

## OVERALL MACROECONOMIC ENVIRONMENT IMPACT ON BUSINESS DEMOGRAPHY

Astra Auziņa<sup>1</sup>, Remigijs Počs<sup>2</sup>

Faculty of Engineering Economics, Riga Technical University, Kalku iela 1, LV-1658,  
Riga, Latvia, e-mail: <sup>1</sup>astra.auzina@rtu.lv; <sup>2</sup>remigijs.pocs@rtu.lv

**Abstract.** Economic environment has a considerable effect on business activity in any country, and the recent fast macroeconomic development pace in the new EU member states claims detailed analysis concerning the influence on business activity indicators. The paper is devoted to the estimation of relationships between overall macroeconomic development and business activity in the Baltic States. The empiric research of the application of econometric methods indicates that the business activity is influenced by a composite of factors. The impact of individual macroeconomic factors, as real GDP growth rate, inflation, labour productivity, is examined and estimated. Business activity and business demography behaviour equations can be integrated in macroeconomic models, including multisectoral macroeconomic models. Detailed estimation and evaluation of existing relationships between indicators provide valuable information for entrepreneurs, managers, potential investors, government and other institutions to make optimal decisions.

**Keywords:** macroeconomic development, business demography, regression analysis, multisectoral macroeconomic models.

### 1. Introduction

Entrepreneurship and private initiative are some of the key driving forces in contemporary economy. Entrepreneurship is a complex process that incorporates a wide variety of resources and searching the optimal composition of them, including human resources, skills, techniques, predictions and estimations. Decisions made by entrepreneurs are based on objective and subjective attitude towards internal and external processes.

Business demography indicators illustrate the existing business pattern whether it is a long-run project or it is a short-run project. Issues regarding business demography and its forecasts are interesting, firstly, for entrepreneurs and managers to take into account and make a lesson from own and/or rivals experience, secondly, for investors to evaluate the present and potential investments and relocate if required, thirdly, for government to plan and adapt the economic and other policies to reach the stated short-term and long-term goals, fourthly, for non-government institutions to analyse the current stage, for instance, in job market, fifthly, for international organizations, research institutions, universities, business analysts and consultants etc. to be informed and predict potential business activity changes and shifts of particular company, branch or general economy-wide trends.

Many authors [1–3] mainly focus their studies on internal factors that influence business activity and consequently business demography, hence the impact of external factors are covered and investigated on minor extend [4–6]. Some macroeconomic researches analyse major issues regarding business activity [7, 8]. Reveal and evaluation of overall macroeconomic environment and its changes impact on business demography is the goal of the research, which results are presented in this paper. The applied methods by this research are inductive and deductive methods, analysis and synthesis methods, generalization, statistical and modelling methods.

### 2. Analysis of trends in the Baltic States

Business demography is considerably new concept, however the meaning covered by it has been widely examined and studied under similar studies.

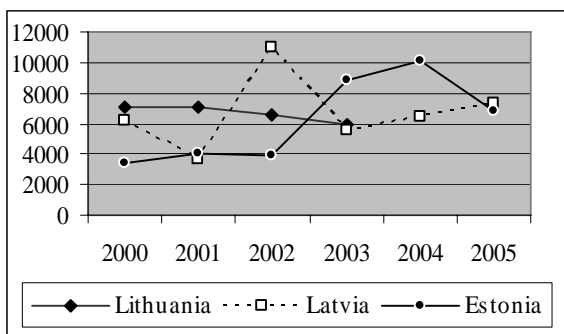
The statistical indicators used to characterise the business demography is the following [9]:

- Number of enterprises – the number of active enterprises of year  $n$ .
- Birth rate of enterprises – the ratio between the number of enterprises created/started of year  $n$  and the population of active enterprises of year  $n$ .
- Survival rate of enterprises – the percentage of all enterprise started of year  $n-2$  which are still active in year  $n$ .

- Death rate of enterprises – the ratio between the number of enterprise deaths of year  $n$  and the population of active enterprises of year  $n$ .

Total number of enterprises created per year in the Baltic States significantly fluctuates (see Fig 1). It is observable that the overall economic activity increases.

