



ESTABLISHING A SET OF MACROECONOMIC FACTORS EXPLAINING VARIATION OVER TIME OF PERFORMANCE IN BUSINESS SECTORS

Audrius DZIKEVIČIUS¹, Svetlana ŠARANDA²

*Department of Finance Engineering, Faculty of Business Management,
Vilnius Gediminas Technical University, Saulėtekio al. 11, LT-10223 Vilnius, Lietuva*

E-mails: ¹audrius.dzikevicius@vgtu.lt (corresponding author); ²svetlana.saranda@gmail.com

Received 25 February 2015; accepted 15 October 2015

Abstract. With increasing competitiveness of companies and business sectors in the domestic markets of Lithuania, economic units are frequently confronted with the lack of methods for more detailed analysis of external factors explaining the variation over time of corporate financial indicators. The analysis or forecasting of financial indicators is usually linked with the development of a stock market or undertaken to estimate the probability of bankruptcy. However, there is a lack of studies aimed at identifying links between macroeconomic factors and financial performance indicators and explaining their variation over time. To serve that purpose, the factors of the macroeconomic environment that are most significant for certain economic activities have been identified and analysed to enable explaining the variation over time patterns of corporate financial indicators. The analysis covers economic performance, i.e. financial performance indicators and their links with macroeconomic factors, in 89 business sectors of Lithuania at a three-digit level of NACE 2 ed. The findings of the research indicate that the unemployment level in the country, the volume of export and import and the GDP are the most important macroeconomic factors that can be used to forecast different profitability, financial leverage, liquidity and other financial performance indicators of individual business sectors or companies. The research has not unfolded any significant differences between business sectors therefore the above factors are considered generic macroeconomic factors enabling to explain financial performance indicators of the 89 business sectors. Hence, special attention has to be paid to identifying and analysing specific factors and assessing the causal link. When established, the set of such factors provides a framework for building of a model to forecast business sector financial indicators.

Key words: external environment, macroeconomic factors, financial situation, financial indicators, business sector, competition, correlation-regression analysis.

JEL Classification: L60, L70, L80, L90.

Introduction

In Lithuania, the financial indicators approach is often used to forecast probability of bankruptcy of Lithuanian companies. As a rule, models of discriminant analysis, which are more suitable than regression analysis, are applied. In addition to the above forecasting models intended for assessment of companies' situation, it is recommended to apply additional approaches based on the assessment of absolute and relative financial indicators. The analysis of companies' competitiveness also often lacks more detailed factors of external environment, explaining variation over

time of corporate financial indicators, taking into consideration specific character of individual business sectors, and researches based on targeted and comprehensive approach. The problem is that so far major attention was paid to the impact of the external environment factors on the stock market and companies operating therein (Tvaronavičienė, Michailova 2006; Boreikis, Plinkus 2009; Danilenko 2009; Plinkus 2010; Žvirblis, Rimkevičiūtė 2012, *et al.*) and to the researches aimed at the assessment of bankruptcy probability on the basis of financial indicators, while efforts to assess the links between macroeconomic factors and financial performance indicators of individual economic units

(companies or business sectors) were lacking. Therefore, it is appropriate to identify and examine an exhaustive set of individual external environment factors that are most significant to specific economic activities, as a research object. The purpose of this study is, hence, to identify and analyse individual external environment factors most important for specific economic activities that would allow explaining the variation over time of corporate financial indicators. The analysis performed for the purpose of the pursued objective is based on official public statistics. Correlation-regression analysis methods are also applied.

1. Overview of the theory concerning appraisal of an economic unit's performance

The modern business environment is defined by competitiveness. Companies find it increasingly important to analyse their financial positions and appraise their performance with a view to assessing their market shares and future development prospects. (Martišius, A. S., Martišius, M. 2008). The analysis of academic literature shows that financial statements by companies reflect their current situation with a 70–80% reliability and can be used to analyse their performance (Janovič 2012). To make proper use of the information disclosed in the financial statements, financial performance indicators of the companies should be analysed and the factors that affect their variation over time should be identified. In Lithuania, these issues have been discussed by Bagdžiūnienė (2005), Juozaitienė (2000), Lazauskas (2005) and Mackevičius (2005, 2008, 2010). Gökçehan Demirhan and Anwar (2014) emphasise that in the framework of assessment of the factors affecting business performance the analysis of both internal and external factors is relevant.

