Malmquist Index and Efficiency Score for the CEECs' Welfare Sector

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Abstract

The aim of the paper is to analyse the development of efficiency and productivity in the provision of public welfare services of the Central and Eastern European countries (CEECs) over the period 1997-2006. Efficiency scores are estimated applying data envelopment analysis (DEA), which is particularly suitable for the public services. Then, Malmquist index is calculated to separate productivity and efficiency changes. In conclusion, the CEECs are found to be relatively efficient in the provision of welfare services. Nevertheless, the efficiency scores indicate the existence of potential input level saving.

Keywords: *welfare sector, Central and Eastern European countries (CEECs), efficiency analysis*

JEL Classification: C31, N34, L44

1. Introduction

The economic debate about the efficient provision of public goods and services, in recent time, has shifted from a theoretical toward a more applied approach. Over the last decade, aging population, increased expenditure and political concern for the provision of public services has stimulated economists to develop new empirical techniques to study the long-term growth of efficiency in service sector (Raguseo and Vlček, 2008; Odeck, 2000; Bjurek and Hjalmarsson, 1995; Färe, Gross, Lindgren and Roor, 1992). Despite this increasing interest, still little research has been oriented to analyse the development of efficiency in the provision of welfare services in the Central and Eastern European countries (CEECs). This is the main aim of our paper. We focus on the public welfare services provided by public and private organizations acting in the CEECs. We

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want to analyse the efficiency change over the period 1997 – 2006 and find out whether there are any potentials for efficiency improvement. For the purpose of our study, we refer to welfare services as composed by education, health and social services as in Raguseo and Kuvikova (2008). Indeed, because of their non-rival characteristic, the previously mentioned welfare services are an interesting case of quasi-public good (Brown and Jackson, 1992; Afonso, Schuknecht and Tanzi, 2003). We find useful to employ a non-parametric frontier technique (DEA) in order to calculate efficiency scores because the selected welfare industries produce multiple outputs, there is not clear market-price information, and the behavior of providers is often uncertain (Odeck, 2000). Our technique combines measurements of efficiency and productivity as defined by Farrell (1957), Caves, Christensen and Diewert (1982) and Färe et al. (1992). Farrell decomposed the overall efficiency into technical and allocative efficiency, while Caves, Christensen and Diewert defined a productivity index as the ratio between two distance functions. Färe et al., in their article, distinguish between change in efficiency and change in technology (i.e. production frontier shift).

Our Malmquist total factor productivity (TFP) index is calculated as ratio between the overall efficiency for the same country in two different years and then decomposed to estimate separate measures of efficiency and total productivity changes. All data are borrowed from the OECD statistics. The panel data are collected on CEECs over a 10-years period from 1997 to 2006 and they refer to the welfare services (education, health and social services) provided by both public and private sectors. As input variable we choose both public and private expenditure for welfare services provision. Output variables are chosen among the most commonly used and available indicators of the aggregate welfare condition.

The paper is organized as follows. In section 2, the applied methodology is developed. Section 3 shows and interprets the results. Last section concludes and discusses the empirical findings.

2. The Model

The DEA Efficiency Measure and the Malmquist Productivity Index

Efficiency and productivity changes can be analysed in several ways (Coelli, Rao and Battese, 1998). In this paper we rely on the Malmquist index because of its several advantages helpful to our analysis (Malmquist, 1953). Since it doesn't require either particular assumptions regarding the behavior of the units of analysis or market-price information, we find particularly advantageous to employ Malmquist index because the behaviour of the providers of public services is

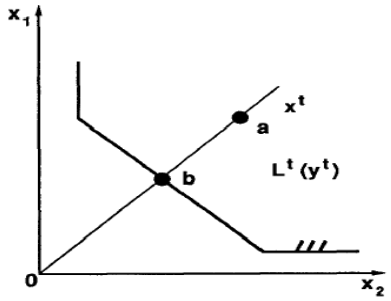
generally uncertain and public goods are often supplied at a price that is not the profit maximizing market-price.

In the case of panel data, DEA technique can be successfully applied in order to obtain estimates of Malmquist total factor productivity index (Färe et al., 1992). This index can also be decomposed into technical change and efficiency change. Our model assumes constant return to scale (CRS) technology and opts for an input-oriented approach because of the exogeneity of the multiple-output variables. We just concentrate on the case where units of analysis can control only the input variable. The reason behind this is that governments constantly search for ways to reduce expenditures.