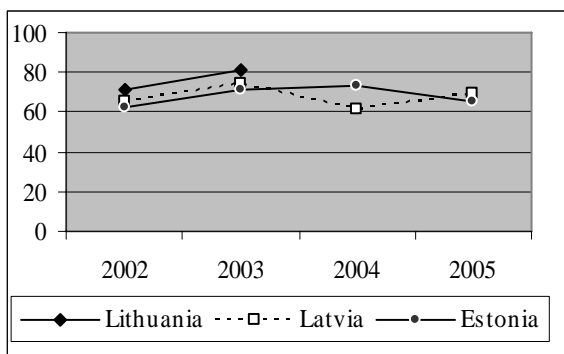
Business survival indicators are more important for analysis of business continuity [10, 11] and long-run business pattern in a country [12]. According to the international comparison of the countries included in Eurostat data base [9], in Latvia the survival rate is one of the lowest, but in Lithuania and Estonia the rates are close to the average.



Data source: Eurostat  
Data for Lithuania only till 2003 in the source.

Fig 1. Number of births of enterprises

The dynamics of business survival rate in the Baltic States are illustrated by Fig 2.

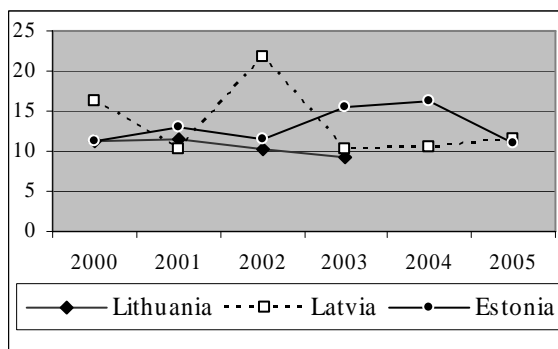


Data source: Eurostat  
Data for Lithuania only till 2003 in the source.

Fig 2. Business survival rate

The analysis of business birth rates in the Baltic States shows that national business activity fluctuates and retains considerably high level (see Fig 3).

According to Eurostat data, in 2005 the highest business birth rate among the EU member states was in Romania (18.3); however the data of 8 EU member states (Bulgaria, Belgium, Czech Republic, Denmark, France, Lithuania, Slovenia, and Sweden) were not available.



Data source: Eurostat  
Data for Lithuania only till 2003 in the source.

Fig 3. Business birth rate

The analysis of dynamics gives a general insight in trends; however at the current development pattern of the Baltic economies it is more important to reveal the influence of wide variety of factors, including major macroeconomic factors. Therefore more sophisticated methods should be applied to.

### 3. Method

Macroeconomic indicators (as annual time series) used to reveal the existing relationship are real gross domestic product (GDP) growth rate, harmonised annual average consumer price index, labour productivity per person employed, and GDP per capita in PPS.

The pre-study hypothesis is stated that overall macroeconomic environment influences business activity. To detect and estimate individual influence of macroeconomic factors a detailed analysis is applied (see Equations (1)–(4)).

$$\log(e_{i,t}) = a_0 + a_1 \times \log(gdp_{i,t}) + \varepsilon, \quad (1)$$

$$\log(e_{i,t}) = a_0 + a_1 \times \log(i_{i,t}) + \varepsilon, \quad (2)$$

$$\log(e_{i,t}) = a_0 + a_1 \times \log(lp_{i,t}) + \varepsilon, \quad (3)$$

$$\log(e_{i,t}) = a_0 + a_1 \times \log(gdp - p_{i,t}) + \varepsilon, \quad (4)$$

where  $e_{i,t}$  – number of enterprises in country  $i$ , in time period  $t$ ;  $gdp_{i,t}$  – real GDP growth rate in country  $i$ , in time period  $t$ ;  $lp_{i,t}$  – labour productivity in country  $i$ , in time period  $t$ ;  $gdp - p_{i,t}$  – GDP per capita in PPS in country  $i$ , in time period  $t$ ;

The above-mentioned four econometric equations are estimated for Latvia, Lithuania, and Estonia. As in all countries the equation estimation faces considerably short time series, theoretical models that integrated more than three independent variables are not applicable at the current data endowment conditions.

However, the estimation of influence of macroeconomic factors composite on business activity and development has an utmost importance for financial

intermediation, insurance and business consulting companies, government policy makers and other institutions. Equation (5) illustrates the influence of such macroeconomic indicators as GDP growth rate ( $gdpi,t$ ), productivity ( $lpi,t$ ), unemployment ( $ui,t$ ), GDP per person ( $gdp_pi,t$ ), savings ( $si,t$ ), and wages ( $wi,t$ ) to estimate the impact on the entrepreneurial activity.

$$e_{i,t} = a_0 + a_1gdpi,t + a_2lpi,t + a_3ui,t + a_4gdp_pi,t + a_5si,t + a_6wi,t + a_7time + \varepsilon \quad (5)$$

In Equation (5) additional factors can be included, which characterizes current and potential entrepreneurs' and managers' behaviour and decision-making specifics.

