

THE IMPACT OF MACROECONOMIC INDICES UPON THE LIQUIDITY OF THE BALTIC CAPITAL MARKETS

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Summary. *The present paper addresses the issue of the interaction of a range of macroeconomic indices upon the liquidity of Lithuanian, Latvian and Estonian capital markets, and includes a survey of the factors having an effect upon the processes. The analysis of the liquidity in the markets concerned in the period from 2001 to 2010 was performed with reference to indicators based on trading volumes in these markets. The correlation analysis performed for the purpose of the present paper showed that changes in a number of macroeconomic indicators, such as GDP, unemployment levels, trade and service balance, also the FDI flows, produced the most tangible impact upon the liquidity of the Baltic capital markets.*

Key words: *capital market liquidity, liquidity ratios, macroeconomic indicators, dynamics, factors, correlations, Baltic States.*

Introduction

A successful implementation of the economic functions of the capital market to a large extent depends on the level of its liquidity. The functioning of a liquid capital market has a material influence on the economic development of a country, it largely contributes to an efficient accumulation and distribution of capital and builds up the foundation for the overall economic stability. The very issue of capital market liquidity and a number of factors that affect it are of specific relevance to market players that refer to the projections in macroeconomic indicators to forecast changes in the national investment climate.

The object of the present study was to assess the impact of changes in macroeconomic indicators for the dynamics in the liquidity of the Lithuanian, Latvian and Estonian capital market in the period from 2004 to 2010.

Tasks pursued by the present article:

to define the concept of the market-level liquidity and the level of informativeness of different liquidity parameters; to perform a liquidity analysis of the Baltic capital markets in 2004–2010 and to assess the impact of such indicators on their liquidity.

The issue covered by the present article has not been examined to any tangible extent in research literature. Furthermore, the subject matter of the article is pursued as relevant

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in view of the absence of any unanimous opinion regarding the factors playing a vital role in the liquidity of capital markets, and whether the factors affect the liquidity in different national capital markets in the same manner. Different Lithuanian and foreign researchers ordinarily conclude on the impact of the macroeconomic environment on the securities market in relation to share prices and the development of capital markets (Fabozzi, Modigliani, 1996; Jones, 1996; Schröder, 2001; Pekarskienė, 2001; Rafael, Tvaronavičienė, 2005; Boreika, Pilinkus, 2009; Jasienė, Paškevičius, 2010); however, there is a tangible shortage of any more detailed research in the interrelation between various macroeconomic indicators and the capital market liquidity.

Methods applied: analysis of research sources, comparative analysis, graphic method, correlation analysis, analysis and generalisation of statistical data.

1. The concept of liquidity

In financial markets, liquidity (Latin *liquid* – fluid, flowing) refers to the ease of realisation in converting material valuables into cash. Since the theory of economics operates several meanings of liquidity, although interrelated but still demonstrating material differences, the term used in relation to the capital market refers to market-level liquidity, as different from firm-level liquidity which could conditionally defined as the ability of a firm to cover its liabilities by using its liquid assets.

The statement that market-level liquidity is the ability of a market to absorb temporary demand and supply fluctuations with a minimum price impact (Kancerevyčius, 2009) is further expanded by a quantity segment distinguished by other authors: market-level liquidity is the ability of a market to facilitate trading in larger volumes of securities with a minimum impact on the market price. In an ideal case, i.e., where the market is perfectly liquid, the possible buy or sell volumes would be approaching infinity, and the changes in the market price due to the trades would be approaching a zero (Fabozzi ir Modigliani, 1996). The market performance history has shown that large-volume new issues are normally highly liquid. In the event even large-volume deals impact the market price to only a minimum extent, the market for the financial instrument is definitely liquid.

In his characteristic of a liquid market situation, Kancerevyčius (2009) points out that a liquid market is distinguished by its small difference in purchase and sell prices, transparency immaterial change in the price irrespective of the volume of transactions.

2. Factors impacting the market liquidity

A number of research papers on the market liquidity issue provided an analysis of the different factors posing a threat to market liquidity. B.J. Foley (1994) has distinguished two groups of factors – global and internal – that produce the strongest impact on the development of the capital market. Following the conventional use of terminology, any factors that depend

on changes in the country-specific macroeconomic situation could be referred to as internal factors, while those related to market integration and globalisation processes are perceived as external or global factors. Generalised data from different countries are presented in Table 1.