An input-oriented distance measure can be defined as the largest proportional contraction of the input vector keeping constant the output vector (Coelli, Rao and Battese, 1998). Graph 1 shows the necessary input vector x^t reduction for unit *a* in order to be efficient like unit *b*. An efficient unit must be able to minimize the input x^t belonging to the input requirement set $L^t(y^t)$ used for producing a given level of output y^t.

G r a p h 1

The Input-oriented Distance Measure



Source: Authors' elaboration.

Farrell (1957) specifies an input-oriented efficiency measure for unit *n* observed at the period *t* as:

$$E_{n(t)} = \frac{h(y_{n(t)})}{x_{n(t)}} = \frac{x_{y,n(t)}}{x_{n(t)}} \tag{1}$$

where $x_{n(t)}$ is the input of the unit *n* at time period *t*, and $x_{y,n(t)}$ is the input, for the same unit at the same period, required to be at the frontier and produce the output vector *y*. In other words, this measure is the ratio between potential use of input at the frontier and observed use of input keeping output constant.

The Malmquist index measures the TFP change between two periods by calculating the ratio of the distances of a unit at each period from a common technology (Coelli, 1996). Thus, the associated Malmquist TFP index for the unit *n* between the periods *t* and *t + 1*, can be written as:

$$TFP_n = \frac{E_{n(t+1)}}{E_{n(t)}} \tag{2}$$

the ratio between the input-oriented efficiency measures for unit *n* observed at time *t+1* and *t* respectively.

It must also be said, that the Malmquist TFP index is dependent on the chosen reference technology. Our model employs Malmquist index based on changing reference technologies because when moving away from the base year, the reference technology may become less and less representative due to the technological innovation. Looking at graph 2, which is borrowed from Färe et al. (1992), we can illustrate the main idea behind the input-oriented Malmquist index based on changing reference technologies. In the first period, s^t, a unit is observed with the combination (x^t, y^t); however, the corresponding efficient point is in (e, y^t). The related efficiency score is equal to the ratio (d/e). In the second period, s^{t+1}, the same unit is now observed with the combination (x^{t+1}, y^{t+1}); but the corresponding efficient point is in (a, y^{t+1}). Thus, the related efficiency score is now equal to the ratio (b/a). Since, the Malmquist index is the ratio between efficiency scores for the same unit in two different periods, it can also be written as $(d/e)*(a/b)$. The graphic representation as well demonstrates that the Malmquist index is a measure of the relative change in efficiency for the same unit between two periods.

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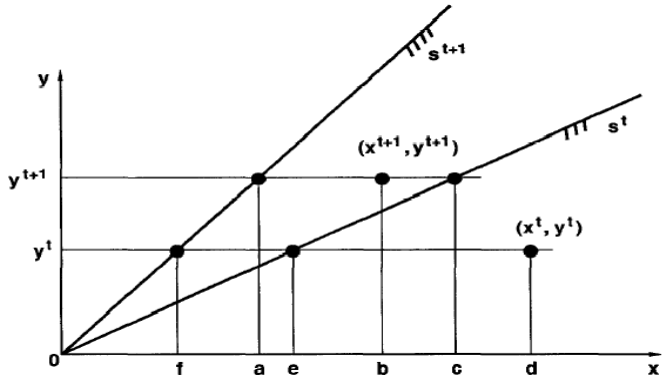
The Input-oriented Malmquist TFP Index



Source: Malmquist (1953).

Allowing our model for changing in reference technologies and replacing the efficiency measures for the individual unit *n* with the aggregate measures as in Bjurek and Hjalmarsson (1995), then the Malmquist TFP index can be defined as:

$$TFP_{(t+1)} = \frac{E_{(t+1),t+1}}{E_{(t+1),t}} \tag{3}$$

Indeed, the new index has the same interpretation for the whole industry as the previous one for individual unit. The ratio between the efficiency of the entire industry at time $t + 1$ and t respectively, using the technology of the period $t + 1$. A value higher than one indicates positive TFP change from period t to period $t+1$ while a value lower than one indicates TFP decline.

For the purpose of our analysis, we also decompose the Malmquist TFP index into efficiency change and technical change:

$$TFP_{(t+1)} = \frac{E_{t+1,t+1}}{E_{t,t}} \frac{E_{t,t+1}}{E_{t+1,t+1}} = EC \times TC \tag{4}$$

where EC stands for the efficiency change and TC represents the technology change between the periods t and $t + 1$.

