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COMBINING VARIOUS POLICY MEASURES IN THE LONG-RUN MACROECONOMIC GROWTH MODEL OF SLOVAKIA FRAMEWORK: CASE OF THE UNEMPLOYMENT BENEFIT[1]

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***Abstract*:**
Presented paper provides a practical illustration of capabilities of the long-run macroeconomic growth model of Slovakia, which can be generally used for long-term projections of selected variables' future development. The main focus is given on the options for introducing various shocks to the system via the change of exogenous variable. This was complemented with a practical example of scenarios considering shocks to unemployment benefit in the case of Slovak economy. Particularly, the variability in different nature of shocks and the sign of the effect has been demonstrated as well as the possibility of combining multiple shocks in a single scenario. Regarding the policy implications of the paper, the economy seems to be rather less sensitive to the changes in unemployment benefit possible suggesting that might not be the best choice as a policy measure for combating the high unemployment in Slovakia, based on the obtained results.

Key words: long-run growth model, exogenous variable, shock, Slovakia, unemployment benefit.

JEL classification: C53, C65, E24, J31.

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[1] This research was supported by the project APVV-0371-11 "Inclusive growth in the Europe 2020 strategy – naivety or geniality?"
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Introduction

The long-run macroeconomic growth model of Slovakia (SLMM) is a multivariate model of a larger scale, consisting of 150 equations. By those equations the SLMM is able to explain 150 variables, denoted as endogenous, of total 260 variables used, leaving 110 variables as exogenous. Exogenous variables serve as an external input to the model. Majority of the variables are aggregated at the national level, while population and the labor force is disaggregated by sex and age, yielding 14 age cohorts of length 5 years for both males and females.

The model itself is based on pre-existing model created by Baumagertner et al. (2004), which main purpose was to provide long-term projections for Austrian economy. SLMM as well as its predecessor is founded on theoretical background of neoclassical economic theory (many strict assumptions such as the production technology with constant returns to scale and factor demand based on the producers first optimality conditions). To match the historical data to the highest extend, some rigidities were incorporated in the models (such as merely a partial adjustment of the labor demand and addition of non-Ricardian households to the Ricardian households). SLMM also uses the presentation of the equations by grouping them in logical blocks, consisting of 7 interconnected blocks: firms, households, labor market, income distribution, public sector, social-security system and external trade.

For the application on Slovak economy the SLMM was extended in several ways in comparison to its Austrian counterpart, such as the incorporation of endogenous economic growth, which is affected by the level of human capital in the economy, endogenous participation rates, the division of the pension security system into the two pillars: state-run pay-as-you-go first pillar and a private pension scheme known as the second pillar. Additional modifications and adjustments were also made for the public sector block and the social-security system block.

The paper is organized as follows. First section provides a short introduction into the history, structure, and features of the SLMM, as well as the overview of this paper. Second section clarifies the parametrization, settings, and the process of generating projections in SLMM. Some of the possibilities

of the framework as well as the actual scenarios explored in this paper are described in the third section. Overview of the obtained results for the generated projections is presented in the fourth section of the paper. The fifth and final section of the paper is dedicated to the summary of the capabilities of the SLMM as well as its limitations. This section also features some of the policy-making suggestions, which may be indicated by the obtained results.

1 Parametrization of the SLMM and generation of projections

Following the approach of Baumagertner et al. (2004), the equations of SLMM were in most cases calibrated according to the historical data, using the sample 2005-2012. The data were acquired from the Statistical office of the Slovak Republic, Eurostat, National Bank of Slovakia, the Institute of Fiscal Policy of Ministry of Finance of the Slovak Republic, Public Social insurance company of the Slovak Republic, and Public health insurance company of the Slovak Republic.

In case of some of the equations ordinary least square (OLS) method had been used for parametrization. A procedure suggested by Bradley and Zalesky (2003) served as an approach for simple curve fitting to post data, in case of transition countries with lack of data. This procedure of parametrization was in some cases followed by minor modifications of parameters' value, when deemed necessary. Although an estimation method has been applied, it is not possible to say that some parameters were estimated using Econometrics, since the obtained parameters were not verified, given the short data sample.

The projections for the future periods are subsequently generated as dynamic, deterministic simulations, using the Gauss – Seidel solution algorithm incorporated in the EViews environment, with the terminal conditions of constant levels of endogenous variables. In order to generate these projections for period 2012-2050 the values of 110 exogenous variables for each year had been provided as an input for the model. Majority of these variables was fixed on the last observed levels or as the average of observed historical values. Such exogenous variables served as additional parameters for the model. Some of the exogenous variables (e.g. population, GDP of

closes trade partners, trend component of total factor productivity) were assumed to change during the projected period 2012-2050, which were subsequently interpreted as policy variables. The demographic forecast of Eurostat was used for the development of population during the projected period.

2 Possibilities of the framework in regard to creation of scenarios and the case of unemployment benefit in Slovakia

By assuming changes to the exogenous variables (particularly the policy variables) it is possible to create various scenarios, which can outline the development of the system after the described changes to the exogenous variables took place, which were henceforth denoted as shocks. Given that there are 110 exogenous variables there are numerous possibilities for introducing the shock into the system. To emphasize the variety in the options the paper lists at least some of the intuitive categories of shocks:

- The nature of the shock.
  - Single period shock (occurring once and subsequently never appearing).
  - Cyclical shock (occurring with some frequency).
  - Permanent shock (shock that shifts the system to a different setting).
  - Subsiding shock (the shock reoccurs but with a pattern in the magnitude).
  - …
- The timing of the shock (given that the nature of the system is dynamic same shock may have different effects in various stages of the development of the system).
  - Shock in the beginning of projected period.
  - Shock in the end of projected period.
  - …
- Attributes of the shock (in systems with high nonlinearity it may be of interest to observe differences in reaction of the system to different shocks).

- Different magnitude of the shock.
- Different sign of the shock.
- ...

- Various combinations of shocks to different variables simultaneous.

As the draft of a list above indicates, there is a vast space in SLMM for creating different scenarios, and the number gets even higher when combinations of shocks are considered. For the practical illustration of the capabilities of the SLMM, the case of unemployment benefit in Slovakia had been considered. The reason for this choice is that Slovakia has been showing one of the highest unemployment rates across the EU for more than two decades (especially regarding the long-term unemployment).

Based on the construction of wage equation, as originally proposed by Baumgartner et al. (2004), the level of unemployment benefit should be one of the variables determining the development of average wage and through it affecting the labor demand. Thus, shock to the unemployment benefit should among other variables affect the unemployment rate. For the illustration of combination of multiple shocks, additional funding of state budget was considered, which may be interpreted as more efficient utilization of European funds (Cohesion Fund, Fund of Regional Development, and other).

For a better overview of the examined scenarios, scenarios are grouped according to the case of shock they are intended to explore.

- Baseline:
  - A reference scenario, obtained by assuming no particular shock to exogenous variables.
- Case I: Scenarios considering single period shock to the unemployment benefit.
  - Increase of the transfers to unemployed by 10 % relative to the baseline scenario occurring in 2020.
  - Decrease of the size of transfers to unemployed by 10 % relative to the baseline scenario occurring in 2020.
- Case II: Scenarios considering delayed single period shock to the unemployment benefit.

  - Increase of the transfers to unemployed by 10 % relative to the baseline scenario occurring in 2040.
  - Decrease of the size of transfers to unemployed by 10 % relative to the baseline scenario occurring in 2040.
- Case III: Scenarios considering permanent shock to the unemployment benefit.
  - Increase of the transfers to unemployed by 10 % relative to the baseline scenario from 2020 onward.
  - Decrease of the transfers to unemployed by 10 % relative to the baseline scenario from 2020 onward.
- Case IV: Permanent shock to the efficiency of usage of the European funds.
  - Increase of government revenues by 200 mil. Euro from 2020 onward.
- Case V: Combination of simultaneous permanent shocks to two different exogenous variables.
  - Simultaneous increase of the transfers to unemployed by 10 % relative to the baseline scenario and of government revenues by 200 mil. Euro at current prices from 2020 onward.

3 Obtained projections for various scenarios

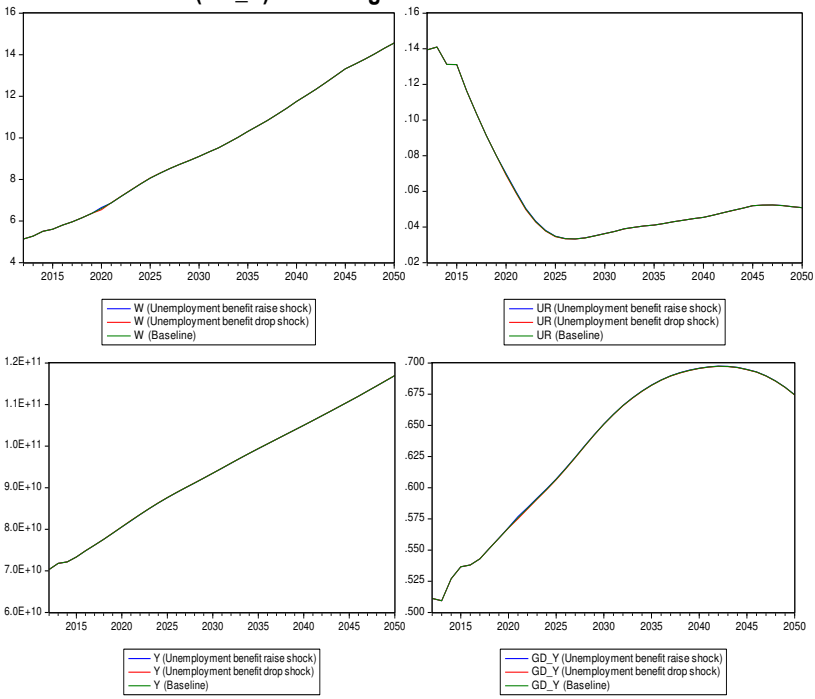
As the shock affects the development of the system during the projected period, possible effects may to some degree appear in all of the 150 endogenous variables. In order to be concise, only variable of average hourly wage at constant prices of year 2010 (W), unemployment rate (UR), GDP at constant prices of year 2010 (Y), and government debt to GDP ratio (GD_Y) were presented to illustrate the effects of examined shocks.

Case I.

In the first case (single period shocks) there was only a slight reaction of the system compared to the high magnitude of the initial shocks (see Figure 1).

Figure 1

Results for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the I. case of shocks



Source: Authors' own computation in EViews environment.

As mentioned above, the effects of the shocks are hardly noticeable, when compared to the baseline. There is a slight change in the hourly wage around 2020, which translates to a greater distortion of unemployment rate and subsequently of the debt to GDP ratio. However, there appears to be no reaction of the output of Slovak economy to the 10 % change of unemployment benefit. To be more precise, the changes compared to the baseline at the period of shock and in subsequent periods after the shock are provided in Table 1.

Table 1
The deviation from the baseline scenario in percentage for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the I. case of shocks

		W (%)	UR (%)	Y (%)	GD_Y (%)
2020	Positive shock	0.76	0.64	0.00	0.05
	Negative shock	-0.84	-0.71	0.00	-0.04
2021	Positive shock	-0.08	0.65	-0.04	0.15
	Negative shock	0.09	-0.72	0.05	-0.15
2025	Positive shock	-0.04	0.38	-0.01	0.05
	Negative shock	0.05	-0.42	0.01	-0.06
2030	Positive shock	-0.01	0.05	0.00	0.03
	Negative shock	0.01	-0.05	0.00	-0.03
2050	Positive shock	0.00	0.00	0.00	0.02
	Negative shock	0.00	0.00	0.00	-0.02

Source: Authors' own computation in EViews environment.

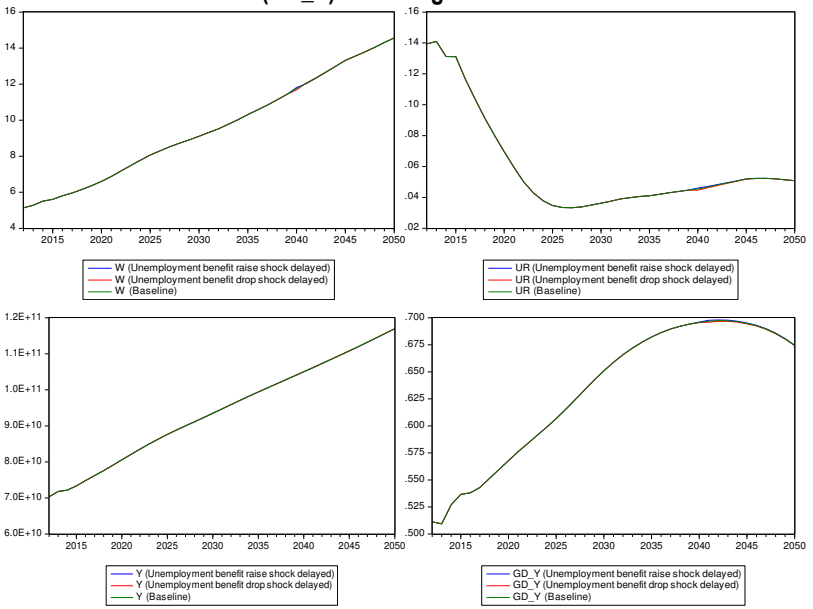
Table 1 provides evidence that the greatest effect of shock to the unemployment benefit was visible for the hourly wage. However, this effect was only short lived, unlike the effect on unemployment rate and government debt, which remained visible decades after the initial shock occurred. Any effect on government debt is hardly visible and the table shows that the greatest effect was noted with a year lag after the shock. The results also indicate that negative shock (decrease of the unemployment benefit) has on average more severe effect than positive shock (increase of the unemployment benefit).

Case II.

When examining similar scenarios of case II, which differs from the previous case by delaying the shock to 2040, some noteworthy changes may be observed (see Figure 2).

Figure 2

Results for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the II. case of shocks



Source: Authors' own computation in the EViews environment.

As the development of the variables appear on the graphs in Figure 2, it is possible to say that the shocks are more visible than in case I. This is to some degree confirmed by the results presented in Table 2.

Table 2

The deviation from the baseline scenario in percentage for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the II. case of shocks

		W (%)	UR (%)	Y (%)	GD_Y (%)
2040	Positive shock	0.52	1.40	-0.02	0.05
	Negative shock	-0.57	-1.53	0.02	-0.05
2041	Positive shock	-0.15	0.90	-0.05	0.12
	Negative shock	0.16	-0.99	0.05	-0.13
2045	Positive shock	-0.03	0.18	-0.01	0.06
	Negative shock	0.03	-0.19	0.01	-0.06
2050	Positive shock	-0.01	0.03	0.00	0.03
	Negative shock	0.01	-0.03	0.00	-0.03

Source: Authors' own computation in the EViews environment.

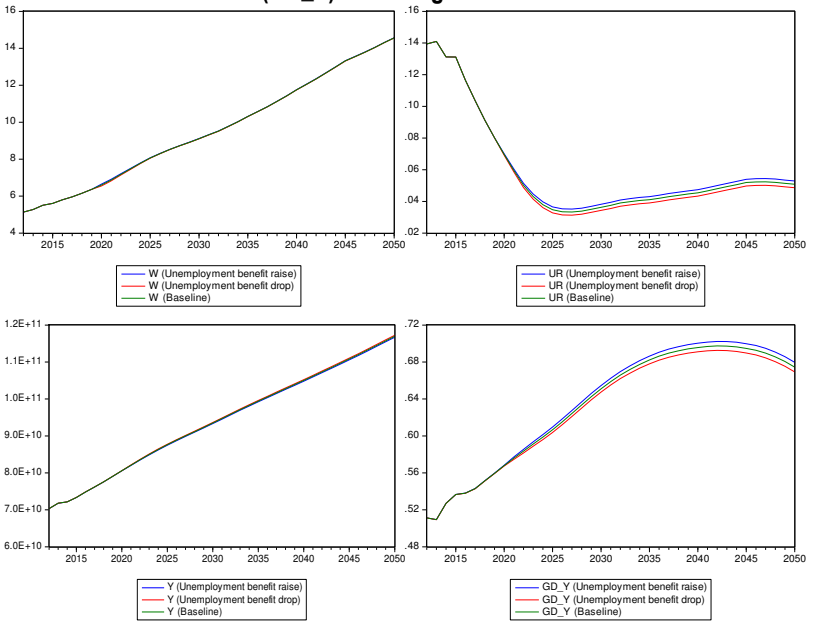
When comparing the effect on hourly wage with those in case I scenarios it is possible to see that, although the initial reaction is lower than in case I. The subsequent reaction outperforms the case I, but then it declines in faster rate than in case I. On the other hand, unemployment rate shows initially far greater response than in previous case, but again the response is only short lived compared to case I. GDP shows also some response in the first period but subsequently its development mimics the development from case I. Similarly, the same could be said about debt to GDP ratio, which responds with a little bit lower magnitude one year after the shock when compared to case I.

Case III.

The case of permanent shock shows indications of persistence in some of the results, as can be seen from Figure 3.

Figure 3

Results for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the III. case of shocks



Source: Authors' own computation in EViews environment.

Based on development presented by Figure 3, it is possible to say that under the permanent shock to unemployment benefit the unemployment rate, GDP, and debt to GDP ratio are all diverging from the baseline, while the hourly wage converges to it. This claim can be partially supported by the results presented in Table 3.

Table 3
The deviation from the baseline scenario in percentage for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the III. case of shocks

		W (%)	UR (%)	Y (%)	GD_Y (%)
2020	Positive shock	0.74	0.65	-0.03	0.08
	Negative shock	-0.81	-0.72	0.04	-0.08
2021	Positive shock	0.62	1.50	-0.08	0.23
	Negative shock	-0.68	-1.65	0.08	-0.23
2025	Positive shock	0.14	5.26	-0.14	0.48
	Negative shock	-0.13	-5.64	0.15	-0.49
2030	Positive shock	0.08	5.16	-0.16	0.55
	Negative shock	-0.08	-5.43	0.17	-0.55
2050	Positive shock	0.04	4.07	-0.22	0.77
	Negative shock	-0.04	-4.32	0.24	-0.77

Source: Authors' own computation in EViews environment.

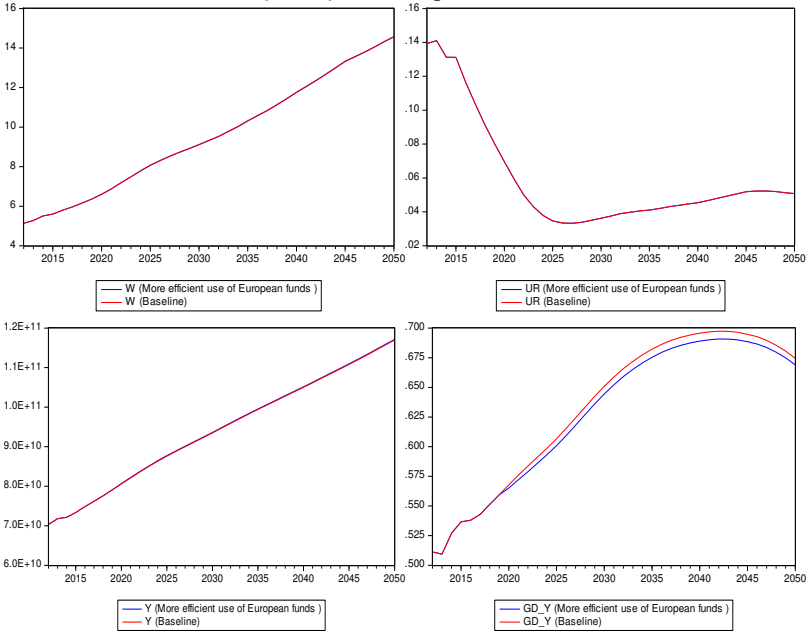
Result in Table 3 show that while permanent shock to unemployment benefit results in divergence of GDP and debt to GDP ratio, the unemployment rate remains fairly stable from the long run. Nevertheless, the convergence of hourly wage with the baseline had been confirmed.

Case IV.

The shock which was explored for the case IV is the permanent increase of government revenues by 200 mil. Euro at current prices in 2020. The results for this measure are presented in Figure 4.

Figure 4

Results for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the IV. case of shocks



Source: Authors' own computation in EViews environment.

Based on the development presented in Figure 4, one may conclude that the increase in government revenues had insignificant effect on all of the examined variables, with the exception of debt to GDP ratio. However, the results in Table 4 contradict with this claim to some degree.

Table 4

The deviation from the baseline scenario in percentage for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the IV. case of shocks

	W (%)	UR (%)	Y (%)	GD_Y (%)
2020	0.10	-0.02	0.12	-0.47
2021	0.10	-0.05	0.13	-0.67
2025	0.11	-0.16	0.13	-0.96
2030	0.11	-0.16	0.13	-1.00
2050	0.11	-0.12	0.13	-0.82

Source: Authors' own computation in EViews environment.

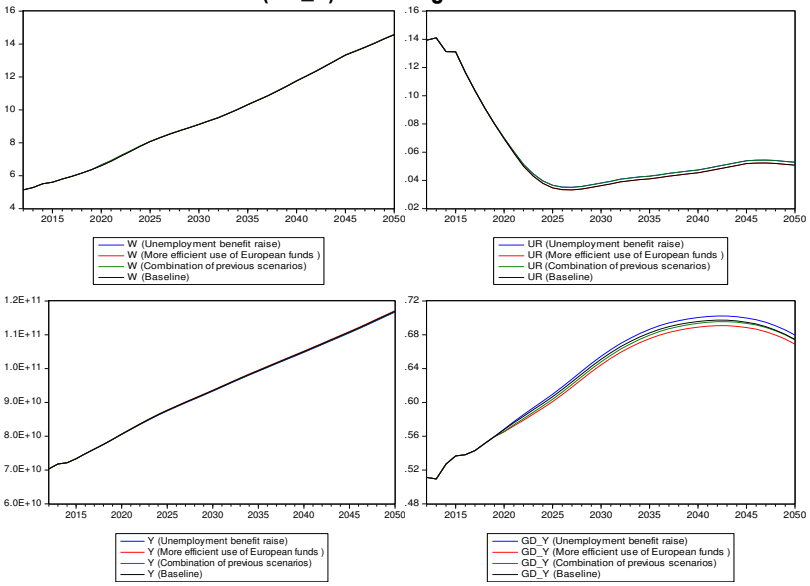
Although the increase in government revenues did not have such strong initial effect on wage and unemployment rate as previously examined shocks (case III), the initial effect on GDP and debt to GDP ratio is quite similar to the case of permanent decrease of unemployment benefit. On the other hand the increase of wage in the last observed period 2050 is the highest, when compared with all of previously examined scenarios (cases I-III). However, it is possible to expect that this effect will also diminish in time since the increase is fixed at 200 mil. Euro at current prices. That is why the proportion of shock on overall government revenues will diminish with time, which is also visible on the development of the debt to GDP ratio.

Case V.

For the last case the permanent shock of unemployment benefit increase from case III is combined with the shock of government revenue increase from case IV. To provide a better overview of the effects for combination of two scenarios, the results for case V are presented together with the case IV scenario and scenario of positive shock in case III, which are listed below as Figure 5.

Figure 5

Results for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the V. case of shocks



Source: Authors' own computation in EViews environment.

Based on the development of selected variables during the projected period it is possible to say that greatest differences, in comparison to the baseline scenario, are evident for the unemployment rate and debt to GDP ratio. The exact quantities of these differences are presented in Table 5.

Table 5

The deviation from the baseline scenario in percentage for hourly wage (W), unemployment rate (UR), GDP (Y) and government debt to GDP ratio (GD_Y) assuming the V. case of shocks

		W (%)	UR (%)	Y (%)	GD_Y (%)
2020	Benefit increase	0.74	0.65	-0.03	0.08
	Revenue increase	0.10	-0.02	0.12	-0.47
	Combination	0.84	0.63	0.09	-0.39
2021	Benefit increase	0.62	1.50	-0.08	0.23
	Revenue increase	0.10	-0.05	0.13	-0.67
	Combination	0.72	1.45	0.05	-0.44
2025	Benefit increase	0.14	5.26	-0.14	0.48
	Revenue increase	0.11	-0.16	0.13	-0.96
	Combination	0.25	5.09	-0.02	-0.49
2030	Benefit increase	0.08	5.16	-0.16	0.55
	Revenue increase	0.11	-0.16	0.13	-1.00
	Combination	0.19	4.99	-0.03	-0.47
2050	Benefit increase	0.04	4.07	-0.22	0.77
	Revenue increase	0.11	-0.12	0.13	-0.82
	Combination	0.14	3.95	-0.09	-0.07

Source: Authors' own computation in EViews environment.

The results in Table 5 confirms that by the end of projected period the greatest relative differences between examined combination of shocks and the baseline is found for unemployment benefit. However, the relative deference for debt to GDP ratio created by unemployment benefit is almost evened out by the increase in government revenue in the final projected period.

Additional finding, which is of interest to the topic of this paper, is that as time proceeds the combination of shock becomes less a simple sum of the effects of single shock, and the difference among the simple sum and combination becomes more evident. Of course at this point it is not possible to exclude the possibility of this difference being a propagated rounding error created by EViews environment. However, as the model showed

many path-depending developments of variables after a single shock (Case I – II), it is possible to assume that these differences arise as a result of incidence of two simultaneous shocks.

Conclusion

To summarize the paper, some illustrative scenarios have been drafted to demonstrate the capabilities of SLMM and the variety of shock which can be introduced into the model. Of particular interest is the possibility to examine combination of two or more shocks which are presented to the system simultaneously. The results indicate that the specific period of introduction of the shock, magnitude, or the sign of shock do matter and there are differences among particular cases. Similarly the combination of shocks yielded unique reactions of the system, which were in this paper attributed to the interactions and self-reinforcing effects, driven by the shocks to the exogenous variables.

However, the results provided should not be regarded as exact predictions of the future state of Slovak economy, neither as a demonstration of actual reactions of the economy to the examined policy measures. The SLMM is not intended to provide the best forecast of development of Slovak economy, and the obtained results should be regarded only in sense of potential outline of the behavior patterns of Slovak economy, which were mostly based on economic theory, calibrated, and not verified empirical.

That being said, the effects of permanent increase/decrease of unemployment benefit seem to be rather marginal and in case of wage only short lived, based on the presented results. The results thus indicated low elasticity of the examined variables to the unemployment benefit, as a variable and a possible labor market policy measure. Since either great raises or cuts would have to be made to drive a substantial change in the target variable, the unemployment rate does not seem as the optimal option for tackling the issue of high unemployment rate of Slovakia.

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WAS THE GROWTH IN EU INCLUSIVE?[1]

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***Abstract*:**
This research aims to investigate the development of poverty in the European countries. At the beginning the Foster-Greer-Thorbeck class of poverty measures are calculated. The robustness of the results is checked by using Poverty Incidence Curves. After that we analysed the impact of economic growth on the distribution of income in each particular member state through a Poverty Equivalent Growth Rate measure. The results show that the growth in EU was not clearly pro-poor in most of the analysed countries even before or after the crises period. Furthermore, the nature of pro-poor growth is different in times of economic growth and economic contractions.

Key words: poverty in EU, PEGR, pro-poor growth.

JEL classification: I32, O47.

Introduction

Inclusive growth is one of the main pillars of the Europe 2020 strategy, thus, in the past few years it became an intensively discussed question. It has two main targets:

- employment rate over 75 % for that part of the population aged 25 – 64,
- decrease in the population at risk of poverty by 25 % by the year 2020.

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This research relies on the assumption that inclusive growth is in line with pro-poor growth according to an absolute definition (World Bank, 2009). The methodology we use relies on the approach proposed by an aggregate measurement of pro-poor growth called poverty equivalent growth rate (PEGR) which was developed by Kakwani and Son (2008).

The main aim of this research paper is to provide a comprehensive outlook about the development of poverty and pro-poor growht in the European Union (EU) countries. Firstly the Headcount Index (HI), the Poverty Gap Index (PGI) and the Severity of Poverty Index (SPI) are calculated for the years from 2006 till 2013. Then, the robustness of these results towards the selection of poverty line is evaluated by the Poverty Incidence Curve (PIC) methodology. Then we calculate the PEGR according to its relative, absolute and poverty reducing definitions.

PEGR is an aggregate measure allowing to analyze the effects of economic growth on the distribution of income in a particular sample (in our case each particular EU member state). Kakwani et al. (2008) defines three different pro-poor growth concepts. These are relative pro-poor growth, absolute pro-poor growth and poverty reducing pro-poor growth. In times of economic growth, the absolute concept is the strongest assumption and the weakest one is the poverty reducing pro-poor growth. On the contrary, in times of economic downturns, the poverty reducing concept is the strongest condition of pro-poor growth.

There are some studies discussing pro-poor growth in Europe, but usually for short time periods and for one particular country. Notable studies are for example Brzezinski (2011a and 2011b), CASE (2010), Raziye and Fahriye (2013), Madden (2013) or Domonkos et at. (2013).

1 Used methodology

Poverty Indices

The evaluetion of the nature of growth is composed of three subprocesses. As the first step we determine the FGT class of poverty measures. The HI, PGI and SPI. These indicators are based on a parametric function

in which the aversion to poverty is expressed by the value of its parameter. Each of these measures is additively decomposable, thus, it makes possible the analysis of poverty in different subgroups. The HI is calculated as:

$$HI = \frac{1}{N}\sum_{i=1}^{N} M(y_i < z)$$

z is the poverty line, N is the total population of the sample, M(.) is an indicator function which's value is one if the condition in brackets is met and zero otherwise. Furthermore, if available, weights can be used to adjust each particular observation to cover the total population.

The second index used is the PGI, which is a sum of the average percentage fall of the poor below the poverty line. It is calculated as a percentage of the poverty line.

$$HI = \frac{1}{zN}\sum_{i=1}^{N} K(y_i < z)$$

z is the poverty line, *N* is the total population of the sample, *K*(.) is an indicator function which's value is $(z - y_i)$ if the condition in brackets is met and zero otherwise. This measure can be adjusted by the particular weight to cover the total population as well.

The third index applied is the SPI. This measure gives higher weights to the very poor and thus allows to capture the distributional changes among the poorer strata of the society. The measure is calculated as follows:

$$HI = \frac{1}{N}\sum_{i=1}^{N} \left(\frac{K(y_i < z)}{z}\right)^2$$

z is the poverty line, *N* is the total population of the sample, *K*(.) is an indicator function which's value is $(z - y_i)$ if the condition in brackets is met and zero otherwise. This measure can be adjusted by weights to cover the total population as well.

