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Labor Share in National Income: Implications in the Baltic Countries

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Abstract: Despite the fact that stability of labor share in national income is a key foundation in macroeconomic models, scientists acknowledge, that in the last three decades it has been declining around the world. The Baltic countries are not an exception; they follow similar patters to large economies, thus the research aims at determining economic factors at play. With the help of error correction model and time series data covering the past twenty years, we determine factors which contribute to the decline of labor share in the Baltic countries. We find significant long-term relationships between labor share and government spending, trade openness, and emigration. Government spending exhibits the highest contribution to variance of labor share in Lithuania, which also explains a large part of Latvia's labor share variations. We find many similarities between the analyzed countries, however some differences are also visible.

Key words: Baltic countries, income distribution, labor economics, labor share

JEL Classification: J01, J30, E25, D33

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Introduction

With intensifying globalization processes, the topic of changes in labor share and its implications has gained renewed attention from the scientific community. Scientists acknowledge the fact that labor share in national income is declining around the world (Berthold, Fehn, Thode, 1999; EC, 2007; Giovannoni, 2008; Rodriguez and Jayadev, 2010; Dunhaupt, 2013; Izyumov and Vahaly, 2014; etc.). This decline points to large social implications since capital share might benefit more from economic growth than labor (Piketti, 2014) and factors such as openness to trade, mobility opportunities and government policies. Furthermore, the implications of changing labor shares on income inequality is often claimed (Guscina, 2006; Dauey and Garcia-Penalosa, 2007; Checchi and Garcia-Penalosa, 2009; Piketty, 2014) and rising income inequality is closely related to the ownership of assets and the bargaining power over them.

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The stability of labor share in national income and factors affecting it caught the attention of economists once sufficient empirical data became available. Nevertheless, most of the analyses are currently related to groups of developing or developed countries, rarely focusing on more dynamic, small open economies[2].

Lithuania, Latvia and Estonia, as the Baltic countries, have undergone a rapid economic restructuration by moving from fully socialist to rather open market economies, opening their borders and leaving their citizens' incomes vulnerable to international competition, changes in government expenditure, emigration, informal economy and other factors. This raises an interesting research question: what economic factors affect the labor share in small open economies and how? Thus, this article aims at identifying economic factors influencing changes in labor share of the three Baltic countries and revealing the implications of these changes.

1. Overview of literature on labor share

Once sufficient empirical evidence became available, economists started to study the dynamics of factor shares (Blanchard, 1997; Giammarioli, Messina, Steinberger and Strozzi, 2002; EC, 2007; Rodriguez and Jayadev, 2010; Young, 2010; Guerriero, 2012; Grover and Short (2016); etc.), but the majority came to the conclusion that labor share components are not able to fully explain the downward trend of labor share, which is visible in the majority of countries and most pronounced in Continental Europe. Thus, the studies related to labor share shifted into the direction of finding forces responsible for the decline[3].

There are number of economic factors discussed in scientific publications which might have an effect on the long-term shifts in labor and capital shares in national income (Slaughter and Swagel 1997; Rodic, 1998; Diwan, 2001; Bertolila, Saint-Paul, 2003; Harrison, 2005; Guscina, 2006; Bertoli and Farina, 2007; Giovannoni, 2008; Stockhammer, 2009; van Treeck and Wacker, (2017); etc.). Some factors are more often studied than others. Most attention is given to trade openness, liberalization, financial globalization, biased technological progress, active labor policies, bargaining power changes, etc.; less popular connections to factor shares are the level of privatization (Torrini, 2005; Azmat, Manning and Reenen, 2007), the level of development (Maarek, 2010), democracy (Rodric, 1998), financial crisis (Diwan, 2001) and feminization of labor force (Finnoff and Jayadev, 2006).

Various scientific contributions outline different combinations of economic factors responsible for the changes in labor shares. Nevertheless, in the case of this research, the authors are limited to the examination of a smaller group of economic factors due to

[2] The author defines small open economies as active participants in the international trade and price takers in the world market (Wynne, 2007).
[3] For detailed analysis on declining labor share in the Baltic countries, refer to Razgune and Lazutka (2015).

data availability issues for the Baltic countries. Thus, labor productivity, trade openness, inward FDI, government spending, emigration and GDP per capita factors are studied.