Data

The panel data are collected on four CEECs (Czech Republic, Hungary, Slovakia and Poland) for the period 1997 – 2006 and they refer to the welfare services (education, health and social services) provided by both public and private sectors in these countries. All data are received from the OECD statistics. Primary data are listed in appendix. These data are then used as inputs and outputs in the efficiency analysis as shown in Chart 1.

Chart 1

Input and Output Indicators

Inputs	Outputs
1. Public welfare expenditure • Educational expenditure • Health expenditure • Social expenditure **2. Private welfare expenditure** • Educational expenditure • Health expenditure • Social expenditure	**1. Number of graduates** **2. School expectancy** **3. Life expectancy** **4. Infant mortality** **5. Gini coefficient**

Source: OECD Statistics (2008).

The main input variable is represented by the welfare expenditures classified in public and private sources as in Raguseo and Vlček (2008). We decide not to collect data on labour input not only because of their difficult availability but also because of the strict complementarity between the two inputs (expenditure and labour). Therefore, a model with one input (expenditures) and multiple outputs seems to be a simplified, yet good representation of the production technology.

Public welfare expenditure referees to the educational expenditure of central, regional, and local governments for all levels of education, plus expenditure on health care[1] incurred by public funds as state, regional and local Government bodies, plus public social expenditure[2] at all program levels.

Private welfare expenditure referees to the educational expenditure of households, and other private entities for all levels of education, plus expenditure on health care privately funded, including out-of-pocket payment, private insurance programmes and charities, plus mandatory and voluntary private social expenditure[2] at all program levels.

For the output variables, graduates refer to those who successfully complete an educational programme during the reference year of the data collection. One condition of a successful completion is that students should have enrolled in, and successfully completed, the final year of the corresponding educational programme. Students who do not complete the final year of an educational programme, but successfully complete a recognised "equivalency" examination based on knowledge learned outside of the education system, should not be counted as graduates.

School expectancy (in years) is the expected years of schooling under current conditions, excluding education for children under the age of five. It is estimated by taking the sum of enrolment rates across each single year of age starting at five. When comparing data on school expectancy, however, it must be borne in mind that neither the length of the school year nor the quality of education is necessarily the same in each country.

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[1] *Total expenditure on health* is defined as the sum of expenditure on activities that – through application of medical, paramedical, and nursing knowledge and technology – has the goals of: promoting health and preventing disease; curing illness and reducing premature mortality; caring for persons affected by chronic illness who require nursing care; caring for persons with health-related impairments, disability, and handicaps who require nursing care; providing and administering public health; providing and administering health programmes, health insurance and other funding arrangements.

[2] *Total social expenditure* is related to the provision by public (and private) institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare. Such benefits can be cash transfers, or can be the direct provision of goods and services.

Life expectancy at birth for the total population is the average number of years that a person can be expected to live, assuming that the specific mortality levels remain constant. It is estimated by the OECD Secretariat for all countries, using the unweighted average of life expectancy of men and women.

So far, we have considered output variable for which a higher value generally implies more efficiency. Of course, this is not the case of the infant mortality rate. Infant mortality, deaths per 1,000 live births, is the number of deaths of children aged under one year of age that occurred in a given year, expressed per 1,000 live births. For this indicator we calculate the inverse of the original value before running the DEA analysis.

Gini coefficient is one of the most commonly used social-welfare indexes. It measures the inequality in income distribution among a population (Cullis and Jones, 1992). We choose Gini coefficient as output variable for evaluating the efficiency of welfare services sector because a social distributive function is natural part of welfare state. Already Musgrave defined it as "the distributive role of government" (Musgrave, 1959) and Gini coefficient indeed well fits this idea (see Afonso, Schuknecht and Tanzi, 2003). Gini coefficient based on disposable income, after taxes and transfers is defined as the area between the Lorenz curve (which plots cumulative shares of the population, from the poorest to the richest, against the cumulative share of income that they receive) and the 45 line, taken as a ratio of the whole triangle. Since Gini coefficient range between 0, in the case of "perfect equality" (i.e. each share of the population gets the same share of income), and 1, in the case of "perfect inequality" (i.e. all income goes to the individual with the highest income), in order to insert it into the DEA analysis, the original values have been subtracted from one, so the new values are between 1 and 0, where 1 represents now perfect equality and values lower than one are associated with less distributive equality.