PIC methodology

Furthermore, the robustness check of the selection of the poverty line was carried out by computing the PIC for first, second and third order stochastic dominance according to Haughton et al. (2008). The PIC is based on

the idea, that poverty is compared in two separate time periods for the same range of poverty lines. If one period dominates the other, then poverty in that particular time period is higher regardless of the selection of the poverty line. We determined PIC for all three applied FGT indices.

PEGR methodology

The key tool for evaluation of the pro-poor growth is the Poverty Equivalent Growth Rate (PEGR), proposed by Kakwani et al. (2008). This aggregate measure allows us to determine, through comparison of the PEGR to the actual growth rate, whether this economic growth was pro-poor or not.

The basis of this framework relies on a particular income distribution density function *f(x)* and a homogeneous function *P(z, x)* which evaluates the actual poverty of a given household. Combining the previously stated functions we obtain an arbitrary poverty measure θ (Kakwani et al., 2008).

$$\theta = \int_0^z P(z,x) f(x)\, dx$$

For the theoretical derivation of the mentioned relations, confront the source literature (Kakwani et al., 2008). According to Kakwani et al. (2008) it is possible to numerate this approach for a given poverty line *z* and vector of income *x* as following.

$$\theta = \theta(z, \tilde{x})$$

The second step is to estimate the growth elasticity of poverty as.

$$\hat{\delta} = (\ln[\theta(z, \tilde{x}_2)] - \ln[\theta(z, \tilde{x}_1)])/\hat{\gamma}$$

Where $\tilde{x}_1$ and $\tilde{x}_2$ are the income distributions in two consecutive years, $\hat{\gamma}$ is the estimate of the growth rate of mean income, which can be computed as following.

$$\hat{\gamma} = \ln(\mu_2) - \ln(\mu_1)$$

Where μ_1 and μ_2 are the mean incomes in two consecutive years. $\hat{\gamma}$ can be therefore viewed as the actual growth of the income. Given elasticity $\hat{\delta}$ can be further decomposed into two components. First is caused by the changes in economic growth $\hat{\eta}$ and the second results from the changes in the distribution of income (the growth or decline of inequality) $\hat{\zeta}$. Indicators $\hat{\eta}$ and $\hat{\zeta}$ may be estimated using the following formulas.

$$\hat{\eta} = \{\ln[\theta(z, \mu_2\tilde{x}_1/\mu_1)] - \ln[\theta(z, \tilde{x}_1)] + \ln[\theta(z, \tilde{x}_2)] - \ln[\theta(z, \mu_1\tilde{x}_2/\mu_2)]\}/2\hat{\gamma}$$

$\hat{\eta}$ may be interpreted as the percentage change in poverty, caused by one percent change in actual income, provided that the income inequality won't change. Kakwani et al. (2008) denoted it as neutral relative growth elasticity of poverty.

$$\hat{\zeta} = \{\ln[\theta(z, \mu_1\tilde{x}_2/\mu_2)] - \ln[\theta(z, \tilde{x}_1)] + \ln[\theta(z, \tilde{x}_2)] - \ln[\theta(z, \mu_2\tilde{x}_1/\mu_1)]\}/2\hat{\gamma}$$

$\hat{\zeta}$ may be interpreted as the percentage change in poverty, caused by the changes in income distribution accompanied with the growth process. Based on these estimates we are able to compute the relative pro-poor growth index φ as following.

$$\varphi = \frac{\hat{\delta}}{\hat{\eta}}$$

For the period of economic growth ($\hat{\gamma}$>0), if the φ >1 then growth is relatively pro-poor, which means that the poor are enjoying relatively more of the benefits of the growth than the rich. Conversely, for the period of economic decline ($\hat{\gamma}$<0), if the φ <1, then the loss of income is relatively pro-poor. In the last step, we are able to compute the PEGR as follows.

$$\hat{\gamma}^* = \varphi\hat{\gamma}$$

$\hat{\gamma}^*$ denotes the growth rate, which would be necessary to achieve the same shift in poverty as was obtained by the actual growth $\hat{\gamma}$, provided that the inequality won't change. Thus growth, is relatively pro-poor if $\hat{\gamma}^*$>$\hat{\gamma}$. In order to evaluate the absolute pro-poor growth we have to compute the neutral absolute growth elasticity of poverty ($\hat{\eta}^*$).

$$\hat{\eta}^* = \{\ln[\theta(z, \mu_2 + \tilde{x}_1 - \mu_1)] - \ln[\theta(z, \tilde{x}_1)] + \ln[\theta(z, \tilde{x}_2)] - \ln[\theta(z, \mu_1 + \tilde{x}_2 - \mu_2)]\}/2\hat{\gamma}$$

The concept is analogous to the neutral relative growth elasticity of poverty $\hat{\eta}$. $\hat{\eta}^*$ can be interpreted as an elasticity of poverty due to the one percent change in growth, provided that the benefits of growth are distributed equally.

Similarly to the relative Pro–Poor growth index Kakwani et al. (2008) have derived the absolute pro – poor growth index φ^*.

$$\varphi^* = \frac{\hat{\delta}}{\hat{\eta}^*}$$

In analogy to the relative pro–poor growth index, if the φ^*>1 during the period of economic growth ($\hat{\gamma}$>0), then growth is pro-poor in absolute sense, which means that the poor are enjoying more of the benefits of the growth in the absolute sense than the rich. The converse is also true for the period of economic decline ($\hat{\gamma}$<0); if the φ^*<1, then the loss of mean income is pro-poor in absolute sense.

Consequently, we may interpret PEGR in the absolute sense of pro–poor growth through following condition. Economic growth is pro–poor in the absolute sense, if the following condition is satisfied.

$$\hat{\gamma}^* > \hat{\gamma}[1 + (\varphi - \varphi^*)]$$

This equation is a key measuring tool for this paper, since it allows us to determine whether economic growth was pro-poor or not.

Data

The data used are from the European Union Statistics on Income and Living Conditions (EU-SILC) database. This database covers the years 2004 – 2013 for almost all EU28 member states.

We approximated the welfare indicator (economic growth) with the mean equalized disposable income of households. The data were adjusted by using consumer price index with base yare 2005. Furthermore, to be able to replicate the results published by Eurostat, we applied cross-sectional weights attached to the households adjusted by the size of that particular household. The poverty line was set as 60 % of the median national equalized disposable.

2 Results and Discussion

Tables 1, 2 and 3 contains the results for the FGT class of poverty measures for the EU28 countries. The results show a rather divergent development and large differences between the member states. Several countries from the EU10 have lover poverty rates then many EU15 member states.

This might be caused by country specific approach when the poverty line is selected.

Table 1
Headcount Index

Head count ratio	2005	2006	2007	2008	2009	2010	2011	2012	2013
Belgium	0.1477	0.1454	0.1495	0.1454	0.1426	0.1448	0.1520	0.1501	0.1499
Bulgaria	.	.	0.2196	0.2136	0.2186	0.2068	0.2225	0.2170	0.2093
Czech Republic	0.1037	0.0986	0.0961	0.0906	0.0855	0.0898	0.0979	0.0961	0.0857
Denmark	0.1132	0.1125	0.1104	0.1123	0.1181	0.1247	0.1204	0.1191	0.1129
Germany	0.1226	0.1236	0.1455	0.1484	0.1539	0.1551	0.1561	0.1594	0.1579
Estonia	0.1768	0.1811	0.1931	0.1937	0.1960	0.1566	0.1730	0.1728	0.1839
Ireland	0.1981	0.1870	0.1723	0.1544	0.1500	0.1502	0.1516	0.1574	0.1405
Greece	.	.	.	0.1963	0.1916	0.1988	0.2087	0.2197	0.2250
Spain	0.1919	0.1871	0.1784	0.2024	0.1990	0.2029	0.2024	0.2041	0.1997
France	0.1298	0.1307	0.1294	0.1252	0.1284	0.1321	0.1395	0.1405	0.1359
Croatia	.	.	.	.	.	0.2056	0.2091	0.2028	0.1950
Italy	0.1863	0.1939	0.1948	0.1838	0.1829	0.1794	0.1942	0.1934	0.1883
Cyprus	0.1617	0.1575	0.1547	0.1594	0.1580	0.1557	0.1480	0.1470	0.1534
Lithuania	0.1594	0.2270	0.2107	0.2549	0.2610	0.2084	0.1909	0.1907	0.1901
Latvia	0.2054	0.2001	0.1912	0.1962	0.2027	0.2036	0.1902	0.1842	0.2049
Luxemburg	0.1360	0.1394	0.1352	0.1328	0.1482	0.1429	0.1341	0.1495	0.1552
Hungary	0.1341	0.1562	0.1230	0.1233	0.1241	0.1225	0.1380	0.1401	0.1422
Malta	.	.	.	0.1515	0.1488	0.1523	0.1539	0.1498	0.1566
Netherlands	0.1029	0.0928	0.0958	0.0998	0.1074	0.0984	0.1055	0.0980	0.1014
Austria	0.1177	0.1255	0.1200	0.1519	0.1471	0.1500	0.1394	0.1440	0.1436
Poland	0.2045	0.1903	0.1726	0.1677	0.1713	0.1756	0.1764	0.1708	0.1721
Portugal	0.1944	0.1847	0.1808	0.1853	0.1786	0.1789	0.1804	0.1790	0.1873
Romania	.	.	0.2472	0.2329	0.2221	0.2106	0.2209	0.2273	0.2178
Slovenia	0.1204	0.1166	0.1154	0.1239	0.1136	0.1274	0.1366	0.1370	0.1445
Slovakia	0.1314	0.1160	0.1045	0.1081	0.1091	0.1195	0.1298	0.1318	0.1282
Finland	0.1185	0.1271	0.1298	0.1357	0.1381	0.1311	0.1365	0.1321	0.1179
Sweden	0.0976	0.1234	0.1041	0.1204	0.1303	0.1263	0.1379	0.1390	0.1452
United Kingdom	0.1875	0.1917	0.1872	0.1840	0.1696	0.1667	0.1571	0.1566	0.1563

Source: Authors' calculations based on EU-SILC data.

Table 2
Poverty Gap Index

Poverty gap ratio	2005	2006	2007	2008	2009	2010	2011	2012	2013
Belgium	0.0303	0.0340	0.0341	0.0321	0.0311	0.0347	0.0355	0.0355	0.0355
Bulgaria	.	.	0.0852	0.0660	0.0677	0.0674	0.0746	0.0725	0.0716
Czech Republic	0.0241	0.0209	0.0215	0.0208	0.0202	0.0219	0.0229	0.0227	0.0200
Denmark	0.0260	0.0265	0.0254	0.0271	0.0286	0.0362	0.0333	0.0320	0.0310
Germany	0.0293	0.0326	0.0401	0.0397	0.0402	0.0370	0.0389	0.0392	0.0377
Estonia	0.0516	0.0502	0.0520	0.0512	0.0474	0.0448	0.0537	0.0522	0.0518
Ireland	0.0455	0.0381	0.0387	0.0327	0.0337	0.0374	0.0425	0.0434	0.0364
Greece	.	.	.	0.0546	0.0532	0.0572	0.0652	0.0746	0.0795
Spain	0.0597	0.0589	0.0547	0.0612	0.0617	0.0672	0.0659	0.0727	0.0702
France	0.0275	0.0297	0.0278	0.0246	0.0280	0.0315	0.0312	0.0305	0.0290
Croatia	.	.	.	.	.	0.0665	0.0686	0.0666	0.0629
Italy	0.0570	0.0595	0.0582	0.0544	0.0555	0.0569	0.0661	0.0641	0.0660
Cyprus	0.0371	0.0348	0.0346	0.0315	0.0319	0.0348	0.0326	0.0330	0.0317
Lithuania	0.0546	0.0718	0.0638	0.0797	0.0840	0.0714	0.0670	0.0620	0.0604
Latvia	0.0700	0.0654	0.0600	0.0599	0.0614	0.0758	0.0645	0.0519	0.0606
Luxemburg	0.0295	0.0332	0.0282	0.0276	0.0326	0.0298	0.0277	0.0298	0.0332
Hungary	0.0299	0.0442	0.0288	0.0266	0.0252	0.0241	0.0296	0.0334	0.0364
Malta	.	.	.	0.0394	0.0306	0.0357	0.0335	0.0319	0.0352
Netherlands	0.0279	0.0231	0.0212	0.0225	0.0260	0.0220	0.0224	0.0227	0.0227
Austria	0.0276	0.0301	0.0295	0.0406	0.0406	0.0455	0.0376	0.0416	0.0431
Poland	0.0708	0.0561	0.0496	0.0445	0.0451	0.0473	0.0475	0.0466	0.0463
Portugal	0.0567	0.0532	0.0501	0.0500	0.0499	0.0493	0.0472	0.0518	0.0606
Romania	.	.	0.0904	0.0822	0.0792	0.0710	0.0782	0.0811	0.0816
Slovenia	0.0291	0.0277	0.0265	0.0292	0.0265	0.0293	0.0315	0.0314	0.0347
Slovakia	0.0346	0.0296	0.0261	0.0275	0.0310	0.0360	0.0370	0.0362	0.0380
Finland	0.0228	0.0246	0.0251	0.0271	0.0279	0.0256	0.0264	0.0264	0.0243
Sweden	0.0273	0.0396	0.0297	0.0314	0.0358	0.0330	0.0347	0.0366	0.0385
United Kingdom	0.0527	0.0544	0.0506	0.0484	0.0446	0.0429	0.0409	0.0408	0.0382

Source: Authors' calculations based on EU-SILC data.

Table 3
Severity of Poverty Index

Severity of poverty	2005	2006	2007	2008	2009	2010	2011	2012	2013
Belgium	0.0105	0.0137	0.0135	0.0126	0.0116	0.0143	0.0144	0.0149	0.0143
Bulgaria	.	.	0.0498	0.0317	0.0316	0.0313	0.0366	0.0368	0.0364
Czech Republic	0.0090	0.0072	0.0079	0.0083	0.0079	0.0086	0.0092	0.0088	0.0081
Denmark	0.0118	0.0122	0.0109	0.0123	0.0133	0.0190	0.0167	0.0153	0.0150
Germany	0.0119	0.0150	0.0182	0.0176	0.0171	0.0140	0.0157	0.0152	0.0146
Estonia	0.0251	0.0234	0.0238	0.0225	0.0209	0.0214	0.0273	0.0266	0.0254
Ireland	0.0160	0.0127	0.0155	0.0123	0.0143	0.0191	0.0228	0.0219	0.0178
Greece	.	.	.	0.0252	0.0237	0.0271	0.0328	0.0400	0.0427
Spain	0.0305	0.0302	0.0274	0.0310	0.0308	0.0357	0.0348	0.0407	0.0390
France	0.0104	0.0113	0.0101	0.0087	0.0102	0.0130	0.0122	0.0115	0.0111
Croatia	.	.	.	.	.	0.0337	0.0360	0.0326	0.0308
Italy	0.0291	0.0306	0.0293	0.0274	0.0288	0.0303	0.0376	0.0357	0.0385
Cyprus	0.0134	0.0120	0.0113	0.0100	0.0097	0.0125	0.0117	0.0119	0.0102
Lithuania	0.0299	0.0367	0.0307	0.0362	0.0405	0.0389	0.0356	0.0310	0.0302
Latvia	0.0372	0.0339	0.0303	0.0296	0.0322	0.0431	0.0348	0.0249	0.0293
Luxemburg	0.0108	0.0131	0.0094	0.0093	0.0118	0.0105	0.0105	0.0105	0.0123
Hungary	0.0107	0.0206	0.0107	0.0099	0.0082	0.0077	0.0099	0.0122	0.0147
Malta	.	.	.	0.0179	0.0112	0.0155	0.0125	0.0122	0.0125
Netherlands	0.0139	0.0108	0.0087	0.0097	0.0116	0.0096	0.0088	0.0094	0.0094
Austria	0.0123	0.0133	0.0129	0.0192	0.0203	0.0238	0.0184	0.0215	0.0228
Poland	0.0375	0.0260	0.0223	0.0195	0.0186	0.0204	0.0211	0.0204	0.0197
Portugal	0.0258	0.0249	0.0210	0.0210	0.0220	0.0208	0.0199	0.0240	0.0304
Romania	.	.	0.0468	0.0422	0.0410	0.0344	0.0408	0.0430	0.0455
Slovenia	0.0117	0.0110	0.0101	0.0113	0.0096	0.0106	0.0112	0.0117	0.0128
Slovakia	0.0138	0.0122	0.0112	0.0128	0.0143	0.0173	0.0179	0.0167	0.0182
Finland	0.0081	0.0087	0.0091	0.0095	0.0100	0.0093	0.0095	0.0093	0.0091
Sweden	0.0148	0.0234	0.0155	0.0157	0.0181	0.0158	0.0165	0.0180	0.0189
United Kingdom	0.0246	0.0257	0.0223	0.0213	0.0203	0.0184	0.0182	0.0191	0.0160

Source: Authors' calculations based on EU-SILC data.

Table 4 containes the results from the PIC analysis. In countries like Bulgaria, Greece, Spain, Croatia or Malta the development of poverty changed regardless of the selection of the poverty line. On the contrary, in the majority of the EU28 countries the FGT class of poverty measures are sensitive to the selection of the poverty line.

Table 4
Poverty Incidence Curve Summary Results

		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Belgium	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	Decreas	No	No	No	No
	Third Order Stochastic Dominance	Decreas	No	Decreas	No	Increas	No	No
Bulgaria	*First Order Stochastic Dominance*	Increas	Decreas	No	No	No	No	No
	Second Order Stochastic Dominance	Increas	Decreas	No	Decreas	No	Increas	Decreas
	Third Order Stochastic Dominance	Increas	Decreas	No	Decreas	No	Increas	Decreas
Czech Republic	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	No	No	No	No	No
	Third Order Stochastic Dominance	No	No	No	No	No	No	No
Denmark	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	Decreas	No	No	Increas	No	No	No
	Third Order Stochastic Dominance	Decreas	No	No	Increas	No	No	No
Germany	*First Order Stochastic Dominance*	No	No	No	No	Increas	No	No
	Second Order Stochastic Dominance	No	No	No	Decreas	Increas	Decreas	Increas
	Third Order Stochastic Dominance	No	Decreas	No	Decreas	Increas	Decreas	Increas
Estonia	*First Order Stochastic Dominance*	No	Decreas	No	No	Increas	No	Decreas
	Second Order Stochastic Dominance	No	Decreas	No	No	Increas	No	Decreas
	Third Order Stochastic Dominance	No	Decreas	No	No	Increas	No	Decreas
Ireland	*First Order Stochastic Dominance*	No	No	No	Increas	No	No	No
	Second Order Stochastic Dominance	No	Decreas	Increas	Increas	No	No	Decreas
	Third Order Stochastic Dominance	No	Decreas	Increas	Increas	No	No	Decreas
Greece	*First Order Stochastic Dominance*	Increas	Increas	Decreas	Increas	No	Increas	No
	Second Order Stochastic Dominance	Increas	Increas	Decreas	Increas	No	Increas	No
	Third Order Stochastic Dominance	Increas	Increas	Decreas	Increas	No	Increas	No
Spain	*First Order Stochastic Dominance*	Decreas	No	Decreas	Increas	No	Increas	No
	Second Order Stochastic Dominance	Decreas	No	Decreas	Increas	No	Increas	No
	Third Order Stochastic Dominance	Decreas	No	Decreas	Increas	No	Increas	No
France	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	Decreas	No	No	Increas	No	Decreas	No
	Third Order Stochastic Dominance	Decreas	No	No	Increas	No	Decreas	No
Croatia	*First Order Stochastic Dominance*	Increas	Increas	Increas	Increas	Increas	No	No
	Second Order Stochastic Dominance	Increas	Increas	Increas	Increas	Increas	No	Increas
	Third Order Stochastic Dominance	Increas	Increas	Increas	Increas	Increas	No	Increas
Italy	*First Order Stochastic Dominance*	No	No	No	No	Increas	No	No
	Second Order Stochastic Dominance	No	Decreas	Increas	No	Increas	No	No
	Third Order Stochastic Dominance	No	Decreas	Increas	Increas	Increas	No	No

Cyprus	*First Order Stochastic Dominance*	Decreas	No	No	Increas	No	No	No
	Second Order Stochastic Dominance	Decreas	Increas	No	Increas	No	No	No
	Third Order Stochastic Dominance	Decreas	Increas	No	Increas	Decreas	No	No
Latvia	*First Order Stochastic Dominance*	Decreas	Decreas	No	Increas	No	Decreas	No
	Second Order Stochastic Dominance	Decreas	Decreas	No	Increas	No	Decreas	No
	Third Order Stochastic Dominance	Decreas	Decreas	No	Increas	No	Decreas	No
Lithuania	*First Order Stochastic Dominance*	No	No	No	No	No	Decreas	No
	Second Order Stochastic Dominance	No	No	No	No	No	Decreas	No
	Third Order Stochastic Dominance	No	No	No	No	No	Decreas	No
Luxemburg	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	No	No	No	No	No
	Third Order Stochastic Dominance	Decreas	No	No	No	No	No	No
Hungary	*First Order Stochastic Dominance*	No	No	Decreas	Increas	No	No	Increas
	Second Order Stochastic Dominance	No	Decreas	Decreas	Increas	No	Increas	Increas
	Third Order Stochastic Dominance	Decreas	Decreas	Decreas	Increas	No	Increas	Increas
Malta	*First Order Stochastic Dominance*	Increas	Increas	Decreas	Increas	No	No	Decreas
	Second Order Stochastic Dominance	Increas	Increas	Decreas	Increas	Decreas	No	Decreas
	Third Order Stochastic Dominance	Increas	Increas	Decreas	Increas	Decreas	No	Decreas
Netherlands	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	Decreas	No	No	No	No	Increas	No
	Third Order Stochastic Dominance	Decreas	No	No	No	No	No	No
Austria	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	No	Increas	Decreas	No	Increas
	Third Order Stochastic Dominance	Decreas	Increas	No	Increas	Decreas	No	Increas
Poland	*First Order Stochastic Dominance*	No	No	Decreas	Increas	No	No	No
	Second Order Stochastic Dominance	No	No	Decreas	Increas	No	No	Decreas
	Third Order Stochastic Dominance	No	No	Decreas	Increas	No	No	Decreas
Portugal	*First Order Stochastic Dominance*	No	No	No	No	No	Increas	Increas
	Second Order Stochastic Dominance	Decreas	No	No	No	No	Increas	Increas
	Third Order Stochastic Dominance	Decreas	No	No	No	No	Increas	Increas
Romania	*First Order Stochastic Dominance*	Increas	No	No	No	Increas	No	Increas
	Second Order Stochastic Dominance	Increas	No	No	No	Increas	Increas	No
	Third Order Stochastic Dominance	Increas	No	No	No	Increas	Increas	No
Slovenia	*First Order Stochastic Dominance*	Decreas	No	Decreas	Increas	No	No	No
	Second Order Stochastic Dominance	Decreas	No	Decreas	Increas	No	No	Increas
	Third Order Stochastic Dominance	Decreas	No	Decreas	Increas	No	No	Increas
Slovakia	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	No	No	No	No	No
	Third Order Stochastic Dominance	No	No	No	No	No	No	No
Finland	*First Order Stochastic Dominance*	No	No	No	No	No	No	No
	Second Order Stochastic Dominance	No	No	No	No	No	No	No
	Third Order Stochastic Dominance	No	Decreas	No	No	No	No	No

Sweden	*First Order Stochastic Dominance*	Decreas	No	No	No	No	No	No
	Second Order Stochastic Dominance	Decreas	No	No	No	No	No	No
	Third Order Stochastic Dominance	Decreas	No	Increas	No	No	No	No
United Kingdom	*First Order Stochastic Dominance*	Decreas	No	Increas	Decreas	No	No	No
	Second Order Stochastic Dominance	Decreas	Increas	Increas	Decreas	Increas	No	No
	Third Order Stochastic Dominance	Decreas	Increas	Increas	Decreas	Increas	No	No

Source: Authors' calculations based on EU-SILC data.

Table 5 presents the results from the calculation of the PEGR and its evaluation according to the relative, absolute and poverty reducing definitions of pro-poor growth. The growth of income in the EU28 countries was pro-poor mostly in times of economic downturns and anti-poor in times of economic growth. It seems that, the distribution of income is rather set towards pro-poor loss. This might be caused by the social systems and the safety networks of social security systems present in EU28 countries.

Table 5

Patterns of pro-poor growth in EU countries

Belgium		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	Yes	Yes	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	Yes	Yes	Yes	No	Yes	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	Yes	No	No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	Yes	No	No	Yes	Yes	No
	Absolute Pro-Poor growth	No	Yes	Yes	No	No	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	No	Yes	Yes	No	No	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	Yes	No	No	Yes	Yes	No
	Absolute Pro-Poor growth	No	Yes	Yes	No	No	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	No	No	No	Yes
Bulgaria		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*			No	No	No	Yes	Yes	No
	Absolute Pro-Poor growth			No	No	No	Yes	Yes	No
	Poverty reduction Pro-Poor Growth				No	Yes	No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*			No	No	No	Yes	Yes	No
	Absolute Pro-Poor growth			No	No	No	Yes	Yes	No
	Poverty reduction Pro-Poor Growth				No	Yes	No	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*			No	No	No	No	Yes	No
	Absolute Pro-Poor growth			No	No	No	Yes	Yes	No
	Poverty reduction Pro-Poor Growth				Yes	Yes	No	No	Yes

Czech Republic		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	Yes	No	No	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	No	No	Yes	No	No	Yes	Yes
Denmark		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	Yes	No	No	Yes	No
	Absolute Pro-Poor growth	No	No	No	Yes	No	No	Yes	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	Yes	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	No	No	Yes	No
	Absolute Pro-Poor growth	No	No	No	Yes	No	No	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	No	Yes	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	No	No	Yes	Yes	No
	Absolute Pro-Poor growth	No	No	No	Yes	No	No	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	No	Yes	Yes	Yes
Germany		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	No	No	No	No	Yes	No	No
	Absolute Pro-Poor growth	Yes	No	No	No	No	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	No	No	No	No	No	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	No	No	Yes	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	No	Yes	No	Yes	No	No	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	Yes	Yes	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	No	Yes	Yes	Yes	No	Yes	Yes

Estonia		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	No	No	No	Yes	No	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	Yes	No	No	Yes	Yes
Ireland		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	Yes	No	No	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	No	No	No	No	Yes
Severity of poverty	*Relative Pro-Poor Growth*	Yes	No	Yes	No	No	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	Yes	Yes	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	No	Yes	No	No	No	Yes	Yes
Greece		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*				No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth				No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth				Yes	No	No	No	No
Poverty gap ratio	*Relative Pro-Poor Growth*				No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth				No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth				Yes	No	No	No	No
Severity of poverty	*Relative Pro-Poor Growth*				No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth				No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth				Yes	No	No	No	No

Spain		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	No	Yes	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	No	No	No	Yes	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	Yes	No	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	No	No	Yes	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	No	Yes	No	Yes
France		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	Yes	No	No	Yes	No	No	Yes
	Absolute Pro-Poor growth	Yes	Yes	No	No	Yes	No	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	No	No	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	No	No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	Yes	No	No	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	No	Yes	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	Yes	No	No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	No	Yes	Yes	Yes
Croatia		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*						Yes	Yes	Yes
	Absolute Pro-Poor growth						Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth						No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*						Yes	Yes	Yes
	Absolute Pro-Poor growth						Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth						No	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*						Yes	Yes	Yes
	Absolute Pro-Poor growth						Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth						No	Yes	Yes

Italy		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	No	Yes	Yes	Yes	No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	Yes	No	No	No	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	Yes	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	No	No	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	Yes	No	No	No	Yes	No
	Absolute Pro-Poor growth	Yes	No	Yes	No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	No	No	Yes	No
Cyprus		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	Yes	No	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	No	No	Yes	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	Yes	No	Yes	Yes	No	Yes
	Absolute Pro-Poor growth	No	No	Yes	No	Yes	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	No	Yes	No	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	Yes	No	No	Yes	No	Yes
	Absolute Pro-Poor growth	No	No	Yes	No	Yes	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Lithuania		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	Yes		No	Yes	Yes	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	Yes		No	Yes	Yes	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	Yes		No	Yes	Yes	Yes	Yes

Latvia		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	Yes	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	No	Yes	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	No	Yes	Yes	No
Luxemburg		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	Yes	Yes	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	No	Yes	Yes	No	Yes	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	Yes	Yes	No	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	Yes	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	No	Yes	Yes	No	Yes	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	Yes	Yes	No	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	Yes	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	No	Yes	Yes	No	Yes	Yes	Yes	No
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	No	Yes	No	Yes	No
Hungary		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	Yes	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	Yes	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	Yes	No	No	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	No	No	Yes	No	No	Yes
	Absolute Pro-Poor growth	No	Yes	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	Yes	No	No	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	Yes	Yes	No	No	No
	Absolute Pro-Poor growth	No	Yes	No	No	Yes	No	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	Yes	No	No	No

Malta		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*				No	Yes	No	No	No
	Absolute Pro-Poor growth				No	Yes	No	No	No
	Poverty reduction Pro-Poor Growth				Yes	No	No	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*				Yes	No	Yes	No	No
	Absolute Pro-Poor growth				No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth				Yes	No	Yes	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*				Yes	No	Yes	No	No
	Absolute Pro-Poor growth				Yes	No	Yes	No	No
	Poverty reduction Pro-Poor Growth				Yes	No	Yes	Yes	No
Netherlands		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	No	No	No	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	No	No	No	Yes	No	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	No	No	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	Yes	No	No	No
Severity of poverty	*Relative Pro-Poor Growth*	Yes	Yes	No	No	Yes	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	Yes	Yes	No	No
Austria		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	Yes	No	No	No	Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	No	Yes	No	Yes	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	No	No	No	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	No	No	No	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	No	Yes	No	No
Severity of poverty	*Relative Pro-Poor Growth*	Yes	Yes	No	No	No	Yes	No	No
	Absolute Pro-Poor growth	Yes	No	No	No	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	No	Yes	No	No

Poland		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	No	No	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	No	No	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	No
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Portugal		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	No	No	No		Yes	Yes	Yes
	Absolute Pro-Poor growth	Yes	No	No	No		Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes		No	Yes	No
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	Yes	No	No	Yes	Yes	Yes	No
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Severity of poverty	*Relative Pro-Poor Growth*	Yes	Yes	No	No	Yes	Yes	No	No
	Absolute Pro-Poor growth	Yes	No	No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	Yes	No	Yes	Yes	No	No
Romania		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*			No	Yes	Yes	Yes	Yes	Yes
	Absolute Pro-Poor growth			No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth			Yes	Yes	Yes	No	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*			No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth			No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth			Yes	Yes	Yes	No	No	No
Severity of poverty	*Relative Pro-Poor Growth*			No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth			No	No	Yes	Yes	Yes	Yes
	Poverty reduction Pro-Poor Growth			Yes	Yes	Yes	No	No	No

Slovenia		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	No	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	No	No	No	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	No	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	No	No	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	No	No	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	Yes	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	Yes	No	No	No	No
Slovakia		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	No	No	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	No	No	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	No	No	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	No	Yes	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	No	Yes	No
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	No	No	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	Yes	Yes	No	No	No	No	Yes	No
Finland		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	Yes	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	No	No	No	Yes	No	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	No	Yes
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	No	No	No	Yes	No	No	Yes
Severity of poverty	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	Yes	No	No
	Poverty reduction Pro-Poor Growth	No	No	No	No	Yes	No	Yes	Yes

Sweden		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	No	No	No	No	Yes	No	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	No	No
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	Yes	No	No	No
Poverty gap ratio	*Relative Pro-Poor Growth*	No	Yes	No	No	Yes	No	No	No
	Absolute Pro-Poor growth	No	No	No	No	Yes	No	No	No
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	Yes	No	No	No
Severity of poverty	*Relative Pro-Poor Growth*	No	Yes	No	No	Yes	No	No	No
	Absolute Pro-Poor growth	No	Yes	No	No	Yes	No	No	No
	Poverty reduction Pro-Poor Growth	No	Yes	No	No	Yes	No	No	No
United Kingdom		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Head count ratio	*Relative Pro-Poor Growth*	Yes	No	Yes	Yes	No	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	Yes	Yes	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Poverty gap ratio	*Relative Pro-Poor Growth*	Yes	No	Yes	Yes	No	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	Yes	Yes	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Severity of poverty	*Relative Pro-Poor Growth*	Yes	No	Yes	Yes	Yes	Yes	No	Yes
	Absolute Pro-Poor growth	Yes	No	Yes	Yes	No	Yes	No	Yes
	Poverty reduction Pro-Poor Growth	No	Yes	Yes	Yes	Yes	Yes	No	Yes

Source: Authors' calculations based on EU-SILC data.
Note: Sub-period of economic loss is shown as light red area.