TABLE 1. Key factors boosting the capital market liquidity

Factors	Outcome
Stock price crash	Securities are impossible to sell at normal prices: panic rules the market; few buyers; low prices prevail, with the imminent closure of the market
Local and global crises	The "risk appetite" on the part of investors subsides, which is clearly reflected in prices
Small scale of the market	Securities trading interrupted, few market participants and the sluggish trade increased buy / sell differences
Shortage of information transparency and insufficient immediacy	No reliable information on available positions, market conditions and financial instrument characteristics; no possibility to project asset prices, possible loss if an expedient selling of securities fails
Inefficiency and lack of reliability of the market	The number of security transactions in a time unit decreases; thus, the investor's possibility to recover its investment also decreases
Significant transaction costs	Scarce participants, turnover slowing down, growing interest rate of securities offered
Procedural discrepancies	Differences in the requirements for stock exchange prevent its participants from acting in several markets and obstruct capital mobility

Source: compiled by the authors according to Mayer, T., Duesenberry, J. S., Aliber, R. Z., Pinigai, bankai ir ekonomika, Vilnius: Alma littera, 1995, 42 p.; Dodonova, I. V., Особенности формирования финансового рынка как формы движения финансового капитала; Сборник научных трудов. Серия „Экономика“, вып. 5; Северо-Кавказский государственный технический университет. Ставрополь, 2002, 129 с. [accessed on 20 May 2011]. Internet access: <<http://science.ncstu.ru/articles/econom/5>>; Juozapavičienė, A., Išvestiniai instrumentai tarptautinėse finansų rinkose: mokomoji knyga. Kaunas: KTU, Technologija, 2006, 38 p.; Kancerevyčius, G., Finansai ir investicijos, Kaunas: Smaltijos leidykla, 2009, 111 p.

In all these cases, market liquidity is steadily declining; however, as noted by Eiteman et al. (2007), market liquidity may be manifested in two different forms, depending on whether the market in calm or undergoing a crisis period. Under calm market conditions, liquidity means whatever makes investors believe in the ease of selling or buying – prices do not play against them. On the contrary, under crisis conditions, liquidity is the factor that exhausts the trading. Hence it follows that the factors, whether positive or negative in respect of the market, cannot be brought to absolute values and in particular so that they are related to the macroeconomic situation of a specific country.

Macroeconomic factors affect a group of issues, or, alternatively, the entire market. They reflect the condition of a national or the global market. A. Rasteniene (1998) has distinguished a number of macroeconomic factors affecting the market activity:

- 1) stability of the economic system, harmony, development prospects, reliability of the financial system (investment risk degree);
- 2) saving level and the public debts (interest rates);

- 3) commodity, gold and real estate market conditions (comparison of alternative investment possibilities);
- 4) rates of economic growth, inflation (yield);
- 5) volumes of production of public companies, and the use of securities to meet the corporate funding needs;
- 6) overlap of international capital, condition of the payment balance and the currency system.

Thus, it may be definitely concluded that capital market liquidity is closely related to the economic situation in a country and the economic indicators in terms of international economy.

3. Market liquidity indicators

The very methods of calculating the liquidity indicators, as well as the number of such indicators vary considerably. The difference in the treatment of the different market liquidity ratios as presented in different sources demonstrates the universal nature of the liquidity as an economic category. Tracking the motivation underlying the grouping of market liquidity ratios would be a challenging task, first of all due to the difference of the dimensions operated by different researchers.

For example, Mayer et al., (1995) designating liquidity as a “possibility to sell securities”, indicating that “this is defined by the price of securities of a certain volume in sales”, referring to the dimension of market tightness. The link of this ratio to trade costs was also referred to by A. Sarr et al. (2002). Transaction costs arising from the sale and buying securities or assets specifically represent market liquidity. The difference arises from a variety of fees, etc. charged by intermediaries in the market.

It has been noted that for the purpose of determining the liquidity degree, the focus is placed on trade costs and the time required to strike a deal, i.e., the market *immediacy*. Market immediacy is perceived as the speed with which orders executed and thus measured in time within which the transaction can be completed (Sarr et al., 2002). Rico von Wyss (2004) also believes that market immediacy could be measured by a number of trades per time unit: a larger number of trades would show a growing market immediacy, and thus the liquidity.

Notable is a nearly unanimous opinion that market liquidity can be measured with reference to market depth and market resilience parameters (Bank of International Settlements, 1999; Sarr et al., 2002; Fleming, 2003). The market resiliency parameter is defined as the ability of the market to restore a reasonable market price during a flow of newly generated orders.

Difficulties have been encountered in attempting to differentiate between the market *depth* and market *breadth* parameters, which have turned to be quite a challenge. In numerous sources on economics, market depth is perceived as a sufficiently large

number of orders priced below or above the market closing price, and the risk breadth characterises the condition of the market facilitating large-volume trades at existing prices.

As claimed by Sarr and Lybek (2002), developing a single and universal measure able to fully disclose the market liquidity position would be a challenging and possibly impossible task. On the other hand, these authors offer their understanding of most informative liquidity indicators: bid-ask spread, trade volumes, liquidity and market efficiency ratios. The selected liquidity measures are undoubtedly able to provide a sufficiently abundant and unbiased information; however, their development may be a rather time-consuming exercise, in particular in view of the shortage of reliable data.