3. Empirical Results

In our analysis, we have chosen to calculate Malmquist index because of its advantage to decompose total factor productivity change in technical change (TC) and efficiency change (EC). Total factor productivity change is the amount of output growth exceeds input growth over a given time period. The technical change component is a measure of the longer-term shift of the technology production frontier. The efficiency change (or catching-up effect) reflects the short-run effect of changes in the utilization of inputs. We utilize DEAP 2.1. computer program in order to estimate the efficiency change of the CEECs' welfare services sector over a 10-years period from 1997 to 2006. For our model, the results for each individual country are presented in Appendix. In Tables 1 and 2 are summarized the average efficiency changes.

For the whole sample, we find years with regress as well as years with progress in the overall efficiency. For the first five time-observations, the efficiency change is kept almost constant. Since 2002 the average overall efficiency declined of approximately 20 points toward a minimum of 0.985 in the period 2004/2005. This has been followed by a slight progress in efficiency in the last period. Looking at the annual technical change of the production frontier, as expected, we can see a closely correlated pattern with the total factor productivity, both swinging around the efficiency change and crossing it in the year 2004. Then, in the last two periods, namely, 2004/2005 and 2005/2006, the TFP continues to be quite unchanged around 1, even though the overall efficiency did not match the technical progress in both comparisons. For the CEECs, we find, over the whole period, a production technology progress jointly with a TFP growth rate equal to a 1 percent per year. This measure can be decomposed into an annual 1.3 percent improvement in technological change (frontier shift) and 0.3 decline in efficiency per year. The decline in the efficiency (catching-up effect) is explained, notably in the last two periods, by the fact that the efficient countries (Czech Republic and Hungary) were, on average, improving at a faster rate relative to the inefficient countries (Slovakia and Poland). At this point, it is needful to say that there is not a simple and single explanation for the observed development in the efficiency level of the welfare services sector in the CEECs. It is also likely that the efficiency scores reported in our analysis have been affected by political factors.

Table 1

Malmquist Index Summary of Annual Means (in %)

Year	EC	TC	TFP
1997/1998	1.003	1.027	1.030
1998/1999	1.012	1.012	1.024
1999/2000	0.990	1.043	1.033
2000/2001	1.012	0.993	1.005
2001/2002	1.012	0.962	0.974
2002/2003	0.994	1.024	1.018
2003/2004	1.005	0.997	1.002
2004/2005	0.985	1.021	1.006
2005/2006	0.992	1.011	1.002

Source: Authors' elaboration.

Table 2

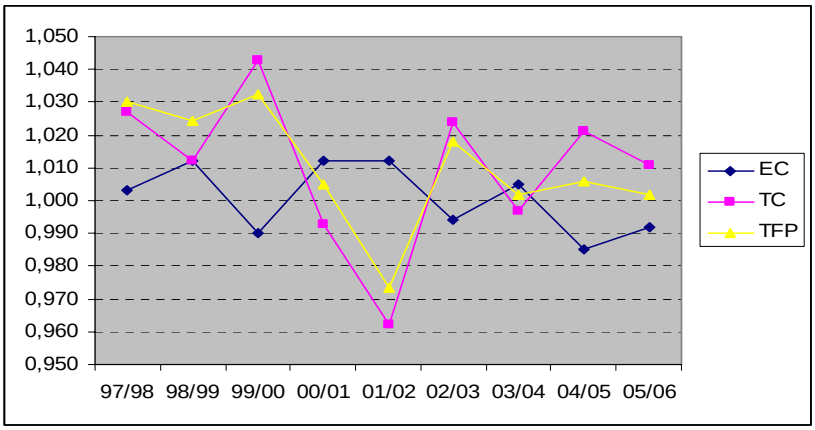
Malmquist Index Summary of Country Means (in %)

Country	EC	TC	TFP
Czech Republic	1.000	1.022	1.022
Slovakia	0.997	1.008	1.005
Poland	1.000	1.003	1.003
Hungary	1.005	1.006	1.010

Source: Authors' elaboration.

Graph 3

Malmquist Total Factor Productivity (TFP) Index and its Components Technical Change (TC) and Efficiency Change (EC)



Source: Authors' elaboration.

The results from the breakdown of Malmquist total factor productivity index jointly with the measurement of an additional technical efficiency scores also suggest that the CEECs were relatively efficient in the provision of welfare services and that their efficiency level was kept generally constant over time. Nevertheless, the efficiency scores indicate the existence of potential input level saving for producing the same outputs.

The input-oriented CRS technical efficiency scores for the years 1997 up to 2006 are shown in Table 3. The DEA scores show that, on average, the CEECs could decrease the total expenditure on education, health and social services by 10 percent without reducing the output of their welfare services sector. There are, of course, some dissimilarities among CEECs. Czech Republic, for example, is the country that has been found always efficient, while Poland has seen further worsening its condition in the provision of welfare services over the time. Moreover, as also showed in graph 4, Slovakia has an interesting pattern alternating an initial decrease followed by an increase in the technical efficiency scores.