Conclusion

The development of poverty and Inclusive growth has been an intensively discussed issue in the last few years in the EU. It seems that the development of poverty tends to have divergent path between the EU28 countries. The growth of income seems to be distributed towards the richer strata of society in times of economic growth. On the contrary, the growth of income in the EU28 countries was pro-poor mostly in times of economic downturns. It seems that, the distribution of income is rather set towards pro-poor loss

then pro-poor growth. This might be affected by the efficient social systems and the safety networks of social security systems applied in the EU28 countries. It seems, that they might not foster positive income changes among the poor, but rather prevent greater deprivation of the poor in times of economic contraction.

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REGIONAL INCOME CLUB CONVERGENCE: A SPATIAL APPROACH[1]

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***Abstract*:**
This paper deals with the testing of regional income club convergence based on spatial approach. The club convergence hypothesis was tested for the sample of 252 NUTS 2 EU regions over the period 2000 – 2011. Three clubs were specified exogenously based on the threshold levels of per capita GDP in 2000. Our empirical results provide support for the absolute beta-convergence modelling from spatial econometric perspective as well as for the club convergence hypothesis.

Key words: club convergence, spatial econometric models.

JEL classification: C21, R11.

Introduction

Concerning the issue of regional income convergence in the EU, which deals with the question whether poor economies catch-up to wealthier economies, wide range of empirical research on international, national, state, county and urban level has been conducted based on different approaches (for an extensive survey see e.g. Rey and Janikas, 2005). Although, it is generally accepted that regions with high economic growth are geographically

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faraway from those with a slow growth performance, majority of earlier regional income convergence studies does not consider the spatial aspect. The problem of possibly biased results and hence misleading conclusions with using of nonspatial empirical analyses that have ignored the influence of spatial location on the process of growth is pointed out by e.g. Carrington (2003), Fingleton and López-Bazo (2006), Paas et al. (2007) and Chocholatá and Furková (2015).

The aim of this paper is to verify the hypotheses of absolute and club income convergence of the EU regions for the period 2000-2011 based on spatial approaches. GDP per capita in Euro of NUTS 2 (Nomenclature of Units for Territorial Statistics) EU regions is used as a proxy for the income level of individual regions.

The rest of the paper is organized as follows: section 2 deals with club convergence and spatial aspects of analysis, section 3 provides a description of the data, empirical results are presented in section 4 and the last section concludes.

1 Club Convergence and Spatial Aspects

In the literature we can distinguish three hypotheses concerning the regional income convergence: the absolute (unconditional) convergence hypothesis, the conditional convergence hypothesis and the club convergence hypothesis (see e.g. Galor, 1996, Paas et al., 2007, Hančlová et al., 2010).

The empirical analysis is mostly concentrated on testing the validity of income convergence hypotheses based on the so-called β-convergence (catching-up in per capita income levels) which is usually based on the cross-country/region growth regression model suggested by Mankiw et al. (1992) and Barro and Sala-i-Martin (1995).

Regarding the club convergence hypothesis, Debarsy and Ertur (2006) distinguish between exogenous and endogenous way of determination of convergence clubs. Firstly, they mention various criteria used to create clubs exogenously, e.g. the belonging to a geographical zone or choosing of threshold levels of per capita GDP. On the other hand they also present a survey of several methods which can be used to endogenize the determination of clubs.

In this paper the clubs will be created in exogenous way based on the initial income levels.

Models for analysis of β-convergence are in general based on the fact that each region is treated as a geographically independent entity without any spatial interactions. Since it is clear that each region is likely to interact with its neighbouring regions, during the last years these models have been modified in order to capture the spatial effects (spatial autocorrelation and spatial heterogeneity).

Since our main aim is to test the club convergence hypothesis it seems to be convenient to mention some studies dealing with the evidence of multiple convergence regimes. From the studies taking into account the spatial context can be mentioned e.g. Baumont et al. (2002), Fischer and Stirböck (2004), Ramajo et al. (2005) and Debarsy and Ertur (2006).

One of the crucial spatial effects is the spatial autocorrelation. The term "spatial autocorrelation" was first developed in a statistical framework by Cliff and Ord (1969) and can be in general characterized as the correlation of a variable with itself through space, i.e. the data from one region may influence the data from some other region through spatial spillover effects. The spatial interactions among regions are specified by the spatial weight matrix **W** of dimension ($N \times N$), where *N* is the number of regions in the data set. The simplest and most commonly used is the contiguity matrix **W**. Besides this specification we can meet with the distance-based weights, combination of contiguity and distance, ranked distances, *k* nearest neighbours, etc. (for some other schemes see e.g. Getis, 2010).

Spatial heterogeneity, on the other hand, can be controlled for e.g. by allowing cross-region parameter variation in the form of various spatial regimes (clubs). In such a case the convergence process, if it exists, could differ across the considered clubs (Ramajo et al., 2005). Another possibility to capture the region heterogeneity is to use the region dummies.

In order to examine the spatial structure of the underlying data and to check whether spatial patterns exist, the Exploratory Spatial Data Analysis (ESDA) as well as various global and local test statistics can be used.

The analysis usually begin with the estimation of the β-convergence regression model using the OLS. In case that the spatial autocorrelation is

present, the Lagrange Multiplier (LM) tests can be used in order to decide whether a spatial autoregressive (SAR) or a spatial error (SEM) model of spatial dependence is the most appropriate (see Arbia, 2006, Paas et al., 2007). Two indicators for judging the convergence of economy – the speed of convergence and the so called half-life time can be calculated. The half-life time represents the time that it takes for half of the initial gap in the per capita income to be eliminated (Arbia, 2006).

2 Data

The data used in this study were retrieved from the Eurostat database (General and Regional Statistics). The explanatory variable is initial GDP per capita (defined at current market prices in Euro) in 2000; the dependent variable is the growth rate from 2000 to 2011, both variables expressed in logarithms. Our data set covers 252 NUTS 2 EU regions in 26 countries over the 2000 – 2011 period. The spatial weight matrix of queen case definition of neighbours was used to capture spatial structure of analysed regions. The whole analysis was carried out in the software GeoDa (Geographic Data Analysis).[4] The corresponding shapefile (.shp) for Europe was downloaded from the web page of Eurostat and thereafter 252 NUTS 2 regions were selected in GeoDa.

3 Empirical Results

As the recent growth theories and empirical results suggest that the distribution of income per capita of countries (regions) may display convergence clubs; the main aim of this paper is to test the club convergence hypothesis using both non-spatial and spatial approaches.

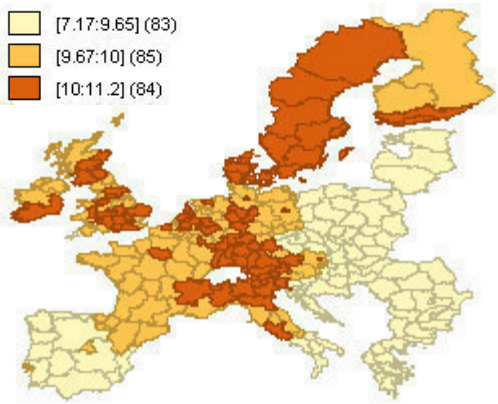
If regional economies differ in e.g. growth parameters or knowledge spillovers across regions are weak, regional economies may not converge to a common per capita income, but to different economic-specific equilibrium levels of per capita income (spatial heterogeneity). Thus, there might be

[4] Complete results of analysis can be provided by authors upon request.

convergence among similar groups of economies, i.e. club convergence. Economic theory does not provide unique rule neither for the number of clubs nor variable which determines clubs. Our decision for possible three convergence clubs was based on the exogenous way of the club determination, i.e. we set threshold levels of per capita GDP in 2000 supported by GDP quantile map (see Figure 1) in order to divide the regions into highly (club 1), middle (club 2) and weak (club 3) developed ones. The isolated regions of the particular clubs were excluded from the consideration.

Figure 1

Quantile map for ln(GDP) in 2000 (at current market prices by NUTS 2, in EURO per inhabitants)



Source: Own calculations.

Since in case of all three clubs the existence of spatial autocorrelation was confirmed, it was necessary to estimate the appropriate spatial econometric models, i.e. model SEM for club 1 and models SAR for club 2 and club 3. The estimated models are as follows:

Club 1: $\ln\left(\frac{y_{i,T}}{y_{i,0}}\right) = -0.372 + 0.058 \ln\left(y_{i,0}\right), \quad \hat{\varepsilon}_i = 0.731 \sum_j w_{ij}\varepsilon_j ,$

$b = -0.51\,\%$, $t_{half-life} = -136.01$

Club 2: $\ln\left(\frac{y_{i,T}}{y_{i,0}}\right) = 2.162 - 0.211 \ln\left(y_{i,0}\right) + 0.696 \sum_j w_{ij} \left(\ln\left(\frac{y_{j,T}}{y_{j,0}}\right)\right)$,

$b = 2.16\%$, $t_{half-life} = 32.139$

Club 3: $\ln\left(\frac{y_{i,T}}{y_{i,0}}\right) = 2.018 - 0.194 \ln\left(y_{i,0}\right) + 0.482 \sum_j w_{ij} \left(\ln\left(\frac{y_{j,T}}{y_{j,0}}\right)\right)$,

$b = 1.96\%$, $t_{half-life} = 35.320$

where $y_{i,0}$ and $y_{i,T}$ are the per capita incomes of the region *i* ($i = 1,2,...,N$) in the base year 0 and in the final year *T*, respectively. The growth rate of the *i*-th region per capita income in the period $(0,T)$ is given by $\ln\left(\frac{y_{i,T}}{y_{i,0}}\right)$, where *T* denotes also the number of periods for which we have data and *N* is the number of regions in the data set, w_{ij} are the elements of matrix **W** describing the structure and intensity of spatial effects, ε_i is a random disturbance term, *b* denotes the speed of convergence and $t_{half-life}$ the half-life time.

As for club 1 results, we can notice that the second estimated parameter, i.e. so called parameter β, was statistically significant but not negative, hence the hypothesis of absolute convergence during the period 2000 – 2011 was not confirmed within this group of regions. The statistical significance of spatial autoregressive parameter confirms the existence of spatial effects among neighbouring regions within the club 1. In contrast to estimation results of club 1, the outcomes of the regressions of the two remaining clubs (club 2 and club 3) confirm the hypothesis of absolute β-convergence within these two clubs. The principal finding resulting from the club convergence point of view is that spatial interactions and spillovers among regions do matter and we found out that the convergence process appears to be weaker if spatial effects are taken into account (the club 1 is excluded from the consideration due to the detected process of divergence).

The convergence characteristics for the club 2 and the club 3 are only slightly different; the results imply the annual convergence rate of 2.16 % for regions within the club 2 and the rate of 1.96 %.

Overall, the estimation of the spatial income convergence models showed that the spatial dependence among regions does matter. Accordingly, our club convergence hypothesis of three possible convergence clubs was confirmed in our sample of NUTS 2 regions.

Conclusion

In this paper we considered the problem of regional income club convergence among EU regions for the period 2000 – 2011. GDP per capita in Euro of NUTS 2 was used as a proxy for the income level of individual regions and β-convergence approach was applied.

A significant factor which differs this paper from the mainstream in this field is the relaxation of the implicit assumption of a growth single stable steady-state, i.e. we supposed multiple convergence regimes – clubs. Club 1 consists of the regions with the best performance (based on the per capita GDP in 2000) and the remaining two clubs the middle and weak developed regions (based on the per capita GDP in 2000). Empirical procedure had identified the treating of spatial effects in income club convergence models as appropriate, thus only results from the spatial econometric perspective were presented. Surprisingly, we observed that the sample of regions belonging to club 1 exhibit the process of divergence. On the other hand, income β-convergence process has been confirmed for the remaining two clubs.

The presented paper can be developed in various directions and hopefully, it could be possible starting point for future research studies dealing with the non-spatial and spatial income β-convergence modelling. Since no apparent difference between the convergence characteristics in club 2 and club 3 was confirmed it should be interesting to deal with the question of a possible merger of these two clubs.

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IF AT FIRST YOU DON'T SUCCEED: INCLUSIVE GROWTH FROM LISBON 2010 TO EUROPE 2020

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***Abstract*:**
In 2000, the European Union (EU) set itself the goal to increase its economic growth and job creation in the face of both increased external competitive pressures and internal resource and structural deficiencies. The resulting Lisbon Strategy put forth the objective of transforming the EU into the "most dynamic and competitive knowledge-based economy in the world" by 2010. As progress towards this objective failed to materialize, the Strategy was first reset in 2005 and then recast under more tempered objectives and an extended deadline of Europe 2020. As of 2015, the EU has experienced varying degrees of national structural and market reforms, none of which seem to have been sufficient to attain the desired economic growth region-wide. This paper examines the measurement of progress towards Europe 2020 objectives using distinct indexes – including data envelopment analysis (DEA) – to incorporate aspects of hard and soft policy coordination. The results suggest that member states with large differences between index scores establish a commitment to higher benchmarks and implement the reforms necessary to attain them rather than rely on lower national benchmarks that give the appearance of policy success.

JEL classification: F15, F42, F45, F55.

Introduction

The Lisbon Strategy (also Lisbon Agenda or Lisbon 2010), launched by the European Union (EU) at its summit in the Portuguese capital in 2000, grew from growing concern with the stagnant economic growth and high unemployment that had persisted in many member-states throughout the 1990s. With annual GDP growth rates lodged at 1.5 % or less, the EU

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continued to see its share of global production fall relative to traditional competitors like the US and Japan, as well as to new competitors in Asia and central Europe. To arrest its deteriorating competitive position, concerted action at the EU level was sought to improve on its record of low labor utilization rates and lagging labor productivity growth.[2] Faced with continued economic stagnation, the EU acknowledged that it was encumbered by restrictive labor market regulations; high tax rates; generous unemployment benefits; structural rigidities in housing and education; and demographic challenges of an aging and declining population (CER, 2005). The resulting Lisbon Strategy set the goal of attaining by 2010"…the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment" (Kok, 2004).

The 2000-10 decade passed without fulfilment of the Lisbon Strategy and generated much analysis and commentary concerning the causes of this apparent failure. This paper explores these results as well as the effort to extend the EU's commitment to – and requirement for – policy coordination beyond 2010 as represented in the Europe 2020 initiative. Section 2 reviews the path from Lisbon 2010 to Europe 2020 and highlights the main features of each program in light of the diversity exhibited by the EU's expanding membership. A significant difference between the two programs is found in the flexibility under Europe 2020 to quantify policy targets that simultaneously reflect requirements at the EU and national levels. Section 3 explores the measure of progress towards Europe 2020 by using an established index approach before employing non-parametric Data Envelopment Analysis (DEA) measures. The use of each measure relative to national and EU targets might reveal the presence of time-consistent policy targets that contribute to the sub-optimal performance of some member states. The approach taken here applies the Europe 2020 criteria to the Lisbon 2010 period (2000-10) and up to the present to gauge whether the flexible

[2] See O'Mahony and van Ark (2003), Gust and Marquez (2004), Gordon (2004), and Cameron and Fawcett (2005) for further discussion of the factors, like labor regulations and the slow uptake of information and communication technology on the part of EU businesses, that contribute to lagging EU labor utilization and productivity.

benchmarks improve a member-state's success. Section 4 sets out the data envelopment analysis framework used to examine the evolution and significance of the Europe 2020 criteria across the EU-28. Section 5 discusses the main results of the DEA as applied to the Europe 2020 with specific attention to optimal relative efficiency and efficient member-state references. Section 6 concludes.

By exploring the flexibility of the benchmarks and weights attached to the Europe 2020 criteria across member-states, the tradeoffs between hard and soft policy coordination noted in previous studies is reinforced by the results here. EU members with greater uniformity between EU and national benchmarks – a reflection of hard policy coordination – achieve higher scores across a range of effectiveness and efficiency indexes and are persistent references whose policy actions might offer relevant guidelines for member-states old and new.

1 The path from Lisbon 2010 to Europe 2020

As initially conceived, the Lisbon Strategy emphasized the necessity of reforms in five areas extending across the EU's product and capital markets, investments in information and communication technology, labor markets, social policy, and environmental policy (as added in 2001). While the initiative sought to alter the EU's position regarding the level and pattern of international production, the design and implementation of specific policy measures was left to the national level.[3] Each member state was affected differently by the slow growth, high unemployment, and low productivity gains that had generated concern about an EU malaise. As a result, the EU established an extensive list of 104 indicators, grouped into six categories, that was to guide and monitor national progress in attaining the level of competitiveness required to strengthen Europe's overall position in the global economy.

Midway through the Lisbon Strategy, the apparent lack of progress led the EU Council to recast the approach with an eye towards remedying the

[3] See Ioannou et al. (2008) for a discussion of the open method of coordination (OMC) that was implemented under Lisbon 2010 as an additional means of policy coordination.

imprecision and inconsistencies in the original's various directives.[4] Kok (2004), Cameron and Fawcett (2005), CER (2005), Pisani-Ferry (2005) and Pisani-Ferry and Sapir (2006) highlight this lack of progress towards, and identify the methodological weaknesses of, the original Lisbon 2010 approach. In effect, the complexity, length, and redundancy inherent in the list of indicators – combined with a lack of national commitment to many of the measures – resulted in negligible progress towards achieving the Lisbon Strategy. For example, Pisani-Ferry and Sapir (2006) notes that the multitude of policy guidelines, combined with increasing member-state diversity, produced a level of policy and structural heterogeneity that limited progress towards the Agenda's objectives.

As a result of these weaknesses, the indicators against which the actions of member states would be assessed as contained in the list of Lisbon criteria were reduced from 104 to 14. The broad array of criteria blurred the line between relevant policy objectives and the actions required to see them come to fruition. EU policy makers turn to these indicators to monitor policy implementation across the EU and to attribute the degree of success or failure achieved by the government of each member state. The resulting shortened list, presented in Table 1, includes two to three indicators within each of the original categories. A close look reveals that only four of the Lisbon indicators had specific quantitative targets attached to them (employment rate, employment rate of older workers, research and development expenditures, and greenhouse gas emissions). Instead of benchmarks, many of the 14 indicators were identified as proxies for member state progress towards Lisbon 2010 objectives. As indicated in Table 1, some indicators emphasized minimum values while other stressed maximum values. The EU Commission also shifted its focus to the policy intentions that emerged from each member's national reform plan (NRP) and encouraged policy actions to conform with the condensed list of Lisbon objectives. Here, the EU strengthened the degree of latitude in the reform policies implemented by member-states while enhancing its role in monitoring the contribution to overall Lisbon progress. The intent was to provide greater clarity regarding

[4] Specifically, the EU Council endorsed the EU Commission's recommendations for reform of Lisbon Agenda as outlined in Kok (2004) and EU Commission (2005c).

both the common objective of improving EU competitiveness and how progress could be measured: a restatement of ends and means. As such, the reform of the Lisbon Strategy aimed to improve the commitment of divergent national constituencies to the objectives contained in the original's centrally-determined approach.

However, it was increasingly apparent before the onset of the global financial crisis in 2007-08 that the limited quantitative goals of the Lisbon Strategy would not be met consistently within member states – much less uniformly across the EU – by 2010. Notably, the headline target to increase the overall EU-wide employment rate above 70 %, as well as to increase that for female workers and older workers (above 60 % and 50 % respectively), were unmet. The employment gap remained despite the 2005 restart of the Lisbon Strategy that had deemphasized the social and environmental pillars – shedding references for gender equality and environmental quality – in favor of greater focus on the economic growth objective. Additional goals for long-term unemployment, research and development investment, secondary school dropouts, and at-risk of poverty were similarly unmet as the financial crisis set in. Indeed, the EU's final report on the Lisbon Strategy notes that "…it seems highly likely that the 2010 objectives would not have been met even if the crisis hadn't taken place." (Rodriguez et al. 2010, p. 14)

Instead of attaining the Lisbon 2010 objectives, the EU found itself in 2009 suffering from a 4 % decline in GDP, a rise above 10 % in EU-wide unemployment, and a drop in industrial production to 1990s levels.[5] The financial crisis revealed the persistence of the EU's structural shortcomings beyond those presented by its demographic challenges and the global competitive pressures issuing from established and new economic competitors in North American and Asia. Instead of transforming into the world's most innovative economy by 2010, the EU struggled to avoid further decline. However, despite the absence of measurable results, the EU Commission noted that the Lisbon Strategy generated a policy process that most likely lessened the negative effects of the financial crisis within the EU. (European Commission, 2010a)

[5] European Commission, 2010a.

Consequently, the EU sought to emphasize the coordination process in the design of policy in the post-2010 period while responding to the lessons learned about the interdependencies and inconsistencies between the economic, social, and environmental pillars. As the EU moves beyond 2010, Rodriguez et al. (2010) point out the persistent need to improve policy coordination and participation in light of the lingering effects of the recession, the impending demographic shortcomings, the increasing demands for environmental protection, and the complexities of enlargement. These interdependencies suggest the application of an invariant or hard approach to EU policy implementation across member states that entails centralized coordination, uniform design of reforms, standardized choice of instruments, and identical measurement of progress. To achieve efficient policy implementation, Ioannou et. al. (2008) cites the need for hard policy coordination to contain (extend) the negative (positive) externalities issuing from a partner's actions as well as to discourage the free-riding issuing from a partner's inaction. This is offset by the benefits of soft policy coordination that permits flexibility in the selection, interpretation, and implementation of policy instruments to motivate positive member state action – rather than sanction adverse behavior or inaction – relative to common objectives. Rodriguez et al. (2010, p. 118) underscore the importance of designing relevant quantitative targets that encourage "realistic ambition" over an appropriate timeframe in recognition of EU-wide objectives and divergent member state conditions. As a consequence, a key aspect of the relative hardness or softness of EU policy coordination beyond 2010 resides in the measurement of the benchmarks that are established to evaluate policy progress.

In light of these challenges, the EU extended its commitment to joint and comprehensive action with the adoption of the Europe 2020 program. The objectives of Europe 2020 are somewhat more moderate relative to those of Lisbon 2010. The EU's ambition for 2020 is to "…come out stronger from the crisis and turn the EU into a smart, sustainable and inclusive economy, delivering high levels of employment, productivity and social cohesion."[6] Although the aspiration to be "…the most dynamic and competitive knowledge-based economy in the world" is absent, the social and sustainability

[6] EU Commission (2010b).

objectives that had been downplayed in Lisbon 2010 have received renewed and equal prominence with Europe 2020's economic goals. Evaluating progress towards the Europe 2020 goals remains a complex undertaking: one that must balance hard versus soft coordination.

As illustrated in Table 1, only four of the Lisbon 2010 indicators were assigned specific quantitative targets. The remaining indicators lacked specific numerical targets and only sought improvements from then current levels. Conversely, Europe 2020 specifies eight quantitative targets across five thematic areas representing assumed bottlenecks to growth that, if removed through a series of national reform efforts, would send EU growth back to its pre-crisis levels. As thematic areas, the "General Economic Background" and "Economic Reform" categories and their associated criteria have been removed. Europe 2020 maintains only the 3 % research and development target from the Lisbon 2010 "Innovation and Research" category. The thematic area "Education" appears separately with two indicators (one that had previous been included under the "Innovation and Research" area). All the other thematic areas include reduced or altered indicators that now carry quantitative targets set at the EU level.

The policy hardness inherent in the coordination around eight explicit quantitative targets is offset by the policy softness provided by the ability to choose two benchmarks for each indicator. Europe 2020 affords each member state the ability to set its own national target above or below the EU target illustrated in Table 1. This soft approach results from the EU's Open Method of Coordination (OMC) and is an attempt to respond to the uneven conditions present across member states and involve a broader range of national constituencies. By providing such flexibility, Europe 2020 aims to increase policy ownership and encourage commitment to European-wide objectives. However, the combination of a national leg and a European leg might have the negative effect of politicizing the process and complicating its implementation (see Pisani-Ferry and Sapir, 2006 and Radlo and Bates, 2006). Yielding to national political concerns, while necessary to attract adherence and cooperation at the member state level, can also create externalities and free-rider behavior (see Begg, 2003; Begg et al., 2003) and inject the time-consistency behavior (see Kydland and Prescott, 1977) into

the Europe 2020 project. Here, national political and social constituencies press for targets different from the EU requirement in response to the special circumstances issuing from varying initial conditions and/or exposure to the economic crisis. As such the national target might be consistent with current economic, political, and/or social demands, but lead to weakened policy plans that reduce policy efficiency, increase the costs of uncoordinated policies at the EU and national levels, and are sub-optimal in the long run.

The choice of dual benchmarks blends hard and soft policy to assess member state progress towards Europe 2020 goals. However, the flexibility provided by multiple measures represents a sort of "Goldilocks" approach that can challenge the implementation of Europe 2020. As addressed below, a large distinction between benchmarks that hides the presence of inadequate reform plans will also blur the assessment of its implementation. As a consequence, uncertainty over benchmarks will make it difficult to determine whether a member state is gaining traction in achieving national and EU goals. Under Lisbon 2010, the EU Commission attempted to establish a unified (hard) approach to achieving EU goals through a pledge to "…'name and shame' those that fail as well as to 'fame' those that succeed" (Kok, 2004, p. 17). However, this tactic was ultimately rejected in the EU Council leaving the Commission to focus on engaging national constituencies to take ownership of reform efforts.

As part of efforts to engage national constituencies, the EU Commission (EU Commission, 2005a) presents an annual European Innovation Scorecard (EIS) that measures each member state relative to 20 available factors ranging from human resources and education, to patents and knowledge transmission, to innovation finance. The results reveal which members are the innovation leaders and which are losing momentum, catching up, or falling further behind. However, because the EIS centers on measures of technology development and innovation – and omits important aspects of competitiveness emanating from labor productivity, market structure, price levels, and infrastructure assets – it might not provide a complete picture of progress towards the EU-wide objectives nor suggest a comprehensive policy mix needed to attain them. A more general approach, applied in the

next section, is to assess progress (or the lack thereof) through the construction of an index such as the Human Development Index.

2 An index to assess Europe 2020

The initial approach taken here involves the calculation of an annual index of Europe 2020 progress (E2020) for each of the 28 member states from 2000 to 2013 relative to both the EU target and the national target. The 2000-13 period allows for an exploration of pre- and post-Europe 2020 conditions in each of the EU28. Although the EU-13 did not join the EU until May 2004 or after, by 2000 many were associated members actively oriented towards adopting the Acquis Communautaire. A comparison of the results under these different benchmarks might indicate the presence of policy inefficiencies and time consistency among EU member states. For each member state i, the annual values for the eight indicators (q_{it}) were obtained from Eurostat and are normalized relative to the benchmark (b) established by the EU and then to the benchmark established nationally such that:

$$x_{it} = 1 - \frac{(q_{it} - b)}{b} \tag{1a}$$

$$x_{it} = \frac{(q_{it} - b)}{b} + 1 \tag{1b}$$

Normalization in Equation 1a is applied when exceeding a benchmark target is desirable whereas normalization using Equation 1b is applied when exceeding a benchmark is not desirable. Consequently, $x_{it} = 1$ when country i meets the relevant target in year t; $x_{it} > 1$ country i as falls short of meeting the relevant target in year t; and $x_{it} < 1$ as country i exceeds the relevant target in year t. In all instances then lower values reflect greater success in achieving or exceeding the outcome targeted in the benchmark. For several missing observations on v, the value was imputed using lag values for the country or by using EU-28 averages when lag values were not possible. This is done to have minimum effect on the value of the index. Due to the lack of data for all EU28 members from 2000-03, the *Renewable Energy* indicator is not included in the construction of the E2020 index for those years.

Because smaller values for x_{it} are positive, the E2020 index is constructed as illustrated in Equation 2 (the numerator would be inversed in the opposite case).

$$E2020_{it} = \sum_{j=1}^{J} \sum_{m=1}^{M} w_{jm} \left\{ \frac{\left(X_{jmt}^{max} - X_{jmit}\right)}{\left(X_{jmt}^{max} - X_{jmt}^{min}\right)} \right\} \quad (2)$$

where:

$i = EU\ member\ state$

$t = annual\ period$

$j = within\ indicator\ subscript$

$m = EU\ between\ indicator\ subscript$

$X = Europe\ 2020\ indicator\ relative\ to\ benchmark$

$w = weight\ assigned\ to\ indicator$

$\max = maximum\ indicator\ value\ across\ EU28\ in\ year\ t$

$\min = minimum\ indicator\ value\ across\ EU28\ in\ year\ t$

Reflecting a naïve approach in such indexes, the weighs w_{jm} are equal and constant within and across categories reflecting an average annual E2020 for each member state.