Government spending plays an important role in the European economies, such as the Baltic countries, since its redistribution power is still significant even though it is declining. Striving towards market economy through the liberalization and privatization of the state-owned enterprises has been a distinct feature of the former Soviet Union states, such as the Baltic countries. Therefore, it is important to look at the liberalization effects as well. For instance, government spending (GOV) has diminished in all Baltic countries since 1995. In Estonia it has decreased by 6%, in Latvia by close to 9% and in Lithuania the decrease reached 8% of GDP during the period of 1995 to 2013[4]. These changes can be partially attributed to market liberalization and increasing foreign competition, which pushes for reduction in corporate taxes.

This process took place in other countries as well, however, it was not as pronounced and rapid as in the Baltic countries. Reduced government spending can also be interpreted as liberal policies pursued by national governments. Furthermore, the government budget tightening does not decrease inequality; it spreads the burden among wide range of people, thus the amount of increased burden per capita is small, but affects everyone. Therefore, reductions in government spending should be negatively reflected in labor share; in other words, government spending and labor share are expected to show direct relationship.

Trade openness is one of the most often mentioned economic factors in the scientific literature as exhibiting effect on labor share (Ortega and Roriguesz, 2002; Harrison, 2005; Guscina, 2006; EC, 2007; Hutchinson and Persyn, 2011; Diwan, 2001; ILO, 2011). Most of the researchers find a negative effect of this factor on labor share in developed countries and mixed effect in developing countries. Furthermore, when considering widening globalization, it is also important not to disregard the effects of capital mobility on labor shares as it increases mobility of businesses and intensifies competition within countries (Decreuse and Maarek, 2007; Jayadev, 2007). Since the Baltic countries receive more inward FDI than they invest abroad, the effect of capital mobility factor is expected to be positive since increasing FDI contributed to job creation and competition of businesses over employees, this way increasing their bargaining power. The labor productivity measure is also often mentioned in the literature as an important factor when comparing the share of output attributed to labor or capital (Jayadev, 2007), thus it is included in the research.

Furthermore, the analysis takes into account the effects of country specific factors. In the case of Baltic countries it is the emigration indicator. Migration is often analyzed in the scientific literature as a factor effecting labor bargaining power (Jaumotte and Tytell, 2007; Kristal, 2010). In the Baltic countries, emigration has extensively increased since 1998 and remains high, on average amounting to 1% per year of total population in

[4] Calculations are based on EUROSTAT data (Final consumption expenditure of general government). "General government" describes the institutional sector that consists of central, regional, state and local government units.

Latvia and Lithuania, whereas, in Estonia, this indicator is less significant and amounts to 0.28% on average per year[5]. Emigration in general signals higher ability for labor to relocate, thus it should positively affect labor share by increasing bargaining power of employees. On the other hand, large scale emigration might cause so called "Brain-drain" in a country, which in turn will effect firms' investment decisions since if there are no highly skilled employees needed for the company, it might choose a different location for its business. Therefore, it is imperative to understand the relationship between emigration and labor share.

2. Methodology for determining effects on labor shares in the Baltic countries

In order to determine the causes for these changes in labor share in the Baltic countries and their implications, the dynamic error correction model was applied on the basis of factors effecting labor share movements that were identified earlier. It should be stressed that the list of predictor variables is not conclusive, but rather selective, based on data availability, and could be later extended.

Labor share is measured using the methodology suggested by Razgune and Lazutla (2015), where the income of self-employed is attributed to labor share, gross value added serves as output and compensation of employees is the measure of wages. Mathematically, it could be expressed the following way:

$$ALS_t = \frac{EC_t}{GVA_t} * \frac{TE_t}{E_t} \quad (1)$$

where ALS_t is adjusted labor share for self-employment, EC_t is compensation of employees and GVA_t stands for gross value added, TE_t is total employment[6] and E_t is the number of employed.

Several sources were used to construct the database for this research. Macroeconomic statistical data was retrieved from EUROSTAT database. Quarterly time series data was used for three Baltic countries: Estonia, Latvia and Lithuania and a sample for the period of 1995Q1-2015Q1 (n=81 per country).

For data processing, Eviews statistical package was employed. All data is seasonally adjusted, where quarterly data was not available, cubic spline interpolation was used to transform yearly or semiannual data to quarterly data. Some variables (inward FDI, GDP per capita and labor productivity) were transformed using natural logarithms due to the different measurement units of variables, others were not transformed in order to provide simpler interpretation of the analysis results (variables expressed as percentage).

[5] Authors' calculations based on Eurostat data.

[6] Total employment in this research is an indicator covering employees and self-employed persons.

