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Can the implementation of the Europe 2020 Strategy goals be efficient? The challenge for achieving social equality in the European Union

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Keywords: *DEA method; economic crisis; EU28; Europe 2020 strategy; social inequality*

Abstract
Research background: Economic crisis hit all the European Union Member States hard, with the impact of crisis varying considerably. The low growth performance in the EU has increased concerns regarding an increasing wage dispersion, income inequality at large, and social exclusion in line with poverty. Inequality should be seen as a cornerstone of both sustainable and inclusive growth under the Europe 2020 Strategy. Social inequality in the EU is a real problem, which hampers sustainable economic growth.
Purpose of the article: The purpose of this study is to introduce evaluation of social development convergence and divergence trends between the EU Member States in the context of the Europe 2020 Strategy. The study gives an outline of the issues of the labour market and income disparities and poverty. Policymakers must be clear about what social objectives they are aiming to achieve, therefore special attention is paid to headline national goals of the Europe 2020 Strategy.
Methods: The main task of this study is to assess social dimension and inequalities problems in the EU27 by applying Data Envelopment Analysis method, resp. time-series dynamic efficiency analysis in the form of output-oriented Malmquist Productivity Index. This study contains changes of key social equality indicators related to the Europe 2020 Strategy and compares objectives and general outlines of period 2010-2015, as well as the impact on national economics and living conditions.

Findings & Vlue added: Results contain elements of typology premises of the EU28 and point to a large diversity in inequality patterns, as the Author observes both increases and decreases in inequality at the EU level. Recent changes in social inequality have been associated with the business cycle, particularly with the accessibility of the labour market and, of course, with income inequality. Additionally, the development challenges are discussed for improvement of the socioeconomic well-being of the EU and to avoid social disparities.

Introduction

The European Union (EU) faces many challenges. On the global stage, the EU has to speak with one voice to counter a plethora of political, military and economic crises. Internally, it needs to foster cohesion in spite of the many events that threaten the EU at its core. In this context, do social issues matter at all? If we look at the EU evolution over the past decades, substantial progress has been made in terms of building an internal market and an economic and monetary union, albeit not without problems, as the 2008 crisis has shown actually as if the EU mostly thinking in economic terms, hoping that economic solutions will fix all social problems at once. To negate the importance of social issues is to undermine the EU foundations (Allmendinger & Driesch, 2014). Many politicians and economists believe that economic growth replaces or diminishes the need for social policies. The EU growth over the last decades has been accompanied by an increase in inequalities in many countries. Inequalities threaten social cohesion and growth.

If such concerns are correct, it is essential not only to build institutional structures for the European social union, but also to map social inequalities in the EU. The low growth performance in the EU over the recent decades has increased concerns regarding an increasing economic dispersion, income inequality at large, and social exclusion. Recent research works have stimulated fierce debate on inequality among academics and policymakers. The economic crisis revealed many of the weaknesses of the current European economic policy, not least at the level of its fiscal policy, monetary policy, industrial policy, and social policy, and its inability to address problems related to inequality. Inequalities in the EU have been the object of extensive research over the last decade. Several factors can explain this widespread interest; especially the revival of growth theory (Romer, 1990; Aghion & Howitt, 1998) was contemporaneous with a growing body of empirical literature on economic convergence (Sala-i-Martin, 2006; Quah, 1997; Barro & Sala-i-Martin, 1995).

The level of social inequalities belongs to important indicators influencing the socio-economic development and other processes taking place in

the social and economic realm. Facilitating rational income distribution and reducing poverty are mentioned among the main goals of public policy. It should be mentioned that such multidimensional phenomena as income disparity and poverty might be analysed from many different perspectives, including the national and international, also within the EU. Striving for fairness in economic development is crucial in order for societies to be stable and citizens not to feel disenchanted. The economic crisis has put inequalities high on the political agenda and made this an issue of serious public concern. There is an increasing recognition that social policy can reduce inequality and poverty while simultaneously improving the economic functioning of the country as reflected in the idea of inclusive growth in the Europe 2020 Strategy, with references to a high-employment economy delivering economic, social, and territorial cohesion in which benefits of growth and jobs are widely shared.