To account for any differences between the established and recent EU member states and for ease of exposition, Figures 1a and 1b illustrate the E2020 Index scores for the 15 pre-2004 EU members and the 13 post-2004 EU members respectively from 2000 to 2013. Including the pre-Europe 2020 period (2000-10), allows an assessment of how each member state would have performed both before and after Europe 2020 was implemented. For the established EU members, the three Scandinavian countries consistently achieve the highest E2020 index scores with Greece, Italy, Portugal, and Spain ranking consistently at the low end throughout the period. The lower ranks for these four southern EU15 members persists as well when compared to the recent EU13 members where only Malta ranks lower. The Baltic counties plus the Czech Republic achieve E2020 scores comparable to the middle ranking EU15 members when assessed against the EU benchmarks. When measured against the benchmarks that have been self-selected by each of the 28 member states, Figures 2a and 2b illustrate that the top E2020 Index scores remain with the three Scandinavian countries in the

EU15 and with the Baltic states plus the Czech Republic among the EU13. The four southern EU15 countries and Cyprus significantly improve their results when assessed against national rather than EU benchmarks. However among the EU13, the lowest scoring member, Malta, does not achieve much improvement under the national benchmarks.

Further clarification of the effect of using EU versus national targets can be gained by highlighting the difference in E2020 Index scores for each member state across time as shown in Figures 3a and 3b. This demonstrates the difference between the results in Figures 1a and 2a for the EU15 and between Figures 1b and 2b for the EU13. Positive (negative) values denote E2020 scores that are higher (lower) under national benchmarks and generated by setting national benchmarks below (above) their corresponding EU level. Among the EU15, Greece, Italy, Portugal, and Spain experience significant and sustained improvements in their E2020 Index scores under the national targets. Whereas the E2020 Index score for the United Kingdom is relatively invariant to the benchmark used, the remaining EU15 member states score consistently worse under national benchmarks than those set at the EU level. This outcome is almost absent among the EU13 where only Slovakia scores consistently worse under the self-selected or national benchmarks and Estonia, Lithuania, and Poland are not as strongly nor consistently affected by the benchmark used. The other EU13 members – especially Cyprus, Malta, Romania, and Hungary – experience a significant and sustained increase in E2020 scores under national benchmarks. The implication of these results indicates that the ability to apply national benchmarks under Europe 2020 is a significant form of soft coordination that enables many member states to meet (or claim to meet) their commitments.

3 An index using data envelopment analysis

The previous exposition reveals that the ability to alter the reference benchmark against which the results of the eight Europe 2020 criteria are normalized introduces a degree of softness into EU policy coordination. It demonstrates also that this flexibility makes a difference in the assessments of many EU member states. Whether under Lisbon 2010 or Europe 2020,

the relevance of particular indicators remains open to debate and the construction of an appropriate index to measure progress entails methodological concerns over measurement, normalization and weights. Heshmati and Oh (2005) cite the limits inherent in several indices of national competitiveness as well as the difficulties in assessing the effects of EU-inspired reforms in delivering EU-wide economic growth and employment gains. Tracking the difference between E2020 index scores using EU and national benchmarks allows an exploration of the issues of measurement and normalization. It also provides a constructive tool to reveal the potential for soft policy inefficiencies within individual member states.

The application of equal weights in an index like E2020, however, continues to present challenges. Such a standardized approach, while arbitrary, implies policy hardness because it assumes that all member states face similar economic, social, and political conditions and have (or should have) the same policy preferences. To address the issue of weighting, this section employs data envelopment analysis (DEA) that enables the weights on the eight Europe indicators to vary between member states and across time. DEA is regularly applied to measure technical efficiency of a decision-making unit (DMU) such as individual firms at the micro level. Generically, a DMU is regarded as an entity responsible for converting inputs into outputs and whose performance is to be evaluated. This section expands the use of data envelopment analysis to include panel data using the EU members as DMUs relative to the Europe 2020 criteria from 2000-13. Coelli et al. (2011) undertake a similar approach to compare the performance of EU members in 2007 on indicators of social inclusion. For each member-state DMU, the numerical data available for each input and output need not be congruent and are assumed to be non-negative with smaller amounts preferable for inputs and larger amounts preferable for outputs so that the resulting scores reflect the DEA efficiency principles. The normalized values for each of the eight Europe 2020 indicators in the 28 members from Equations 1a and 1b and the annual data for GDP growth fit this constraint. The methodology provides a measure of each member state's efficiency before and after Europe 2020 was launched with the assumption that progress is revealed in the ability of a member state to increase its GDP growth.

Since we are interested in minimizing inputs (the Europe 2020 criteria in their normalized values) while generating at least the given levels of output (GDP growth), the methodology uses the Charnes-Coopers-Rhodes input-oriented model (CCR-I). As noted in Cooper, Seiford, and Tone (2005, p. 43), the CCR-I model used here is based on the matrix (X,Y), and is formulated as an LP problem with row vector *v* for Europe 2020 criteria input multipliers and row vector *u* as GDP growth output multipliers. A member-state DMU is considered CCR or Pareto-Koopmans efficient if its overall efficiency score (θ^*) equals one and exhibits zero slack. The CCR-I method also reveals occurrences of input slack relative to a reference DMU. The presence of slack for any of the Lisbon criteria inputs is foretold by the behavior of its input weight v_i^* such that $s^- > 0$ when $v_i^* = 0$. When $\theta^* < 1$ and $s^- > 0$, a member-state DMU is inefficient and possesses an efficient reference set of other member-state(s). For each year from 2000-13, the eight Europe 2020 criteria were evaluated as inputs against GDP growth in each of the 28 EU member-states (DMUs). In order to assess the evolution of each member relative to the Europe 2020 goals and to suggest which DMU might serve as models for improvement, the results examined here include the annual measures of overall efficiency (θ) and a reference set of efficient country(ies) for each inefficient DMU.

4 DEA results and discussion

Table 2 presents the annual efficiency scores for each EU member state ranked according to the average score of each DMU over all 8 criteria when the EU benchmarks are used as the reference. Table 3 presents similar data when the national benchmarks are employed. As noted above, the DMU is considered to be CCR or Pareto-Koopmans efficient when an optimal efficiency score ($\theta^* = 1$) is obtained and no other DMU serves as an efficiency reference (i.e. there is zero slack and the EU member is its own reference). If only the former holds then the member state DMU is ratio efficient and positioned along the efficient frontier.

Relative to the coordinated EU benchmarks that represent a more inflexible, hard policy approach, we see the Nordic EU members – both established and recent – obtain CCR efficiency in most if not all of the period surveyed. The traditional engines of EU integration – France and Germany – score in the medium tier, while southern members Portugal, Italy and Greece place the lowest in terms of EU15 efficiency against EU-determined benchmarks. For the newer EU members, Hungary, Romania, and Malta recurrently appear towards the low end of the efficiency scale. The use of national benchmarks or soft targets produces some significant improvements in the DEA efficiency scores for the lowest ranking DEAs such as Hungary, Portugal, Spain, Italy, Greece, and Malta. Similar to the E2020 results illustrated above, Figures 4a and 4b show the changes in DEA efficiency scores when shifting from the EU to the national benchmarks. As with E2020, Greece, Italy, Portugal, and Spain – with the addition of Austria – record persistent improvements in their scores under the national benchmarks among the EU15. However, among the EU13 only Hungary, Malta, Bulgaria, and Croatia experience improvements in scores, albeit more moderate, under the national benchmarks versus the EU benchmarks. Slovakia, and also Poland, experience lower scores under the EU benchmarks. However, the remaining EU13 DMUs see little sustained difference in relation to the benchmark used under the DEA index whereas they recorded improvements between the two in the E2020 index.

Table 4 summarizes the average score and rank for each member state under the four indexes. Recall that the E2020 index uses hard policy benchmarks and hard policy weights; the DEA EU index uses hard policy benchmarks and soft policy weights; the E2020 National index uses soft policy benchmarks and hard policy weights; the DEA National index uses soft policy benchmarks and soft policy weights. By allowing the weights to change, the DEA scores improve on the corresponding E2020 index scores regardless of the benchmark used. Portugal, Cyprus, Hungary, Spain, and Italy experience the largest improvements in their average scores (by 20, 16, 15, 12, and 10 places respectively) going from the hard-hard E2020 index to the soft-soft DEA National index. This increase is due to the standard under DEA where the reference is the DMU with the best practice in the DEA

efficiency calculations instead of the ideal or perfect outcome expected under E2020. By allowing the weights to vary relative to national conditions under the DEA approach, approximately 40 % of the member state DMUs improve their ranking relative to the fixed average weights used in the E2020 indexes. These instances are highlighted by the grey cells in Table 4. The remaining 60 % see a decline or no change in their rankings. during the pre-Lisbon period, several of the then-candidate countries (the countries that now comprise the EU-10) achieve CCR efficiency or otherwise high efficiency scores. Although the small size and variability of Malta and Cyprus makes them less than ideal examples, the consistently high ranks across measures of E2020 and CCR efficiency in several of the EU13 countries (Czech Republic, Estonia, and Latvia) provides evidence of the competitive challenge that they posed to many established market economies of the EU-15.

A further comparison of the effects of using the EU benchmarks versus the national benchmarks under the DEA based index and the E2020 index is illustrated in Figure 5. For most EU member states (Austria and Hungary are exceptions), the fluctuation in weights on the eight Europe 2020 criteria enabled under the DEA approach moderates the increases and decreases in scores that results from the shift between national and EU benchmarks. Instead of gaining improvements, several EU13 member states experience a deterioration in their index scores under EU benchmarks when compared under the DEA index.

The efficiency measure θ^* reflects the degree to which a particular DMU must alter all inputs radially to achieve a position along the technically efficient frontier. As a final piece of the analysis, the DEA results provide clues regarding the weakness(es) of each EU member relative to the nearest CCR efficient DMU. By exploring the degree of slack across variables, DEA not only reveals relative sources of inefficiency, but also provides a reference country (or countries) that might serve as a guidepost for improvement in each inefficient member DMU. Tables 5 and 6 provide a listing of those EU member that might serve as such a reference when using the EU and national benchmarks respectively.[7] During periods of inefficiency relative to EU

[7] A DMU that is Pareto-Koopmans efficient has itself as a reference.

benchmarks, the set of efficient reference DMUs is concentrated on both the established and recent northern EU member states. Sweden, Finland, Denmark, Estonia, Latvia, and Lithuania appear recurrently in the list and serve as policy examples for the inefficient member states. As illustrated in Figures 4a and 4b, these member states are generally equally or less efficient under national standards than under the corresponding EU levels. This results from the application of national standards that are the same or greater than the hard targets set at the EU level. The Nordic emphasis on enhancing research and development capacities, and the structural and policy reforms adopted in the transition countries of central Europe are reflected in the reappearance as references of Sweden and Finland on the one hand, and Estonia and Latvia on the other.

When the shift to national benchmarks is made, the list of efficient reference DMUs expands as shown in Table 6. Along with increasing their efficiency scores, the lower national benchmarks enable many of the southern EU members states become self-references (signifying Pareto-Koopmans efficiency) and also references for other member-state DMUs. Cyprus, Hungary, Portugal, and Greece for example become their own references as well as efficiency references for other member states especially around the time of the 2007-08 financial crisis. Given the weak GDP growth of these member-states relative to that of the Nordic members, a policy implication would suggest that inefficient member states establish a commitment to higher benchmarks and implement the reforms necessary to attain them rather than to rely on lower national benchmarks that give the appearance of policy efficiency.

Conclusion

As Europe 2020 passes its mid-life, the EU has faced challenges in designing, implementing, and evaluating the set of national reform plans. This paper reviewed the complexities of implementing EU policy across 28 heterogeneous member states while coordinating to achieve region-wide objectives under the Lisbon 2010 strategy and its successor Europe 2020 program. In the aftermath of the Lisbon 2010 experience, EU policymakers have

attempted to include soft and hard aspects of policy coordination to encourage positive aspects like policy motivation and ownership while limiting negative aspects like free-rider behavior and time consistency that reduce policy effectiveness. A nontrivial aspect in this regard is the construction and use of an appropriate tool to measure progress towards national and EU objectives: a tool that combines sufficient hardness and softness to generate a "Goldilocks" index. Given the difficulties in measuring, normalizing, and weighing a proper set of criteria, four index variants were explored and their results compared as a means to reveal how closely national objectives aligned with EU objectives.

This study used data envelopment analysis as a way to sort through some of these methodological issues and to prioritize divergent policy preferences across member-states and time. The results might provide a way forward as the EU attempts to implement a system to monitor and motivate the policy actions of its members. For one, it is not obvious from the summary efficiency data on the EU-15 and the EU-13 that there are significant or persistent differences between the index and efficiency scores of the more established and more recent members. Consequently, it is not clear that there exists a set of common policy responses applicable exclusively within the EU-15 or EU-13. The list of efficient references indicates that the Nordic countries, who generally apply hard benchmarks, are models across the spectrum of inefficient EU member-states. Further study would benefit from engaging a wider set of input measures more consistent with theoretical foundations and an expanded set of output measures such as competitiveness and total factor productivity.

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Table 1

Lisbon 2010 and Europe 2020 Indicators and Targets

LISBON 2010		EUROPE 2020	
Indicator[1]	**Target**	**Indicator[2]**	**Target**
General Economic Background		**General Economic Background**	
GDP per capita in PPS	No maximum quantitative target specified	Not included in Europe 2020	--
Labor productivity	No maximum quantitative target specified	Not included in Europe 2020	--
Employment		**Employment**	
Employment rate	70 % of the population aged 15 to 64 to be employed.	Employment rate	75 % of the population aged 20 to 64 to be employed.
Employment rate of older workers	50 % of the population aged 55 to 64 to be employed.	Not included in Europe 2020	--
Innovation and Research		**Research and Development**	
Gross domestic expenditure on R&D	3 % of GDP to be invested in research and development.	Gross domestic expenditure on R&D	3 % of GDP to be invested in research and development.
Youth secondary educational attainment	No maximum quantitative target specified	**Education**	
		Early leavers from education & training	<10 % of early leavers from education & training
		Tertiary educational attainment	40 % of population aged 30-34 with competed tertiary education
Economic Reform		**Economic Reform**	
Comparative price levels	No minimum quantitative target specified	Not included in Europe 2020	--
Business investment	No minimum quantitative target specified	Not included in Europe 2020	--
Social Cohesion		**Fighting poverty and social exclusion**	
Risk-of-poverty rate after transfers	No minimum quantitative target specified	Poverty and social exclusion	25 % reduction or 20million people to be lifted out of the risk of poverty or social exclusion EU-wide
Long-term unemployment rate	No minimum quantitative target specified	Not included in Europe 2020	--
Dispersion of regional employment	No minimum quantitative target specified	Not included in Europe 2020	--
Environment		**Climate change and energy sustainability**	
Greenhouse gas emissions	8 % reduction in its greenhouse gas emissions by 2008-2012, compared to the Kyoto base year.	Greenhouse gas emissions	20 % reduction in greenhouse gas emissions compared to 1990 levels.
Energy intensity of the economy	No minimum quantitative target specified	Energy efficiency	20 % increase in energy efficiency equaling a reduction to 1,483Mtoe of primary consumption and to 1,086Mtoe of final energy consumption.
Volume of freight transport	No minimum quantitative target specified	Share of renewable energy in gross final energy consumption	20 % share of renewable energy in gross final energy consumption

[1] Definitions taken from EU Commission (2005b).

[2] Definitions taken from EU Commission (2010).

Table 2

Annual country efficiency values using EU benchmarks ranked by DMU period average

DMU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Avg	Stdev
FI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
SE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
EE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
LV	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
CZ	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	1.00	0.01
SI	0.97	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.01
DK	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.98	0.97	0.95	0.99	0.99	0.02
IE	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.96	0.92	0.99	0.02
LT	0.95	0.91	0.88	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.04
DE	1.00	1.00	1.00	1.00	1.00	0.93	1.00	0.91	0.92	0.97	1.00	0.99	0.98	0.99	0.98	0.03
CY	0.94	0.99	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.77	0.98	0.06
HR	0.90	0.90	0.92	0.98	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.96	0.95	1.00	0.97	0.04
LU	1.00	1.00	1.00	1.00	0.99	0.93	0.93	0.93	1.00	1.00	1.00	1.00	0.90	0.84	0.97	0.05
FR	1.00	1.00	1.00	1.00	0.99	0.97	0.96	0.95	0.95	1.00	0.96	0.93	0.90	0.89	0.96	0.03
UK	1.00	1.00	1.00	1.00	1.00	0.97	0.92	0.91	0.93	0.99	0.99	0.96	0.92	0.88	0.96	0.04
BE	1.00	1.00	1.00	0.98	1.00	0.97	0.96	0.93	0.94	0.98	0.97	0.91	0.89	0.88	0.96	0.04
AT	0.92	0.87	0.88	0.95	0.89	0.93	0.97	0.91	0.91	0.95	0.95	0.97	0.99	1.00	0.94	0.04
NL	0.92	0.93	0.92	0.92	0.89	0.89	0.94	0.90	0.96	1.00	1.00	0.98	0.94	0.88	0.93	0.04
SK	0.90	0.85	0.87	1.00	0.91	0.91	0.89	0.92	0.95	1.00	1.00	1.00	1.00	0.86	0.93	0.05
BG	0.93	0.93	1.00	1.00	1.00	1.00	0.89	0.76	0.90	1.00	1.00	0.88	0.84	0.86	0.93	0.07
ES	1.00	1.00	1.00	1.00	0.97	1.00	0.94	0.93	0.93	0.89	0.92	0.84	0.77	0.76	0.92	0.08
PL	0.82	0.80	0.85	0.93	0.91	0.89	0.90	0.89	0.93	1.00	1.00	1.00	0.99	0.98	0.92	0.06
HU	0.92	0.91	0.97	0.95	0.91	0.88	0.83	0.84	0.92	0.96	0.89	0.83	0.78	0.78	0.88	0.06
PT	0.93	0.94	0.94	0.92	0.92	0.90	0.87	0.81	0.86	0.92	0.93	0.88	0.78	0.73	0.88	0.06
RO	0.82	0.85	0.85	0.89	0.90	0.82	0.80	0.78	0.88	0.95	1.00	0.89	0.85	0.84	0.87	0.06
IT	0.92	0.93	0.91	0.93	0.89	0.87	0.85	0.79	0.89	0.85	0.88	0.82	0.75	0.71	0.86	0.06
EL	0.78	0.78	0.78	0.84	0.85	0.86	0.87	0.84	0.92	0.91	0.89	0.74	0.62	0.59	0.81	0.09
MT	0.72	0.73	0.74	0.81	0.75	0.75	0.83	0.71	0.83	0.79	0.85	0.84	0.81	0.81	0.78	0.05

Table 3

Annual country efficiency values using National benchmarks ranked by DMU period average

DMU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Avg	Stdev
CZ	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
HU	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.01
SE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	0.01
DK	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	0.93	0.99	0.02
DE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.97	0.98	1.00	1.00	0.97	0.95	0.99	0.02
CY	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.84	0.99	0.04
PT	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.98	0.05
LU	1.00	1.00	1.00	1.00	0.99	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.89	0.94	0.98	0.03
AT	1.00	1.00	1.00	1.00	0.98	0.98	0.95	0.97	0.98	1.00	1.00	0.98	0.96	0.89	0.98	0.03
UK	0.97	0.98	1.00	1.00	1.00	0.99	0.98	0.95	0.95	0.98	1.00	1.00	0.98	0.89	0.98	0.03
EE	0.90	0.87	0.94	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.04
SI	0.94	0.95	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.94	0.84	0.98	0.04
ES	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.99	1.00	1.00	1.00	0.96	0.76	0.98	0.06
FI	1.00	1.00	1.00	0.96	1.00	1.00	0.98	1.00	1.00	0.99	0.98	0.97	0.91	0.85	0.97	0.04
HR	0.96	1.00	1.00	1.00	1.00	1.00	0.98	0.99	1.00	1.00	1.00	0.95	0.93	0.83	0.97	0.04
IT	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.97	0.96	0.97	0.97	0.98	0.97	0.81	0.97	0.05
IE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.94	0.95	0.95	0.91	0.84	0.97	0.04
EL	0.94	0.94	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.89	0.77	0.96	0.06
LV	0.83	0.83	0.88	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.06
BG	0.82	0.88	0.92	0.96	1.00	1.00	0.87	0.92	0.99	1.00	1.00	1.00	1.00	1.00	0.95	0.06
FR	0.98	0.99	0.99	1.00	0.98	0.96	0.94	0.92	0.92	0.94	0.96	0.97	0.93	0.85	0.95	0.04
NL	0.95	0.94	0.93	0.93	0.91	0.92	0.97	0.97	1.00	1.00	1.00	0.97	0.92	0.86	0.95	0.04
BE	0.97	0.96	0.94	0.93	0.94	0.93	0.92	0.93	0.91	0.95	0.96	0.97	0.96	0.84	0.94	0.03
LT	0.73	0.76	0.78	0.86	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.10
MT	0.99	0.93	0.97	0.96	0.96	0.97	0.88	0.89	0.92	0.94	0.93	0.92	0.88	0.86	0.93	0.04
RO	0.74	0.78	0.82	0.88	0.93	0.88	0.86	0.94	1.00	1.00	1.00	1.00	1.00	0.98	0.92	0.08
SK	0.81	0.81	0.79	0.88	0.84	0.87	0.88	0.93	0.96	1.00	1.00	1.00	1.00	0.92	0.91	0.07
PL	0.82	0.83	0.83	0.85	0.84	0.84	0.81	0.83	0.84	0.95	0.96	0.95	0.91	0.88	0.87	0.05

Table 4

Comparison of Average Score and Rank by Index – 2000 – 2013

	E2020 EU		DEA EU		E2020 Natl		DEA Natl	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
AT	0.534	13	0.936	17	0.526	18	0.978	9
BE	0.537	12	0.958	16	0.481	24	0.936	23
DK	0.688	3	0.990	7	0.616	6	0.991	4
FI	0.711	2	1.000	1	0.584	9	0.975	14
FR	0.584	9	0.964	14	0.510	20	0.953	21
DE	0.584	8	0.977	10	0.545	15	0.988	5
EL	0.298	24	0.806	27	0.568	11	0.963	18
IE	0.430	20	0.987	8	0.397	27	0.967	17
IT	0.286	26	0.855	26	0.494	21	0.972	16
LU	0.521	15	0.965	13	0.489	22	0.979	8
NL	0.594	6	0.934	18	0.538	16	0.949	22
PT	0.277	27	0.880	24	0.488	23	0.985	7
ES	0.287	25	0.925	21	0.559	12	0.976	13
SE	0.806	1	1.000	1	0.680	2	0.997	3
UK	0.537	11	0.962	15	0.534	17	0.977	10
CY	0.406	22	0.975	11	0.628	5	0.987	6
CZ	0.593	7	0.997	5	0.693	1	1.000	1
EE	0.622	5	1.000	1	0.631	4	0.976	11
HU	0.466	17	0.882	23	0.547	14	0.998	2
LV	0.529	14	1.000	1	0.592	8	0.961	19
LT	0.623	4	0.980	9	0.647	3	0.934	24
MT	0.167	28	0.783	28	0.327	28	0.929	25
PL	0.437	19	0.920	22	0.462	26	0.867	28
SK	0.509	16	0.933	19	0.463	25	0.907	27
SI	0.551	10	0.996	6	0.604	7	0.976	12
BG	0.454	18	0.928	20	0.519	19	0.954	20
RO	0.416	21	0.866	25	0.550	13	0.915	26
HR	0.388	23	0.969	12	0.576	10	0.975	15

Table 5

Reference Countries under EU Benchmarks

DMU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AT	DK DE SE CZ	DK DE CZ EE	DK SI	DK SE SI	DK FI SE	DK SE HR	DK SE LV	SE LV	SE EE SI	AT 09	NL SE EE	SE EE	FI SE LT	FI SE LT
BE	BE	BE	BE	FR IE CY	BE	DK IE	DK IE EE	FI IE EE	IE SE LT	DK FI FR EL IE LT	IE SE EE LT	FI SE LT	SE LT	SE EE LT
DK	DK	DK	DK	DK	DK	DK	DK	SE EE	DK	DK	DE SE	FI SE EE	FI SE EE	FI SE LT
FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI	FI
FR	BE DK FI UK	FR	FR	FR	DK IE UK	DK IE	DK IE EE	FI IE EE	SE CY LT	FR	IE SE CY LT	SE LT	SE LT	SE EE LT
DE	DE	DE	DE	DE	DE	SE EE LV	DE	SE EE	DK SE EE	DK FI SE EE LV	DE	SE EE	FI SE EE	FI SE EE
EL	DK FI	DK EE	DK FR IE CY	DK LU UK	DK	DK SE	DK	SE EE LV	DK LU HR	EL	NL SE LV	SE EE	EE LT	FI SE EE LT
IE	DK FI	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	SE LT	SE LT	SE LT
IT	DK DE EE	DK DE EE	DK EE	DK DE UK EE	DK EE LV	DK SE EE	DK EE	SE EE LV	DK LU LV	FI EL LV	NL SE EE	SE EE	EE	FI EE LV
LU	LU	LU	LU	LU	DK	DK SE	DK EE	SE CY EE	LU	LU	LU	LU	SE LT	SE LT SI
NL	DK UK EE	DK EE	DK EE	DK UK	DK EE	DK	DK EE	IE SE EE	DK SE CY EE LT	NL	NL	SE EE	SE EE LT	SE EE LT
PT	DK	DK	DK	DK	DK SE	DK SE	SE EE	SE EE LV	DK SE EE LV	EL SE LV	NL SE LV	SE EE	SE EE	FI SE EE LV
ES	ES	ES	ES	ES	DK FI IE CY	DK IE	DK IE CY	SE CY	SE DY LT	FI EL IE LV	IE SE CY EE	SE EE LT	SE EE LT	EE LV LT
SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
UK	UK	UK	UK	UK	UK	DK EE	DK IE EE	FI IE SE EE	IE SE CY EE	UK	SE LT RO	SE EE LT	EE LT	EE LT
CY	DK FI	DK FI IE	CY	CY	CY	DK IE	CY	CY	CY	CY	CY	SE LT	LT	LT
CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	SE LT SI	SE LT SI
EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE
HU	DK CZ EE	DK DE CZ EE	DK DE EE	DK SE CZ EE	DK EE LT	DK SE EE LT	DK SE CZ EE	SE EE LV LT	DK LV LT HR	FI EL LV HR	DE SE EE LT	SE EE	EE	FI SE EE
LV	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV
LT	DK EE	EE	EE	CZ EE	LT	LT	LT	LT	LT	LT	LT	LT	LT	LT
MT	DK DE EE	DK DE EE	DK DE EE	DK DE LU	DK BG	DK SE EE	DK	SE EE LV	DK LU	EL LV	NL EE LV	SE EE	EE	EE
PL	DK DE SE CZ	DK DE CZ EE	DK CZ EE	DK SE CZ SI	DK LT HR	DK LT HR	DK LT HR	CZ LT SI	LT SI HR	PL	PL	PL	LT SI	LT SI
SK	CZ EE	CZ EE	CZ EE	SK	CZ LT	CZ LT	CZ LT HR	CZ LT HR	LT HR	SK	SK	SK	SK	LT SI
SI	SE CZ	DK CZ	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI I	SI
BG	DE EE	DE EE	BG	BG	BG	BG	DK EE	EE LV LT	EE LV LT	BG	BG	SE EE	EE LV LT	EE LV LT
RO	DE EE	DE EE	DE EE BG	DE EE BG	DE EE LV	EE LV	DK EE LV	EE LV	EE LV	RO	RO	EE LT	EE LV LT	EE LV LT
HR	SE CZ EE	DK CZ EE	DK CZ EE	DK CZ SI	HR	HR	HR	HR	HR	HR	SE SK SI	CZ LT PL	LT SK SI	LT SI