#### 4. Data

Eurostat data base is used as a data source for all macroeconomic environment indicators to insure the data comparability. Business activity indicators are published in Eurostat data base with a lag, hence the most recent changes in the economy are absent. Therefore, the data sources of the business activity statistics are the national statistical offices [13–15].

Business demography indicators published by Eurostat are available for majority of the European Union (EU) member states (Czech Republic, Estonia, Spain, Italy, Latvia, Lithuania, Luxembourg, Hungary, Netherlands, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, and United Kingdom).

The logarithms of the series are used to perform comparisons. Data period is 2000–2006. Software *EViews* is used for estimation.

#### 5. Results

**Latvia:** According to the estimation results, there is a considerably weak relationship between the real GDP growth rate ( $GDP\_LV$ ) and number of active enterprises ( $E\_LV$ ). The signs of the coefficients are according to the economic theory – economic development stimulates overall economic activity and creation of new businesses. In a result, during the economic growth period the survival rates are higher and death rates are lower.

By equation (6) more than 47 percent of changes in dependent variable can be explained.

$$\text{LOG}(E\_LV) = 9.232 + 0.76696 * \text{LOG}(GDP\_LV), \quad (6)$$

(t-Statistic) (11.977)      (2.122)

R – squared ( $R^2$ )=0.474;  
Durbin-Watson statistic (DW)=1.37.

General price changes are one of the factors that are assumed to have a negative impact on the business activity. However, in Latvia, high level of inflation is bundle with fast economic development, productivity increase, new potential exports markets and other factors, and hence there is observable weak and in-

definite influence of inflation as single independent factor (see Equation (7)).

$$\text{log}(E\_LV) = 10.368 + 0.3715 * \text{log}(I\_LV), \quad (7)$$

(56.04)      (2.838)

$R^2=0.617$ ;  $DW=1.50$ ;

where  $I\_LV$  – harmonised annual average consumer price indices.

According to the econometric estimation, there is a relationship between recent increase in labour productivity and business activity (considerably high level of determination coefficient (0.82)). Estimated equation (8) indicates that productivity increase stimulates business activity; in particular, it is a newsworthy issue in Latvia, concerning the rocketing real wage increase in the past years.

$$\text{log}(E\_LV) = 1.780 + 2.3841 * \text{log}(LP\_LV), \quad (8)$$

(0.941)      (4.798)

$R^2=0.822$ ;  $DW=1.51$ ;

where  $LP\_LV$  – labour productivity per person employed ( $EU-27=100$ ).

As the level of labour productivity in Latvia is the second lowest in the EU (52.8 % of the EU-27 average in 2006), increase in productivity is also expected in the future.

Average individual wealth and incomes indicate exiting and potential consumption pattern and volume, thus it illustrates approaching business options in certain sectors. GDP per capita has increased noticeably in past years due to the overall economic development and decrease in population. There is a considerably strong estimated relation between business activity and GDP per capita (see Equation (9)).

$$\text{log}(E\_LV) = 4.698 + 1.6264 * \text{log}(GDP\_P\_LV), \quad (9)$$

(4.334)      (5.689)

$R^2=0.866$ ;  $DW=1.70$ ;

where  $GDP\_P\_LV$  – GDP per capita in PPS ( $EU-27 = 100$ ).

Due to the short time series and overall economy-wide changes and development that affect both dependent and independent variables, in some equations, there is evidence of positive serial correlation.

Evaluating the changes in the number of active enterprises by the estimated equation (6), and integrating the official forecasts of Ministry of Economics (of Latvia) [16] that considers two potential development scenarios of the national economy – dynamic development (average annual GDP growth rate of 8 %) and medium development (5 %) –, the results show that the estimated number of active enterprises are 48,6 thsd. and 48,1 thsd. enterprises. As the estimation of the parameters of Equation (6) is affected by the considerably short time series covering the time period when the annual GDP growth rates very high and there are estimated individual factor's influ-

ence, then it is well-grounded to use other equations to model the complex impact of macroeconomic environment.

**Lithuania:** Estimation of the relation between business activity and real GDP growth rate indicates a strong relationship (see Equation (10)). Value of coefficient of determination is high (0.995).

$$\log(E_{LT}) = 11.059 + 0.0261 * \log(GDP_{LT}) - 0.0248 * TIME, \quad (10)$$

(959.5)      (3.384)  
(-15.454)

$R^2=0.995$ ;  $DW=2.54$ ;

where  $E_{LT}$  – number of enterprises (in period  $t$ ).