Table 2. The independent variables were used in the analysis

Variable	Definition	Units
Productivity (Prod_hw)	Real labor productivity/hour worked [namq_aux_lp]	Euro per hour worked
GDP per capita (GDP_capita)	GDP per capita [namq_gdp_k]	Euro per capita
Trade globalization (IMEX)	(Exports + imports of goods and services)/GDP [namq_gdp_c]	Percent
Capital mobility (FDI_in)	FDI inflows (Direct investment, In the reporting economy) [bop_q_intpos]	Mln Euro
Emigration (Emi)	Emigration/total population [migr_emi2]	Percent
Government spending (Exp)	Final consumption expenditure of general government/GDP [namq_gdp_c]	Percent

Source: authors' compilation

The relationships between variables and their significances were tested using vector error correction model (VECM). To test the significance, the strength and the direction of relationships between labor share and factors effecting them, an empirical analysis was structured.

3. Data testing methodology and VECM model specification

Time series graphs for all analyzed variables and different countries were used to reveal data behavior (trend) and possible problems (unit roots or structural breaks) if any. Furthermore, time series graphs reveal data spikes due to external shocks (i.e. crisis), which can be corrected with dummy variables.

Mathematical expressions of dummy constructs are represented below:

$$Dummy_{crisis\_LT} = \begin{Bmatrix} 1\ if\ time\ periods\ 1998Q3 - 1999Q3 \text{ or } 2008Q2 - 2009Q2, \\ 0\ otherwise. \end{Bmatrix} \quad (2)$$

$$Dummy_{crisis_{EE}} = \begin{Bmatrix} 1\ if\ time\ period\ \ 2008Q1 - 2010Q2, \\ 0\ otherwise. \end{Bmatrix} \quad (3)$$

$$Dummy_{crisis_{EE}} = \begin{Bmatrix} 1\ if\ time\ period\ \ 2008Q1 - 2010Q2, \\ 0\ otherwise. \end{Bmatrix} \quad (4)$$

For Lithuania, a dummy with two crisis periods was applied, taking into account the Russian crisis (1998Q3-1999Q3) and current economic crisis (2008Q2-2009Q1). In the cases of the other two countries, dummies covering the following periods showed most significance in the model: for Estonia – 2008Q1-2010Q2 and for Latvia – 2007Q1-

2009Q2. Other variations of dummies were also tested for each country, however, showed no significance to the model, thus they were removed.

Furthermore, most macroeconomists agree that macroeconomic variables often exhibit non-stationarity (EC, 2007; Hein and Vogel, 2007; Stockhammer, 2009; ILO, 2011), thus it is important to check if this is true in the analyzed case using not only graphical analysis, but also statistical tests. If non-stationarity was found, the econometric analysis of this research would proceed with vector error correction model, which is a restricted form of vector autoregressive model, designed for non-stationary variables.

In order to test stationarity of variables, the most common unit root test – ADF Fisher Chi-Square test was applied, which assumes individual autoregressive process, i.e. unit root under null hypothesis. If variables were determined to be non-stationary, first differences of the variables were calculated and checked for stationarity again. Initially, non-stationary variables, which become stationary at first differences, were tested for cointegration. If variables returned mixed stationarity results (e.g. due to trend or intercept), then second test – Dickey-Fuller test with GLS detrending (DFGLS) was applied. This test uses transformation of variables with generalized least squares regression. It is more suitable for small sample sizes and has greater predictive power than initial Dickey-Fuller test (Elliott, Rothenberg and Stock, 1996).

Furthermore, according to Ozcicek and McMillin (1999), selecting correct number of lags is important since incorrect lag length might cause inconsistent estimates or autocorrelation among model errors. Thus, VAR lag order selection criteria[7] was applied in order to select the appropriate number of lags for the model.

Furthermore, the data was tested for cointegration relationships. Testing data for stationarity is no longer sufficient in modern econometrics, as pointed out by Engle and Granger (1987); two or more non-stationary variables might be cointegrated, which would point to long-term relationships between variables. Thus, non-stationary variables which showed stationarity at first differences, were tested for cointegrated relationships, using one of the most popular VAR based Johansen cointegration test (Johansen, 1991 and 1995).

Multiple researchers in the field of labor economics have applied different types of error correction models (Berthold, Fehn and Thode, 1999; Serres and Scarpetta, 2002; Hein and Vogel, 2007; Stockhammer, Hein and Grafl, 2011; Kristal, 2010, etc.). For this research, VECM (Vector error correction model) was selected, due to individually non-stationary variables, which have a common stochastic trend.

[7] Sequential modified LR test statistics (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ).