Table 6

Reference Countries under National Benchmarks

DMU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AT	AT	AT	AT	AT	EL SE SI	DK SE SI	DK SE EE	EL SE EE SI	EL SE EE SI	AT	AT	PT SE CZ LT	PT CZ HU LT	CZ LT
BE	DK FI ES	DK IT ES	DK IT CY	DK IT UK CY	DK EL CY	DK EL CY	SE CY CZ EE	EL CY CZ SI	EL SE CY	EL SE CZ HU SI	EL SE CY CZ SI	PT UK CZ HU LT	PT CZ HU LT	CZ LT
DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	DK	CZ EE LV LT	CZ EE LT	CZ LV LT
FI	FI	FI	FI	DK CY	FI	FI	DK SE CZ	FI	FI	DK SE CZ HR	DE SE CY CZ	DE SE CZ EE	CZ EE LT	CZ LV LT
FR	DK FI IT ES SE	DK IT ES	DK IT CY	DK IT UK CY	DK EL IT CY	DK FI EL IE IT CY	SE CY CZ EE	EL SE CY CZ EE	EL SE CZ EE LT	EL SE CY CZ HR	PT SE CY SI HR	DE PT CZ LT	PT CZ LT	CZ LT
DE	DE	DE	DK IT LU	DE	DE	DE	DE	EL PT CZ LV	DK LU CZ	DK CZ	DE	DE	CZ EE	CZ LV LT
EL	DK IT PT ES CY	DK IT ES	IT ES CY	EL	EL	EL	EL	EL	EL	EL	EL	UK HU	HU LT	CZ LV BG
IE	DK IT PT	IE	IE	IE	IE	IE	IE	CZ EE	FI SE CZ LV	EL CY HR	PT CY HR	DE PT CZ LT	PT CZ LT	CZ LT
IT	IT	IT	IT	IT	IT	IT	EL CY CZ EE	EL CY CZ SI	EL SE CZ SI	EL CZ HU SI	EL PT CZ HU SI	PT CZ HU LT	PT CZ HU LT	CZ EE LT BG
LU	LU	LU	LU	LU	DK DE ES	DK ES	DK DE CZ EE	SE CZ LV	LU	LU	LU	LU	EE LT	LT
NL	DK FI IT ES	DK IT ES CY	DK IE IT CY	DK IT CY	DK CY CZ	DK EL CY	DK DE CZ EE	SE CZ EE LV	NL	NL	NL	DE SE CZ EE LT	CZ EE LV LT	CZ EE LV
PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	PT	CZ LV BG
ES	ES	ES	ES	ES	ES	ES	DK CY CZ EE	EL SE CZ EE	DK EL SE CY CZ	ES	ES	ES	PT CZ HU LT	CZ LV BG
SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	CZ EE LT	CZ LV LT
UK	DK FI ES	DK ES CY	DK CY	UK	UK	DK EL IE CY	DK SE EE	EL CY EE	EL CY EE	EL NL CY	UK	UK	LV LT	EE LV LT
CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	CY	EE LV LT	CZ LV LT
CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ	CZ
EE	ES HU	ES HU HR	ES HU HR	EL ES HU HR	EE	EE	EE	EE	EE	EE	EE	EE	EE	EE
HU	HU	HU	HU	HU	HU	HU	CZ EE	HU	HU	HU	HU	HU	HU	CZ LV BG
LV	PT ES	PT ES HR	HU HR	HU HR	LV	LV	LV	LV	LV	LV	LV	LV	LV	LV
LT	PT ES	HU HR	HU	IE HU HR	EE HU SI HR	LT	LT	LT	LT	LT	LT	LT	LT	LT
MT	LU PT	PT ES	PT ES	PT ES HU	EL ES HU	EL ES EE	DE EE	PT EE HU	LU PT EE	EL NL CZ HU	EL NL PT ES	DE PT LT	PT CZ LT	LT
PL	ES HU	HU HR	HU HR	HU HR	DK HU LV SI	HU LT HR	CZ EE	EE HU LT	HU LV LT HR	CY LT BG HR	SE CZ LT RO	DE EE LT	EE LT	CZ LT
SK	AT HU	DK HU	DK HU SI	HU SI	HU SI	HU LT SI	CZ EE	EE HU LT	HU LV LT	SK	SK	SK	SK	CZ LV BG
SI	AT IT HU	AT IT HU	SI	SI	SI	SI	CZ EE	SI	SI	SI	SI	CZ HU LT SK	CZ HU LT	CZ LT
BG	PT ES	PT ES HR	ES HU	ES HU	BG	BG	DK EE	HU LV	HU LV	BG	BG	BG	BG	BG
RO	PT ES	PT ES HR	ES HU HR	ES HU	DK HU LV BG	LV	EE	LV	RO	RO	RO	RO	HU LV LT BG	LV BG
HR	IT ES	HR	HR	HR	HR	HR	SE CZ EE LT	CZ EE HU LT SI	HR	HR	HR	DE PT CZ LT	PT HU LT	CZ LV BG

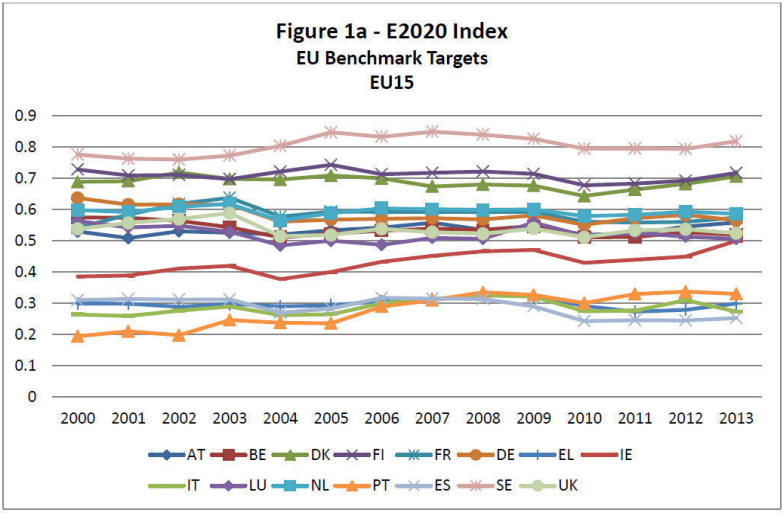
Figure 1a - E2020 Index
EU Benchmark Targets
EU15
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
AT BE DK FI FR DE EL IE
IT LU NL PT ES SE UK

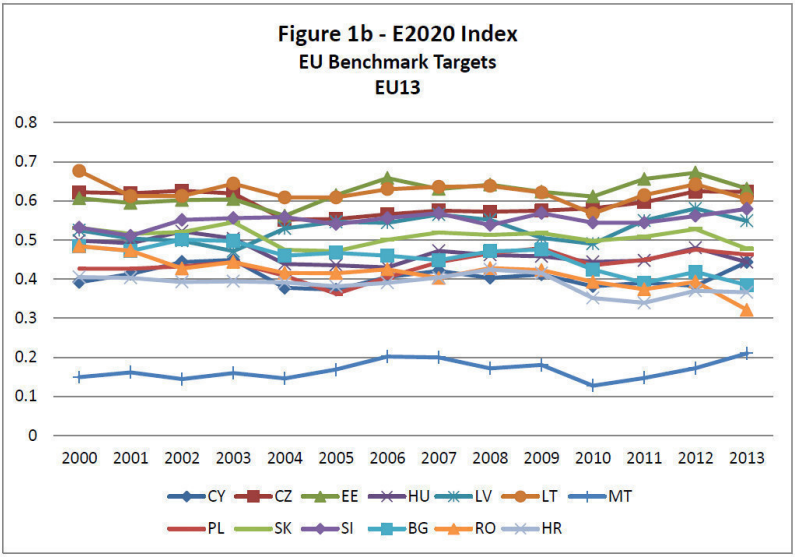
Figure 1b - E2020 Index
EU Benchmark Targets
EU13
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
CY CZ EE HU LV LT MT
PL SK SI BG RO HR

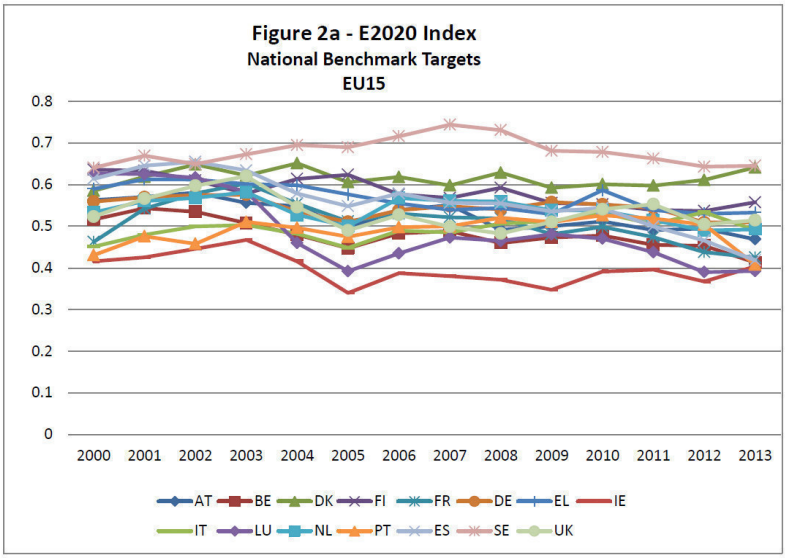
Figure 2a - E2020 Index
National Benchmark Targets
EU15
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
AT BE DK FI FR DE EL IE
IT LU NL PT ES SE UK

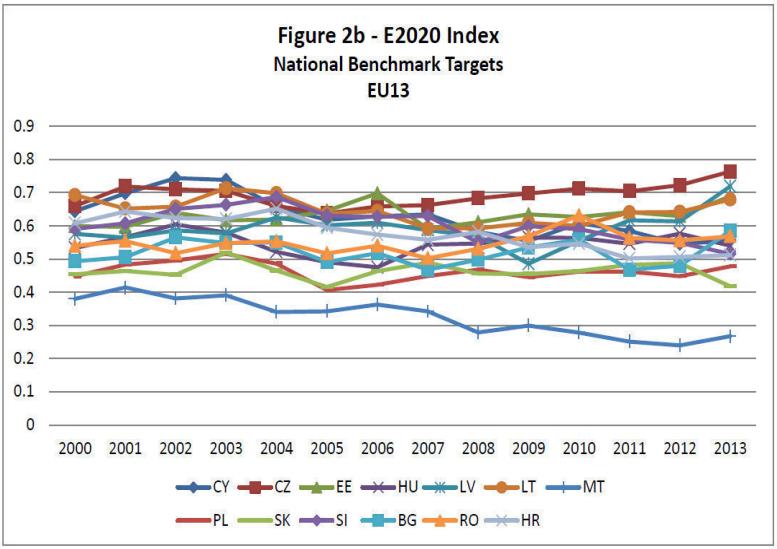
Figure 2b - E2020 Index
National Benchmark Targets
EU13
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
CY CZ EE HU LV LT MT
PL SK SI BG RO HR

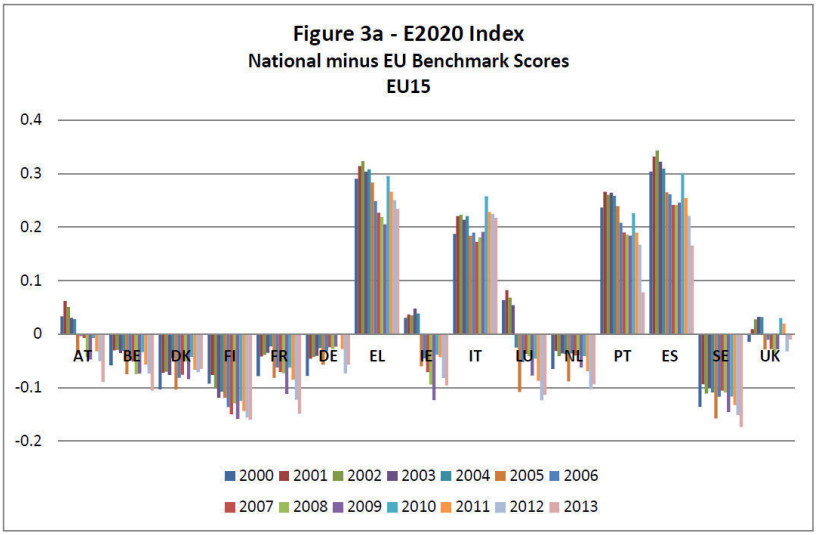
Figure 3a - E2020 Index
National minus EU Benchmark Scores
EU15
0.4
0.3
0.2
0.1
0
-0.1
-0.2
AT
BE
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2000 2001 2002 2003 2004 2005 2006
2007 2008 2009 2010 2011 2012 2013

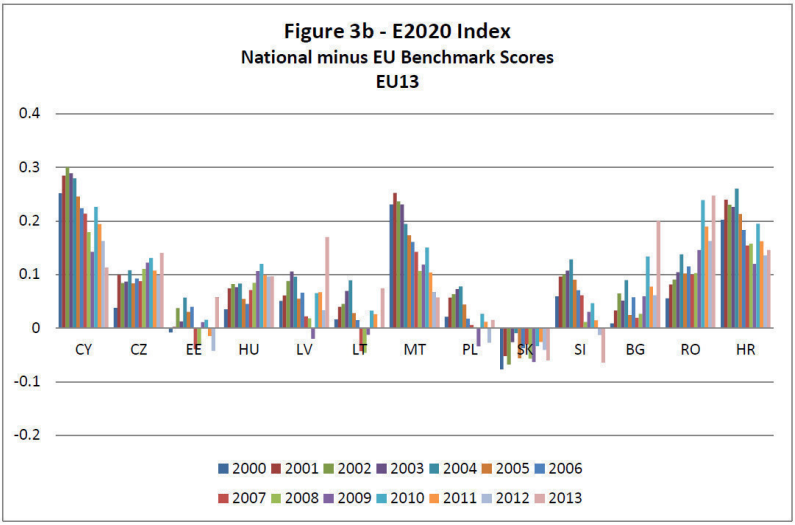


Figure 3b - E2020 Index
National minus EU Benchmark Scores
EU13
0.4
0.3
0.2
0.1
0
-0.1
-0.2
CY
CZ
EE
HU
LV
LT
MT
PL
SK
SI
BG
RO
HR
2000 2001 2002 2003 2004 2005 2006
2007 2008 2009 2010 2011 2012 2013

Figure 4a - DEA Efficiency Gap
National minus EU Benchmark Scores
EU15

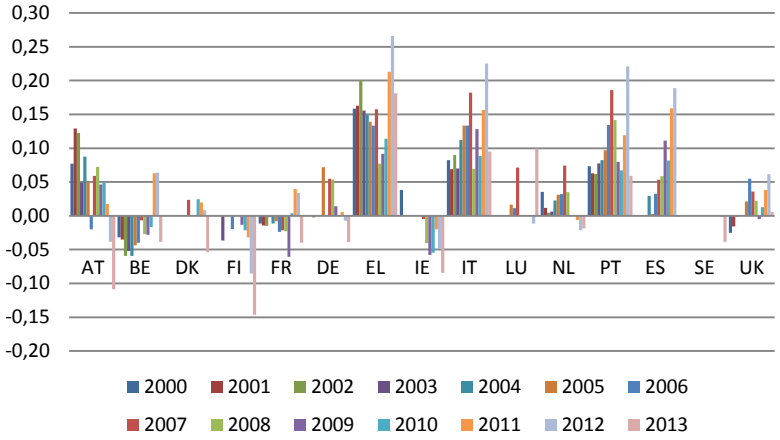


Figure 4b - DEA Efficiency Gap
National minus EU Benchmark Scores
EU13

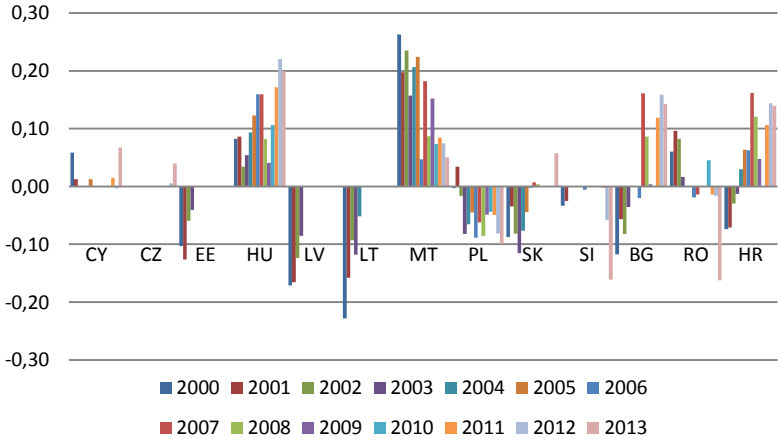
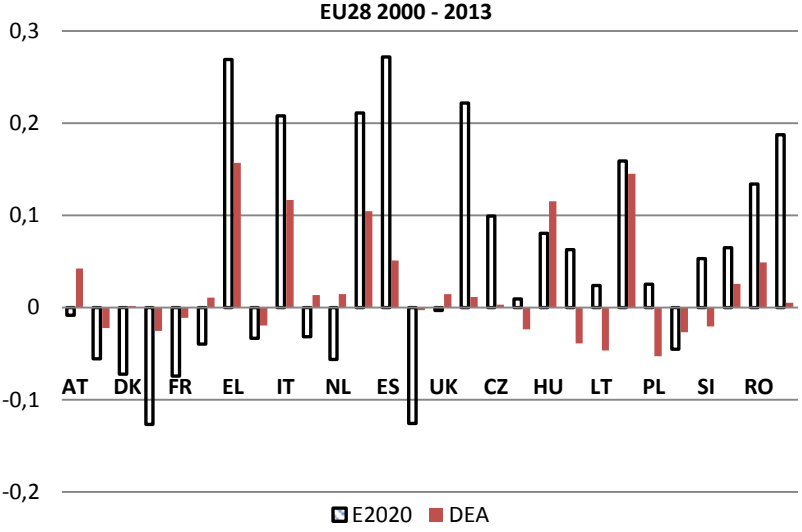


Figure 5 - E2020 vs. DEA Index Scores 2020
Average Difference National vs. EU Targets
EU28 2000 - 2013



THE MINIMUM WAGE AS A TOOL OF DEEPENING DISCRIMINATION OF EXCLUDED GROUPS

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***Abstract*:**
Discrimination of excluded groups is a problem in almost every society. Slovak republic is not an exception. In this paper, we focus on discrimination against Roma population on the labor market and influence of the minimum wage it has on the excluded group. We present the results of primary survey among Slovak employers which confirmed the presence of discrimination against Roma population on the Slovak labor market. Subsequently, we discuss how the minimum wage affects employment opportunities for Roma population. In conclusion, we propose policy recommendations.

Key words: Roma population, minimum wage, discrimination.

JEL classification: J15, J71.

Introduction

Discrimination of excluded groups is present in various forms in Slovak republic. The most populated excluded group is Roma population. In our paper, we focus mostly on discrimination of this excluded group on the Slovak labor market.

There is not many statistical data concerning the phenomenon of discrimination of Roma on the labor market. Therefore, one of the contributions of this paper is the presentation of unique statistical data from the primary survey among Slovak employers. We collected the responses from 100 small businesses from all regions in Slovak republic. We examine experiences of employers with employing Roma population.

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Supposing the discrimination of Roma population by employers on the Slovak labor market, a challenge for public policy arises. We deal with a theoretical examination of the specific public policy – the minimum wage. We try to show how the minimum wage influences the labor market where discrimination is present.

The paper is organized in following structure: in the second section we shortly introduce theories of discrimination. Subsequently we present state of the research in the field of the minimum wage and its brief history. In the fourth section, we present the results of primary survey among employers. Findings of three preceding sections are conjunct in the fifth section. Conclusion and recommendations are in the section number six.

1 Discrimination in neoclassical theory

In general, there are two kinds of discrimination models. They show how discrimination is implemented and what are their consequences under various conditions.

The first source of discrimination is subjective prejudices

This type of discrimination was first introduced by Becker (1971) in his classic work. Becker's model operates with discrimination as a personal prejudice, or taste, against associating with a particular group. Consequently, this group is treated differently than members of other groups with the same productive characteristics.

This means – for example in the labor market – that potential employees that are identical in their productive effort are not treated equally by employers. Since employers' decisions are not based on objective characteristics, but rather they are based on subjective prejudices, discriminated group is then treated as if it was less productive.

It is Becker's contribution to show that discrimination on the competitive market can persist only in the short run. Since employer with subjective prejudices is financially penalized for his discriminating (he hires more expensive workers with same productivity than employers who don't discriminate), he will be forced to leave the market in the long run.

The second source of discrimination is statistical discrimination

Employer hiring people needs to know certain information about a potential employee to be able to assess his productivity. This investigation is a costly activity, though. Therefore employer can decide to use certain informational shortcuts and utilize information about the average characteristics of the groups to which potential employee belongs. When an employer makes a decision based on these group characteristics, statistical discrimination can be outcome even in the absence of subjective prejudices (Altonji and Pierret, 2001).

Statistical discrimination is part of the screening problem. This problem arises when observable characteristics of potential employees are correlated with signs of a certain group, however, this correlation is not perfect. Then, it is possible that people with the same productive characteristics (education, working skills, etc.) will be treated differently depending on group affiliation.

Post-Becker theoretical works focused primarily on various modifications in models and assumptions which could explain situations when there is persisting discrimination in the long run. They tried to explain evidence from empirical works which showed how discrimination persist on the labor market even in the long run, e.g. in the form of wage differentials (Darity and Mason, 1998).

Yet these conclusions are often challenged. For example economists June O'Neill and Dave O'Neill (2005) provide a vivid example of how omitted information can change conclusions about discrimination in wage studies. Nonetheless, we focus more on the influence of public policy, specifically the minimum wage, on the presence of discrimination against Roma population.

2 Minimum wage, its effects and origin

Minimum wage is often seen as a tool of helping poor families with working members (Neumark et al., 1998). Additionally the minimum wage is by some economists advocated as a tool of the reduction of discrimination between different groups. They consider the minimum wage to be anti-discrimination and pro equal opportunities tool on the labor market. For example Rubery sees the minimum wage as: „an efficient and effective tool

for reducing gender pay inequality, provided that the minimum wage is set at a sufficiently high level to improve the pay received by women and other disadvantaged groups“ and then he continues: „this tool can have beneficial effects in reducing wage discrimination in the labor market more generally, for example discrimination encountered by racial or ethnic minorities, immigrants etc.“ (Rubery, 2003, p. 1).

However, if we look at the historical development of the minimum wage policy, we will discover very opposite story. The minimum wage was used for exactly opposite purposes. The very first federal minimum wage in the USA was enacted in 1931 (Davis-Bacon Act) with an explicit purpose to forbid African Americans to compete with White Americans on federal construction projects. Since White Americans were members of labor unions, they earned higher wages than were wages accepted by African Americans workers (Bernstein, 1993). Authors studying The Progressive Era in USA (the beginning of 20th century) report many historical examples and interesting quotations from this period that testifies the racist background of the minimum wage (Leonard and Bernstein, 2009). For example progressive economist A. B. Wolfe (the future AEA president) considered to be the advantage of the minimum wage that it removed from employment those who were “a burden on society.” According to him: “If the inefficient entrepreneurs would be eliminated [by minimum wages,] so would the ineffective workers. [...] I am not disposed to waste much sympathy upon either class. The elimination of the inefficient is in line with our traditional emphasis on free competition, and also with the spirit and trend of modern social economics.” (Wolfe, 1917. p. 278). In the same manner H. R. Seager (the future AEA president as well) welcomed effects of the minimum wage: “If we are to maintain a race that is to be made of up of capable, efficient and independent individuals and family groups we must courageously cut off lines of heredity that have been proved to be undesirable by isolation or sterilization” (Seager, 1913, p. 9)

Yet the minimum wage was not abused only in the USA. In 1925, the minimum wage was enacted in British Columbia (a province located at the west coast of Canada) with the purpose to remove Japanese migrants from the labor market in the wood industry. The same purpose had the minimum

wage in Australia, where it was supposed to protect the standard of living for white workers from the labor supply of Chinese people at the beginning of 20th century (Sowell, 2013). A similar course of events is behind the minimum wage in South Africa (Williams, 1989).

In spite of this history, proponents of the minimum wage use very different arguments today. They consider the minimum wage to be the help for poor and excluded groups. Recently this interpretation of effects of the minimum wage was supported by several empirical works suggesting that there are no negative effects or even that there are positive effects of minimum wage on employment (Card and Krueger, 1995). Nonetheless, the majority of studies still agree on the opposite conclusion. Neumark a Washer (2008) reviewed nearly 100 studies and showed that considerable majority of existing studies find disemployment effects.

Moreover, there are empirical works focusing directly on the minimum wage and its effects on employment of excluded groups in the USA. All of them find larger negative effect of the minimum wage for young black population (Burkhauser et al, 2000; Neumark and Wacher 2007; Even and Macpherson, 2011).

3 Primary survey among employers

Before we get to the result of our primary survey, we would like to briefly describe the state of the Slovak labor market. The Slovak labor market is characterized by the high unemployment rate. In last 20 years, the unemployment rate was on average 14,5 %, what is significantly above the average of other EU countries (IFP, 2014). Moreover, there is a significant share of long-term unemployment (one and more years) which is two times higher than average of EU countries (INESS, 2015). While employment rate among Roma people is estimated to be only 15 – 17 %, in majority population it is about 60 % (IPF, 2014).

At the beginning of 2015 we conducted the survey among 100 small employers (from 1 to 19 employees) from all regions of Slovak Republic. We asked them 5 questions about their experiences and opinions about employing Roma population.

In the first question, we asked employers “Have you ever had a Roma employee??”. 49 % answered “yes”. This question enables us to divide set of employers to two categories: one which form their opinions about Roma population (probably) on the basis of personal experiences and another which form their opinions on the basis of indirect information.

Then we asked: “Is it more costly to train an Roma employee or it is same as with an employee from the majority population?”. 71 % employers with experiences answered that it is more costly to train an employee from Roma population. In category without experiences, only 56 % agreed with them. Thus, we can argue that employers without experience are not in principle more prone overestimate costs of training Roma employees. Similar results we observed in next question about whether the quality of the work of employees from Roma population is the same as quality of the work of employees from the majority population. 53 % employers with experiences consider Roma population to be less productive, whereas only 24 % employers without experiences think so.

Employers with and without experiences have almost the same opinion about the influence of hired employees from Roma population on other employees from the majority population. 59 % from all employers think that employees work rather in the company which doesn’t hire Roma population. 61 % employers with experiences agree.

Given the relatively problematic cohabitation between Roma and the majority population in some regions, these results are not so much surprising. It seems that the majority of employers consider Roma population to be less productive. Yet since we cannot tell from the data what kind of discrimination Roma population faces in Slovak republic, we look at the effect of minimum wage on both types of discrimination.

4 Discussion: The minimum wage in the context of discrimination

In this section, we look at findings from 2nd and 3rd section and apply them on empirical findings from 4th section. In other words, we look at effects of the minimum wage on the labor market where discrimination is present.

Discrimination based on subjective prejudices

As we mentioned in the second section, there is a tendency to the expulsion of discriminating employers from the market in the long run, as these employers would be penalized by larger costs. This conclusion, however, does not hold when there is the minimum wage.

Minimum wage prohibits employment for less than arbitrary set wage limit and thus prohibits workers from competing amongst one another on the basis of price. If wages were not fixed at a certain minimum, those who were discriminated against could compensate employers by offering their labor at a cheaper price. Setting minimum wage thus removes penalties from the discriminatory employer's decision-making process and thus effectively decreases the costs of discrimination for those employers who wished to practice it (Kibbe, 1988).

As a result, employers replace wage discrimination with discrimination in hiring. Instead of differences in wages there will be differences in unemployment rate between the groups. Consequently, the group that is the subject of discrimination may by subject to even more discrimination due to a minimum wage (Lundahl and Wadensjo, 2015).

Discrimination based on statistical discrimination

The outcome of setting minimum wage on the labor market where statistical discrimination is present is similar as on the labor market with discrimination based on prejudices. Minimum wage leads again to differences in employing between discriminated and non-discriminated groups.

Yet the mechanism which brings about negative effects is a little bit different. Unemployment of discriminated group is not the outcome of removing costs from discriminating employers, but rather the outcome of crippling the process of signaling relative productivity by discriminated employees and crippling the process of learning by employers.

Minimum wage makes it impossible for discriminated employees to gain working experience, formal and informal contacts etc. (by their willingness to work for lower wage than their non-discriminated colleagues). Consequently working experience would help them to signal their real productivity. Afterward, employers could better detect relative productivity of employees from discriminated groups and would be able to learn in this process how to identify

the difference between unfairly discriminated and fairly discriminated potential employees.

However, the whole process is hampered by the adoption of the minimum wage. Minimum wage removes the possibility of gaining experience and contacts by employees and does not allow the process of learning by employers. Subsequently, employers will rely more on inaccurate information regarding group affiliation and less on accurate information regarding individual productivity (Lundahl and Wadensjo, 2015).

Conclusion and recommendations

We showed in our primary survey that there is real discrimination of Roma population on the labor market in Slovak republic. There are also estimated statistics about the unemployment rate of Roma population which is also persistently high. We would like to argue that it is minimum wage which connects these two phenomena. It does not mean that minimum is the only factor and that limiting the negative impact of the minimum wage is sufficient condition to solve all problems with long run unemployment of Roma population. We would like to argue, however, that it is the necessary condition in today's circumstances.

The problem of the minimum wage is even more urgent if we realize that minimum wage would probably cause high unemployment rate of Roma population even without present any discrimination at all. Roma population's human capital is, in general, relatively less valued on the market and Roma employees compete at in particular low-capitalized and highly competitive industries with relatively narrow profit margins, where distribution of wages is close to the minimum wage (e.g. construction and retail). The minimum wage thus affects this group more negatively than the rest of population. Moreover, Roma population is geographically allocated mostly in poor and eastern areas of Slovak republic. That makes them even more vulnerable to the minimum wage. In 2014 minimum wage was only 37,13 % of the median wage in Bratislava region, whereas minimum wage was up to 54,32 % of the median wage in Prešov region.

There are, of course, another ways how to help to decrease discrimination and unemployment of excluded groups. The majority models of discrimination agree on one thing – the more competitive market is the less

discrimination survives in society. The government should, therefore, enact policies which improve the competitiveness of markets, or removes artificial barriers to entry to the market.

Furthermore, it is necessary to focus on improving the quality of human capital of Roma population. Negative effects are brought about by tax and contributions which elevate the tax wedge, especially for low-income employees. Equally important is the reduction of administrative and other costs related to employment.

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POVERTY TRENDS IN EUROPE AND SLOVAKIA[1]

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***Abstract*:**
The aim of the presented document is to assess the current poverty trend in conditions of Europe, as well as in Slovakia. In addition to GDP indicator, through which it is possible to evaluate the country´s wealth and its productivity, it is however not possible to compare the quality of life of the citizens of each country. For this very reason, we have focused on the assessment of poverty through basic poverty indicators, namely at-risk-of-poverty threshold and the at-risk-of-poverty rate indicator.

Key words: at-risk-of-poverty threshold, at-risk-of-poverty rate indicator.

JEL classification: I320.

Introduction

In many scientific publications the comparision of poverty levels between countries is based on macroeconomic indicator of gross domestic product per capita (GDP). Based on this indicator we can tell how productive is the country, but we can not safely declare the quality of life of residents in that particular country. It is precisely because this indicator does not reflect the distribution of income, nor does it include information about non-monetary factors.

On Graph 1 we can see that the GDP in 2014 for EU28 reached 27.400 € per capita, and in 2013 (see graph 2) for EU28 it reached around 25.700 € per capita. An increase of 1.700€ per capita. Luxembourg reached the highest GDP – 87.600 € per capita in 2014 and 83.400 € per capita in 2013. Relatively high GDP in both years was also reached by Norway and Switzerland.