The authors conclude their considerations on the benefits of liquidity measurements by offering their finding that illiquid markets are rather an indication of than a reason for an inadequate market functioning, and point out that the only decision yielding a favourable result able to contribute to maintaining liquid markets is the promotion of a transparent economic policy. In the context of such conclusions by Sarr and Lybek (2002), the question raised by Goyenko Holen and Trzcinka (2009) “Do liquidity measures measure liquidity?” does no longer look a purely rhetorical inquiry.

In the opinion of Sarr and Lybek (2002), market depth, immediacy or other measures mentioned here may be interpreted as liquidity measures only in terms of bid-ask spread, turnover ration, price indicators, or a number of deals, etc. However, they warn that all such measures are far from universal and may issue to the market some misleading messages (specifically in the context of crises); therefore, they should be assessed only in the context of specific market factors.

It should be concluded that any attempts to identify the possible causal links with such dimensions of liquidity could expediently benefit from a discussion of a number of other measures, such as market turnover, the number of deals or the average value of such transactions.

The trading volume measures are normally considered to represent the number of securities traded within a span of time; therefore, an increase in the volume represents an increase in liquidity. The statement should be considered substantiated only in the cases when prices do not increase and there are no new issues, as such factors would indicate only changes in the turnover without necessarily changing the overall liquidity of the market.

The trading frequency indicator allows measuring the market liquidity by referring to the indicator of the number of transactions (N_t). Provided all other conditions are equal, the increasing number of deals actually demonstrates an increasing market liquidity; however, as any of more markable market fluctuations can be caused by an increased number of deals only, the liquidity measured on the basis of these measures only cannot be assessed unambiguously.

It should be mentioned, though, that the average price size alone can favourably affect the average transaction size; therefore, it is absolutely necessary to assess also other indicators.

It is not difficult to conclude that other measures as discussed here allow only a unilateral assessment of market developments. On the other hand, it is specifically due to their one-sidedness that they are able to identify a specific risk area in terms of the market stability. It would be logical to conclude that the application of a balanced system of measures would be appropriate; however, there is still an important question as to what and how many of such indicators the system should be composed of. There is only one consideration to be concluded with absolute certainty: the indicators should reflect all functions performed by the market.

Any measurement of market liquidity normally refers to the time during which any financial instrument may be converted into cash, in addition to the costs related to the trading process. Conclusively, market immediacy is considered to be one of the material indicators of market liquidity. In the opinion of Sarr and Lybek (2002), most informative are the indicators including transaction costs as well as those based on trading volumes. These have been extensively discussed both by the authors concerned and by other researchers.

Ordinarily, the researchers have been distinguishing detailed costs related to the deal ordering process and different other fees, as well as expected costs, in addition to the transaction execution costs. Since the bid-ask spread may include virtually all costs, it is this measure that is most often used to measure the transaction execution costs. The bid-ask spread can be measured as the absolute difference in the best bid and the best ask price, or a percentage representation of the difference. The percentage movement in the prices allows a belief that the resulting price gap, from the procedure cost viewpoint, will be the cheaper the higher the prices; in addition, the percentage representation of the measure offers a possibility to compare the bid-ask spread in different markets.

High transaction costs lessen the demand, and, consequently, the number of potential market participants. In the meantime, lower transaction costs (that are ordinarily related to more liquid markets and open extended possibilities for decentralisation and diversification) result in an increased number of transactions.

High transaction costs lead to market polarisation: an increased number of off-the-market transactions as they are able to pay-off the search costs, and the prices that not necessarily fluctuate around the right mean; thus, the market tends to turn shallow. When transaction costs are low, buyers more gladly opt for dealer services which lead to transactions rotating around the equilibrium price, thus uniting and deepening the market.

The transaction flow elasticity is rather low when transaction costs are high. The transaction scarcity may also be the result of a considerable price inconsistency. Hence

it follows that high transaction costs virtually trigger a chain market destabilisation reaction.

The indicators based on trading volumes are most efficient in measuring the market breadth (i.e., a large number of market participants, large-volume transactions with a minimum price impact). It should be noted that the larger are the transactions that may be continuing in terms of the quoted spread, the deeper is the market. Deeper markets lead to an increased market breadth, as higher costs may be split into several smaller orders thus diminishing the price impact.

The numerical value of trading volumes is normally used to measure the number of market participants and transactions; however, it is obvious that linking trading volumes with the volumes of quoted financial instruments may be a more meaningful and informative move. The resulting turnover indicator shows how, or, more specifically, the number of instances of the change in the number of a quoted financial instrument:

$$V = \sum (P_i * Q_i),$$

where V is the turnover in monetary expression, P_i is the price of the financial instrument i , and Q_i is the volumes (in units) of the financial instrument i sold within a certain period of time;

$$Tn = V / (S * P),$$

where Tn is the turnover indicator, V is the turnover in monetary expression, S is the number of shares issued by a company (issue), and P is the average price of the financial instrument within a certain period of time.