I. Arbidane and J. Volkova (2012) concluded that researchers tend to focus on the analysis of internal and external factors when examining management processes in the companies. To assess a company's performance indicators (including financial performance indicators) specific factors of macroeconomic environment that influence the company must be identified (Franceschini *et al.* 2014). Given the increasing influence of external factors on companies' performance, the approaches commonly used are PEST or SWOT analyses which reveal external factors-related opportunities and threats (Auškalnytė, Ginevičius 2001). R. Beker (2012) states that in the recent years, in Lithuania much attention has been paid to the analysis of business profitability of the companies, while comprehensive studies covering external factors and their impact on the companies' performance (e.g. profitability) are often lacking.

According to K. N. Gourdin (2006), the external environment of a company can be analysed -in two aspects: in terms of business sector wherein the company is competing, or in terms of macroeconomic environment. The external environment of the business sector where in the

company is operating usually combines such elements as competitors, clients and suppliers. While the macroeconomic environment embraces more elements, i.e. economic, social, demographic, political, legal and technological factors. For a company to be able to successfully implement the envisaged strategy and to compete on the market, it is important that it examines the macroeconomic environment specifically focusing on the economic aspect. According to J. Mackevičius (2010), such economic factors are among the most important elements exerting much impact on a business sector or a specific company. However, business performance appraisal methods, including methods for assessing of the probability of bankruptcy, are limited to the sole analysis of a company's financial position, often neglecting influence of the environment (Stundžienė, Bliekienė 2012).

Financial performance indicators are among the most important measures of a company's business success (Katja 2009). They constitute a very important analytic financial tool enabling managers to derive critical insights with regard to the cost structure, the opportunities to increase the capital and the available reserves, as well as the efficiency of the assets. Comparison of the financial performance indicators among companies operating in the same business sector or with the sector's median ratios allows justifying strengths and weaknesses of a company as part of a SWOT analysis and different aspects of the company's performance (Joy 2008). The analysis of financial indicators also helps to assess liquidity, business profitability and solvency contributing to a company's management-related decisions (Periasamy 2005).

In Lithuania, the analysis of financial performance indicators is usually undertaken with a view to assessing probability of bankruptcy, however, the increasing intensity of developments in the business sector and its environment also raise quite many challenges (Ginevičius, Čirba 2009). To this end, examining of the links between the financial performance indicators and the external factors is relevant. The examining of the links between the financial performance indicators and the external factors provide insights on the elements likely to influence certain business sector. For instance, there was much debate on what mistakes had been made and what led to the adverse situation on the real estate sector in 2008–2009, therefore analysing of the development of macroeconomic and financial indications has gained importance (Misiūnas 2011). Hence, it is ultimately important to identify the external factors determining competitiveness of a company or an industry and to filter a set of the available data and indicators to be appraised (Liučvaitienė, Paleckis 2011).

Once established, the relationship between the financial performance indicators of a business sector and the external factors influencing them allow to draw prospects for the

development of business sectors and forecast the expected level of the future financial indicators. Bruner *et al.* (2012) states that a valid forecast of financial indicators has to be based on the assessment of the external environment of a business sector. Since business development correlates with the economic indicators of a country's level, information about the external factors (including economic ones) has to be taken into account to determine business development prospects. In addition to that, any changes of the external factors have either positive or negative implications on more than one, if not tens of companies operating in the same business sector (Wei, Zhang 2008).

The above leads to the need to identify those macroeconomic factors that are linked with financial performance indicators. Hence, it is appropriate to examine an exhaustive set of individual factors of the external environment that are most important to a specific economic activity by applying correlation-regression analysis methods.

2. Methodology to analyse the relationship between the macroeconomic factors and the financial indicators of business sectors

In the framework of the researches, to ensure precision of economic and financial results special attention must be paid to the quality of the input data and information (Dzikevičius *et al.* 2011). To this end, only publically available and validated statistical data has been compiled, grouped and analysed.

In the first phase of the research, the set of the business sectors to be analysed has been established. Public statistics reflecting economic efficiency, i.e. financial performance indicators of business sectors, is available for a total of 223 business sectors (3-digit level of NACE 2 ed.). The research deals only with the business sectors wherein financial indicators were consistently disclosed and are available for at least five years over the 2004–2014 period, inclusively. The analysis of publically available data has produced a set of 89 business sectors to be studied.