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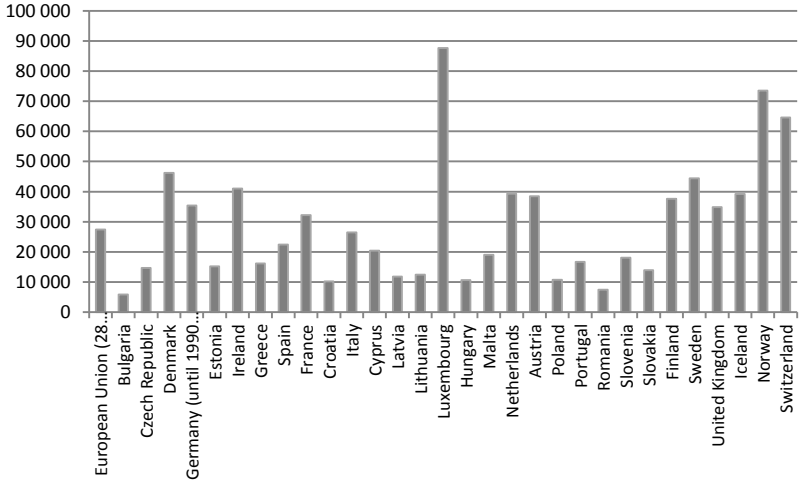
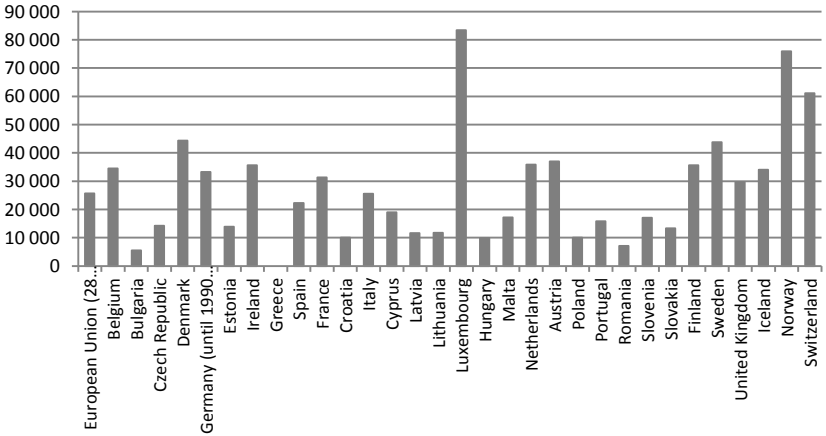
Graph 1
GDP in 2014



Source: Eurostat.

Graph 2
GDP in 2013



Source: Eurostat.

In contrast, the lowest GDP was recorded for the countries Romania and Bulgaria. GDP in Bulgaria in 2014 was at 5.900 € per capita, while in 2013 it was at 5.500 € per capita. Slovak GDP in 2014 was at 13.900 € per capita and in 2013 at 13.300 € per capita.

1 Used methodology

As we said, the GDP indicator does not tell about the income of residents of a given country. The distribution of income across population can be with significant differences. These differences can be motivating, as well as demotivating. We follow motivation to seek improvement in living situation, whether by working or by newly acquired skills and experience. We understand demotivation as linking inequality in income with higher criminal activity and poverty, in the end with social exclusion. We can present such comparison of poverty levels of each country based on at-risk-of-poverty threshold and at-risk-of-poverty rate.

The indicators that we have chosen to compare the poverty levels of each country of EU and Slovakia are compiled on the basis of EU statistics on Income and Living Conditions (EU-SILC). Data collection is regulated by the European Parliament and Council Regulation (EC) no. 1177/2003 and has begun since 2004 in 15 countries, in 2005 it was extended to other Member States of the EU25, including Iceland and Norway. EU-SILC are now the reference denouncing EU statistics on income and living conditions of indicators, which describe social inclusion. EU-SILC are also means by which the progress can be monitored in meeting the main objective, which was set in the Europe 2020 Strategy and adopted by the European Council. The objective by year 2020 is that there should be at least 20 milion less people in the EU at risk of poverty or social exclusion.

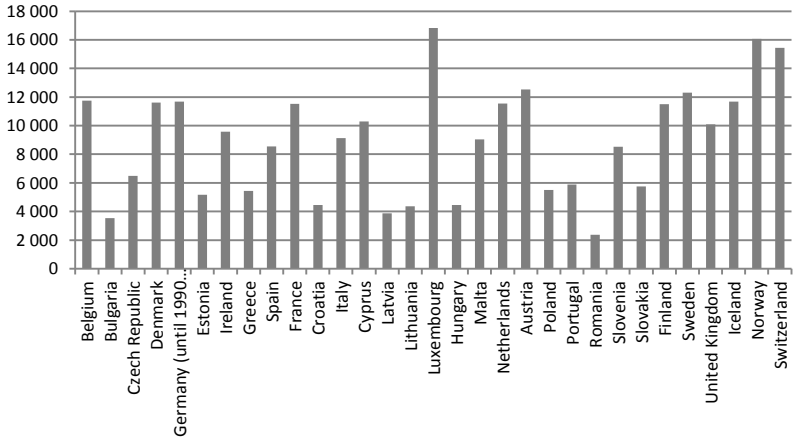
At-risk-of-poverty threshold is a value of the poverty threshold (60 % of the national median equivalent income), calculated on purchasing power party and the Euro. This indicator is expressed in purchasing power standard (PPS).

At-risk-of-poverty threshold in 2013 was considerably different (see graph 3) for each individual country in Europe. The threshold varied from around 2.361 PPS in Romania to 16.818 PPS in Luxembourg.

Relatively low poverty line can be also seen in countries like Bulgaria at 3.540 PPS and Latvia at 3.868 PPS. Countries such as Belgium, Austria and Sweden were at 11.738 PPS, 12.542 PPS and 12.310 PPS. Relatively high poverty line nearing the one of Luxembourg had Norway and Switzerland. Slovakia in 2013 had poverty line at 5.743 PPS. The poverty line in 2012 was at 4.156 €/year, which represents 346 €/month for a one-person household. In this case, it was an increase in the poverty line from previous year (2011) by 9.8 %.

Graph 3

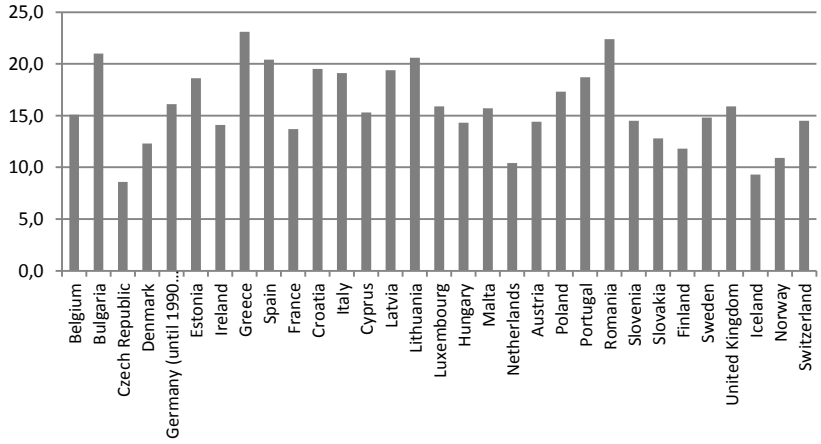
At-risk-of-poverty threshold in 2013



Source: Eurostat.

At-risk-of-poverty rate represents a portion of people with equivalent disposable income below 60 % of the national median equivalent income. At-risk-of-poverty rate is (in accordance with the decisions of the European Council) measured in relation to the situation of each individual EU Member State, not by applying a common threshold. At-the-risk-of-poverty rate can be expressed before or after social transfers, while the difference measures hypothetical impact of national social transfers in reducing risk of poverty.

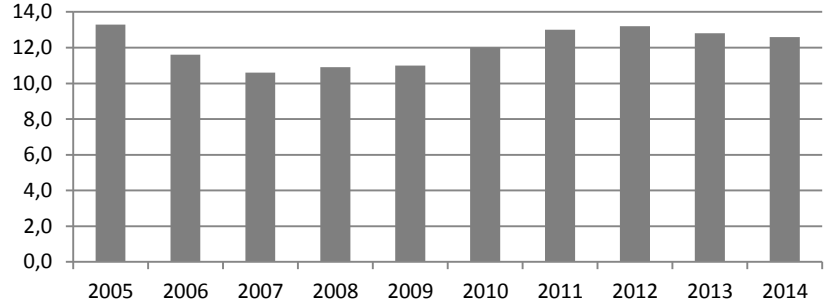
Graph 4
At-risk-of-poverty rate in 2013



Source: Eurostat.

At-risk-of-poverty rate is calculated as a weighted average of the results calculated in each country. In countries such as Greece (23.1 %), Romania (22.4 %), Bulgaria (21 %), more than one-fifth of the population is at risk of poverty. In contrast, countries with a very small portion of population at risk of poverty are Czech Republic (8.6 %), Iceland (9.3 %) and the Netherlands (10.4 %).

Graph 5
At-risk-of-poverty rate in Slovakia in years 2005 – 2014



Source: Eurostat.

On Graph 5 we can see the evolution of at-risk-of-poverty rate in Slovakia during the years 2005 to 2014. Slovakia in 2005 showed the rate at 13.3 %. In absolute terms, this represented 718.000 inhabitants with an equivalent disposable income below 60 % of the national median equivalent income. From these inhabitants were 336.000 men and 381.000 women. In the following year there was a decline in the rate – to a level of 11.6 %. Year 2007 had the lowest at-risk-of-poverty rate at 10.6 %, while the rate for women was at 11 % and for men it was at 10.2 %. In subsequent years, the rate increased until 2012, when it reached a maximum value within the monitored period – 13.2 %. In 2013 there was a decrease in the rate to a level of 12.8 %. The highest rate was measured in the unemployed population (44.6 %). Other most vurnerable are households with three or more dependent children, incomplete households and children under 18 years. In terms of gender, the risk of poverty was almost balanced – 12.9 % for women and men. In 2014, the at-risk-of-poverty rate was around 12.6 %, which represents an annual decrease of 0.2 %.

We will discuss more about the Europe 2020 Strategy and its aim in the next section.

Conclusion

The society's view on poverty, its understanding and as well as its relation to poverty and the poor was changing and forming for several centuries. Poverty can be described as a paradoxical phenomenom in which, despite the prosperity and wealth of a developed country, there is a population in this country that is poor (Gotschak, Džambazovič, 2004).

This fact is also linked to the fact that the poverty in European countries is in greater part expressed mainly in relative poverty, rather than absolute poverty. Currently in Europe, the poverty is closely linked to the new concepts of social exclusion, inclusion and cohesion, which have been selected as a fundamental basis of building a cohesive European society, and which largely affect the shape of social policies of individual EU countries. This does not necessarily mean, that the poverty in the society lost its meaning – it

means that the interest in its broader definition (and understanding of the processes and mechanism that lead to poverty) has changed.

„Several sources define poverty as a social phenomenom and social and individual problem. However, there is no absolute and universal definition or threshold, that would define who is considered poor“ (Žilová, 2005). Based on previous definition, we can say that poverty is now entering into wider perception and thus comes to the moment, when we can not determine the exact scientific definition of poverty, resp. determine the perfect way how to measure it. We can only measure a concept of poverty and the way in which it is defined.

We can say that poverty is now becoming a serious problem, not only a socio-economic problem in developing countries, but increasingly also in developed economies. Based on the latest estimates (World bank, 2010) is at the poverty level around 25 % of population in developing countries. According to the latest estimates (Eurostat, 2010) is at the poverty level around 17 % of EU citizens. The campaign against poverty is currently one of the objectives of the EU.

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ECONOMIC, SOCIAL AND CULTURAL STATUS AS ACADEMIC ACHIEVEMENT PREDICTOR

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Abstract:
Quality of education in elementary and high schools can be understood as crucial factor of student's future employment options. One of the recognized problems in educational system of Slovakia is clustering of students based on their economic, social and cultural status which often leads to inequality in access to higher-quality education. In this paper we analyze relationship between academic achievement (as latent variable combining results in available standardized tests) and economic, social and cultural status, motivation towards learning and ability in logical thinking. The results suggests that effect of socioeconomic status on academic achievement is partially indirect – mediated by direct predictors of academic achievement such as ability in logical thinking and motivation towards learning, and partially direct. Research of auxiliary aspects of education, such as socioeconomic status, was carried out within the framework of project "Increasing quality of primary and secondary education with the use of electronic testing" (ITMS: 26110130546 & 26140130030).

Key words: socioeconomic status, academic achievement, indirect effect, structural equation modeling.

Introduction

Variability in academic achievement is broadly examined subject for very long time. It is usually explained by variables such as intelligence, motivation towards learning, personality traits related to performance in school and similar. One of the variables which were at first not related to the academic

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achievement is socioeconomic status (SES). SES is usually a measure of real and perceived wealth and social status of family (e.g. Liberatos, Link & Kelsey, 1988). Several studies found that the relationship between SES and academic achievement is linear through whole scale of SES measure and that higher SES predicts better academic achievement (e.g. Preis, 2009). Linear relationship through whole scale of SES means, that not only difference between students with high and low SES exists (in the means of academic achievement), but also students with very similar SES will perform differently in school (Barry, 2005). However, the relationship between SES and academic achievement is probably not very easy to describe. This problem stems from different theoretical approaches to the SES as predictor of academic achievement. First approach states that real and perceived level of SES affects the school performance of student directly. Usually unique set of behaviour can be detected these students, their academic aspirations, persistence rates and educational attainment are often considered as lower (Walpole, 2003; Berliner, 2006). This means, that teachers as schools in general expects lower SES students to perform worse, which can in many cases lead to the case of self-fulfilling prophecy (Rist, 1970). The second approach, on the other hand, proposes that the role of SES as predictor of academic achievement is indirect, often contradicting the importance of teacher's role (e.g. Chetty, Friedman & Rockoff, 2011), and variables which are afflicted by family environment, education of parents and their attitudes towards education and similar (which manifests in SES) mediates the effect of SES on academic achievement (Peterson et al., 2011).

In this study we aim to analyze the relationship between SES and academic achievement in Slovak elementary, high and grammar schools mainly by means of linear regression analysis. In order to test the proposed indirect effect of SES, we employed control variables which are strong predictors of academic achievement – ability in logical thinking (similar to the general factor of intelligence) and motivation towards learning. Generally, we assumed that the effect of SES is indeed indirect; however we did not omit the possibility of simultaneous existence of both direct and indirect effects.

1 Sample

The sample consisted of 1698 students of 8th grade of elementary schools (approx. 13 - 14 years old; n=748), 2nd grade of high schools (approx. 16 – 17 years old; n=718) and 6th grade of 8-year grammar schools (which approximately equals to 2nd grade of high school; n=232) in Slovakia (note that the grade applies for the time of SES assessment). Number of females and males in sample was kept equal (51,5 % females). This sample was created by listwise deletion of cases from the original sample of 16509 students who completed PISA study questionnaire of social, economic and cultural status in Slovakia. Students who remained in the sample after listwise deletion were those students, who completed all measurements and school performance assessments listed below.

2 Measurement methods

In order to measure social, economic and cultural status of students, we used 30-items questionnaire from PISA study (PISA 2012 technical report) which propose three measures of student's SES – highest achieved education of parents, highest employment status of parents (based on the ISCO codes of employment status) and household possessions. In order to achieve correct SES measurement for our sample, we entered these three indicators of SES in factor analysis (KMO=0,629; Bartlett's χ^2=9706,39; p<0,001). This procedure resulted in continuous univariate measurement of students' SES, practically weighting scores of the three aforementioned indicators by coefficients of 0,845; 0,831 and 0,686 respectively.

The ability in logical thinking was measured by numeric (36 items) and verbal (36 items) subtests of Test of general abilities (GAT) (Smith & Whetton, 1996). Correlations between general abilities tests and general factor intelligence tests are usually higher than 0,6, therefore we can conclude that this test can effectively predict school achievement in way the general factor intelligence tests do (Laidra, Pullman & Allik, 2007).

Motivation towards learning was measured by 25-items questionnaire (Hrabal & Pavelková, 2011). The questionnaire consist of three distinct factors of motivation towards learning – need to success, need to avoid failure

and motivational disinterest. In later statistical analysis only factor measuring need to success was used – partly because of high correlations between factors (-0,522 between need to success and motivational disinterest and 0,380 between need to avoid failure and motivational disinterest respectively) and partly because the need to success showed best psychometric properties when analyzed by nonparametric IRT model of Mokken homogeneous monotonicity (highest Loevinger's scalability coefficient H).

Lastly, we measured the academic achievement by pooling available results of standardized school performance assessments by method of factor analysis into one continuous univariate measure of school performance for each group of students in our research sample (defined by the grade they were attending in time of SES assessment). For students of 8th grade of elementary schools the pooled assessments were yearly assessments of performance in math and Slovak language in 8th and 9th grade and PISA assessment of mathematical performance (note that data were collected longitudinally, therefore we were able to interconnect results of school performance assessments in higher grades with previously assessed SES, therefore the grade applies for grade in time of SES assessment). Similarly, pooled school performance assessments for students of 2nd grade of high schools were math and Slovak language performance assessments in 9th grade of elementary school and 3rd grade of high school and results of graduation test in Slovak language. For students of 6nd grade of grammar schools the pooled assessments were assessments of performance in math and Slovak language in 9th grade of elementary school, 6th and 7th grade of grammar school and results of graduation test in Slovak language.

All continuous variables were standardized to the mean of zero and standard deviation of one prior to the statistical analysis. Analysis was performed in IBM SPSS (v. 19.0) and following packages for R (v.3.2.0) – *mokken* (Van der Ark, 2014), *lavaan* (Rossel et al., 2015) and *nortest* (Gross & Ligges, 2015).

3 Statistical analysis and results

Preliminary analysis revealed that the normality null hypothesis was rejected at α=0,05 (Shapiro-Francia test) for all used continuous variables

(academic achievement, SES, numeric and verbal subtests of GAT and motivation towards learning expressed by need to success). However, histograms of variables haven't displayed concerning departures from normal curve, therefore we can assume that the null hypothesis rejection was caused by a large number of observations. Additionally, bootstrap parameter estimation was used in the following statistical analysis as precaution method of dealing with suspected violation of normality assumption.

In order to examine the relationship between SES, ability in logical thinking, motivation towards learning and academic achievement, we at first calculated Pearson correlations between those variables (Table 1). Correlations revealed that moderately strong relationship between both subtests of GAT and academic achievement exists. Additionally, somewhat weaker relationship was observed between academic achievement and SES and motivation towards learning. However, as literature suggests, relationship between SES and academic achievement should not be direct, but mediated by variables, which affects academic achievement directly. Therefore, we calculated partial correlation between SES and academic achievement controlling for numeric and verbal subtests of GAT and motivation towards learning and correlation actually dropped from ρ=0,236; p<0,001 (zero order) to ρ=0,072; p<0,01. This indicates that relationship between SES and academic achievement is partly explained by variables we were controlling for, but still small part of variance of academic achievement can be explained directly by SES.

Next step in analysis was estimation of five linear regression models, in order to approve the existence of indirect effect of SES on academic achievement. The models are summarized in formulas below:

$$academic\ achievement = \beta_1 SES + \varepsilon_1 \quad (1)$$

$$academic\ achievement = \beta_2 SES + \beta_3 numeric\ GAT + \beta_4 verbal\ GAT + \beta_5 motivation + \varepsilon_2 \quad (2)$$

$$academic\ achievement = \beta_6 numeric\ GAT + \beta_7 verbal\ GAT + \beta_8 motivation + \varepsilon_3 \quad (3)$$

$$\varepsilon_3 = \beta_9 SES + \varepsilon_4 \quad (4)$$

$$\varepsilon_1 = \beta_{10} numeric\ GAT + \beta_{11} verbal\ GAT + \beta_{12} motivation + \varepsilon_5 \quad (5)$$

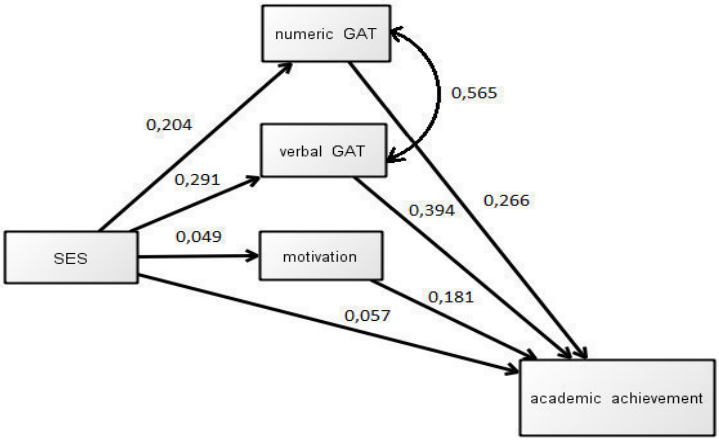
In all cases, the model null hypothesis was rejected (by Fischer test at α=0,05) and all estimated parameters (betas) for predictors were not equal to zero (*t*-test*;* α=0,05). If we compare the fraction of variance explained by model 1 and model 4 (8 % vs. 0,79 %), we can assume that the majority of variance of academic achievement explained by SES is communally explained by ability in logical thinking (measured by numeric and verbal subtests of GAT) and motivation towards learning as well. The idea of shared explained variance is further supported by comparison of models 3 and 5 – explained variance od academic achievement in model 3 is 41,87 %, but when variance explained by SES is removed (by employing the error term ε_1 as dependent variable in model 5), the variance of academic achievement explained by ability in logical thinking and motivation towards learning drops to 32,33 %. Additionally, variance explained by model 3 (without SES as predictor) was 41,87 % and variance explained by model 2 was 42,96 %. In conclusion, after we analyzed the data by linear regression models listed above, we assumed that effect of SES on academic achievement is indeed indirect and mediated (in case of available predictors in our data) by ability in logical thinking (or intelligence in general) and motivation towards learning. However, the analysis suggests that small direct effect of SES exists alongside indirect effect.

Table 1
Pearson correlations between used continuous variables

	SES	numeric GAT	verbal GAT	motivation	academic achievement
SES	1				
numeric GAT	0.204**	1			
verbal GAT	0.291**	0.625**	1		
motivation	0.049*	0.015	0.053*	1	
academic achievement	0.236**	0.527**	0.587**	0.209**	1

*p<0,05
**p<0,001

Figure 1
Structural equation model – indirect effect of SEM on academic achievement



Source: Authors.

The next step in analysis was to estimate a structural equation model (SEM) which would shed more light on the relationship between SES and academic achievement. We present the final model in Figure 1. The SEM consist total of four linear regressions and one estimate of covariance. For sake of practicality we list the formulas (6-10) together with estimated betas. Note that the parameters were estimated by maximum likelihood method with Bollen-Stine bootstrap (n=1000).

(1) $$numeric\ GAT = 0{,}204 * SES + \varepsilon_6$$

(2) $$verbal\ GAT = 0{,}291 * SES + \varepsilon_7$$

(3) $$motivation = 0{,}049 * SES + \varepsilon_8$$

(4) $$academic\ achievement = 0{,}266 * numeric\ GAT + 0{,}394 * verbal\ GAT + 0{,}181 * motivation + 0{,}057 * SES + \varepsilon_9$$

(5) $$COV(numeric\ GAT, verbal\ GAT) = 0{,}565$$

Null hypothesis for proposed structural equation model was rejected by omnibus chi-squared test (χ^2=3,705; df=2; p=0,157; bootstrap p=0,179;

logLikelihood=-11079,12; *AIC*=22182,24; *BIC*=22247,48). Additionally, root mean square error of approximation (*rmsea*) showed, that model fit to data is satisfactory – *rmsea*=0,022; *95%CI*=<0,000;0,058>. Also, all null hypotheses for estimation of parameters were rejected at α=0,05.

Discussion

Linear relationship between socioeconomic and cultural status and academic achievement is subject to countless researches nowadays. The fact, that relationship is strictly linear at all levels of SES (Barry, 2005) together with some contradictory results (Sirin, 2005) introduced the notion of possibility, that relationship between SES and academic achievement is indirect. This opinion was supported also by our data. When analyzed by partial correlations and regression linear modeling, we found that variance of academic achievement explained by SES is to great degree communally explained by ability in logical thinking and motivation towards learning. The analysis of explained variance of academic achievement led us to the consideration that the effect of SES on academic achievement is partially mediated by ability in logical thinking and motivation and partially direct. Structural equation model confirmed that ability in logical thinking and motivation towards learning indeed are mediators of the SES's effect on academic achievement. Also, small direct effect of SES exists alongside proposed mediation. Rejection of model null hypothesis alongside with good model fit indices lead us to believe, that our structural equation model is describing mediated and direct effect of SES on academic achievement correctly.

Mediated effect of SES can be interpreted by theory of social, economic and cultural resources (Bourdieu & Passeron, 1977) which proposes that students with lower SES are disadvantaged, in comparison to students with higher SES, because their family environment is lacking several important precursors of academic achievement. These are usually material things in one hand, such as books, quiet place to study, own desk, computer or internet connectivity; on the other hand achieved education level of parents determine attitudes towards academic achievement of their children and also can affect motivation of children towards academic achievement. Therefore,

the SES does not only express the economic conditions of the family and their perceived economic conditions, but more importantly, the whole family environment related to the academic achievement can be projected to the measure of SES. This notion is further supported by the framework of the PISA SES questionnaire, which items are mainly targeted on the family environment, parents' employment and educational status and on the material household possessions.

In conclusion, we propose that our structural equation model describes relationship between SES and academic achievement in that way, that direct predictors of academic achievement, such as ability in logical thinking (or general intelligence) and motivation towards learning are partially predicted by family environment (and partially are genetically predisposed). Furthermore, family environment projects to the measure of SES (given by items of PISA questionnaire). Therefore, SES partially predicts variables which are directly related to the academic achievement. Additionally, we found that small direct effect of SES on the academic achievement exists alongside the mediated indirect effect.

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CONSUMPTION AND INCOME INEQUALITIES IN CONDITIONS OF SLOVAKIA[1]

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***Abstract*:**
The article deals with measuring and monitoring consumption and income inequalities in the Slovak Republic. For the purpose of fulfilment of the objective were estimated expenditure elasticities throughout quadratic almost ideal system QAIDS. Through identifying expenditure elasticities by employing the Quadratic Almost Ideal System (QUAIDS) in the analysis of nine groups of consumer goods and services we were able to define what low and high income households consider luxury goods and necessity goods. In order to estimate the demand system, household budget surveys data of SR were adopted.

Key words: households 'income, consumption, inequalities, elasticity.

JEL classification: C5, D1, E2.

Introduction

Examining consumer behaviour seems to be crucial mainly because of the existence of consumption linkages on the employment effects. As it turns out, households tend to postpone consumption into the future in case of uncertainty of economic development, which consequently affects production capacity and labour market. In the difficult economic situation, which is

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characterized by increasing pressure to consolidate public finances and reduce expenditure on social protection, difficulties with entry into new foreign markets, as well as by unfavourable demographic development, household consumption behaviour and key determinants of household consumption pattern have become increasingly important.

The increasing polarization in the society also contribute to the complexity of the situation as Slovakia belongs to two third EU Member States in which income inequality and the incidence of low wage work has increased between 2006 and 2011 (Dreger et al., 2015). Wage inequalities are very closely linked to persistent problems on labour market, as the long-term unemployment remains one of the highest among EU member states. Problematic is also high rate of very long-term unemployment, which was in Slovakia in 2014 on the level of 6.6 % which is more than twice as much as the EU15 average. Long-term unemployment is closely related to the issue of employing low-skilled workers, whose unemployment rate was in the first quarter of 2015 higher approximately by 26 p.p. than the overall unemployment rate. Process of reducing earning inequality could be slowed down by the fact, that employment rate of low-skilled labour force is very little sensitive to the economic growth rate. Previous research in this field showed, that threshold of the real gross value added growth, at which employment in this segment starts to increase is on average at the level of 10 % (Morvay, 2014). According to NBS (2015) prognosis, Slovak economy is expected to grow by 3,8 % in 2016 and by 3,5 % in 2017, which is a clear signal to economic policy that economic growth is not a sufficient condition for solving this problem and more effort should be done in this field.

It was the main purpose of the paper to draw attention to the trends in consumption inequality in Slovakia. Our analysis provides also a picture of consumer behaviour from the perspective of how households change their expenditures on the goods and services in respond to change in prices and incomes. Using households´ longitudinal micro data from Household Budget Survey we employ the Quadratic Almost Ideal System (QUAIDS) in the analysis of nine groups of consumer goods and services. The deeper research in the field of income elasticities for individual groups of goods allows

us to better document the evolution of inequalities in consumption during the particular period.

1 Methodology

In order to investigate the consumption behaviour of Slovak households we use the quadratic model AIDS devised by Blanks, Lewbel and Blundell (1997). QUAIDS model is an extension of model called AIDS of authors Deaton and Maellbauer (1980), which additionally allows for the consideration of quadratic Engel curves. As a result of the quadratic form, it is possible that the good is at the certain level of income luxurious and if income changes may become necessity good. Model QUAIDS consider consumer demand for a set of *k* goods that the consumer procures on *m* monetary units. In our case, the *k* goods expresses aggregate expenditure categories divided according to the classification of individual consumption by purpose (COICOP) such as food, alcoholic beverages, clothing and footwear etc. and *m* expresses household income or total household expenditure incurred on the various expenditure categories, respectively.[4]

2 Data

In order to estimate model QUAIDS two types of dataset were used. As first detailed microdata was adopted from the Household Budget Survey (HBS) collected by the Slovak Statistical Office. HBS data usually consist of approximately 4700[5] observed households on an annual basis, whereby data of each household provide detailed structure on household expenditure, income and also contain lot of social (economic activity, profession, entitlement to social or unemployment benefits etc.) and demographic (marital status, education, gender, region etc.) features of particular household. There are more advantages of using individual data (Dybczak et al. 2014), especially they allow for analysing of consumer behaviour of different

[4] For detailed description of QUAIDS model see Banks et al. (1997).

[5] Every year sample of used time span contains around 4600 – 4700 observations of households, except year 2010 which provides over 6100 observations.

consumers groups, depending on characteristic features of particular consumer group (household income, number of family members, age etc.). For the purpose of our analysis we employed data in period 2004 – 2012. Main disadvantage of the HBS is the fact that majority of households is changed every single year, that´s way is not possible to estimate demand system as a panel data.

Additionally, there was necessity to use the second dataset, since HBS does not provide explicit price information of individual commodities. For that reason, consumer price index was adopted (CPI) provided by Slovak Statistical Office. The key advantage of using previously mentioned datasets is the fact that both are structured according to the classification of individual consumption by purpose (COICOP).[6]

Since the aim of the study is to track the consumption behaviour based on expenditure elasticity of aggregate commodity group, certain level of expenditure aggregation is needed. Generally, it is common practice in applied demand analysis to bundle commodities into larger expenditure group, especially if you work with such detailed data as HBS provides.[7] Some level of aggregation is also necessary in order to make estimation process manageable.[8] For the purpose of the analysis we bundled commodities into the nine relatively homogeneous groups using the COICOP classification: 1. Food and non-alcoholic beverages; 2. Alcoholic beverages, tobacco; 3. Clothing and footwear; 4. Housing, water, electricity, gas and other fuels; 5. Furnishings, household equipment and routine household maintenance; 6. Health; 7. Transport+ Communication and Postal services; 8. Recreation and culture + Restaurants and hotels, 9. Other goods and services.