With one cointegrated equation the bivariate VECM model can be specified using a dynamic single-equation error correction model which consists of two equations:[8]

$$\Delta y_t = \alpha_0 + \gamma_1 * (y_{t-1} - \delta x_{t-1}) + \sum_{i=1}^{n} \alpha_{1i} * \Delta y_{t-1} + \sum_{i=1}^{n} a_{2i} \Delta x_{t-1} + \varepsilon_{1t} \quad (5)$$

$$\Delta x_t = \beta_0 + \gamma_2 * (y_{t-1} - \delta x_{t-1}) + \sum_{i=1}^{n} \beta_{1i} * \Delta y_{t-1} + \sum_{i=1}^{n} \beta_{2i} \Delta x_{t-1} + \varepsilon_{2t} \quad (6)$$

where α_0 and β_0 are constant drifts, γ shows the speed of adjustment to long-run equilibrium, $(y_{t-1} - \delta x_{t-1})$ denotes the error correction term and ε_t are a white noise error terms, which is assumed to be serially uncorrelated.

Furthermore, the model residuals were tested for autocorrelation using LM test, which checks for serial correlation among the residuals of the model. This test is superior to Durbin-Watson test since it can test not only the first order serial correlation. Null hypothesis of the LM test is no serial correlation at the selected lag order, thus if p value was above 5% we assumed that model residuals do not exhibit autocorrelation. If p values were below 5%, the selected lag order was adjusted.

Moreover, White's test for residual heteroskedasticity was applied to VECM model residuals. This test provides Chi-square statistics. Null hypothesis of the test is that the residuals are homoscedastic, thus p value above 5% signaled homoscedasticity of the model residuals and the model would be accepted.

Additionally, the specified model was tested for normality to avoid biased data in it. It is not always possible to achieve normality in macroeconomic variable distribution due to the rapid changes in economic conditions, especially in small open economies, such as the Baltic countries. Nevertheless, it is important to test for normality and if the test results show non normal distribution, the results of the model must be interpreted with caution. The selected test for this research is multivariate Jarque-Bera test, which tests the normality of model's residuals using the value of skewness and kurtosis and provides an overall Jarque-Bera test statistics (Jarque and Bera, 1987). For Jarque-Bera test, the null hypothesis is that the residuals of the model are normally distributed, thus we would accept H_o if $p>0.05$, and reject if $p<0.05$. This test informed us about the normality of the residuals and suggested further modifications of the model.

After a stable and reliable model was constructed, model causality was tested using error correction term coefficients; a negative coefficient and significant p value would point to sustainable long-term relationship between independent and dependent variables. P value of less than 5% would point to statistically significant relationship with 95% confidence level.

[8] Multivariate regression model can be build using the same logic.

Later, variance decomposition of independent variables exhibiting significant effect on the dependent variable was tested. This provided us with additional information about dynamic properties of the model, such as the duration of the effect of significant predictor variables on the dependent variable. Variance decomposition separated the variation into component shocks to the model for the period of ten quarters, which gave us a sufficient measure of long-term effects. Variance decomposition measured the fraction of forecasted variance of the dependent variable caused by unexplained variance or independent variables. It is important to stress, that causality tests and variance decomposition might result in different outcomes due to the difference in variable lags. Causality tests are performed on lagged variables, whereas variance decomposition focusses on raw data.

4. Analysis of factors effecting labor share using VECM model

The analysis of time series graphs of selected variables has revealed the non-stationarity trend in all three analyzed countries for the majority of variables. This confirms the notion that macroeconomic data can be often characterized by non-stationarity feature (EC, 2007; Hein and Vogel, 2007; Stockhammer, 2009; ILO, 2011).

After graphical analysis, the variables were also checked for unit roots with Augmented -Dickey-Fuller unit root test to confirm the non-stationarity of variables observed in the graphical analysis. Stationarity tests confirm the primary suspicion that the analyzed variables are non-stationary at level, but the majority of them are stationary at first difference.

In the case of Estonia, only the inward FDI measure was found stationary at level, thus it was removed from the model.

Furthermore, cointegration analysis for variables stationary at first difference was performed, which provides us with information about cointegration (long-term) relationships between the analyzed variables. For the purpose of this research VAR lag order selection was performed to select appropriate lags for VAR-based Johansen cointegration test. Suggested lag order for Lithuania's and Estonia's models is one; for Latvia's model the suggested lag order is two. After the appropriate lags were selected, Johansen test of cointegration was performed on all remaining variables since they are all non-stationary at level, but are integrated at the same order (first difference). Johansen cointegration test shows that models of three countries contain one cointegration relationship, thus the use of the vector error correction model is justified.