In view of the current debate and the literature review, the objectives of this study focus on the following key issues: 1) to describe the recent evolution of inequalities and dispersion across the EU Member States using different definitions of social inequality measures in relation to the Europe 2020 Strategy; and 2) to assess the social dimension and inequality problems in the EU Member States by applying the Data Envelopment Analysis (DEA) method. The purpose of this study is to introduce evaluation of social-economic development and trends among the EU countries in the context of the Europe 2020 Strategy. The main task of this study is to assess the social dimension and inequality problems in the EU countries by applying time-series dynamic efficiency analysis in the form of output-oriented Malmquist Productivity Index (MPI). It has to be emphasized that individual EU countries are characterized by different development levels, which is confirmed by their national levels in achieving the socio-economic goals of the Europe 2020 Strategy. This study contains changes of key social equality indicators related to the Europe 2020 Strategy and compares national progress in reference period 2010–2015. Development challenges are discussed for improvement of the socio-economic well-being of the EU Member States and to avoid social disparities. The study thus gives an outline of the issues of social inequalities.

Theoretical background

The competitiveness and welfare level of people of any country is clearly related to the performance of its potential economic growth. The keen interest in economic growth or productivity growth is the objective of eco-

nomic policy. Therefore, the economic performance of countries and the world as a whole has formed the subject matter of numerous studies over the last decades. Academics and policymakers are concerned with the evolution of inequality and its negative effect on development, see: Rajan (2010), Stiglitz (2009) or Krugman (2008). Nevertheless, the differences between the EU Member States are enormous. Small, rich countries, such as Luxembourg, contrast sharply with big, poor ones, such as Romania. Despite this, many indicators are published which refer to the EU as a whole, including measures of socio-economic inequalities and with the time. The recent economic crisis revealed many of the weaknesses of the current European economic policy, not least at the level of its fiscal policy, monetary policy, industrial policy, and social policy, and its inability to address problems related to inequality. The current Europe 2020 Strategy aims to achieve an inclusive economic growth, benefitting the largest possible number of people, while other international institutions are also fully concerned with inequality issues. The European Council approved of the Europe 2020 Strategy, an economic growth and well-being improvement plan for the EU in the ensuing decade. The strategy includes five interrelated headline targets to be achieved by the year 2020, encompassing employment, innovation, education, poverty and social inclusion, and climate/energy. Inequality should be seen as a cornerstone of sustainable and inclusive growth.

Inequality is the key problem facing the EU, and it has significant impact not only on human well-being, but also on economic performance. In order to address this problem properly, there is the need for substantial changes in economic theory, and in the empirical measurement of inequality. The effectiveness of the European convergence policy can also be improved by clever choice of the country-specific social activities and significant economic growth. Inequality can have many dimensions. Economists are concerned specifically with the economic or monetarily measurable dimension related to individual or household income and consumption. However, this is just one perspective, and inequality can be linked to inequality in skills, education, opportunities, happiness, health, life expectancy, welfare, assets and social mobility. The inequality can be defined and measured as a specific resource which is distributed across the whole society, while economic inequality means primarily differences in earnings and incomes, social inequality relates to differences in access to social commodities including education and healthcare, but also social and institutional networks. While the EU has a clear role and competences in reducing inequality, reducing inequality at national level within EU countries is a precondition for reducing the European inequality.

Research methodology

The recent interest in inequality is thus simply the recognition of the centrality of the topic in economic theory-policy, and performance. The return of the topic of inequality has been triggered by important contributions to the empirical analysis of inequality (Galbraith, 2009), but these empirical analyses must be combined with an economic theory that is adequate to address the macroeconomic and microeconomic effects of inequality on social welfare. These problems are not always well-diagnosed, because the empirical measurement of inequality is often unable to take into account the geographical dimension of inequality, which is particularly complex in Europe. As Galbraith (2009) notes, if we take into account inequality in Europe as a whole, rather than focusing on inequalities within specific countries, we find that inequality in Europe is a much more serious problem than it is usually believed. To study inequality in Europe as a whole, one needs adequate statistical tools which can be used in the geographical and political context faced by Europe. Economic analysis is in need not only of an economic theory that focuses on the macroeconomic and microeconomic impact of inequality, but also of economic measurement that takes into account the several dimensions of inequality across individuals in Europe, including the geographical dimension (Martins *et al*., 2015).