It should be noted, however, that the trading volumes may suddenly augment either within a single day or within one month (depending on the trading mode), for instance, following a release of information, in particular if it is relevant to a specific financial instrument. Any fluctuations in the trading volumes should be constantly in the focus of market participants. The time required for the extended spread to reach the normal level on the days of important news releases may be perceived as the market resilience indicator. For instance, Fleming and Remolona (1999), referring to the trading volumes in the USA securities markets in the course of 250 days and focusing on the hottest news, concluded that the principal macroeconomic news cause expressed and sudden price changes and suppress the trading volumes; they also noted a significant increase in the ask-bid spread immediately after the news release.

Baldwin Hui and Barbara Heubel have developed a liquidity indicator specifically for the equity market (Sarr, Lybek, 2002). The Hui–Heubel liquidity indicator (hereinafter LHH) seeks to incorporate the market breadth dimensions that link the transaction volumes with their impact upon both the prices and the market resilience.

The LHH indicator may be computed as, for example a five-days' mean within a selected sample (e.g., three months), in order to take into account any insignificant fluctuation. With regard to the accessibility of the data for the purpose of fixing short-term price fluctuations, the indicator can be calculated on a daily basis. The lower the LHH, the larger is the liquidity of the financial instrument concerned. It could be concluded that the market is considered broader when the LHH is low:

$$LHH = [(P_{max} - P_{min}) / P_{min}] / [V / (S * P_{ave})],$$

where P_{max} is the highest price for the period, P_{min} is the lowest price for the period, V is the total turnover for the period concerned, S is the number of shares issued by the company (issue), and P_{ave} is the average closing price for the financial instrument for the period concerned.

The LHH denominator could be calculated as a percentage change in the highest and the lowest price for the period. Where the relevant prices are not relevant, bid-ask prices may be used instead; this, however, arguably affects the accuracy of the result.

Conventional liquidity measures normally link the price changes to the total turnover of the period concerned (V). Thus, the denominator in the Hui–Heubel liquidity calculation formula will include the trading volume and the number of shares issued by the company in monetary terms (essentially the turnover indicator). Subject to the data availability for the purpose of the calculation, the LHH denominator could include other measures of trading volumes (e.g., the number of shares traded).

In general, liquidity indicators may also be expressed in terms of the number of the financial instruments traded in the period concerned before the percentage changes took place. The larger the number of transactions per percentage price change, the broader is the market.

A matter possibly causing concern is the fact that the effect of trading volumes depend on whether or not the trading volumes account for a sufficiently large share of the financial instruments in the market that could be covered by the Hui–Heubel indicator. Thus, where a buyer or a seller suddenly decide to purchase or sell financial instruments that account for the major part of such instruments in the market, a significant change in the price could be expected, since these transactions reflect the new information spread in the market; however, price fluctuations should not be perceived as an indicator of market illiquidity.

This liquidity indicator, however, is criticized because the relation between the price fluctuations and volumes is disproportionate. When using the indicator for the purpose of identifying the link between two variables, certain price changes may be overestimated in case the trading volumes are significant, or underestimated where the trading volumes are low. This approach fails also to address the difference between the short-term and long-term price fluctuations.

Certain researchers tend to disregard the indicator of trading volume, believing that the price alone is able to reflect everything; however, as noted by Kancerevyčius (2009), a number of empiric surveys have yielded the following results:

- 1) low volumes are often followed by a decline in price;
- 2) high volumes are often followed by an increase in price;
- 3) a sudden leap in volumes is ordinarily followed by a material increase or a material drop in the price;
- 4) where for a period of five trading days the volumes were steadily declining, it is concluded that the share price shall continue to decline for the next four days, and vice versa.

Thus, the following conclusions may be offered:

- the volume indicates the level of activity of market participants;
- when comparing two markets, the trading volume indicates which market will be more active or liquid.

Econometric computations are definitely more progressive and detailed; they, however, are used for the calculation of liquidity as being not sufficiently expedient as the computation costs (in terms of time required) readily outweigh the advantages. In order to more expediently determine the market breadth situation, it would be more expedient to analyse trading volumes and price fluctuations in the long period, using simpler liquidity ratios (such as LHH) and the turnover data. However, it should be born in mind that the statistical ratio between the price fluctuation and the volume will not be that accurate, although the general trends will be disclosed.

Liquidity may be defined in terms of the indicators based on price changes by directly analysing price fluctuations; however, these indicators are not in a position to reflect the market situation when price changes are affected by new information flows; therefore, these indicators show rather market resilience.

Markets are highly complex and rapidly changing; therefore, it is hardly feasible to identify one indicator or a ration that would indicate a correct direction for the behaviour. The absence of the sole indicator able to clearly and unambiguously measure the ratios such as market tightness, immediacy, depth, breadth and resilience has been on numerous instances noted by several researchers (Sarr, Lybek, 2002; Kancerevyčius, 2009; Valakevičius, 2008, and others). It is obvious that any appropriate assessment of the situation with a view to achieving the highest yield at the lowest risk and maintaining the liquidity of the market, the assessment of the situation in a specific market should take into account all relevant factors and considerations.