The coefficient's value of real GDP growth (0.0261) indicates that the overall economic development has lesser impact on business activity in Lithuania than in Latvia and Estonia.

Statistically significant relationships between the number of enterprises and inflation are not established. It indicates that recent price increase due to internal and external factors is only one of the influencing factors and in some cases its influence might be overestimated.

According to econometric estimates the labour productivity convergence with the EU-27 average level negatively influences the entrepreneurial activity (see Equation (11)). As the analysis focuses on economy-wide business activity and economy-wide labour productivity changes, individual shifts in certain sectors and branches are obscure.

$$\log(E_{LT}) = 12.259 - 0.3139 * \log(LP_{LT}), \quad (11)$$

(24.33)      (-2.450)

$R^2=0.667$ ;  $DW=2.49$ .

Analysis of GDP per capita impact on business activity leads to a similar phenomenon (see Equation (12)). The gradual and fast convergence with the EU-27 average and changes in business activity develop with different speed. In Lithuania, since 2000 GDP per capita in PPS has increased from 39.4 % to 57.7 % of the annual EU-27 average, but the number of enterprises fluctuates.

$$\log(E_{LT}) = 11.869 - 0.2183 * \log(GDP_P_{LT}), \quad (12)$$

(53.93)      (-3.805)

$R^2=0.784$ ;  $DW=2.59$ .

**Estonia:** According to the estimation results, there is a strong relationship between the real GDP growth rate and business activity (see Equation (13)). The value of coefficient of determination (0.998) indicates that the estimated equation explains the changes in dependent variable to a large extent.

$$\log(E_{EE}) = 10.155 + 0.0680 * \log(GDP_{EE}) + 0.0662 * TIME, \quad (13)$$

(246.1)      (3.615)  
(40.686)

$R^2=0.998$ ;  $DW=2.26$ ;

where  $E_{LT}$  – economically active enterprises (in period  $t$ ).

According to the estimation, the statistically significant relationships between the number of enterprises and inflation are not established in Estonia, likewise in Lithuania. But the productivity and GDP per capita coefficients have positive value that indicates positive relationship between independent and dependent variables (see Equations (14) and (15)).

$$\log(E_{EE}) = 5.849 + 1.1811 * \log(LP_{EE}), \quad (14)$$

(48.48)      (38.846)

$R^2=0.997$ ;  $DW=3.51$ .

There are a strong relationship between business activity and GDP per capita convergence with the EU-27 average. The higher the GDP per capita the more it stimulates the economic activity. However, the coefficient value is lower (0.959) than in Latvia (1.626).

$$\log(E_{EE}) = 6.740 + 0.9590 * \log(GDP_P_{EE}), \quad (15)$$

(34.72)      (19.699)

$R^2=0.992$ ;  $DW=3.23$ .

Due to the short time series and factors that affect both dependent and independent variables; in some equations, there is statistical evidence that the error terms may be negatively autocorrelated.

The research confirms the pre-study hypothesis that entrepreneurship activities are influenced by the composite of factors and a separate factor has low level of influence. According to economic theory, general economic development and increase in personal income should encourage and stimulate personal saving and consequently investment activities [4, 5]. However, the econometrical estimates of time series show weak relationship between the number of new businesses started (birth rate of enterprises) and real GDP growth rate in Latvia, Lithuania, and Estonia.

## 6. Conclusions

Economic development, inflation, productivity, GDP per capita and business activity relationships are econometrically estimated in Latvia, Lithuania, and Estonia. The revealed statistically significant estimated equations can be used to forecast further business activity development in the Baltic States.

Empiric research of the evaluation of the impact of macroeconomic environment on business activity in the Baltic States enables to state that:

- Presented method can be used by companies, government, and other institutions to analyse and estimate the impact of macroeconomic factors on national business activity overall;

- The method can be used to carry out international comparisons to investigate the business environment using additional alternative tools;
- The method encloses several drawbacks regarding the adequate evaluation of parameters' values due to availability and newness of the statistical data (both business demography and macroeconomic data). However, the presented method can be used for analysis and modelling purposes.

Business activity and business demography behaviour equations can be integrated in macroeconomic models, including multisectoral macroeconomic models. Detailed estimation and evaluation of existing relationships between indicators provide valuable information for entrepreneurs, managers, potential investors, government, international institutions, and other institutions to make optimal decisions.

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