There is ongoing and increasing interest in measuring the level, causes and development of inequality. The European inequality, however, has been explicitly covered less often, and only by Brandolini (2007) and Franzini (2009). The necessity of having performance measures in terms of welfare beyond GDP calls for new approaches capable of simultaneously taking into account economic as well as social and environmental indicators. In the recent period, efficiency has become a very important part of governments' decisions, and the main reason is financial constraints that public finance needs to face in the setting of the financial crisis. So in given financial constraints, the efficiency of public spending plays quite a significant role. Empirical studies engaging the technique of non-parametric method Data Envelopment Analysis (DEA) use the production function that combines various types of public expenditures as inputs and outputs are given by some public objectives, and thus to calculate the countries' efficiency scores. DEA is an approach for providing a relative efficiency assessment and evaluating the performance of a set of peer entities called decision-making units (DMUs), which convert multiple inputs into multiple outputs. The definition of a DMU is generic and flexible. DEA is convenient for determining the efficiency of DMUs that are mutually comparable — using the same inputs and producing the same outputs but with

different performances. Determining whether a DMU is efficient from the observed data is equivalent to testing whether the DMU is on the production possibility frontier set. DMU is efficient if the observed data correspond to testing whether the DMU is on the imaginary production possibility frontier (Coelli *et al.*, 2005). All other DMUs are inefficient. The best-performing units are used as a reference for the evaluation of the other group units.

Farrell model (1957) for measuring the efficiency of units (with one input and one output) has been expanded in 1978 by Charnes, Cooper and Rhodes assuming Constant Returns to Scale (the CCR CRS model) and later modified in 1984 by Banker, Charnes and Cooper assuming Variable Constant Returns to Scale (the BCC VRS model). DEA methods also include advanced additive models, such as Slack-Based Model (SBM) introduced by Tone in 2002 and Free Disposal Hull (FDH) and Free Replicability Hull (FRH) models formulated in 1984 by Deprins, Simar and Tulkens. In recent years, the research effort has focused on the investigation of the causes and decomposition of productivity change. Malmquist Productivity Index (MPI), introduced by Caves *et al*. (1982), has become the standard approach in productivity measurement over time.

There is a great variety of applications of DEA for evaluating the performances of many different kinds of entities engaged in many different activities. Use of DEA has been mostly engaged in assessing the efficiency in economic sectors and in-country settings (Hančlová & Melecký, 2016; Melecký, 2013; Lavado & Cabanda, 2009), the growing literature has been introduced also on DEA application in the public sphere (for more cases see: Štikarová (2014)). Because of the low assumption requirements, DEA has also opened up possibilities for use in cases that have been resistant to other approaches because of the complex (often-unknown) nature of relations between multiple inputs and multiple outputs involved in DMUs. DEA method is a convenient method for comparing national efficiency as an assumption for the performance of territory because it evaluates not only one factor, but also a set of different factors that determine the degree of economic development.

The empirical analysis is based on MPI measuring the change of technical efficiency and the movement of the frontier in terms of individual DMUs (Färe *et al*., 1994). Suppose each DMU_j ($j=1, 2\ldots n$) produces a vector of output $y_j^t = \left(y_{1j}^t, \ldots, y_{sj}^t\right)$ by using a vector of inputs $x_j^t = \left(x_{1j}^t, \ldots, x_{mj}^t\right)$ at each time period t, $t = 1..., T$. From time t to time $t+1$, DMU_0*'s* efficiency may change or (and) the frontier may shift. MPI is cal-

culated via (1) comparing x_0^t to the frontier at time *t*, i.e., calculating $\theta_0^t\left(x_0^t, y_0^t\right)$ in CCR CRS model (Zhu, 2012):

$$\theta_0^t\left(x_0^t, y_0^t\right) = \min \theta_0 , \tag{1}$$

subject to

$$\sum_{j=1}^{n} \lambda_j x_j^t \le \theta_0 x_0^t ,$$

$$\sum_{j=1}^{n} \lambda_j y_j^t \ge y_0^t ,$$

$$\lambda_j \ge 0,\ j = 1,\ldots, n,$$

where θ_0 indicates the efficiency score of observed DMU_0, $x_0^t = \left(x_{10}^t,\ldots, x_{m0}^t\right)$ and $y_0^t = \left(y_{10}^t,\ldots, y_{s0}^t\right)$ are input and output vectors of DMU_0 among others.