The fundamental analysis, which is to a large extent based on changes in the macroeconomic factors, seeks to identify the fair value of securities – whether they are lower or higher than the prevailing market price. The fair price of securities is determined with reference to the GDP, industry sales volumes, corporate sales volumes and costs,

i.e., essentially by a number of macroeconomic factors. In most cases, however, macroeconomic news alone are not considered to provide a reliable basis for the decision-making process. In principle, such news are known in advance from different publications of analyst forecasts and opinions concerning the forthcoming ratios that are published at least a week before the official news are released. Such projections are most often very close to the actual result. Still, beyond any doubt, a parallel may be drawn between the GDP growth and the growth of a specific entity. Furthermore, the analysis of different economic ratios allows forecasting the risk-free yield, changes in risk levels, and thus the market liquidity level.

Financial markets may demonstrate a completely different behaviour in the so-called stress periods or, conversely, periods of stability. O'Hara (2000) has claimed that stressful periods in the market have revealed a tangible trend of shifting from electronic trade to dealer market in foreign currencies. Tension in a single market may affect another market or even other countries, despite the ability of the appropriate clearing or settlement systems to mitigate the inherent systemic risk. In view of the great variety of factors that affect market liquidity in stressful periods, liquidity measures based on trade volumes and bid-ask spread should be analysed on a case-by-case basis, while different efficiency indicators remain indicative of market resiliency. It may be reasonably presumed that a comparison of the results of measurement of the fundamental and technical analysis with the results of different liquidity calculation measurements could lead to an objective assessment of both the current and the future liquidity situation in the market.

4. Analysis of the Baltic capital market liquidity

The analysis of the Baltic States capital market, conducted by the authors of the present article, was based on the assumption that a number of parameters related to the liquidity of the markets are to a largest extent affected by macroeconomic factors. For the purpose of the survey, the authors selected several methods: systemic analysis, treating liquidity as one of the key elements of the triad of capital market (yield–risk–liquidity); comparative analysis, enabling a detailed assessment of the effect of the performance of individual market participants upon the liquidity of the Baltic capital markets, and the graphic and descriptive methods, instrumental due to their ability to illustrate not only the dynamics in the liquidity of securities in the period surveyed, but also the development and trends in the liquidity of such capital markets.

For the purpose of the survey, the authors chose the period from 2004 to 2010 with a view to assessing the Baltic capital market liquidity dynamics. The beginning of the period under survey was determined by a number of significant developments in the particular year – Lithuania, Latvia and Estonia becoming Members States of the European Union and members of the OMX exchange alliance, which is believed to have made a significant impact on the liquidity of the national capital markets.

Changes in the liquidity of shares, listed in the Main List of the Baltic Exchange, were computed, analysed and described on the basis of historical data of the Nasdaq OMX Baltic Exchange. To identify the main trends in liquidity during the period under survey, the authors of the present article used the turnover ratio, by many researchers considered to be most informative, and the Hui–Heubel (LHH) liquidity ratio. The latter is used to identify the key trends in the development of long-term liquidity.

Such indicators were calculated for each Baltic State individually, also for each company on the Main List of each national stock exchange, and in respect of each year of the period covered. As the weight ratio, the authors chose the number of sold shares of each company included into the Main List of each Exchange, and, more precisely, their share in the total number of shares sold in the same year. The relation between changes in liquidity ratios and those in macroeconomic indicators in the Baltic States was determined by correlation analysis of the weighted LHH ratios, turnover ratios

TABLE 2. Correlation coefficients between the Lithuanian liquidity and macroeconomic ratios

	Nasdaq OMX Vilnius	
	LHH	Turnover ratio
GDP at current prices, m EUR	0.241	0.192
GDP growth, %	-0.750	0.473
CPI average growth, %	0.160	0.330
Unemployment level, %	0.512	-0.706
Growth in the average annual real net earnings, %	-0.699	0.737
Growth in export of goods and services, %	-0.443	0.258
Growth in import of goods and services, %	-0.641	0.394
Trade balance and balance of services, % BVP	0.641	-0.823
Current account balance, % GDP	0.597	-0.813
Current and capital account balance, % GDP	0.588	-0.778
FDI proceeds, % GDP	-0.683	0.645
Total external debt, % GDP	0.137	0.213
Government sector balance, % GDP	-0.713	0.451
Government sector total debt, % GDP	0.235	-0.576

Source: compiled by the authors according to the trade statistics of the Nasdaq OMX Baltic stock exchange [viewed on 20 May 2011]. Internet access: <<http://www.nasdaqomxbaltic.com/market/?lang=lt>>; Eurostat database, [viewed on 20 May 2011]. Internet access: <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database>. Saar, A., Lybek, T., Measuring liquidity in financial markets, International Monetary Fund, Working paper, 2002, p. 62 [viewed on 20 May 2011]. Internet access: <<http://imf.org/external/pubs/cat/longres.cfm?sk=16211.0>>; Statistics Lithuania; Key social and economic development indicators, [viewed on 20 May 2011]. Internet access: <<http://www.stat.gov.lt/lt/pages/view/?id=2621>>; Wyss, R. Measuring and Predicting Liquidity in the Stock Market, Dissertation der Universitat St. Gallen. 2004, No. 2899, p. 182 [viewed on 20 May 2011]. Internet access: <[http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/\\$FILE/dis2899.pdf](http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/$FILE/dis2899.pdf)>.