In order to avoid the biased outcomes of our estimates, some adjustments of the used data had to be performed. At first there was an effort to track the consumption structure only of households with possible economic active head for the purpose to evade families whose head already retired and at the same time compare only the homogeneous groups. Therefore we

[6] Expenditure commodities in HBS as well as consumer price index are structured according to the COICOP.

[7] For example see Dybczak et al. (2014), Janský (2013), Cupák et al. (2014, 2015).

[8] For more details about the benefits of the expenditure aggregation into broader commodity group see Dybczak et al. (2014).

decide to omit observations where head of household is younger than 25 or older than 62. Since we do investigate consumption inequalities between the poor and the rich, we decided to divide households in a similar manner as Aguiar et al. (2015) according to the net income but on contrary, attributable to the member of household and not to the household as a whole. This adjustment was performed in order to distinguish among households with the same net income but different number of person living out of the household budget. For that reason we defined the "low-income households" as households with net income per person is lower than 20th percentile and the "high-income households" whose net income per person is higher than 80th percentile. Due to the existence of extreme values in the net income observations we decided to drop households with net income lower than 5th and higher than 95th percentile.[9] In order to avoid the biases arising from the presence of the outliers in price indexes we removed all the observations below the first and above the last percentile in each commodity group.

3 Estimation

For the purpose of empirical analysis of consumer behaviour of the rich and the poor the QUAIDS model of authors Blanks et al. (1997) were adopted. In the parameter estimation procedure we followed approach designed by Poi (2012) who constructed code in STATA software, which can be used to estimate the model QUAIDS through an iterative nonlinear generalized least squares method, which is equivalent to multivariate maximum likelihood estimator. The designed program also allows for post-estimation analysis which enables the computation of the price and the expenditure elasticities. When the command devised by Poi (2012) is adopted it is necessary to specify the value of parameter α_0. In our analysis we followed approach of authors Deaton et al. (1980) and Blanks et al. (1997) who set the α_0 parameter slightly below the minimum value of the logarithm of total household expenditure (ln*m*). Particular income elasticities are calculated individually

[9] Similar bins of households were used in Aguiar et al.(2015) who had examined whole population in 5 bins divided by before-tax income into the following percentile groups(5-20,20-40,40-60,60-80,80-95).

for each household using the expenditure shares w_i. Such computation allows the quantification of elasticities as the average value of each household elasticity, also enabling to calculate the median value of individual elasticities. The majority of the parameters are statistically significant on 5 % significance level.[10]

4 Results and Discussion

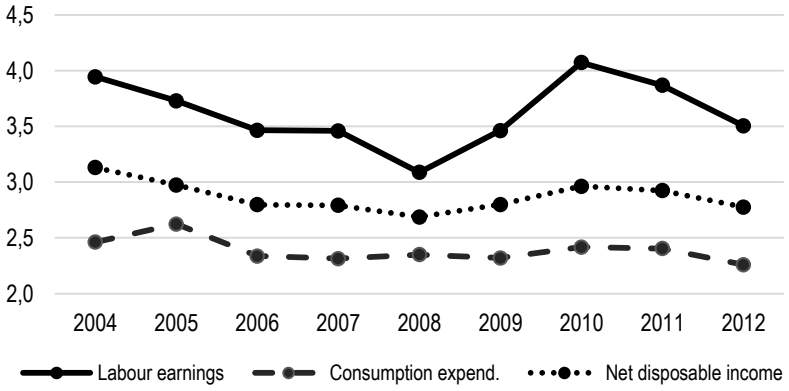
One of the main factors affecting household consumption behavior is household net disposable income per capita. In 2004 there could be seen a gap between the richest and poorest in Slovakia as the high-income households had net disposable income per capita more than 3,1 times as much as low-income households. Inequality among households increases as we consider only labor incomes. As shown in Graph 1, positive economic development between 2004 and 2008 helped to shrink this labor income inequality, as labor income of low-income households showed much stronger growth than was the average of the total population. General economic conditions after 2008 have disproportionally affected employment of low and high income households as low skilled workers who are mostly a head of low-income households were the hardest hit by the worsening situation on the labor market and therefore crisis has had moderate negative effects on income and wage inequalities.

The graph 1 also shows, that income inequality has not been fully tracked by consumption inequality, as the 80-95/20-5 ratio for consumption expenditures has remained flat between 2004 and 2012, which means very close to the level of 2,5 %. The main determinates, which significantly affected the trend in consumption inequalities include a combinations of factors such as: development of prices, an increase in disposable income of high-income households has been not fully reflected in the growth of consumption expenditures, but rather in the increase of savings; government income redistribution policies helped to mitigate the impact of financial and economic crisis on low-income households; changing consumer preferences

[10] The estimated parameters of the QUAIDS model can be provided upon request.

economic crisis on low-income households; changing consumer preferences and increasing possibilities to shift expenditures towards cheaper substitutes and the better accessibility of consumer loans.

Graph 1
Income and consumption inequalities in Slovakia



Source: Authors, based on HBSs.
Note: Y – axis shows the ratio of high-income to low-income household, net disposable income, labor earnings and consumption expenditures. The calculation of the ratio takes into the account the number of family members.

Since one of the article main targets is to analyse the changes in the consumption behaviour in pre-crisis (2004 – 2008) and after crisis period (2009 – 2012) we split our dataset accordingly and compute expenditure elasticities individually for each sample. Next, we investigated expenditure elasticities belonging to the group of poor families, defined by lower 5 – 20 percentile of net income divided by number of family member to find out, whether the bad economic situation caused by the crisis reflected into a shifts of certain expenditure groups from the necessity goods into the luxury ones. Estimation based expenditure elasticities for poor households of both periods are provided in Table 1.

Table 1

Medians of expenditure elasticities for 2004 – 2008 and 2009 – 2012, the group of low-income households (the 5 – 20 percentile of net income divided by number of family members)

Expenditure group	1. Food and non-alcoholic beverages	2. Alcoholic beverages, tobacco	3. Clothing and footwear	4. Housing, water, electricity, gas and other fuels	5. Furnishings, household equipment and routine household maintenance	6. Health	7. Transport + Communication and Postal services	8. Recreation and culture + Restaurants and hotels	9. Other goods and services
				2004 – 2008					
Expenditure elasticity	0.354	-0.048	0.611	0.951	6.489	1.066	1.260	2.736	0.562
				2009 – 2012					
Expenditure elasticity	0.555	0.807	1.249	0.696	8.825	0.873	-0.452	4.129	0.419

Source: Authors, based on HBSs.

Based on the Table 1, we can observe that during the pre-crisis period except the group of the Alcoholic beverages all the expenditure elasticities are positive. As a luxury good for the low income households can be considered four of our commodity groups: 5. Furnishings, household equipment and routine household maintenance – with the highest level of expenditure elasticity, this group contains relatively expensive electronic equipment and is represented by a very small expenditure share;[11] 6. Health – healthcare in Slovakia is mainly financed through mandatory health insurance. Out-of-pocket payments are the second most important source of health care financing after public finances. As shown before (e.g. Radvanský, Dováľová, 2013), between 2000 and 2010 the increasing share of out-of-pocket payments was one of the highest among EU27 countries, which contributed to the fact that in the pre-crisis period health expenditures had risen more than

[11] As stated in Poi (2012), if the expenditure shares of some commodity group are close to 0, then the expenditure elasticity should be very large in magnitude, since the expenditure share is placed in the denominator in the expenditure elasticity equation.

proportionate to changes in income; 7. Transport + Communication and Postal services; 8. Recreation and culture + Restaurants and hotels – which represents almost an unaffordable expenditure group for low-income households. Since the economic crisis has started the situation has little bit changed. As a result of increased unemployment and worsening income situation, poor households became more sensitive on their level of income with respect to mainly the following groups: 1, 2, 5, and 8, respectively, as the increase of elasticity can be seen in each group. Special case represents group 3 where commodity group shifted from the necessity good into the luxury ones, as its elasticity raised approximately from 0.61 to 1.25. On the contrary, reverse tendency can be seen in case of commodity group 6, which moved from luxury goods into necessary ones.

Table 2

Medians of expenditure elasticities for periods 2004 – 2008 and 2009 – 2012, group of high income households (80 – 95 percentile of net income divided by number of family member)

Expenditure group	Food and non-alcoholic beverages	Alcoholic beverages, tobacco	Clothing and footwear	Housing, water, electricity, gas and other fuels	Furnishings, household equipment and routine household maintenance	Health	Transport + Communication and Postal services	Recreation and culture + Restaurants and hotels	Other goods and services
2004 – 2008									
Expenditure elasticity	**-0.059**	**-2.086**	**-0.043**	**0.994**	**13.477**	**1.227**	**1.323**	**2.919**	**0.291**
Standard deviation	0.015	0.168	0.063	0.003	1.299	0.011	0.010	0.083	0.026
2009 – 2012									
Expenditure elasticity	**0.295**	**0.537**	**1.393**	**0.572**	**15.457**	**0.670**	**-1.081**	**4.332**	**0.170**
Standard deviation	0.012	0.023	0.026	0.007	1.223	0.037	0.106	0.173	0.025

Source: Authors, based on HBSs.

In the case of high-income households, the situation seems to be slightly different. It seems that during the pre-crisis period better situated households had saturated needs in the area of food commodities. For that reason they did not respond significantly to income changes in this commodity group. Similar to low-income households, expenditure elasticity higher than 1 during both periods was achieved only in commodity groups 5, 8. As necessity goods we consider groups 1, 4 and 9. Concerning the changes in commodity types, a similar movement in category 3 can be observed in high-income households as it was in the case of low-income households. The group of clothing shifted from necessity goods in the pre-crisis period to luxury goods after the crisis, since the value of its elasticity increased above one.

Conclusion

The paper is a contribution to the ongoing discussion on income and consumption inequalities. In terms of income inequalities, the analyzed period (2004 – 2012) can be split into two parts. First, the pre-crisis period was characterized by decreasing income inequalities. In the next period the high degree of uncertainty and the problematic labour market suffering from structural problems have sharpened household income inequalities. For the purpose of the analysis based on the QUAIDS model estimation, expenditure elasticities were computed. The results indicate that luxury goods are represented by commodity groups 5 and 8 respectively, and necessity goods are contained in groups 1, 4 and 9. Further significant findings show that the economic crisis effected the consumption patterns of Slovak households in term of households' response to income changes reflected in commodity group shifts from luxury goods to necessity goods and vice versa (for instance groups 3 and 6). The analysis has shown that although the income inequalities were not fully transformed into consumption inequalities as the 80-95/20-5 ratio for consumption expenditures remained lowered compared to the ratio of net disposal income, but the development of consumption and disposal income inequalities seems to be significantly correlated.

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FORECASTING EDUCATION SYSTEM DEVELOPMENT IN SLOVAKIA[1]

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***Abstract*:**
In this paper forecast, of education system development in Slovakia based on its previous development and expected demographic trends are presented. Applied methodological framework is based on analysis of historical development and legislative acts regulating education system. Application of proposed methodology allowed us to estimate future number of students in the educational system in Slovakia on its three basic levels – elementary schools (primary education), high schools (secondary and post-secondary non-tertiary education) and universities (tertiary education). In the paper we also discuss the structural development of educational system and resulting skills and knowledge labour market shortages.

Key words: forecasting, education system, modelling, labour market.

JEL classification: C33, C53, I21.

Introduction

One of the key determining factors influencing the educational system is demographic development. Over the past decades Slovak population has underwent several changes that resulted in its significant ageing. One of the elements that influenced ageing process of population was significant drop in the natality during the era after fall of communism regime. This also translated in the decrease of number of persons in 6 years old cohort that represents major age group from which kids enter into the education system.

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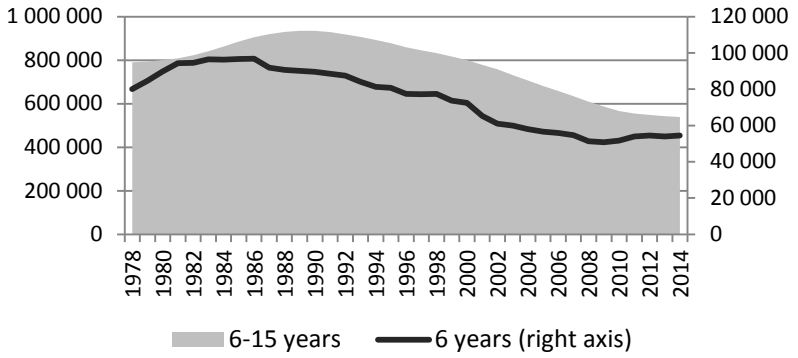
Graph 1
Demographic development of selected age groups, persons



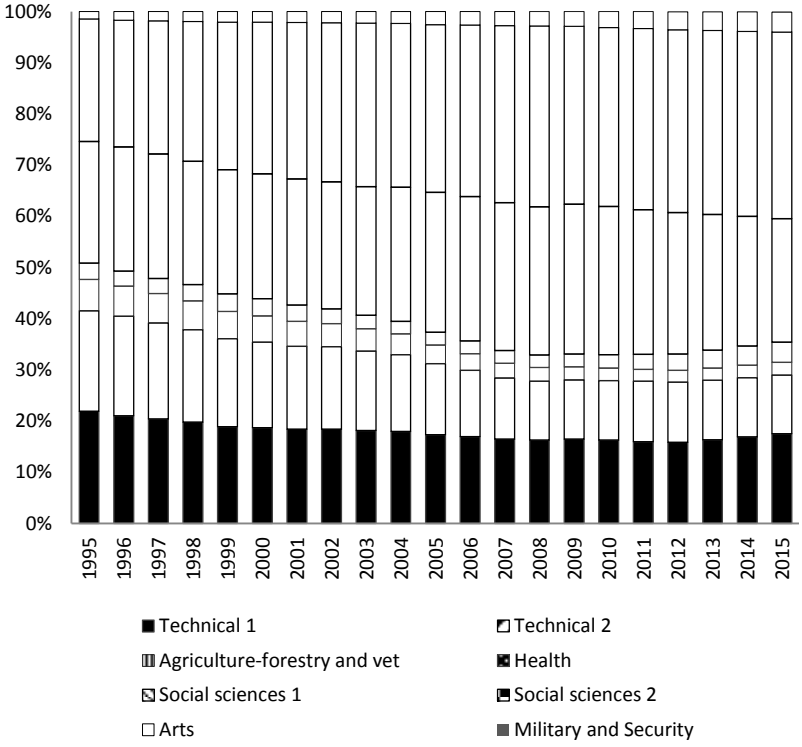
Source: ŠÚ SR.

This decrease in the number of 6 years old (Graph 1) was accompanied by drop in the number of kids in age of compulsory school education (6 – 15 years) by more than 40 %. Peak in the number of 6 years old and in the number of 6 – 15 years old occurred in the 1980's. Since then those numbers are decreasing and over the 1990´s number of kids in elementary school age drop by more than 130 thousand. This drop continued also during the first decade of 21st century by further more than 230 thousand kids. This trend also translated in lower number of people leaving the education system and entering the labour market.

From the year 1995 not only the number of students in the education system decreased, but also its structure has changed significantly. In the mid 90´s almost 50 % of high school students were studying at schools with Technical and Agriculture-forestry programmes. Over the past two decades structure has shifted towards Social sciences where in 2015 more than 60 % of high school students were enrolled. Share of Technical and Agriculture-Forestry programmes drop significantly over last 20 years. Drop in the Agriculture-Forestry programmes enrolment was reflecting the development in the sector in which also the ov erall employment lowered. On the other hand, drop in Technical education represent problem in the labour market, as increasing demand for skilled professionals is covered by decreasing

number of people entering the labour market with appropriate knowledge and skills.

Graph 2
High schools structure, by type of programme



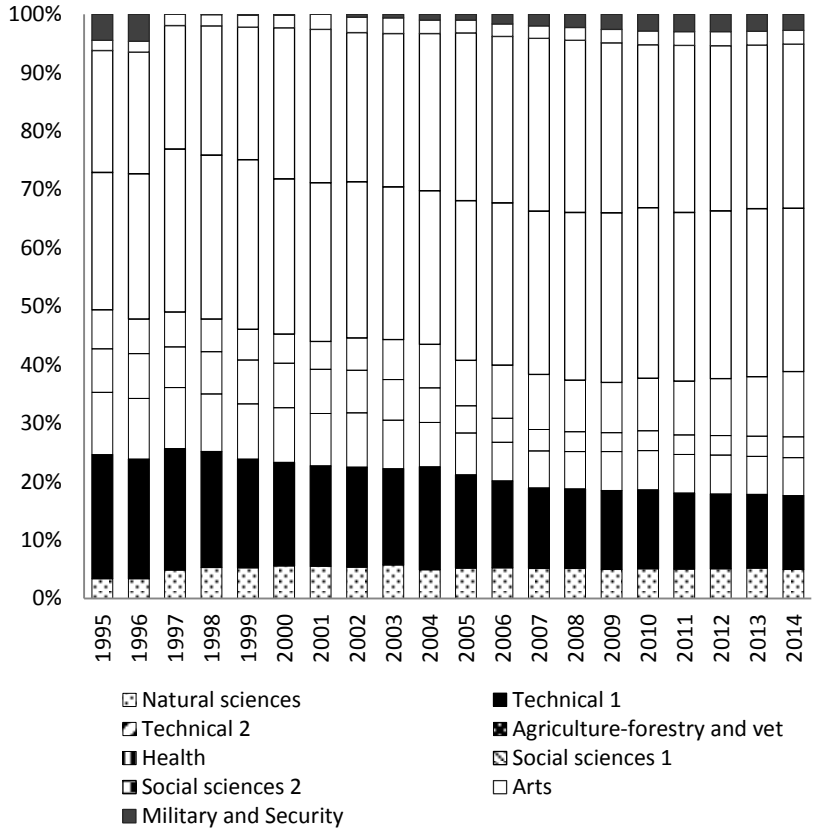
Source: CVTI SR.

Similar development has occurred also in the tertiary education in which in 1995 32 % students were studying Technical programmes. Until year 2015 share of technical field drop to just 19 %. Natural sciences and arts had relatively constant share of 5 %, and 2 % respectively. Different development occurred in non-technical education programs, in social sciences their share increased from 45 % in 1995 to 56 % in 2014. Also in Health share of university students increased between 1995 and 2014 from 7 % to

11 %. In Agriculture-forestry programmes development also copied the development in sector employment similarly to high school education programs and drop from 6 % in 1995 to 2 % in 2014.

Graph 3

Universities structure, by type of programme



Source: CVTI SR.

1 Used methodology

Educational system development is influenced by several factors that are important to be formalized in order to create reliable model for forecasting.

Model that was developed for this paper is based on the works ŠIOV (2015), and model designs presented for each stage of education were modified and interlined to single model system. Based on the past development as important elements of each level of education system development following processes were identified:

- Entry to education;
- Promotion to higher grade;
- Repeating a grade;
- Leaving of the education system (drop-out, promotion to higher education level).

Key element determining future number of students in the education system is the entry to education that needs to be determined at each educational level. At the primary level of education (elementary schools) this process is strictly linked with demographic development, on the higher levels of education entry to system is linked also with development at the last grades of previous level of education (leaving elementary school or graduating from high school). This process can be formalized by the following formula:

$$ES_t = f(EG_t, egc) \quad (1)$$

where ES_t is number of student entering system at time *t*, EG_t is number of persons representing potential entrants to the given level of education system and egc_t is entry group characteristics.

Behaviour of those who are already in the system also needs to be estimated for the purposes of future forecasting. In the first step we determine number of students that are repeating grade in the next year as following function:

$$RG_{i,t} = \beta_i . G_{i,t-1} \quad (2)$$

where $RG_{i,t}$ is number of students repeating grade *i* at time *t*, $G_{i,t-1}$ is number of students in grade *i* at time *t-1* and β_i represents probability of repeating the grade *i*.

In the following step number of students leaving the system is estimated for given grades. It is possible to formalize this process in the following manner:

$$LS_{i,t} = \gamma_i . G_{i,t} \quad (3)$$

where $LS_{i,t}$ is number of students leaving system *i* at time *t,* $G_{i,t}$ is number of students in grade *i* at time *t* and γ_i represents probability that student will leave system during, or after grade *i*. Students should be leaving system for several reasons, one is that they drop out of system before last grade or they leave the system after its successful finishing and potentially enter higher level of education system.

On the basis of the estimation of previous two functions it is also possible to estimate number of new students in each grade by the following formula:

$$NS_{i,t} = G_{i-1,t-1} - LS_{i-1,t-1} - RG_{i-1,t} \quad (4)$$

where $NS_{i,t}$ is number of new students in grade *i* at time *t*.

Formula determining the number of student in each grade as follows needed to be formalized to close the entire model of educational system:

$$G_{i,t} = RG_{i,t} + NS_{i,t} \quad (5)$$

By utilization of system described in this chapter and data on future demographic development we were able to estimate future numbers of students in educational system. Demographic development entering the model was based on the forecasts of INFOSTAT (2012 and 2013) results of which needed to be combined for the purposes of educational system forecasting. As we developed system describing all levels of education in Slovakia in the following part we present results for elementary schools, high schools and universities level.

2 Results

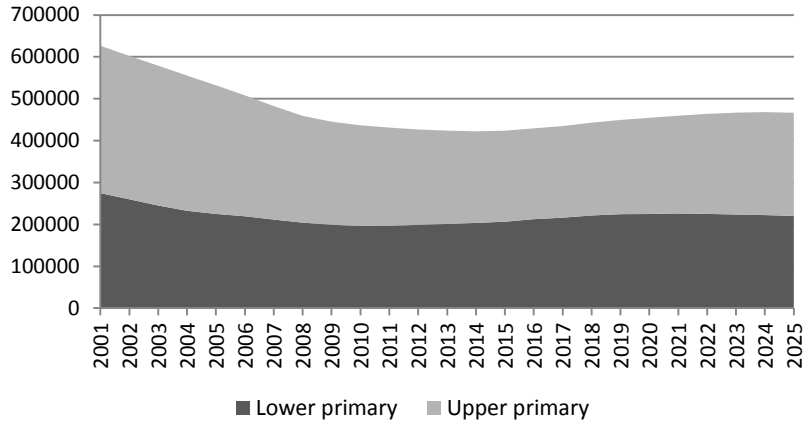
In this part of the paper we present results of forecasts up to 2025 that are based on the methodology described in second. Forecasted data are starting from year 2015 as at the time of forecast only data for year 2014 were available.

Decreasing numbers of new-borns in Slovakia translate in drop of approximately 200 thousand students studying at elementary schools between 2001 and 2014. In the following decade we expect slight increase in number of students in both levels of education provided at level of elementary schools – lower level and upper level. In 2025 approximately 460 thousand

students will be attending elementary schools. From year 2019 more students will be studying in second level of elementary schools in Slovakia.

Graph 4

Elementary school (primary education) attainment forecast, number of students

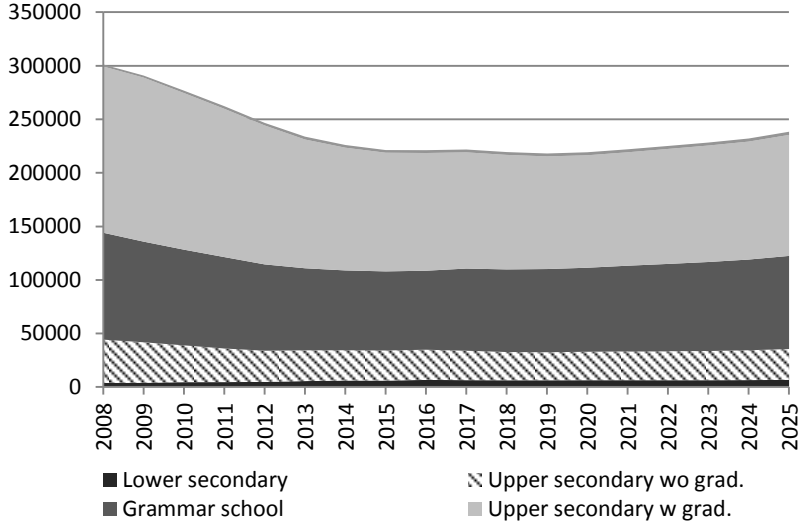


Source: Authors, CVTI SR.

Development in elementary schools determines numbers of students at high schools with certain time lag. In the following 5 years number of students in high schools will be relatively stable – around 220 thousand students. Increasing numbers of upper primary education students continuing their studies at higher level of education system will result in slight increase in number of high school students after year 2020. Number of students attending secondary grammar schools programs is relatively stable over time and not reflecting the decreasing numbers of total secondary education students. Number of students in the lower secondary provided at high school level remains relatively small (approximately 5 thousand students) and stable over time. On the other hand number of students in programmes designed to provide education that is applicable directly at labour market has drop from 195 thousand in 2008 to some 143 thousand in 2014. In the following 5 years we expect further decrease to approximately 130 thousand students. After year 2021 we should expect increase in number of students in this group to its current level.

Graph 5

High school (secondary and post-secondary and non-tertiary education) attainment forecast, number of students



Source: Authors, CVTI SR.

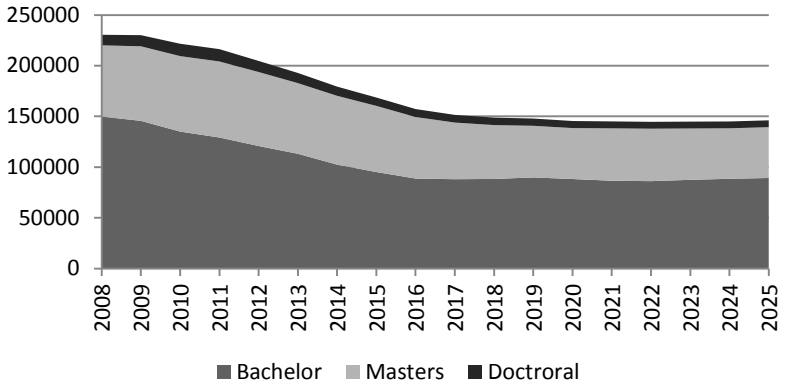
In the following years number of students attaining universities will continue to decrease and we expect that this trend will stop around 2020 at level around 145 thousand students. After this year number of tertiary students will remain relatively stable and hover between 144 – 146 thousand students. Majority of university students attend the first stage (Bachelor level) of tertiary education and numbers in this level of education underwent significant drop between 2008 and 2014 of more than 30 %. Also number of students in Masters and Doctoral levels lowered during this period, but its magnitude was not so significant 3.4 % and 12.9 % respectively.

Over the coming decade number of students in the tertiary level of education is expected to stabilize and its structure will remain relatively stable with dominant proportion of its first stages. Programmes leading to advanced research qualification will drop until year 2025 by approximately 26 %. Very similar development is expected to occur in case of 5A programmes that are expected to also drop by approximately 26 %. In relative

terms number of students in 5B programmes will drop by approximately half of the other two tertiary programmes – 13 %.

Graph 6

Universities (tertiary education) attainment forecast, number of students



Source: Authors, CVTI SR.

Conclusions

Stabilization of processes determining demographic trends will translate in the expected stabilization of number of students in the educational system. Relatively low level of students will put at risk the current system of financing based on the number of students that seem to be inefficient in catching up with labour market needs. This problem was most significant at the peak of economic growth in 2007 – 2008 when not enough professionals was available at labour market. Thus certain employers were forced to "import" person filling opened position from abroad. This was result of massive shift towards social sciences programmes over last decades. This is coped with problems of financing the wages that are currently comparably low and not attracting the entry of new teachers in the system.

Without significant shift in the structure of programmes studied at secondary, post-secondary and tertiary level of education number of students and graduates in Technical programmes will remain relatively low. This would bring several problems for Slovak economy in near future in which

additional investments in automotive industry are expected and also relatively large numbers of persons will retire and will need to be replaced. In light of increasing demand for professionals in the technical occupations related to automotive, chemical and electro-technical industry problem of low level of new potential employees will need to be tackled. In the further future also numbers of economically active population will be shrinking thus more effective educational system will be a must.

Further research would provide more detailed numbers regarding the numbers of mist-matched position, but results of this paper provided at least basic outlook on the future development iof educational system that prepares students more effectively for labour market.

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Zákon 245/2008 Z.z. o výchove a vzdelávaní (školský zákon) a o zmene a doplnení niektorých zákonov.

PAY-OUT PHASE DECISIONS UNDER THE EXISTENCE OF BEQUEST[1]

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***Abstract*:**
Immediate annuitisation as a strategy for a welfare maximization for a payout phase in private pension schemes has been widely criticized. Bequest motive is often overlooked or undermined if individual preferences are examined. We try to test pay-out phase decisions under the bequest motive using two different consumption rates for programmed withdrawal compared to the immediate annuitization subject to uncertain portfolio returns and longevity risk. The objective is to explain formation of decision for annuity pick-up rate when the bequest motive is taken into consideration. Results could serve as a basis for further discussion on improving the legislature on pay-out phase in Slovak private DC pension pillar.

Keywords: annuity, programmed withdrawal, bequest, pay-out phase, DC pension.

JEL classification: D14, D81, E21, G18, G23.

Introduction

Introduction of private DC pension schemes in general means shifting the financial risk onto individuals. Obviously, financial risks can be split into two parts: investment risk occurring especially during the accumulation phase and annuity risk occurring at the moment of retirement. When discussing design of private DC schemes pay-out phase, the key point of the debate is the selection of suitable products for retirees. The second logical

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step is the decision on the retirement strategy, which in general means decision on the combination of various products during the retirement. If the immediate annuitization is the predefined option, annuity risk emerges. Timing of buying the annuity however requires having an alternative to finance the expenses until the annuity is accepted. If only two different products are allowed: annuity and programmed withdrawal, than the decision starts to be more complicated. Under the two product regime, not only the risk of ruin (probability of outliving accumulated wealth before buying an annuity) should be considered. Decision to postpone the annuity purchase is motivated by the existence of bequest motive that refrain an individual from immediate annuity purchase.

The paper is organized in order to present preliminary research findings on annuitization under the existence of bequest motive. Then we present the methodology of our research and data for stochastic simulation. Last chapter discusses findings and recommendations for further research. In conclusion we summarize our findings and present potential steps for better regulation of pay-out options in Slovakia.