Vector error correction model specification

The econometric models for all three countries were constructed by removing unnecessary variables to meet the criteria of the stable model. First of all, variables were removed from VECM based on the stationarity analysis to ensure that all variables are integrated at the same level. Other variables were removed due to non normal distribution of their errors, which is one of the preconditions of regression analysis. The other variables were removed due to the lack of cointegration relationship with labor share. Only some variables not cointegrated with labor share were included into the

models to allow reasonable comparison of the results between countries. The following specifications of the models were concluded:

$$ALS_{lt} = F\left(EXP_{lt}, FDI_{lt}, IMEX_{lt}, PRHW_{lt}, Dummy_{crisis_{lt}}\right) \quad (7)$$

$$ALS_{ee} = F\left(EMI_{ee}, IMEX_{ee}, PRHW_{ee}, Dummy_{crisis_{ee}}\right) \quad (8)$$

$$ALS_{lv} = F\left(EXP_{lv}, EMI_{lv}, FDI_{lv}, GDP_{C\,lv}, Dummy_{crisis_{lv}}\right) \quad (9)$$

The process of reducing the initial number of variables ensures stable and reliable results, however leaves the question about the effect of the removed variables unanswered until more data is available.

The selected VEC models were tested using three robustness tests: VECM Residual Serial Correlation LM Test, which informs us if the error term of the model is autocorrelated, White's heteroskedasticity test and Jarque-Bera normality test, which informs us if the model is in line with the data distribution normality assumption. Low standard errors of regressions (<0.01) in all three models confirmed the absence of high correlation between variables, whereas, the cointegration analysis confirmed that each selected model contains only one cointegrating equation.

Furthermore, LM tests were performed to check for serial correlation which could appear due to incorrect lag selection. Serial correlation LM tests results confirm that models do not exhibit serial correlation among residuals, meaning that the selected lag order is appropriate. Furthermore, the residuals of the selected model were checked for heteroskedasticity using White's test, which showed homoscedastic residuals in all models.

Finally, Jarque-Bera residual test was performed to check for normality of residuals. Lithuania's model showed the Jarque-Bera test probability value of 63.5%, which does not allows us to reject the null hypothesis, that the model residuals are normally distributed. In Estonia's and Latvia's models, Jarque-Bera test probability values were 10.5% and 26.6% respectively. These results also confirmed that residuals are normally distributed since probability values are all above 5%.

Additional robustness tests by shifting, lenghtening or shortening the analyzed time period were not possible due to the limited data of only 20 years, thus variable removal tests from the models were carried out to furhter confirm model robustmess.

VECM model short-term and long-term causality

The long-term[9] and short-term causality of variables in three models were tested using error correction term coefficients and short-term causality obtained from VECM models.

[9] The existence of cointegrated vectors is interpreted as indicator of long-term equilibrium relationship.

Only one equation per model, for the endogenous variable – adjusted labor share, is reported for the purpose of this research.

Table 2. Coefficients of VECM models for three Baltic countries (1995-2014)

	Change in labor share in Lithuania	Change in labor share in Estonia	Change in labor share in Latvia
Long-term effects			
$IMEX_{t-1}$	-0.000749 (-0.92828)	-0.001058*** (-3.89397)	
$Prod\_hw_{t-1}$	-0.220187 (-1.02413)	0.441361*** (5.82737)	
Exp_{t-1}	0.020209*** (3.14682)		0.028853*** (5.03417)
$\log\_FDI\_in_{t-1}$	0.008339 (0.16466)		0.187786*** (3.68904)
Emi_{t-1}		0.044985*** (4.56472)	0.005611 (1.76968)
$log\_GDP\_capita_{t-1}$			0.283676*** (2.21956)
Short-term effects			
$\Delta\ IMEX_{t-1}$	-0.000628** (-2.06995)	-0.000485*** (-2.78950)	
$\Delta\ Prod\_hw_{t-1}$	0.092004 (1.53547)	-0.065168 (-1.41346)	
$\Delta\ Exp_{t-1}$	0.004799*** (2.731114)		0.006800*** (2.32567)
$\Delta \log\_FDI\_in_{t-1}$	0.027747 (1.06378)		0.049152 (0.75655)
$\Delta\ Emi_{t-1}$		-0.004008 (-0.96159)	-0.000577 (-0.36922)
$\Delta \log\_GDP\_capita_{t-1}$			-0.092800 (-1.22858)
Time Dummy	0.016647*** (3.19851)	0.009532* (1.94248)	0.017962*** (2.01381)
Time error correction term (ALS_{t-1})	-0.172064*** (-4.81967)	-0.168932*** (-2.70302)	-0.230016*** (-3.52839)
N	69	55	53
R^2	32%	27%	46%