and the macroeconomic changes in each state concerned. For that purpose, the survey examined a total of 14 macroeconomic indicators. In all three Baltic States, the most robust correlation was established between five ratios (GDP growth, %; unemployment level, %; growth in the average annual real net earnings, %; trade balance and balance of services, % GDP; FDI proceeds, % GDP), and the measures representative of changes in liquidity.

The analysis of a correlation between the key macroeconomic and liquidity indicators showed the strength and direction of the relation between the two measures.

The correlation analysis results allow a conclusion that in Lithuania the macroeconomic indicators demonstrating the strongest positive and negative correlation with the estimated liquidity ratios include the GDP annual percent change, annual percentage change in the unemployment level, annual percentage change in trade balance and balance of services of the GDP, and the annual percentage change in the foreign direct investment of the GDP.

TABLE 3. Correlation coefficients between the Latvian liquidity and macroeconomic ratios

	Nasdaq OMX Riga	
	LHH	Turnover ratio
GDP at current prices, m EUR	-0.223	-0.364
GDP growth, %	-0.411	0.801
CPI average growth, %	-0.252	0.390
Unemployment level, %	0.456	-0.728
Growth in the average annual real net earnings, %	-0.654	0.829
Growth in export of goods and services, %	-0.269	0.660
Growth in import of goods and services, %	-0.388	0.783
Trade balance and balance of services, % BVP	0.482	-0.851
Current account balance, % GDP	0.624	-0.887
Current and capital account balance, % GDP	0.600	-0.895
FDI proceeds, % GDP	-0.807	0.889
Total external debt, % GDP	0.023	-0.565
Government sector balance, % GDP	-0.402	0.842
Government sector total debt, % GDP	0.320	-0.790

Source: compiled by the authors according to the trade statistics of the Nasdaq OMX Baltic stock exchange [viewed on 20 May 2011]. Internet access: <<http://www.nasdaqomxbaltic.com/market/?lang=lt>>; Eurostat database, [viewed on 20 May 2011]. Internet access: <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database>. Saar, A., Lybek, T., Measuring liquidity in financial markets, International Monetary Fund, Working paper, 2002, p. 62 [viewed on 20 May 2011]. Internet access: <<http://imf.org/external/pubs/cat/longres.cfm?sk=16211.0>>; Statistics Lithuania; Key social and economic development indicators, [viewed on 20 May 2011]. Internet access: <<http://www.stat.gov.lt/lt/pages/view/?id=2621>>; Wyss, R. Measuring and Predicting Liquidity in the Stock Market, Dissertation der Universitat St. Gallen. 2004, No. 2899, p. 182 [viewed on 20 May 2011]. Internet access: <[http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/\\$FILE/dis2899.pdf](http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/$FILE/dis2899.pdf)>.

The correlations between the Latvian macroeconomic indicators and the turnover ratios and the LHH ratios, representing changes in liquidity, proved equally robust in the case of Latvia. In most cases, the relation with the indicator representative of the turnover rate proved to be strong (the correlation coefficient in respect of all macroeconomic indicators was above 0.7). The correlation with the LHH liquidity ratio also proved to be sufficient (above 0.4).

TABLE 4. Correlation coefficients between the Estonian liquidity and macroeconomic ratios

	Nasdaq OMX Tallinn	
	LHH	Turnover ratio
GDP at current prices, m EUR	-0.5602	-0.3266
GDP growth, %	0.2474	0.6277
CPI average growth, %	-0.2837	0.3828
Unemployment level, %	0.3888	-0.5823
Growth in the average annual real net earnings, %	-0.0997	0.6613
Growth in export of goods and services, %	0.1914	0.6428
Growth in import of goods and services, %	0.2048	0.5801
Trade balance and balance of services, % BVP	0.0534	-0.6050
Current account balance, % GDP	N/A	N/A
Current and capital account balance, % GDP	0.0418	-0.6362
FDI proceeds, % GDP	-0.3712	0.8937
Total external debt, % GDP	-0.6865	-0.1300
Government sector balance, % GDP	0.0423	0.6726
Government sector total debt, % GDP	0.6736	-0.1846

Source: compiled by the authors according to the trade statistics of the Nasdaq OMX Baltic stock exchange [viewed on 20 May 2011]. Internet access: <<http://www.nasdaqomxbaltic.com/market/?lang=lt>>; Eurostat database, [viewed on 20 May 2011]. Internet access: <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database>. Saar, A., Lybek, T., Measuring liquidity in financial markets, International Monetary Fund, Working paper, 2002, p. 62 [viewed on 20 May 2011]. Internet access: <<http://imf.org/external/pubs/cat/longres.cfm?sk=16211.0>>; Statistics Lithuania; Key social and economic development indicators, [viewed on 20 May 2011]. Internet access: <<http://www.stat.gov.lt/lt/pages/view/?id=2621>>; Wyss, R. Measuring and Predicting Liquidity in the Stock Market, Dissertation der Universitat St. Gallen. 2004, No. 2899, p. 182 [viewed on 20 May 2011]. Internet access: <[http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/\\$FILE/dis2899.pdf](http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/$FILE/dis2899.pdf)>.