MPI is further calculated via (2) comparing x_0^{t+1} to the frontier at time *t+1*, i.e., calculating $\theta_0^{t+1}\left(x_0^{t+1}, y_0^{t+1}\right)$ in CCR CRS model (Zhu, 2012):

$$\theta_0^{t+1}\left(x_0^{t+1}, y_0^{t+1}\right) = \min \theta_0 , \tag{2}$$

subject to

$$\sum_{j=1}^{n} \lambda_j x_j^{t+1} \le \theta_0 x_0^{t+1} ,$$

$$\sum_{j=1}^{n} \lambda_j y_j^{t+1} \ge y_0^{t+1} ,$$

$$\lambda_j \ge 0,\ j = 1,\ldots, n.$$

MPI is further calculated via (3) comparing x_0^t to the frontier at time *t+1*, i.e., calculating $\theta_0^{t+1}\left(x_0^t, y_0^t\right)$ via the following linear program (Zhu, 2012):

$$\theta_0^{t+1}\left(x_0^t, y_0^t\right) = \min \theta_0 , \tag{3}$$

subject to

$$\sum_{j=1}^{n} \lambda_j x_j^{t+1} \leq \theta_0 x_0^t ,$$

$$\sum_{j=1}^{n} \lambda_j x_j^{t+1} \geq y_0^t ,$$

$$\lambda_j \geq 0,\ j = 1,\ldots, n.$$

MPI is further calculated via (4) comparing x_0^{t+1} to the frontier at time *t*, i.e., calculating $\theta_0^t\left(x_0^{t+1}, y_0^{t+1}\right)$ via the following linear program (Zhu, 2012):

$$\theta_0^t\left(x_0^{t+1}, y_0^{t+1}\right) = \min \theta_0 , \tag{4}$$

subject to

$$\sum_{j=1}^{n} \lambda_j x_j^t \leq \theta_0 x_0^{t+1} ,$$

$$\sum_{j=1}^{n} \lambda_j y_j^t \geq y_0^{t+1} ,$$

$$\lambda_j \geq 0,\ j = 1,\ldots, n.$$

MPI measuring the efficiency change of production units between successive periods *t* and *t+1* is formulated via (5):

$$M_0\,(x^{t+1}, y^{t+1}, x^t, y^t) = EFCH_0 \cdot FS_0 \tag{5}$$

where $EFCH_0$ is changing in the relative efficiency of DMU_0 in relation to other units (i.e. due to the production possibility frontier) between time periods *t* and *t+1*. FS_0 describes the change in the production possibility frontier as a result of the technology development between time periods *t* and *t+1*. The following formulation of MPI (6) makes it possible to meas-

ure the change of technical efficiency and the movement of the frontier in terms of a specific DMU_0 (Zhu, 2012):

$$M_0 = \frac{\theta_0^t\left(x_0^t, y_0^t\right)}{\theta_0^{t+1}\left(x_0^{t+1}, y_0^{t+1}\right)}\left[\frac{\theta_0^{t+1}\left(x_0^{t+1}, y_0^{t+1}\right)}{\theta_0^t\left(x_0^{t+1}, y_0^{t+1}\right)} \cdot \frac{\theta_0^{t+1}\left(x_0^t, y_0^t\right)}{\theta_0^t\left(x_0^t, y_0^t\right)}\right]^{1/2}. \quad (6)$$

The first component on the right-hand side measures the magnitude of technical efficiency change between periods *t* and *t+1*. Obviously, the component $EFCH_0 = \frac{\theta_0^t\left(x_0^t, y_0^t\right)}{\theta_0^{t+1}\left(x_0^{t+1}, y_0^{t+1}\right)} \begin{matrix} < \\ = \\ > \end{matrix} 1$ indicating that technical efficiency improves remains or declines. The second component measures the change in production technology, i.e. technology frontier shift, between periods *t* and *t+1*. Trends of MPI, EFCH and FS are illustrated in Table 1.