Source: authors' compilation using calculations done in Eviews statistical program.
*Note: T-statistics are indicated in parenthesis. ***p<.01. **p<.05. *p<.10.*

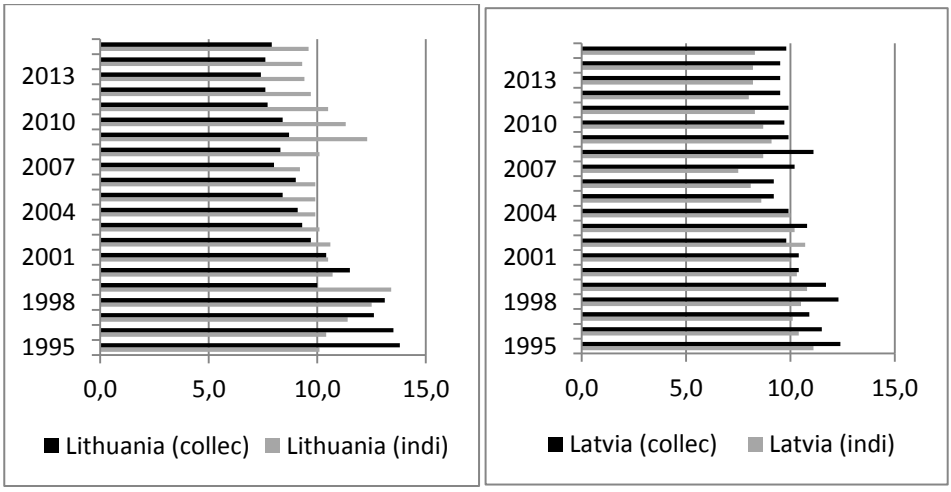
From Table 2, we can deduct, that an error correction term (i.e. the speed of adjustment towards long-term equilibrium of labor share) in the main models of all three countries is negative and significant, which points to a significant causality running from the selected group of independent variables to the dependent variable – adjusted labor share in Lithuania. The speed of adjustment to equilibrium shows that the system will converge to the long-term relationship (will return to the long-term equilibrium).

If we look at separate independent variables and their significance to the main models, we can see that government expenditure exhibits long and short-term significant and

positive effects on labor share in Lithuania and Latvia, meaning that decreases in government spending would push down labor share. The government expenditure measure used in this research can be divided into two parts: collective and individual consumption expenditure of general government. Whereas collective consumption expenditure covers the administrative or governing functions of the government entities, such as justice system, defense, police etc. (public goods which are benefitial to community in general), individual consumption expenditure covers education and healthcare expenditure, spending on culture and housing benefit, etc. (benefits which can be assigned to particular household or its group).

As established previously, government expenditure has declined during the analyzed period of time in all three Baltic countries. Thus, in order to better interpret the obtained results, it is interesting to examine how individual and collective parts of consumption have behaved since 1995 in Lithuania and Latvia (Figure 1.)

Figure 1. Changes in individual and collective consumption expenditures of general government in the Baltic countries in 1995-2015 (% of GDP).



Source: Authors' compilation based on Eurostat data.

In Lithuania, the government has focused more on individual consumption since 2001 and collective consumption has declined at a faster pace than individual consumption over time. In Latvia more funds are allocated to collective consumption and the decline in expenditure is visible in both, collective and individual parts of government expenditure, but the rate of decline is more visible in individual spending of the government. We can claim that government spending is shrinking in the expense of collective expenditures of the government in Lithuania, whereas in Latvia, social guaranties for individuals suffer more from reduced government spending than collective spending.

Furthermore, retired citizens make up a significant part of the population in the Baltic countries, but are not a part of the employment (unless employed) statistics, thus their incomes (pensions) are excluded from the labor share statistics. Thus, increasing government spending might not give the desired effect – increase in labor share,

because gains are distributed to the retired part of the population, rather than to employees.

Trade openness measure exhibits a negative effect on labor share in Lithuania and Estonia. This effect is significant in the short-term in both countries and in the long-term in Estonia. An increase in trade openness causes a downwards shift in labor share. Harrison (2005) and Kristal (2010) find similar effects in large countries.