The correlation between the macroeconomic indicators in Estonia and the turnover, and the LHH ratios reflecting liquidity changes are controversial. All macroeconomic indicators strongly correlate with the turnover ratio, while the correlation with the LHH liquidity indicator is somewhat weaker.

The analysis of the dynamics of the triad of the Baltic capital markets leads to the conclusion that it is the Estonian Exchange that caused the most tangible effect on the market in general; the sharp leaps in the turnover curve of 2005 and 2007 in Estonia

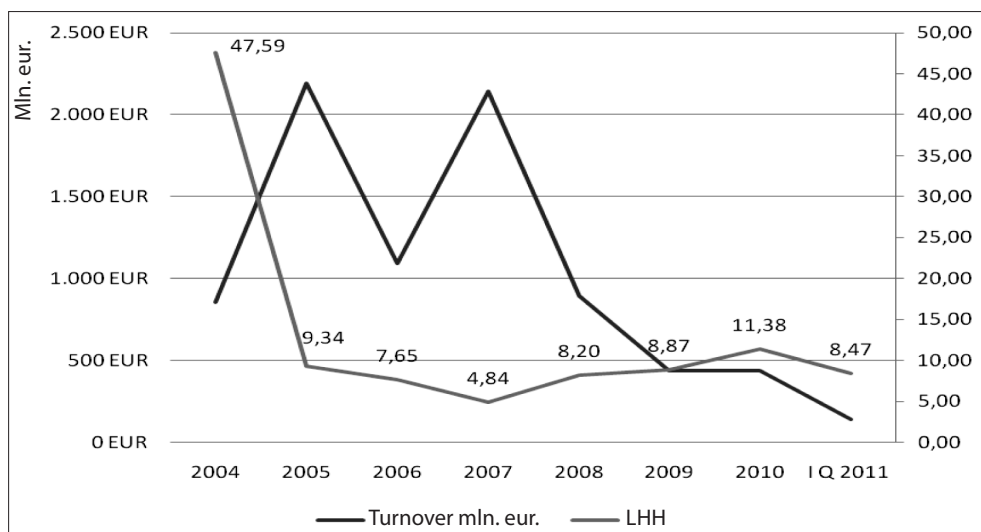


FIG. 1. Dynamics of the liquidity of the Nasdaq OMX Baltic stock exchange: turnover (mln. euros) and LHH

Source: compiled by the authors according to the trade statistics of the Nasdaq OMX Baltic stock exchange [viewed on 20 May 2011]. Internet access: <<http://www.nasdaqomxbaltic.com/market/?lang=lt>>; Eurostat database, [viewed on 20 May 2011]. Internet access: <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database>. Saar, A., Lybek, T., Measuring liquidity in financial markets, International Monetary Fund, Working paper, 2002, p. 62 [viewed on 20 May 2011]. Internet access: <<http://imf.org/external/pubs/cat/longres.cfm?sk=16211.0>>; Statistics Lithuania; Key social and economic development indicators, [viewed on 20 May 2011]. Internet access: <<http://www.stat.gov.lt/pages/view/?id=2621>> ; Wyss, R. Measuring and Predicting Liquidity in the Stock Market, Dissertation der Universitat St. Gallen. 2004, No. 2899, p. 182 [viewed on 20 May 2011]. Internet access: <[http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/\\$FILE/dis2899.pdf](http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/$FILE/dis2899.pdf)>.

are observable also in the curve summarising the overall development and changes in the Baltic capital market liquidity. The upswing in 2005 can be explained by the most voluminous flows of the FDI in Estonia in the period, and the liquidity peak of 2007 was observed in all three stock exchanges of the Baltic States.

The liquidity development curves presented in the graphs show that the Baltic stock market reached its liquidity peak in 2005–2007 when the turnover curve was above the curve representing changes in the LHH ratio. After 2009, when the LHH curve “climbed” over the curve showing a development in the turnover, the Baltic capital market entered into a liquidity crisis. However, the results of Q1 2011 give grounds for optimism that the markets are steadily recovering from the abyss of the 2008 crisis.