When performance measure (input/output) is added or deleted from consideration, it will influence the relative efficiencies. Empirically, when the number of performance measures is high in comparison with the number of DMUs, then most of the DMUs are evaluated efficiently. Hence, the obtained results are not reliable. There is a rule of thumb which expresses the relation between the number of DMUs and the number of performance measures. Toloo *et al*. (2015) found out that in nearly all of the cases the number of inputs and outputs do not exceed 6. Suppose there are *n* DMUs which consume *m* inputs to produce *s* outputs. A simple calculation shows that when $m \leq 6$ and $s \leq 6$, then $3(m + s) \geq m \times s$. As a result, in this study following formula (7) is applied:

$$n \geq 3(m+s). \quad (7)$$

In the study, DMUs number is three times higher than the sum of input-output, i.e. $28 \geq 3(2 + 7)$, $28 \geq 3(9)$, $28 \geq 27$, so the rule has been proved.

Software tools for solving linear programming problems are used in the study, such as the DEA Frontier, and IBM SPSS Statistics 24.

The analysis presented here will try to provide estimates of the European (the EU27 Member States and the EU as a whole) inequality for reference years 2010–2015. The scope of the present study and the methodology selected for analyses are dictated by the availability of suitable data. In order to analyse inequality trends, this study used the most recent data available from the reliable and standardised source, namely the EU Statistics — the Europe 2020 strategy indicators — social dimension (Eurostat,

2017), see: Table 2. Reference period consists of years 2010, 2011, 2012, 2013, 2014 and 2015 with respect to the implementation years of the Europe 2020 Strategy. Efficiency evaluation is calculated across the reference years, that is, between 2010 and 2011, and so on to between 2014 and 2015, and the overall efficiency change between 2010 and 2015.

Results and discussion

The results of the author' calculations (see Table 3) confirm the initial statement about inequality within the EU. With the level of inequality, the EU appears to be much more unequal than other large economies. In a multinational integration area such as the EU is, inequality has two dimensions: within states and between states. The EU itself regards these two sides of inequality as strictly separate, which leads to highly distorted (under)estimates of the inequality within the EU. It is the within-country, not the between-country dimension, which appears to be the most important. During the reference period considered, between-country inequality increased as confirmed MPI decreasing trend by comparing annual MPI change. According to the efficiency analysis and derived results by MPI solution, it emerges that the 2010–2015 annual MPI change of the EU countries range from 0.681 to 1.352. In the case of overall MPI change, the ratio emerges from minimum 0.562 to maximum of 2.322 in the reference period 2010–2015. However, what do these values mean with respect to MPI definition, or any of its elements? If MPI is less than one, it signifies productivity getting worse, while if MPI equals to one, it indicates unchanging productivity, finally and if MPI is higher than one, it signifies productivity getting better (Zhu, 2012). The overall productivity of most evaluated countries has recorded decreasing trend, thus negative. This result is expected due to nature of comparing period (years) in which the European countries solved the impacts of the financial and economic crisis.

Part of the explanation to the large inequalities within the EU countries may then have to do with the differences in competitiveness. An economic entity in the country, which has low competitiveness, may not have similar opportunities as an economic entity in a highly competitive country. This fact remains and is confirmed. However, what does it mean for efficiency in competitiveness? In the case of efficiency analysis of competitiveness and in time comparison analysis of change, the results are just a little bit different. Why? The concept of competitiveness is important not only for evaluation why some countries grow faster than others do, but also why some countries have a better and more efficient distribution of competitive-

ness over time than others. Is it a high level of competitiveness necessarily associated with a high level of efficiency, and vice versa? It may not always be the case due to the evaluated countries, since it is necessary to compare the values of inputs and outputs. Very important is also the fact that with given level of inputs, countries were able to achieve a level of output. Finally, Table 3 show reordered countries, from the best to the worst, MPI score and the corresponding rank with respect to the overall-period MPI change. Based on MPI results is clear, that efficiency changes results seem to be balanced in the EU countries.