The second phase of the research concerns building of a set of the macroeconomic factors to be analysed. These factors influence activities of an economic unit and determine its financial outputs (Chiaroni *et al.* 2010), therefore it is important to know these factors in advance, estimate their development and adapt to the resulting evolution (Arnold, Staffelbach 2012). The selection of the macroeconomic factors has been based on the review of publically available data. *Statistics Lithuania* (2015) publishes lists of the macroeconomic factors that are likely to influence individual business sectors. The selection includes such factors as the GDP, the gross value added, the inflation, the import, the export, the unemployment level in the country and the average wage (net of taxes).

These factors have been selected on the basis of macroeconomic reviews published by different banks (SEB, Swedbank, etc.) in the recent years.

The third phase of the research deals with drawing of a list of the financial indicators. The financial performance indicators have been chosen through an extensive analysis of the academic literature. It is recommended that the analysis should be structured around the main groups of financial indicators, i.e. the profitability, the efficiency of the activities, the financial stability, the liquidity and other indicators (Bivainis, Garškaitė 2010). It is appropriate to compare these indicators with the values of other companies or a business sector as a whole as published in statistic releases (Mackevičius, Poškaitė 1998; Bernstein 2000; Buškevičiūtė, Mačerinskienė 2004; Mackevičius 2007).

Some researchers often recommend assessing only the key financial indicators as part of financial performance analysis (Karalevičienė, Bužinskienė 2012; Buškevičiūtė, Mačerinskienė 2004, Mackevičius *et al.* 2008; Mackevičius, Valkauskas 2010). However, the most important financial indicators differ depending on a sector. Therefore with a view to identifying the macroeconomic factors that can specify the variation over time of a set of financial indicators, 20 indicators have been analysed, their statistical values being provided by *Statistics Lithuania* (Table 1). For reasons of expediency, these were grouped into four categories: profitability, financial leverage, liquidity and other, following the OMX Nasdaq (NASDAQ OMX 2010) classification.

Table 1. Groups of analysed indicators
(source: compiled by the authors)

Profitability indicators	Financial performance indicators		
	Financial leverage indicators	Liquidity indicators	Other indicators
Gross profitability, %	Debt ratio, %	Current liquidity ratio	Net working capital ratio
Net profitability, %	Long-term debt ratio, %	Critical liquidity ratio	
Profitability of the core activity, %	Short-term debt ratio, %		
Profitability of the ordinary activity, %	Financial dependency ratio, %		
Net profitability of the long-term assets, %	Debt to equity ratio		
Net profitability of the assets, %	Debt to capital employed ratio		
Net profitability of the equity, %	Gross solvency ratio		

End of Table 1

Profitability indicators	Financial performance indicators		
	Financial leverage indicators	Liquidity indicators	Other indicators
Profitability of the capital employed, %	Manoeuvrability ratio		
Cost-effectiveness of the activity, %			

Given that not all the business sectors have their financial indicators and macroeconomic factors consistently disclosed for the 2004–2014 period, the data covering 2008–2012 has been studied for the research purposes.

To establish the relationship between the macroeconomic factors and the financial indicators correlation-regression analysis has been applied. Correlation is defined as a parameter of certain stochastic processes applied in modeling as a measure of movement of two variables (Alexander 2001). Correlation coefficient is calculated in accordance with formula 1:

$$r = \frac{\overline{xy} - \bar{x} \cdot \bar{y}}{S_{ox} \cdot S_{oy}}; \quad (1)$$

$$\bar{x} = \frac{1}{n} \sum_{j=1}^n x_j; \quad (2)$$

$$\bar{y} = \frac{1}{n} \sum_{i=1}^m y_i; \quad (3)$$

$$S_{ox} = \sqrt{\overline{x^2} - (\bar{x})^2}; \quad (4)$$

$$S_{oy} = \sqrt{\overline{y^2} - (\bar{y})^2}, \quad (5)$$

where: $x - j^{th}$ macroeconomic factor; $y - i^{th}$ financial indicators of the business sector.

The analysis of the set of external environment factors specifying variation over time of financial indicators follows the assumption that a correlation coefficient falling within the interval:

- |0.00–0.24| defines correlation of a very weak form;
- |0.25–0.49| defines correlation of a weak form;
- |0.50–0.74| defines moderate correlation;
- |0.75–0.90| defines correlation of a strong form;
- |0.90–1.00| defines strong correlation.

To eliminate the links which define weak or moderate correlation between the macroeconomic factors and the financial performance indicators of different business sectors, the r values below |0.75| are filtered out and further analysis focuses on the r values defining strong correlation between the macroeconomic factors and the financial performance

indicators of business sectors. Quite often, the relationship between the financial indicators of the same business sector and the macroeconomic factors might be based on a few links. Therefore two pairs of values with the strongest correlation have been filtered.