The trade deficit persisted in both countries – in Lithuania and Estonia for majority of the analyzed period. Thus, the negative effect of increasing trade openness on labor share could be explained by the fact, that imports outweigh exports in both countries and increasing trade openness favors foreigners and hurts local producers, this way diminishing the returns to workers in the analyzed countries.

On the other hand, emigration and productivity measures are both significant and have a positive effect in Estonia in the long-term. However, they do not show a significant effect on short-term labor share fluctuations, neither in Estonia, nor in other countries. The positive impact of emigration on labor share in Estonia could be explained by emigration of lower-skilled workers rather than skilled workers which would cause the brain-drain effect[10] and the shrinkage of labor share.

Moreover, a positive long-term effect of productivity on labor share in Estonia was also expected. In the case of the Baltic countries, the importance of technological change was only measured through productivity, which did not show significance in Lithuania and showed only a long-term positive significance in Estonia. Nevertheless, productivity measure even though not significant in the model, but showed negative effect in the long-term in Lithuania and short-term in Estonia. These effects could be caused by productivity augmented through capital advances rather than labor. Thus, it would be interesting to explore the effects of additional indications signaling investment and technological advances, for instance ICT or other sectors in these countries. Nevertheless, the ICT sector is still rather small in all three economies and constituted only 2.14% in Lithuania, 2.80% in Latvia and 3.97% in Estonia of value added at factor cost in GDP in year 2012[11].

Furthermore, FDI and GDP per capita show only positive and the long-term significant effects in Latvia's case. The positive effect of inward FDI was expected since increase in FDI creates more jobs and increases competition in the labor market. As a country is competing for employees, international companies are willing to increase salaries to attract qualified work; this also increases GDP per capita measure, which in Latvia shows a long-term significance with a positive sign. Some authors see GDP per capita as a proxy for factor endowments (Ortega and Rodrigueez, 2002) or capital-labor ratio (Finnoff and Jayadev, 2006).

Furthermore, the dummy variables indicating economic crisis periods are found to be significant in all three countries, which indicate the exposure to external economic dis-

[10] Opinion is based on the research completed by Anniste, K., et. al. (2012).

[11] Based on Eurostat data: Percentage of the ICT sector on GDP.

tresses, which have a short-term positive effect on labor share levels in all three countries. This might be explained by the fact that labor share is a less flexible factor than capital and adjusts to economic fluctuations, especially rapid and dramatic downturns slower.

If we look at the overall statistics of the Lithuanian model, F-statistics shows that there is a probability close to zero that results are accidental, Durbin-Watson test also confirms that the model does not show autocorrelation and R-squared shows that the selected independent variables are able to explain around 32% of variations in the labor share of Lithuania. In Estonia's model the general statistics, such as F-statistics and R-squared confirm that the results are not accidental and can explain around 27% of variations in Estonia's labor share. Overall model statistics in Latvia's case point to non-accidental results and the model is able to explain 46% of variations in the labor share of Latvia.

Variance decomposition of labor share

Variance decomposition was performed to provide additional information about dynamic properties of the model, such as duration of the effect of significant predictor variables on dependent variable.

The variance decomposition of the Lithuania's model has confirmed that the government expenditure measure exerts the largest effect on labor share fluctuation and accounts for up to 44% of variation in labor share in Lithuania in three years, whereas own shock to labor share (unexplained variation) has a diminishing effect from 96% during the first quarter, to 49% in three years' time. Trade, productivity and inward FDI variables show an increasing effect on labor share in Lithuania and reach around 2% in three years' time.

The results of variance decomposition are similar to the short- and long-term analysis despite the fact that variance decomposition is performed on non-differenced data.

Furthermore, unexplained variation in Lithuania's labor share in the first quarters is large and shows significant decrease over time. The adjustment time to the economic changes of labor share indicators is rather long, which confirms the findings of relations revealed in Lithuania's VECM model.

The adjustment starts earlier and at a more rapid pace in the case of Estonia's labor share when compared to Lithuania's and Latvia's cases. Already in the second quarter emigration and trade globalization measures can each explain 4%, respectively 3% of labor share variation. Quicker adjustment pace than in the Lithuania's case might point to more flexible labor relations in the country, as previously mentioned.

When considering separate indicators, the emigration measure in Estonia seems to explain most of the variation in labor share in the long-term. It explains around 16.8 % of the variance in labor share in the period of three years. Productivity measured in hours worked explains only up to 3% of variation in three years' time. On the other hand, the trade globalization measure exhibits larger effect earlier (at the second half of the first year) and can explain up to 3%. Also, it decreases with time (to 0.63% in three years).