Classification of the EU15 and the EU12 Member States with respect to the nature of technical and technological change is illustrated in Figure 1. In the overall reference period, the location of all the European countries is recorded with respect to results, resp. values of EFCH and FS. Evaluated countries are divided into two groups — the EU15 Member States and the EU12 Member States for better comparison of common features and differences. It is convenient to remind that EFCH and FS in values of 1.000 mean no productivity change, values higher than 1.000 mean productivity improving and values lower than 1.000 mean productivity deterioration. From this point of view, it is possible to divide the European countries into four categories, resp. quadrants. Via illustration of Figure 1, information about differences in efficiency recorded by MPI in the 2010-2015 period are confirmed. Across the overall-change period, most of the European countries are located in quadrants with a low level of FS, and higher or lower level of EFCH. It means that efficiency change is caused especially by the change in the production possibility frontier because of the technology development between reference years, i.e. technology frontier shift. This fact is positive information with respect to indicators of the Europe 2020 Strategy, and it signifies that countries are able to utilize their internal factor endowment in an effective way and apply technological progress for boosting of their competitive advantages. Countries thus contribute to the qualitative based economic growth and this is an option how to raise the steady state. On the other hand, none of the European countries is located in the quadrants with a high level of FS, and higher or lower level of EFCH. It means that efficiency change is a change in the relative efficiency of the evaluated country in relation to other countries due to the production possibility frontier between reference years, i.e. technical efficiency change. This fact would not be positive information because it means that countries extract their efficiency based on shifts in sources of competitiveness, i.e. make changes in composition and quantity of sources based on exchange business with other countries. The character of technical efficiency change would thus contribute only to quantitative based economic growth having

limits; this is disconcerting with reference to limited sources and their utilization.

These factors affect the convergence trend of the new EU Member States to the old ones, and the growth in old countries has an implicative impact on growth in new countries. This growth may have the same degree in the EU12 as in the EU15 countries or is a higher and multiplied. In fact, the catching-up of the poorer countries is partially based on the relocation of production from high-wage to low-wage locations. The resulting increase in inequality in the richer countries is traditionally explained by the Heckscher-Ohlin theorem predicting complementary redistribution between capital and labour in the trading partners involved. Convergence processes of the EU countries must be based on the strong socio-economic growth of GDP, investment flows, new technologies and productivity. The recent trends of the EU economic development show a moderate GDP growth and require social legislation improvement, income`s level, labour market and education system development. Future social development investigations and governmental decisions need a pragmatic approach in order to create employment, reduce poverty and social disparities in the national economy.

Conclusions

Inequality is the key problem facing the EU, and it has significant impact not only on human well-being, but also on economic performance. This study has tried to show that inequalities in the EU are not a recent phenomenon, and have in general increased over recent times in most of the EU countries. As a general principle, it is important to note that many differences among people in the EU are created by society and systematically linked to life chances. The only way for the EU to meet these challenges is to not only strengthen economic growth policies through broad-based economic programme promoting marketization, but also by resolutely pushing for the expansion of social aspects of the EU model (Allmendinger & Driesch, 2014).

The future design of the European economic policy must provide a framework in which the policy instruments essential for a monetary, fiscal, industrial, sectoral, and social policy consistent with full employment and a reduction in inequality play a more prominent role. The Europe 2020 Strategy is a credible strategy of industrial policy for the future of Europe and has the merits of presenting clear actions, clear targets and detailed measurement strategy to monitor implementation. Combating inequality should be considered as an instrumental target for both sustainable and

inclusive growth. The European policymakers have a long to-do list to foster inclusive growth in Europe (Darvas & Wolff, 2016). In all the EU countries, the welfare state has come under intense scrutiny as a result of budgetary pressures and wider societal developments. The European social policy responses need national and regional contextualisation. Simultaneously, the EU needs a sense of common purpose and a common policy framework in support of national social policies, i.e. creation of a virtuous circle whereby both pan-European cohesion and national cohesion are enhanced.