To establish whether there exists a linear dependence between the selected values, a hypothesis has been formulated and a T-statistics test has been performed, where the significance level $\alpha = 0.05$. To verify this hypothesis, we have applied a statistic hypothesis of a zero correlation coefficient:

$$\begin{cases} H_0 : r = 0 \\ H_1 : r \neq 0 \end{cases}; \quad (6)$$

where: $H_0 : r = 0$ – zero hypothesis; $H_1 : r \neq 0$ – alternative to a zero hypothesis.

T-statistics of the criterion is calculated by applying formula 7:

$$T = r \sqrt{\frac{n-2}{1-r^2}}. \quad (7)$$

A hypothesis is accepted, when $t_{\alpha/2}(n-2)$ (Student's distribution with $(n-2)$ degrees of freedom critical value at $\alpha/2$ level) is larger than $|T|$. Then it is concluded that there exists a linear dependence between certain macroeconomic factor and certain a financial indicator of a business sector's performance.

3. Description of the findings from the research

The calculated correlation between the profitability indicators of business sectors and the selected macroeconomic factors has led to a conclusion that the specified indicators most often correlate with the unemployment level, the volume of export and import and the GDP (Table 2).

The majority of the profitability indicators have strongest correlation with the volume of import, when the gross profitability indicator, reflecting the ability of an economic unit to generate profit from the core activity of the company, to control sales income and sales costs, correlate with the unemployment level in the country.

The analysis of the correlation between the financial leverage indicators and the macroeconomic factors has led to a conclusion that the unemployment level is probably the most important factors affecting debt ratio (long-term and short-term) and gross solvency ratios, as well as debt to equity ratio (Table 3).

The inflation rates in the country, in turn, in many cases correlate with the financial dependency ratio of business sectors, enabling assessment of an economic unit's dependency upon external sources of funding, and with the manoeuvrability coefficient, defined as a short-term asset to equity ratio.

The correlation analysis of the current liquidity and macroeconomic factors has revealed that the unemployment

level, export and import in 55.86% of cases correlate with the given financial indicator (Fig. 1).

Correlation of the above macroeconomic factors is strongest with the ratio reflecting the extent to which short-term assets cover short-term liabilities of an economic unit. In other words, the unemployment level of the country, the

volume of export and the rate of inflation define the capacity of a business sector to discharge short-term liabilities by using available short-term assets within one year.

While the critical liquidity ratio which is deemed to be slightly more stringent than the current liquidity ratio because it does not involve estimation of reserves, correlates

Table 2. Macroeconomic indicators with the strongest correlation with the profitability indicators (Source: compiled by the authors)

Group of financial performance indicators	Indicator	Correlation of the indicator with the macroeconomic indicators (weight of indicator, %)
Profitability indicators	Gross profitability, %	Unemployment level (21.97%), export (21.21%) and import (19.70%).
	Net profitability, %	Import (28.46%), export (20.77%) and GDP (15.38%).
	Profitability of the core activity, %	Import (23.13%), GDP (16.42%) and export (14.93%).
	Profitability of the ordinary activity, %	Import (28.03%), export (20.45%) and inflation (14.39%).
	Net profitability of the long-term assets, %	Import (26.97%), export (26.32%) and GDP (11.84%).
	Net profitability of the assets, %	Import (23.68%), export (22.37%) and GDP (16.45%).
	Net profitability of the equity, %	Inflation (20.59%), GDP (19.85%) and import (17.65%).
	Profitability of the capital employed, %	Import (23.81%), export (19.73%) and GDP (17.01%).
	Cost-efficiency of the activity, %	Import (22.76%), export (22.07%) and inflation (15.17%).

Table 3. Macroeconomic factors with the strongest correlation with leverage indicators (Source: compiled by the authors)

Group of financial performance indicators	Indicator	Correlation of the indicator with macroeconomic factors (weight of indicator, %)
Financial leverage indicators	Debt ratio, %	Unemployment level (20.72%), export (20.72%) and inflation (20.72%).
	Long-term debt ratio, %	Unemployment level (29.82%), export (28.07%) and inflation (16.67%).
	Short-term debt ratio, %	Unemployment level (17.58%), inflation (15.38%) and import (15.38%).
	Financial dependency ratio, %	Inflation (31.93%), unemployment level (26.89%) and export (10.92%).
	Debt to equity ratio	Unemployment level (40.37%), inflation (32.11%) and import (9.17%).
	Debt to capital employed ratio	Unemployment level (34.95%), inflation (25.24%) and import (19.42%).
	Gross solvency ratio	Unemployment level (23.21%), export (1.42%) and inflation (17.86%).
	Manoeuvrability coefficient	Inflation (18.35%), export (16.51%) and unemployment level (15.60%).