Based on the findings of this survey, the authors, of the present article conclude that in most cases the macroeconomic indicators in Lithuania, Latvia and Estonia were correlating with both indices representing liquidity changes in the markets (LHH and the turnover ratio). Table 5 shows the development of liquidity in view of the increase in liquidity ratios that were to a larger or smaller extent prevailing among the fourteen indicators surveyed in all three Baltic States.

TABLE 5. Liquidity in view of the growth of macroeconomic indicators in the Baltic States

Growth in macroeconomic indicators		Nasdaq OMX Vilnius liquidity according to		Nasdaq OMX Riga liquidity according to		Nasdaq OMX Tallin liquidity according to		Capital market liquidity
		LHH	Turnover ratio	LHH	Turnover ratio	LHH	Turnover ratio	
GDP growth, %	↑	↑	↑	↑	↑	↓	↑	↑
Unemployment level, %	↑	↓	↓	↓	↓	↓	↓	↓
Average annual growth in the real net earnings, %	↑	↑	↑	↑	↑	↑	↑	↑
Trade balance and balance of services, % GDP	↑	↑	↑	↑	↑	↓	↑	↑
FDI proceeds, % GDP	↑	↑	↑	↑	↑	↑	↑	↑

Source: compiled by the authors according to the trade statistics of the Nasdaq OMX Baltic stock exchange [viewed on 20 May 2011]. Internet access: <<http://www.nasdaqomxbaltic.com/market/?lang=lt>>; Eurostat database, [viewed on 20 May 2011]. Internet access: <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database>. Saar, A., Lybek, T., Measuring liquidity in financial markets, International Monetary Fund, Working paper, 2002, p. 62 [viewed on 20 May 2011]. Internet access: <<http://imf.org/external/pubs/cat/longres.cfm?sk=16211.0>>; Statistics Lithuania; Key social and economic development indicators, [viewed on 20 May 2011]. Internet access: <<http://www.stat.gov.lt/lt/pages/view/?id=2621>> ; Wyss, R. Measuring and Predicting Liquidity in the Stock Market, Dissertation der Universitat St. Gallen. 2004, No. 2899, p. 182 [viewed on 20 May 2011]. Internet access: <[http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/\\$FILE/dis2899.pdf](http://www.unisg.ch/www/edis.nsf/wwwDisplayIdentifier/2899/$FILE/dis2899.pdf)>.

The findings of the survey allow also a conclusion that the effect of the growth of macroeconomic indicators on liquidity was very similar in all three Baltic States. It may be reasonably presumed that any macroeconomic changes, and in this case specifically the growth of the indicators reflecting them, cause an increase in the liquidity of the capital market (except the growth in the unemployment where the empiric relation between the unemployment level, the rate of economic growth and capital markets is expressly manifested).

Conclusions

1. The market liquidity level is best characterised by a low bid-ask spread, market transparency and an insignificant change in the price: in a liquid market, the price must maintain continuity. The trends in the internal factors affecting the market liquidity development cannot be perceived in absolute terms due to their dependence upon any changes in the country-specific macroeconomic situation, and the external (or global) factors – due to the effect produced by market integration and globalisation processes; therefore, any risk management possibilities may be highly compromised.

2. The limited character of the data provided by individual market liquidity indicators, such as market tightness, immediacy, resilience, depth or breadth, prevents a more systemic assessment of the capital market stability. There is a general trend to consider the measures covering transaction costs and trade volumes to be most informative in respect of the general liquidity situation in the market as instrumental in measuring the market breadth; another efficient measure is the formula designed by Baldwin Hui and Barbara Heubel specifically for computing the liquidity of a financial instrument. There is a good reason to believe that a comparison of the results of the fundamental and technical analysis with the results of different liquidity calculation measurements could lead to an objective assessment of both the current and future liquidity situation in the market.
3. The analysis of the liquidity situation in the Baltic States in 2004–2010, conducted with reference to the measurements based on trade volumes, showed that in most cases macroeconomic developments were correlating with the respective changes in the indicators reflecting the development of the market liquidity (LHH and the turnover ratio); thus, a robust relation between the macroeconomic environment in a country and the capital market liquidity dynamics may be concluded.
4. The findings of the survey allow a conclusion that the growth in macroeconomic indicators produced a very similar effect upon the liquidity in all three Baltic States. It may be presumed that a number of macroeconomic indicators such as GDP, unemployment level, the average annual growth in the real net earnings, trade balance and balance of services, and the proceeds of FDI – and in this case the growth of the indicators reflecting them – enhance the capital market liquidity (except the growth of the unemployment level the growth whereof causes a decline of the capital market liquidity).
5. The computations of the liquidity level, performed for the purpose of the survey, conclude that, in terms of LHH indicators, the most liquid market was the Lithuanian capital market (in 2005–2007 the LHH did not exceed 4.53). If measured in terms of changes in liquidity, the most liquid market was the Estonian capital market (gross turnover in 2004–Q1 2011 exceeded 6,011 m EUR). Such an exceptional performance of the Estonian capital market was to a large extent caused by the significant influx of foreign direct investments in the country in 2005.

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