1 Literature review

In a number of contributions Milevsky et al. (1994, 1997, 1998, 2000) consider the ruin risk of self-annuitization. A self-constructed annuity consists of investing at retirement an initial endowment of wealth amongst the various asset categories (e.g. equity, bonds, real estate) represented by mutual funds, earning a stochastic rate of return, and withdrawing a fixed periodic amount for consumption purposes (Albrecht and Maurer, 2001). The financial risk of this strategy is that retirees can outlive their assets in the event of long-run low investment returns connected with longevity. This is in contrast to purchasing a life annuity, which is an insurance product that pays out a life-long income stream to the retiree in exchange for a fixed premium charge. As Mitchell et al. (1999) pointed out; the main characteristic of the life annuity is that it protects retirees against the risk of underfunding in retirement by pooling mortality experience across the group of annuity purchasers. The particular advantage of the self annuitization strategy

compared to the life annuity is the greater liquidity and the chance of leaving out money for their heirs in the case of an early death, but it is at the expense of running out of money before the uncertain date of death (Albrecht and Maurer, 2001).

In a well-cited paper from the public economics literature, Yaari (1965) proved that in the absence of bequest motives – and in a deterministic financial economy – consumers will annuitize all of their liquid wealth. Richard (1975) generalized this result to a stochastic environment, and Davidoff, Brown, and Diamond (2003) demonstrates the robustness of the Yaari (1965) result. In practice, there are market imperfections, and frictions preclude full annuitization. Similarly, Brugiavini (1993) provides theoretical and empirical guidance on the optimal time to annuitize under various market structures.

As Milevsky and Young (2003) claim, comparing the drawdown option with the purchase of an annuity at retirement, two important points can be observed in literature: a retiree is given complete investment freedom (instead of locking the fund into bond-based assets, as is usual with annuities) and a bequest desire can be satisfied should the member die before buying the annuity (because in case of death the fund remains part of the individual's estate).

Problem of sub-optimality of immediate annuitization has been studied by Di Giacinto and Vigna (2012). Their preliminary conclusion suggests, that because of four key factors cannot be controlled (as some are linked to the financial market, some to mortality conditions, and some to personal preferences) it is evident that a pension system that imposes compulsory immediate annuitization to the whole universe of retirees is bound to be sub-optimal. Clearly, giving more flexibility to the decision maker has the effect of increasing her individual utility, and this holds in every context. However, here they stated that, even if immediate annuitization might turn out to be optimal for the single retiree, it cannot be optimal for the universe of retirees in its globality.

Gerrard, Haberman and Vigna (2004) have dealt with the problem of managing the financial resources of a retiree after retirement, also due to the fact that life annuities are felt by policyholders as "poor value for money" and

have investigated other alternatives given to a retiree at retirement. In fact, retiree from a DC scheme takes the income drawdown option in the hope of doing better than buying an annuity at retirement. Therefore, it makes sense for them to have the wish of being able to buy a better annuity at a certain point of time after retirement than the annuity they would have purchased had they bought it at retirement. The option is thus taken with the final aim of buying a reasonably high pension and if the size of the fund allows the purchase of the high pension before the compulsory age the individual should stop investing the fund and lock it into an annuity. Therefore the existence of a finite maximum bound for the fund process would be realistic.

Milevsky and Robinson (2000) introduced the probability of lifetime ruin as a riskmetric for retirees, albeit in a static environment. As an extension of that work, Young (2004) determined the optimal dynamic investment policy for an individual who consumes at a specific rate, who invests in a complete financial market, and who does not buy annuities. The irreversibility of annuity purchases and their illiquidity creates a complex optimization environment, which renders many classical results inoperable.

Dus, Maurer and Mitchell (2005) conclude their research by presenting some interesting findings. First, they found discretionary management of accumulated assets with systematic phased withdrawals for consumption purposes offering the advantages of flexibility, bequests, and possibly higher rates of consumption than under a standard life annuity. However, they confirmed that phased withdrawal plans also require the retiree to dedicate effort to formulating asset allocation and withdrawal rules.

The personal risk of ruin from self-annuitization strategy is crucially dependent on the amount periodically withdrawn from the accumulated wealth (value of individual retirement account) as well as the fund asset allocation. The choice of a risk minimizing asset allocation with respect to a suitable benchmark for the amount of withdrawal still is an open question. In our paper we choose as a benchmark the amount generated by the single premium life annuity contract itself.

A phased withdrawal strategy paying the same benefit as an annuity exposes the retiree to the risk of outliving his assets while still alive. A phased withdrawal plan using a fixed withdrawal ratio avoids the risk of running out

of money, since benefits fluctuate in tandem with the pension fund's value. But the fixed benefit withdrawal rule affords lower risk than variable withdrawal rules, if one uses a mortality-weighted shortfall-risk measure. When looking at the probability of ruin and bequest, Dus et. al (2005) found that mandatory deferred annuitization with a fixed withdrawal rule can enhance expected payouts and cut expected shortfall risk but at the cost of reduced expected bequests, as compared to no annuity. For a variable withdrawal plan, a simple deferred annuitization may not reduce risk: rather, it requires optimization of the withdrawal ratio.

2 Research methodology

In order to investigate the decision on annuity purchase under the existence of bequest motive, we propose a decision-making algorithm than compares utility of programmed withdrawal with the existence of bequest motive to a utility of annuity purchase. Further on, the value of bequest has to be estimated. The last part is to define the path of a retiree who has to make decision at the beginning as well as during the retirement on suitable moment of annuity purchase.

To simplify the research process, we use the various annuity rates and do not propose the process of pricing the annuity at moment of retirement. The path of benefits payable under a programmed withdrawal rule can be formalized as follows. Let W_t be the value of the retirement assets at the beginning of period t (t = 0, 1, …,T) before the withdrawal B_t for each month is made. At the beginning of period t, an ex-ante specified fraction c_t ($0 < c_t \leq 1$) is withdrawn from current wealth; hence the retiree receives a payment according to:

$$B_t = c_t W_t \tag{1}$$

Formally, under a self-annuitization strategy, the wealth process of the retiree using uncertain return r for a given period can be expressed by following equation:

$$W_{t+1} = r_{t+1}(W_t - B_t) \tag{2}$$

If the retiree enters the retirement phase with wealth *W(0)* equal 1, invests at a rate of *r*, and withdraw at rate *c*, wealth increases at the expected return of portfolio minus the withdrawal rate. The solution to this ordinary differential equation is:

$$W(t) = e^{rt} - c\left(\frac{e^{rt}-1}{r}\right), \quad t \leq t^* \tag{3}$$

where t* is the point in time at which the process reaches the value of 0 (wealth is ruined).

However, an individual utility would be 0 at the time *t** as the risk of ruin reaches 100 %. At this point, an individual has no wealth left to be used for an annuity purchase. Hence this point is certainly not an optimal point of considering buying an annuity. Under the bequest motive and existence of probability of ruin, the optimal point (t_{OPT}) of considering the buying the annuity (switching from programmed withdrawal into an annuity) lies between t_0 and *t**, thus $t_0 < t_{OPT} < t^*$. The value of bequest for programmed withdrawal purchase can be simplified into the remaining wealth after the withdrawal multiplied by the probability of death during one time period *t*. The probability that this person in age *X* dies within the next year (*t*) is denoted by q_x.

Utility from purchasing both products (annuity as well as programmed withdrawal) at a certain time *t* shall be complemented by bequest value, as it has certainly a non-zero utility. Let us therefore introduce a value of bequest (D_t), whose value is dependent on time *t* and obviously decreasing over time under the programmed withdrawal product as remaining wealth W_t could decrease over time. For an annuity, we have to take into consideration the existence of a certain period, for which the payments are guaranteed. This period is set by Slovak legislation at 84 months since the time of annuity purchase. A retiree must receive at least 84 monthly annuity benefits, 7 years respectively (A_B), even in case of his/her death. Bequest value (D_{t+1}) for programmed withdrawal is therefore defined as $W_{t+1}q_x$. For an annuity we define the bequest value as $\ddot{a}_x(A_B)$.

Assuming the future returns are uncertain, we construct retirement investment strategy for self-annuitization. Defined retirement strategies for our research is a bond strategy, which invests only in low-risk bond pension fund (*b*) for a whole retirement period ($t_0, \ldots, T$).

Next, we present the withdrawal strategies defining the withdrawal rate (*c*). The first strategy is based on Milevsky (2001) present value approach, where the withdrawal rate (c_t^r) is equal to the 10 year annualized returns of bond r^b pension fund. Thus the withdrawal rate for a given year is:

$$c_t^r = r^b \tag{4}$$

Intuitively, setting the withdrawal rate equal to long-term return of a pension fund allows for a smoothing of benefits and securing for the probability of ruin.

Second withdrawal strategy, Sustainable Retirement Income (c_t^{SRI}), is based on adjusting the present value approach for volatility of returns (δ_t^2) and life expectancy of a retiree ($\frac{\ln(2)}{e_x}$). The equation for withdrawal rate is as follows:

$$c_t^{SRI} = r_t^b - \delta_t^2 + \frac{\ln(2)}{e_x} \tag{5}$$

Decision on buying programmed withdrawal product for a next period *t* is therefore driven by considering the utility provided by programmed withdrawal with bequest:

$$U(PW)_t = c_t W_t + W_{t+1} q_x \tag{6}$$

and annuity with quasi-bequest of 84 monthly benefits:

$$U(\ddot{a_x})_t = \ddot{a}_x(\frac{1}{12} + A_B)$$

If the utility of programmed withdrawal is higher than the one for annuity, an individual holds the programmed withdrawal for a next period (decision 1) and postpones the annuity purchase. So the decision function *f(d)* can be written as follows:

$$f(d) = \begin{cases} 1 \; if \;\; U(PW)_t > U(\ddot{a_x})_t \\ 0 \qquad\qquad otherwise \end{cases} \tag{7}$$

Introducing uncertainty of bond returns requires presenting a stochastic method. We perform simulations using historical daily data on US bond returns by applying a widely used method in financial econometrics, namely the moving block bootstrap. The basic idea of the block bootstrap is closely related to the i.i.d. nonparametric bootstrap (Vogel & Shallcross, 1996). Moving block bootstrap is based on drawing observations with replacement.

In the block bootstrap, instead of relying on single observations, blocks of consecutive observations are drawn. This is done to capture the dependence structure of neighbored observations. This method allowed us to overcome the problem with capturing close relations among bond returns during the whole pay-out period.

It has been shown that this approach works for a large class of stationary processes (Gilbert & Troitzsch, 2005). The blocks of consecutive observations are drawn with replacement from a set of blocks. By construction, the bootstrap time series has a nonstationary (conditional) distribution. The moving blocks bootstrap is a simple resampling algorithm, which can replace the parametric time series models, avoiding model selection and only requiring an estimate of the moving block length (*l*). In our case, the block length (*l*) is defined by the stressed life expectancy of a 62 year old retiree. Thus we define the block length (*l*) based on the defined life expectancies of a 62 year old retiring individual using 2014 life tables for Slovakia presented by VDC (2015).

For each unit of a block bootstrap, a vector of variables is defined. Pulling consecutive block of data out from the database of 96,5 years of daily data of variables, each block (*k*) than consists of variable observations $(X_{k-1+1}), j = 1, \ldots., l$. Then the simulation is performed for each block (*k*).

By performing 1000 simulation for each combination, we get the cumulative probability of ruin and value of bequest. In total we have performed 8 000 simulations using the same blocks and simulation sequences (simulation seeds) to be able to compare various investing and withdrawal strategies. Simulations were performed in MS Excel environment using Palisade @RISK software.

3 Results and discussion

First we present the results for the strategy, where the withdrawal rate is calculated using equation (4) and all remaining wealth is invested in bond pension fund (DGDF). The table 1 below presents some statistics on benefits and expected value of bequest in case of death under different longevity risk.

Table 1

Benefits and Bequest (DGDF/c_t^r) strategies – fixed withdrawal rate

Investment / Withdrawal Strategy	Longevity risk scenario	Min (€)	Mean (€)	Max (€)	5 % (€)	95 % (€)
DGDF/c_t^r Benefit	#1	41.83	43.50	45.57	43.18	43.91
DGDF/c_t^r Benefit	#1.05	41.40	43.51	45.32	43.18	43.93
DGDF/c_t^r Benefit	#1.1	40.46	43.51	46.44	43.16	43.93
DGDF/c_t^r Benefit	#1.15	41.58	43.50	46.12	43.13	43.88
DGDF/c_t^r Bequest	#1	16 335.99	41 622.30	99 530.39	17 042.07	86 235.52
DGDF/c_t^r Bequest	#1.05	16 179.21	43 712.24	110 548.90	16 903.56	90 921.10
DGDF/c_t^r Bequest	#1.1	16 127.29	46 003.42	121 331.80	16 934.98	98 276.77
DGDF/c_t^r Bequest	#1.15	16 043.44	48 354.37	123 822.80	16 919.20	104 609.50

Source: Own calculations using MikroSIM model.

None of the simulations for the DGDF / c_t^r strategy hit zero values of final wealth. In general, the average withdrawal rate was at 2,61 %, with low volatility (0,1 %) which can be deemed low comparing to the offered annuity rate at 4,75 %. However, average bequest reached the ratio of more than 2 compared to the initial level of savings. For this specific withdrawal strategy, the utility was primarily driven by the value of bequest and in all simulations the utility has been higher than the one from annuity. This combination of investment/withdrawal strategy is suitable when the bequest is preferred by a retiree. In fact, if we increase individual life expectancy the value of final wealth is increasing in time.

Second strategy combines investment into bond pension fund and the withdrawal strategy based on equation (5). The results are presented in table 2 below.

Table 2

Benefits and Bequest (DGDF/c_t^{SRI}) strategies – fixed withdrawal rate

Investment / Withdrawal Strategy	Longevity risk scenario	Min (€)	Mean (€)	Max (€)	5 % (€)	95 % (€)
DGDF/c_t^{SRI} Benefit	#1	68.08	93.43	166.04	68.93	143.70
DGDF/c_t^{SRI} Benefit	#1.05	67.02	93.24	165.65	67.82	144.74
DGDF/c_t^{SRI} Benefit	#1.1	66.07	93.08	168.42	66.74	146.49
DGDF/c_t^{SRI} Benefit	#1.15	65.02	92.85	169.60	65.74	147.56
DGDF/c_t^{SRI} Bequest	#1	8 580.92	18 101.63	37 540.43	8 837.09	34 268.81
DGDF/c_t^{SRI} Bequest	#1.05	8 253.57	18 097.68	39 115.95	8 507.76	34 529.59
DGDF/c_t^{SRI} Bequest	#1.1	7 947.65	18 118.29	41 044.85	8 228.45	35 100.59
DGDF/c_t^{SRI} Bequest	#1.15	7 653.23	18 117.23	39 341.59	7 982.04	35 472.00

Source: Own calculations using MikroSIM model.

Again, this combination delivered no risk of ruin and can be considered conservative with relatively good benefits (average benefit ratio of 5,6 %). However, the volatility of benefit ratio is higher (2,1 %). Compared to the previous combination, this one promises higher benefits, though at the expense of lower value of bequest, which stood at the average rate of 0,9. We can assume that in 10 % of simulations, the utility from programmed withdrawal strategy was lower than the utility of an annuity purchase.

We came close to the Dus, Maurer and Mitchell (2005) conclusions, that an immediate annuitization can be viewed suboptimal in general and also in individual circumstances if the value of bequest plays a role in decision of an individual. However, understanding the stopping function might help retirees to better manage retirement savings and maximize the utility function while minimizing probability of ruin due to the individual longevity risk and ability to maximize utility from the existence of a bequest.

Conclusions

Our paper focuses on deriving the decision on time of annuity purchase under the existence of a bequest motive. Using stochastic simulations of uncertain bond pension funds returns under the existence of an uncertainty in life expectancy, we have shown that a programmed withdrawal strategy with benefit ratio based on the long-term pension fund returns does not expose the retiree to the risk of outliving his assets while still alive. A programmed withdrawal using a dynamic withdrawal rate than corresponds to the past returns and adjust the paid benefits on an annual basis helps avoiding the risk of running out of money, since benefits fluctuate in tandem with the pension fund's returns.

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INTERGENERATIONAL TRANSMISSION OF DISADVANTAGES IN EUROPE[1]

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***Abstract*:**
Empirical literature offers a number of studies suggesting that living conditions in childhood can significantly influence living conditions in adulthood. The aim of this paper is to explore the nature of the intergenerational transmission of poverty and social mobility (in terms of educational and occupational mobility) in the European Union (and Iceland, Switzerland and Norway). Our analyses are based on EU-SILC 2011 "Intergenerational transmission of disadvantages" module microdata. Intergenerational transmission of poverty is proxied by change in the perceived financial stress of household.

***Keywords*:** Intergenerational transmission of poverty, social mobility, Europe, EU-SILC.

JEL classification: I31, I32, Z13.

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Introduction

It is obvious that the living conditions in childhood can significantly affect the whole life of individuals. This has been discussed in a number of studies (see e.g. Bronfenbrenner, 1986, Lundberg, 1991, Luo and Waite, 2005). There is a number of factors potentially affecting changes in the living conditions throughout the life and at the same time there are more possibilities on how to quantify/describe the changes. Our study is focused on changes in the subjective perception of financial stress of household in which the respondent lives, i.e. we apply the subjective approach to the assessment of intergenerational transmission of disadvantages.

The aim of this paper is to provide the first insight into the nature of the intergenerational transmission of disadvantages and social mobility (in terms of educational and occupational mobility) at the European level.

1 Background and goal of the study

Intergenerational transmission of disadvantages can be looked upon as a complex of positive and negative factors that affect a child's chances of experiencing poverty in the future (Moore, 2005) and empirical literature offers a number of evidence suggesting that living conditions in the past (in childhood) can significantly affect living conditions in the future (in adulthood). Thus there is an obvious relationship between deprivation in childhood resulting from parents' poverty and experiencing poverty in youth (Filadelfiová, 2007), which can further predict poverty in the later times of life and a consecutive transmission of poverty to the descendants. But it cannot be generalised, as other factors such as family/household structure, environment, social isolation etc. can independently affect individual's living conditions throughout his or her life cycle (Bird, 2007).

In contrast to the previous studies based on analyses of both respondents' and their parents' characteristics, our study is based on a construction of simple individual variables reflecting intergenerational mobility directly. The constructed indicator of intergenerational mobility has three levels: 1. negative change; 2. no change; 3. positive change. Negative change depicts

a situation in which a respondents perceives higher financial stress at present than in his/her youth (or in terms of education: his/her educational attainment is lower than educational attainment of his/her parents, while the reference category is education of the parent who attained higher level of education (i.e. downward mobility); the same applies to occupational mobility). In a similar way no change and positive change are defined.

2 Description of data

Analyses and results in the study are based on EU-SILC 2011 microdata (Eurostat, 2015) including ad hoc module on intergenerational transmission of disadvantages. The data cover European Union countries,[5] Iceland, Norway and Switzerland. Construction of intergenerational transmission of financial stress perception, is based on comparison of subjective financial stress perception in the past and at present, using the following two EU-SILC questionnaire questions:

[Present]: Variable HS120: *"A household may have different sources of income and more than one household member may contribute to it. Thinking of your household's total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses?"*

[Past]: Variable PT200: *"When you were around 14 years old, with how much difficulty or ease was your household able to make ends meet, that is, to pay for its usual necessary expenses?"*

In the both cases the respondents had to choose one of the following responses: *"1. with great difficulty – 2. with difficulty – 3. with some difficulty – 4. fairly easily – 5. easily – 6. very easily."*

Considering the fact that in case of HS120 variable the response given by the responding person is assigned to all household members and question PT200 was asked by each household member aged 25 – 59, the analysis is focused only on the persons responding the household questionnaire.

[5] Germany is excluded from the data-set, as we still have not received approval from the German National Statistical Institute to use the German microdata for scientific purposes within this research project.

Adopting the principle of carefulness we assume that person responding the household questionnaire generalises his/her perception of the present situation to the whole household, while some of the household members could perceive the present situation differently.

The resulting value of response variable (*y*) can have three categories:

1. person *i* reckons that her present household is able to make ends meet *with greater difficulties* than household in which she lived when she was around 14 years old,
2. person *i* reckons that her present household is able to make ends meet with (approximately) the same difficulties as household in which she lived when she was around 14 years old,
3. person *i* reckons that her present household is able to make ends meet *with lower difficulties* than household in which she lived when she was around 14 years old.

A similar transformation is used also in case of the key explanatory variables: intergenerational educational and occupation mobility. All calculations and estimations in the study were performed in R environment (R Core Team, 2015).

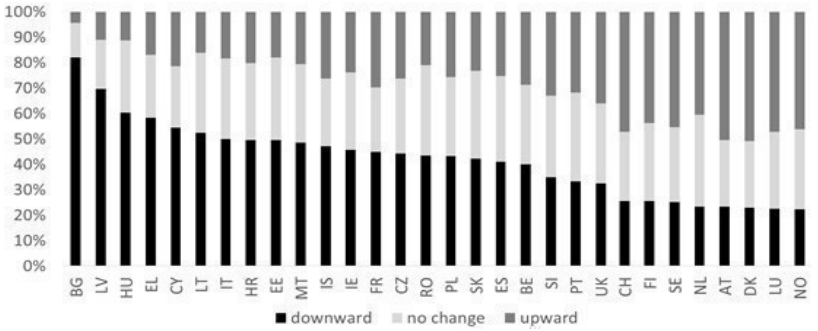
3 Results and discussion

Number of people perceiving that they currently live in a household meeting ends meet with greater difficulties than a household in which they lived when they were around 14 years old (or shortly denoted as *people perceiving deterioration of their financial situation*) is in the most of the countries higher than the number of people perceiving that they currently live in a household meeting ends meet with lower difficulties than a household in which they lived when they were around 14 years old (or shortly denoted as *people perceiving improvement of their financial situation*).

The largest difference between the number of people perceiving deterioration of their financial situation and number of people perceiving improvement of their financial situation is reported in the case of Bulgaria (almost 20-times more people perceiving deterioration than the number of people perceiving improvement of their financial situation), Latvia (6-times more of

such people), Hungary (5-times more) and Greece (4-times more). The share of people perceiving that they currently live in a household making ends meet with approximately the same level of difficulties than a household in which they lived when they were around 14 years old (or shortly denoted as *people perceiving no change in their financial situation*), can be considered as relatively stable across countries and its level is around 30 per cent (see Graph 1).

Graph 1
Share of people perceiving deterioration/improvement/no change in financial situation



Source: Own calculations based on EU-SILC 2011 microdata.

The group of countries, in which the number of people perceiving improvement of financial situation is larger than the number of people perceiving deterioration of financial situation consists of the Western European countries only (Luxembourg, Austria, Norway, Sweden, Switzerland, Finland, Denmark, Netherlands and the United Kingdom).

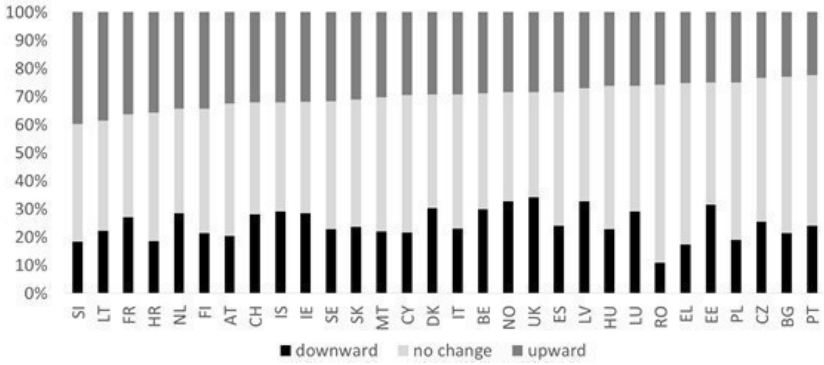
The results hence suggest that people from the Western Europe perceive on average improvement of their financial situation (at present in comparison to period when they were around 14 years old), while for the Central/Eastern European countries the opposite is typical. At least two explanations can be offered. The first one is associated with the fact that the level of economic convergence is not reached as it was expected. The second explanation is connected to the effects of economic crisis, as it can be assumed that the overall lowered economic performance could have affected people's employment opportunities, as well as living standard of certain

groups of people could have decreased. As a result those people perceived a negative change in the financial situation (in comparison to the past).

The division of respondents into two groups based on their age (1. not older than median age and 2. older than median age) leads us to the conclusion that in case of almost all countries (with the exception of Estonia), the "younger" respondents[6] perceive deterioration of their financial situation to a greater extent than the "older" respondents.[7] Portugal, Slovakia and the United Kingdom are countries with the most significant differences between the "older" and the "younger" respondents. More specifically, in case of the "younger" respondents there's a larger number of those perceiving deterioration of their financial situation than the number of respondents perceiving improvement of their financial situation; and in case of the "older" respondents there's a larger number of those perceiving improvement of their financial situation than those perceiving deterioration of their financial situation.

Graph 2

Shares of people with upward/downward and no change in occupational mobility



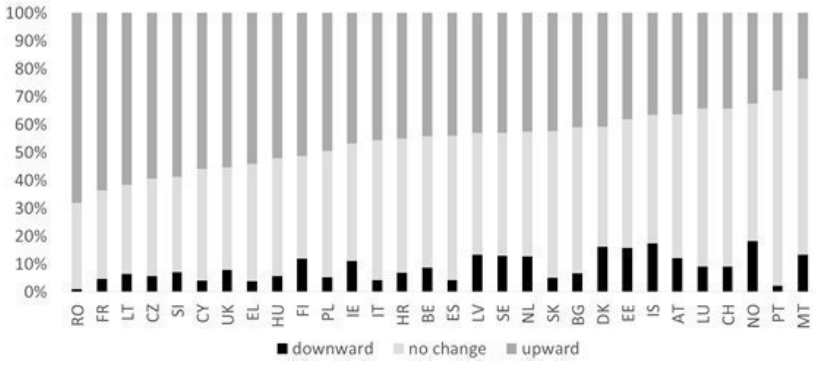
Source: Own calculations based on EU-SILC 2011 microdata.

As for the occupational intergenerational mobility, respondents without change in their social status (i.e. occupational status of respondents does

[6] I.e. the respondents who were approximately 14 years old between 1983 – 2003.
[7] I.e. the respondents who were approximately 14 years old before 1983.

not differ from occupational status of his parent[8]) are the largest group. The results further suggest that in most of the countries (20 out of 30) the number of people with upward occupational mobility is higher than the number of people with downward occupational mobility (see Graph 2).

Graph 3
Shares of people with upward/downward and no change in educational mobility



Source: Own calculations based on EU-SILC 2011 microdata.

Consideration of age (division of respondents to "younger" and "older" than the median age) suggests that in almost all countries (with the exception of Malta and Poland) the probability of upward occupational mobility is higher for "older" respondents than for "younger" respondents.[9] This could be explained by the fact that the younger respondents can still achieve higher occupational status in their future career.

The results further indicate that in general there's an upward or no educational mobility. Respondents with no educational mobility (i.e. no change between the highest attained level of respondents and their parents) is the largest group (35 – 65 per cent). The upward educational mobility (Graph 3) is typical for all countries with the most considerable change in case of Romania (the number of respondents with upward educational mobility is

[8] The respondent's status is compared to that parent, whose social status was higher.
[9] Division of respondents to "younger" and "older" is based on the same principle as described above.

50-times larger than the number of respondents with downward educational mobility). Norway is the only country in which the number of "younger" respondents with downward educational mobility is higher than respondents with upward educational mobility. The largest share of respondents with downward educational mobility is reported in Norway (22 %), Denmark (20 %), Iceland (17 %) and Estonia (16 %).

The relationship between the values of the variables at present and in the past is positive and statistically significant in case of all variables (Table 1). The values of Kendall's τ_B coefficient for the perception of financial stress in the past and at present are between 0.079 (Denmark) and 0.314 (Portugal). The relationship between parent's and respondent's highest attained education is the strongest in all countries with values between 0.246 (Finland) and 0.503 (Luxembourg). Slightly lower values are reported when analysing the occupational status: 0.171 (Iceland) – 0.331 (Romania).

The pattern of relationship is in general the same in all countries – the highest strength of relationship is reported in case of educational status and the lowest in case of subjective perception of financial stress of household.

Table 1

Relationship between present and past values of the selected variables (τ_B)

Country	Disadvantages	Education	Status	Country	Disadvantages	Education	Status
AT	0.146	0.318	0.247	IS	0.098	0.277	0.171
BE	0.231	0.420	0.266	IT	0.225	0.401	0.242
BG	0.188	0.484	0.330	LT	0.163	0.322	0.227
CY	0.188	0.394	0.240	LU	0.247	0.503	0.321
CZ	0.154	0.370	0.291	LV	0.097	0.294	0.232
DK	0.079	0.253	0.211	MT	0.232	0.336	0.285
EE	0.187	0.262	0.215	NL	0.136	0.324	0.223
EL	0.162	0.365	0.189	NO	0.129	0.297	0.203
ES	0.246	0.334	0.240	PL	0.193	0.374	0.278
FI	0.153	0.246	0.241	PT	0.314	0.352	0.235
FR	0.124	0.355	0.254	RO	0.260	0.402	0.331
HR	0.193	0.385	0.232	SE	0.118	0.291	0.249
HU	0.203	0.421	0.308	SI	0.197	0.325	0.288
CH	0.153	0.359	0.237	SK	0.219	0.353	0.272
IE	0.195	0.336	0.249	UK	0.160	0.309	0.211

Source: Own calculations based on EU-SILC 2011 microdata.
Note: All estimates of coefficients are statistically significant ($p < 0.0001$).

Conclusions

It is unquestionable that living conditions in youth can to some extent determine living conditions in later cycles in life. Our paper strives to address a question, to what extent intergenerational transmission of disadvantages (proxied by comparing subjective perception of ability to make ends meet when the respondent was around 14 years old and at present) can be explained by social mobility (in terms of occupational and educational mobility).

As assumed and suggested by theory, our main findings indicate that living conditions in youth determine living conditions in adulthood and furthermore, social mobility is associated with intergenerational transmission of disadvantages.

One of our further findings is that people from the Western Europe perceive on average improvement of their financial situation (at present in comparison to period when they were around 14 years old), while for the Central/Eastern European countries the opposite is typical. This can, to some extent, be explained by the fact that the level of economic convergence is not reached as it was expected and possibly also by the effects of economic crisis (which were still strong in 2010/2011). Our intension was also to compare our results to pre-crisis period (e.g. using a similar module of EU-SILC 2005 microdata, but due to incompatibility of data such analyses were not possible). But analysis of a similar module forthcoming in one of the future EU-SILC surveys can answer the question, to what extent the results are affected by the economic crisis.

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