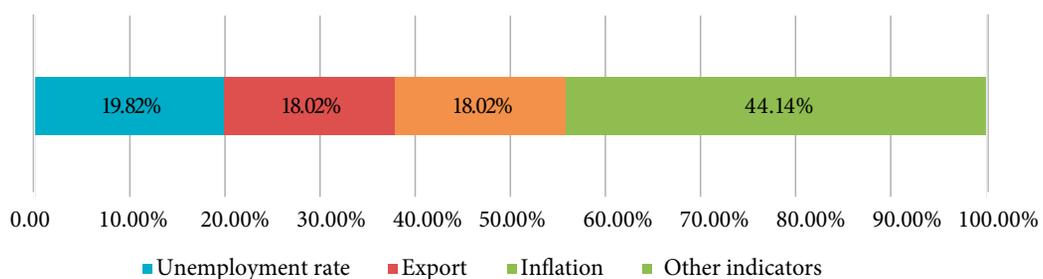


Fig. 1. Set of the macroeconomic factors correlating with the current liquidity ratio (Source: compiled by the authors)

with the import, the unemployment level and the export (Fig. 2).

As part of assessment of the set of macroeconomic factors correlating with the critical liquidity ratio, it should be remembered that in some business sectors, the settlement of accounts between the buyers and the economic units is typically short or creditworthiness is typically high. It is therefore necessary to identify additional variables that can potentially influence the critical liquidity ratio of an economic unit or a business sector as a whole.

The research has concluded that the net working capital ratio indicating the proportion of the assets falling on the funds earmarked for circulation correlates with the unemployment level (20.48%), the volume of import (15.66%) and the rate of inflation in the country (15.66%) (Fig. 3).

Once it has been established which macroeconomic factors correlate with the profitability, financial leverage, liquidity and other indicators, it has been assessed whether there exists linear dependency between these, i.e. a regression analysis has been performed. The T-statistics test has led to a finding that although the variables are correlated, the links between the macroeconomic factors and the financial performance indicators of business sectors are not always these of linear dependency.

Hence, based on the findings of the correlation-regression analysis, the final list of the macroeconomic indicators was drawn, as provided in Table 4.

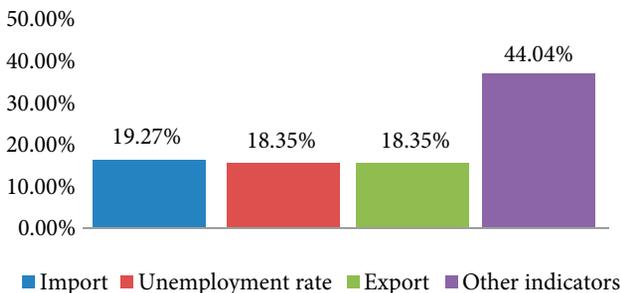


Fig. 2. Set of the macroeconomic factors correlating with the critical liquidity ratio (Source: compiled by the authors)

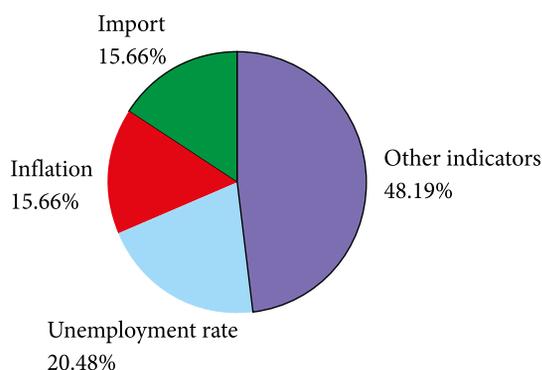


Fig. 3. Set of the macroeconomic factors correlating with the net working capital ratio (Source: compiled by the authors)

Comparison of the results from the correlation and correlation-regression analysis shows that with correlation analysis only, the inflation rates have bigger weight in the research as to what macroeconomic factors influence variation over time of the financial indicators. While the results of regression analysis indicate that this macroeconomic factor often can not be used to measure variation over time of business sectors' financial indicators. The unemployment level in the country, the volumes of export and import and the GDP are probably the most important macroeconomic factors that can be applied with a view to forecasting different financial performance indicators of individual business sectors or companies in terms of profitability, financial leverage and other aspects.

