study only the parameters standing at variable for the liquidity differ, while the remaining parameters estimates take the same characters in both markets. As can easily be seen, the variable defining the size of the company measured by capitalization is not statistically significant at the 0.05 level for the calculations on the data from both the markets of the Baltic countries and Poland. As for the beta coefficient presented in Table 4, Part A, it is important in the formation of the rate of return on shares listed on the markets of the Baltic countries. However, with respect to the Polish market, as shown in Table 4, Part B, there is no significant statistical relationship between the beta coefficient and the rate of return, and systematic risk measured by the beta coefficient does not play a key role in shaping the return of the shares listed on this market.

The fit of the model estimated on data from the markets of the Baltic countries to the actual data, as measured by the coefficient R2, is 0.0144. The fit of the model estimated using data from the Stock Exchange in Warsaw to the actual data, as measured by the coefficient R2, is 0.01717.

Subsequently research was carried out for years T and T + 1, designed to show a relationship between the rate of return on the shares in the period T + 1 and its liquidity, expressed as either a turnover ratio (model 1) or as a number of transactions (model 2), during the period T. When the model presented by the equation (2) introduced variables including time delays, in none of the analyzed cases were statistically significant results obtained, and therefore Iomitted their presentation in this work.

Conclusions

The research presented in this paper was a continuation of studies conducted around the world, and especially in the most developed capital market of the United States. The methodology proposed by Western researchers must be modified to take into account the characteristics of emerging markets, such as a small number of listed companies, short time series, the incidence of problems associated with low activity of investors in the market, and the lack of easy access to information and market data. For these reasons, the methodology had to be adapted to the data available from the Warsaw Stock Exchange and Nasdaq stock exchanges in Tallinn, Riga and Vilnius which form the Baltic Market. Iused the methodology described in a study by Dater, Naik and Radcliffe (1998) in their work "Liquidity and Stock Returns: An Alternative Test" aimed at checking the relationship between the rate of return and systematic risk measured by the beta coefficient, and the size of the company measured by the logarithm of capitalization and liquidity, expressed either as a turnover ratio (model 1) or as a number of transactions (model 2) based on individual transactions. When analyzing liquidity expressed as an indicator of the market or the number of transactions based on data from the markets of the Baltic countries it could be noted that there is a significant statistical relationship between liquidity and rate of return on stocks listed on these markets. As regards the Polish market, the presented calculations show that the liquidity expressed as turnover ratio does not affect the formation of the rate of return of shares listed on this market, while there is a statistically significant relationship between liquidity, expressed as the number of transactions, and the rate of return on shares listed on the Polish market. For the analysis of the Polish market, both for model 1 and model 2, the other variables of systematic risk measured by the beta coefficient and size of the company measured by the logarithm of the capitalization does not affect the formation of the rate of return on shares listed on this market. For the studies conducted on the data from the markets of the Baltic countries, the beta coefficient has a significant influence on the formation of the rate of return only in the case of analysis based on the model 2, while this relationship was not visible in model 1. As concerns the parameter for the size of the company measured by the logarithm of the capitalization, the performed calculations on data from the markets of the Baltic countries shows

that it significantly influenced the formation of the rate of return on these markets only in the analysis of model 1, while model 2 had no such dependence.

The conduct of these several separate studies, using different measures to describe liquidity on the data acquired for the Polish capital market and for the Nasdaq stock exchanges in Tallinn, Riga and Vilnius which form the Baltic Market confirms the hypothesis at the beginning of the work that there is a statistically significant relationship between the liquidity of trading of the shares and the shaping of the rate of return. Independently, the chosen measure of liquidity in most cases has been confirmed by the relationship between the liquidity of trading and the evolution of the rate of return on the shares of the Warsaw Stock Exchange and the Nasdaq stock exchanges in Tallinn, Riga and Vilnius which form the Baltic Market. This allows for concluding that another variable should be taken into account by investors and analysts when valuing securities and estimating the rate of return on investment. For institutions monitoring the capital markets and the financial system the results of this work may shed some light on the problem of liquidity of the entire capital market, which would allow for taking appropriate steps to increase the liquidity. Also, in the context of the valuation of capital, e.g. during the placement of a share issue, the dominant approach associated with the CAPM model test results can be used for a more accurate and broader valuation.

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