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Annex

Table 1. Characteristics and trends of MPI and efficiency changes

Malmquist Productivity Index		**Technical Efficiency Change** **Technology Efficiency Change**	
> 1	Improving	> 1	Improving
= 1	Unchanging	= 1	Unchanging
< 1	Declining	< 1	Declining

Table 2. Input-output indicators in period 2010-2015 relevant to DEA modelling

Input indicators and units		
Gross domestic product (GDP)		Current prices, million euro
General government expenditure (GGE)		Total GGE, million euro
Output indicators and units (Europe 2020 Strategy indicators)		
Employment	Employment rate (ER)	Total employment, LFS, % of total population
Research and development	Gross domestic expenditure on R&D (GERD)	Euro per inhabitant; all sectors
Education	Tertiary educational attainment (TEA)	Tertiary education, age group 30-34
Poverty or social exclusion	People at risk of poverty or social exclusion (PRPSE)	Total age class, % of total population
	People living in households with very low work intensity (PLWI)	% of total population aged less than 60
	People at risk of poverty after social transfers (PRPST)	% of total population
	Severely materially deprived people (SMDP)	% of total population

Source: own elaboration based on data form Eurostat (2017).

Table 3. Annual and overall MPI results for reference period 2010–2015

DMU	**Annual MPI change**					**Overall-period MPI change**		
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Rank	Country	2010-2015
EU	1.022	1.028	1.002	1.004	0.981		EL	2.322
BE	1.038	1.075	1.023	1.008	0.992		CY	1.324
BG	0.944	0.978	0.895	0.681	0.985		CZ	1.300
CZ	1.080	1.113	1.070	1.040	0.979		BE	1.137
DK	1.002	1.005	0.998	0.995	0.990		IT	1.132
DE	1.038	1.012	0.981	1.018	0.988		NL	1.129
EE	1.206	0.877	0.875	0.923	0.976		SI	1.099
IE	0.978	1.012	1.052	0.991	0.962		AT	1.076
EL	1.323	1.352	1.102	1.075	1.046		DE	1.035
ES	0.991	0.985	1.011	1.003	0.937	.	**EU**	**1.011**

Table 3. Continued

DMU	Annual MPI change					Overall-period MPI change		
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	Rank	Country	2010-2015
FR	0.993	1.008	1.002	1.000	0.982	.	DK	0.992
IT	1.103	1.106	0.999	1.019	0.969	.	FR	0.983
CY	0.998	1.114	1.043	1.122	1.035	.	SE	0.967
LV	1.040	0.823	0.912	0.763	0.841	.	IE	0.953
LT	0.887	1.124	0.926	1.017	1.052	.	ES	0.953
LU	0.975	0.845	1.007	0.962	1.000	.	UK	0.921
HU	1.055	1.137	1.032	0.835	0.774	.	PT	0.884
MT	0.982	1.049	0.954	0.946	0.848	.	EE	0.853
NL	1.065	1.015	1.005	1.026	1.001	.	HU	0.845
AT	0.972	1.083	1.008	1.024	0.992	.	LT	0.813
PL	0.931	1.039	1.025	0.998	0.986	.	PL	0.812
PT	0.948	0.976	1.005	0.979	0.969	.	LU	0.798
RO	0.925	1.095	0.934	0.857	0.794	.	SK	0.796
SI	1.137	1.061	1.011	0.928	0.948	.	FI	0.778
SK	0.929	0.967	0.936	0.955	0.982	.	MT	0.777
FI	0.976	0.934	0.957	0.965	0.918	.	RO	0.677
SE	0.999	1.002	1.000	0.943	1.026	.	BG	0.565
UK	1.004	0.948	1.023	0.985	0.986	.	LV	0.562
Min	0.887	0.823	0.875	**0.681**	0.774	Overall Min		0.562
Max	1.323	**1.352**	1.102	1.122	1.052	Overall Max		2.322

Figure 1. Comparison of EU distances in efficiency change and frontier shift