Since the research has not revealed any significant differences between business sectors, the below listed factors can be defined as generic macroeconomic factors enabling to define financial performance indicators of 89 business sectors:

- import;
- export;
- unemployment level in the country;
- GDP.

Therefore it is necessary to focus on the identification and analysis of the specific factors and the establishment of the causal links. When established, the set of such factors provides a framework for building of a model to forecast financial indicators of business sectors.

Conclusions and recommendations

Financial performance indicators are among the most important indicators defining business success of an economic unit (a company or a business sector). Since financial statements reflect the current situation, they can be applied to analyse economic activities with a view to estimating future financial prospects of an economic unit. The analysis of the financial performance is considered an important analytic tool providing significant insights into the cost structure, possibilities to increase capital and the available reserves and the effectiveness of the assets.

In Lithuania, financial performance indicators are usually analysed to assess probability of bankruptcy of an economic unit, however emerging of one or another crisis and efforts to identify what errors had been made and what led to an adverse situation, cause significant amount of debates, therefore analysis into the development of macroeconomic and financial indicators is becoming particularly relevant.

A research of macroeconomic factors explaining variation over time of corporate financial indicators taking into consideration the specific characteristics of a particular business sector has to be performed in stages. First of all, the macroeconomic factors that correlate with the financial performance indicators of an economic unit are identified.

Table 4. Macroeconomic factors linked with the financial indicators based on the results of T-statistics test
(Source: compiled by the authors)

Group of financial performance indicators	Indicator	Correlation of an indicator with the macroeconomic indicators (weight of indicator, %)
Profitability indicators	Gross profitability, %	Export (22.05%), unemployment level (20.47%) and import (20.47%).
	Net profitability, %	Import (31.09%), export (22.69%) and unemployment level (17.65%).
	Profitability of the core activity, %	Import (25.20%), GDP (17.89%) and export (16.26%).
	Profitability of the ordinary activity, %	Import (31.09%), export (22.69%) and GDP (15.13%).
	Net profitability of the long-term assets, %	Import (30.37%), export 29.63% and GDP (13.33%).
	Net profitability of the assets, %	Import (26.87%), export (25.37%) and GDP (18.66%).
	Net profitability of the equity, %	GDP (22.69%), import (20.17%) and export (18.49%).
	Profitability of the capital employed, %	Import (27.56%), export (22.83%) and GDP (19.69%).
Financial leverage indicators	Cost-efficiency of the activities, %	Import (25.38%), export (24.62%) and GDP (16.15%).
	Debt ratio, %	Unemployment level (20.72%), export (20.72%) and inflation (20.72%).
	Long-term debt ratio, %	Export (32.65%), unemployment level (31.63%) and import (19.39%).
	Short-term debt ratio, %	Unemployment level (18.68%), import (15.38%) and GDP (15.38%).
	Financial dependency ratio, %	Inflation (31.62%), unemployment level (26.50%) and export (11.11%).
	Debt to equity ratio	Unemployment level (36.76%), inflation (19.12%) and import (14.71%).
	Debt to capital employed ratio	Unemployment level (31.51%), export (27.40%) and inflation (12.33%).
	Gross solvency ratio	Unemployment level (26.53%), export (25.51%) and import (18.37%).
Liquidity indicators	Manoeuvrability coefficient	Export (18.56%), unemployment level (17.53%) and import (17.53%).
	Current liquidity ratio	Unemployment level (23.91%), export (21.74%) and import (17.39%).
Other indicators	Critical liquidity ratio	Import (21.88%), unemployment level (20.83%) and export (20.83%).
Other indicators	Net working capital ratio	Unemployment level (20.48%), import (15.66%) and inflation (15.66%).

Once the factors with the strongest correlation links are established, a research has to be performed to confirm dependency of the variables (for instance, to determine the existence of a linear dependency T-statistics test is applied), i.e. a regression analysis is performed. Where it is established that there is no dependency between certain macroeconomic factors, these have to be eliminated from further research to ensure higher precision of the results. In addition to the correlation analysis, a regression analysis is hence needed.