Lithuania's variance decomposition results are similar to relationships determined by VECM model, whereas Estonia's variance decomposition results differ. In the model

when looking at single variables, all three variables were indicated as significant, but variance decomposition showed that most variance in Estonia's labor share can be explained by the emigration variable. These discrepancies can be caused by the fact that variance decomposition uses transformed data at level and VECM model uses lagged data, thus VECM model specifications will be perceived superior if the results differ.

The variance decomposition of the Latvia's model has confirmed that government expenditure has the largest effect on labor share. It reaches close to 46% of variation in labor share in Latvia in three years' time. This is consistent finding with the VECM model relationships.

The unexplained variation of Latvia's labor share diminishes from 98% to 38.2% in three years. Another variable explaining a large part of variation in labor share is emigration, in three years' time it can explain up to 13.1% of variation. The GDP per capita measure and FDI show a lower effect on labor share in the case of Latvia; in three years' time they can explain up to 2.3% and 0.5% respectfully.

Conclusion

The authors have performed a scientific literature and empirical research analysis, which revealed that labor share is an under researched topic, lacking especially analysis for small economies on labor share dynamics and factors affecting labor share. The performed empirical research revealed that economic factors play an important role in the income distribution at the macro level.

Economic factors effecting labor share were identified in the scientific research analysis. Some factors are more often researched than others and have shown a more significant effect on labor share. Most often mentioned factors are trade openness, however, others, such as FDI, migration, and government macroeconomic policies, also showed significance in several researches. Based on observation, we can conclude, that some factors, for example intensifying trade, are relevant in majority of countries, but others, for example emigration, can be case specific and can exhibit an effect only in particular countries.

To summarize the econometric analysis, the long-term models were significant in all three countries. This confirms the claim that the declining labor share trend cannot be fully explained by technological advances and other economic factors are at play.

In the cases of Lithuania and Latvia, government expenditure had positive effect on labor shares, meaning that policy makers can influence the further development of income distribution at the macro level by changing the re-distributional priorities. The government spending effect on labor share in Lithuania is related to the declining collective expenditure, whereas in Latvia, social guaranties for individuals suffer more from reduced government spending than collective spending. Furthermore, retired citizens are not considered in labor share statistics, thus, increasing government spending might not give the desired effect – an increase in labor share, because gains are distributed to retired part of the population, rather than employees.

Opening borders and increasing the amount of cross-border trade had a negative effect on labor shares in Lithuania and Estonia; this would be also most likely reflected in

Latvia, but due to data normality issues the authors were not able to prove it. Trade openness has a long-term effect only in Estonia; in Lithuania this effect wears off over time. Both findings are in line with the findings for developed countries.

Emigration could be perceived as a country specific factor and had a positive effect on labor share over the long-term in Estonia. In Latvia, it did not show significant effects. The positive impact of emigration on labor share in Estonia could be explained by emigration of lower-skilled workers rather than skilled workers.

FDI and GDP per capita show long-term significant and positive effects in Latvia's case and did not show significant effects in Lithuania. A positive effect of inward FDI was expected since an increase in FDI creates more jobs and increases competition in the labor market. As a county is competing for employees, international companies are willing to increase salaries to attract qualified work; this also increases the GDP per capita measure, which in Latvia is showing a long-term significance with a positive sign.

The positive and significant long-term effect of productivity on labor share is observed in Estonia. Even though it was not significant in the model, the productivity measure showed a negative effect in the long-term in Lithuania. These effects could be caused by productivity augmented through capital advances rather than labor. Thus, it would be interesting to explore additional indications signaling investment and technological advances, for instance ICT or other sectors in these countries. The ICT sector is still rather small in all three economies, but with time could confirm the claim about capital augmenting technological progress.

Variance decompositions of the dependent factors for the most part confirm the VECM model findings, showing that government expenditure has the largest impact on labor share in Lithuania and Latvia. The emigration measure, although insignificant in the short-term, exhibits the largest effect on labor share in Estonia.

Another significant factor in the regressions was the exogenous variable accounting for the effects of economic crisis. It showed significance in all three countries. This effect was expected, and can be explained by the fact that small and open economies are much less resilient to economic distresses originating abroad.

To conclude, the effects on labor shares in large countries discussed in the scientific literature are similar to the effects on labor shares in small open economies. However, single country analyses reveal that country specific factors also play an important role and should not be disregarded. In the case of the Baltic countries, emigration can be perceived as a country specific factor.

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