As indicated by the present research, the unemployment level in the country, the export and import and the GDP are the most important macroeconomic factors that can be used to forecast the financial performance indicators of different business sectors or individual companies in terms of profitability, financial leverage, liquidity and other aspects. The above factors can be considered generic macroeconomic factors, as the researches have not pointed to any significant differences between different business sectors.

The results achieved by the present research provide all the grounds for a new study to identify the external environment factors typical to each business sector. Once correlating and statistically significant indicators are selected

(for this purpose, ANOVA model is to be built) these can be integrated into a generic model enabling to define variation over time of financial performance indicators of a specific business sector.

References

- Alexander, C. 2001. *Market models: a guide to financial data analysis*. New York: John Wiley & Sons.
- Auškalnytė, R.; Ginevičius, R. 2001. Konkurencinio pranašumo įvertinimas priimant strateginius sprendimus, *Inžinerinė ekonomika* 2(22): 66–71.
- Arbidane, I.; Volkova, J. 2012. External factors influencing management of company's current assets, *Management theory and studies for rural business and infrastructure development* 34(5): 7–14.
- Arnold, A.; Stafeelbach, B. 2012. Perceived post-restructuring job insecurity: the impact of employees' trust in one's employer and perceived employability, *Zeitschrift für Personalforschung* 26(4): 307–330.
<http://dx.doi.org/10.1177/239700221202600405>
- Bagdžiūnienė, V. 2005. *Įmonių veiklos planavimas ir analizė. Esmė ir verslo situacijos*. Vilnius: Conto litera.
- Bernstein, L. 2000. *Analysis of financial management*. New York: McGrawHill.

- Beker, R. 2012. The impact of macroeconomic indicators upon SME's profitability, *Ekonomika* 91(3): 117–128.
- Bivainis, J.; Garškaitė, K. 2010. Įmonių bankroto grėsmės diagnostikos, *Verslas: Teorija ir praktika* 11(3): 204–212.
- Boreikis, R.; Plinkus, D. 2009. Makroekonominė rodiklių ir akcijų kainų tarpusavyje ryšys Baltijos šalyse, *Economics and Management* 14: 692–699.
- Bruner, R. et al. 2012. *Case studies in finance managing for corporation value*. 7th ed. New York: McGraw-Hill/Irwin.
- Buškevičiūtė, E.; Mačerinskienė, I. 2004. *Finansų analizė*. Kaunas: Technologija.
- Chiaroni, D.; Chiesa, V.; Frattini, F. 2010. Unravelling the process from Closed to Open Innovation: evidence from mature, asset-intensive industries, *R&D Management* 40(3): 222–245. <http://dx.doi.org/10.1111/j.1467-9310.2010.00589.x>
- Danilenko, S. 2009. Makroekonominė procesų poveikio akcijų rinkai tyrimas, *Economics and Management* 14: 731–736.
- Džikevičius, A., et al. 2011. Can financial ratios help to forecast stock prices?, *Journal of Security and Sustainability Issues* 1(2): 147–157. [http://dx.doi.org/10.9770/jssi.2011.1.2\(7\)](http://dx.doi.org/10.9770/jssi.2011.1.2(7))
- Franceschini, F., et al. 2014. Impact of performance indicators on organisations: a proposal for an evaluation model, *Production Planning & Control: the Management of Operations* 25(9): 783–799.
- Ginevičius, R.; Čirba, S. 2009. Additive measurement of market concentration, *Journal of Business Economics and Management* 10(3): 191–198. <http://dx.doi.org/10.3846/1611-1699.2009.10.191-198>
- Gourdin, K. N. 2006. *Global logistics management – a competitive advantage for the 21st century*. New Jersey: Blackwell Publishing.
- Gökçekhan Demirhan, H.; Anwar, W. 2014. Factors affecting the financial performance of the firms during the financial crisis: evidence from Turkey, *Ege Strategic Research Journal* 5(1): 65–80. <http://dx.doi.org/10.18354/esam.70099>
- Janovič, V. 2012. Įmonių perspektyvinė finansinė analizė esant neapibrėžtumui, *Mru Business Systems and Economics* 2(1): 102–115.
- Joy, S. R. 2008. Make haste or waste: a case study on predicting bankruptcy of weyst oyl corporation using Altman's Z-Score model, *DLSU Business & Economics Review* 17(1).
- Juozaitienė, L. 2000. *Įmonės finansai: analizė ir valdymas*. Šiauliai: Šiaulių universiteto leidykla.
- Karalevičienė, J.; Bužinskienė, R. 2012. Modernių bankroto modelių tinkamumo įvertinimas įmonių bankroto diagnostikai, *Journal of Management* 1(20): 45–54.
- Katja, L. 2009. *Assessing the resource usage decisions and financial performance in Finnish sawmills within the resource-based view framework*: Academic dissertation. University of Joensuu.
- Lazauskas, J. 2005. *Įmonių ūkinės ir komercinės veiklos ekonominė analizė*. Vilnius: Technika.
- Liučvaitienė, A.; Paleckis, K. 2011. Šiuolaikinio verslo konkurencingumo formavimo ir vertinimo teoriniai modeliai ir jų taikymo galimybės, in *Contemporary Issues in Business, Management and Education*, 17 November 2011, Vilnius, Lithuania, 195–210.
- Mackevičius, J.; Poškaitė, D. 1998. *Finansinė analizė*. Vilnius: Katalikų pasaulis.
- Mackevičius, J. 2005. *Įmonių veiklos analizė. Informacijos rinkimas, sisteminimas ir vertinimas*. Vilnius: TEV.
- Mackevičius, J. 2007. *Įmonės veiklos analizė. Informacijos rinkimas, sisteminimas ir vertinimas*. Vilnius: TEV.
- Mackevičius, J. 2008. Ilgalaikio materialiojo turto kompleksinės analizės metodika, *Verslas: teorija ir praktika* 9(4): 237–244.
- Mackevičius, J., et al. 2008. Bendrojo pardavimo pelningumo kompleksinės analizės metodika, *Ekonomika: mokslo darbai* (81): 74–89.
- Mackevičius, J. 2010. Integruota įmonių bankrotų prognozavimo metodika, *Verslo ir teisės aktualijos* 5: 123–138
- Mackevičius, J.; Valkauskas, R. 2010. Integruota įmonės finansinės būklės ir veiklos rezultatų analizės metodika, *Verslas: teorija ir praktika* 11(3): 213–221.
- Martišius, A. S.; Martišius, M. 2008. Information Society and statistics, *Economics of Engineering Decisions* 5(60): 16–23.
- Misiūnas, A. 2011. Nekilnojamojo turto sektoriaus pokyčiai Lietuvos ūkio kontekste, *Lietuvos statistikos darbai* 50(1): 49–57.
- NASDAQ OMX. 2010. *Įmonių finansinė analizė. Rodiklių skaičiavimo metodika* [online], [cited 1 March 2015]. Stock exchange NASDAQ OMX Vilnius. Available from Internet: http://www.nasdaqomxbaltic.com/files/vilnius/leidiniai/Rodikliu_skaiciavimo_metodika-final.pdf
- Periasamy, P. 2005. *A textbook of financial cost and management accounting*. Mumbai: Himalaya Publishing House.
- Plinkus, D. 2010. Stock market and macroeconomic variables evidences from Lithuania, *Economics and Management* 15: 884–889.
- Statistics Lithuania [online]. 2015 [cited 1 March 2015]. Available from Internet: <http://www.stat.gov.lt/en>
- Stundžienė, A.; Bliedienė, R. 2012. Ekonomikos svyravimų įtaka įmonių veiklos rezultatams, *Verslas: teorija ir praktika* 13(1): 5–17.
- Tvaronavičienė, M.; Michailova, J. 2006. Factors affecting stock prices: theoretical versus practical approach, *Journal of Business Economics and Management* 7(4): 213–222.
- Žvirblis, A.; Rimkevičiūtė, V. 2012. Lietuvos investicinių fondų rodiklių ir makroveiksmų vertinimas, *Socialinių mokslų studijos* 4(1): 111–123.
- Wei, K.; Zhang, Y. 2008. Ownership structure, cash flow, and capital investment: evidence from East Asian economies before the financial crisis, *Journal of Corporate Finance* 14(2): 118–132. <http://dx.doi.org/10.1016/j.jcorpfin.2008.02.002>

Audrius DŽIKEVIČIUS is a docent at the Vilnius Gediminas Technical University, Department of Finance Engineering, since 2007. His scholarly interests cover areas such as management of portfolio risk, forecasting and modelling of financial markets, appraisal of business by qualitative methods, strategic corporate finance management decisions.

Svetlana ŠARANDA completed master studies at the Vilnius Gediminas Technical University, Department of Finance Engineering, in 2012. Her scholarly interests cover areas such as forecasting and modelling of financial markets and market analysis.