Table 3

Input-oriented Constant Returns to Scale (CRS) Technical Efficiency Scores, 1997 – 2006 (in %)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
PL	0.89	0.87	0.87	0.84	0.80	0.8	0.76	0.75	0.76	0.75
CZ	1	1	1	1	1	1	1	1	1	1
HU	1	1	1	0.97	0.96	0.88	0.92	0.94	0.89	0.86
SK	0.90	0.93	0.91	0.9	0.80	0.76	0.78	0.82	0.97	0.77

Source: Authors' elaboration.

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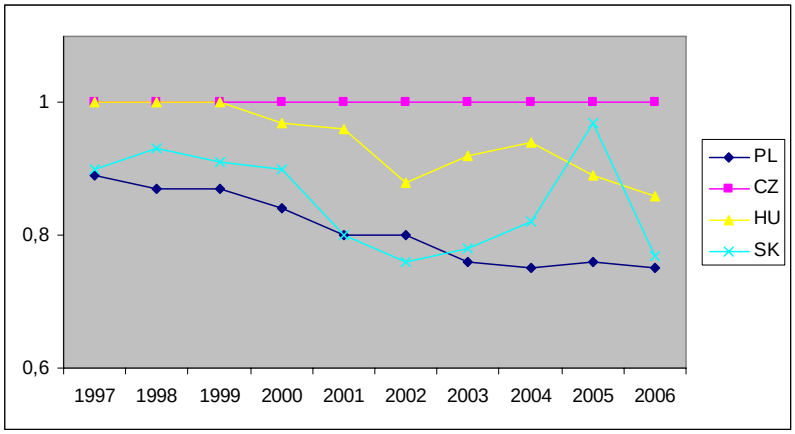
Input-oriented CRS Technical Efficiency Scores, 1997 – 2006



Source: Authors' elaboration.

4. Conclusion and Ways of Improving Efficiency

In our study we used Malmquist TFP index to calculate the efficiency and productivity changes of the CEECs in the provision of welfare services. The analysis suggests that the CEECs were relatively efficient in the provision of welfare services and that their efficiency level was kept generally constant over time. So that the room for maneuver to improve efficiency appears to be quite limited, also given the future challenges that this welfare state model is going to face. Nevertheless, the efficiency scores indicate the existence of potential input level saving. Even thought, the result of this analysis might take into consideration the differences existing among each single country, it can still be useful for policy advices to explain whether inefficiency of a country may be due to divergence in a common welfare policy between the CEECs, or whether other factors play an important role in generating inefficiency in the way CEECs provide public welfare services. The analysis also showed that a country could have remarkable efficiency improvement because it is undertaking reforms in order to remove inefficiency, but efficiency itself may also be influenced by other exogenous causes. At this point, it is also important to note that the efficiency scores reported in the analysis are likely to be affected by political factors (Nemec, 2008). Indeed, before the 2004, year in which Slovakia became member of the European Union (EU), most economic indicators have shown significant improvement and its efficiency growth rate was the highest among all CEECs due to the important reform undertook in the years preceding the EU membership. With the political elections in 2006, the year with the sharpest fall in the overall efficiency, the liberal

government was replaced by a left-wing and populist coalition. With the new government in power was immediately visible a massive return to a state centralized provision of public services which has had a clear negative impact on the overall efficiency change. The other CEECs, even if joined the EU jointly with Slovakia, resulted less influenced by their participation to the EU, probably due to either their relatively large economic size on the international scenario or the less important reform needed for acquiring the EU membership. Over time, Poland and Hungary seem to follow a quite similar downward pattern in their efficiency level. Of course, a part from such similarity in the efficiency score and graphic representation, there are also some important dissimilarities in the structural way CEECs efficiently provide welfare services. As suggestion for further research, the task might involve finding explanations for such divergence in efficiency, so that the less efficient countries can learn from the best performers or, at least, they can better understand the sources of their own inefficiency.

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A p p e n d i x 1

Breakdown of Malmquist Total Factor Productivity (TFP) Index in Efficiency Change (EC) and Technical Change (TC), 1997 – 2006

Year																			
1997/1998				1998/1999				1999/2000				2000/2001				2001/2002			
country	effch	techch	tfpch	country	effch	techch	tfpch	country	effch	techch	tfpch	country	effch	techch	tfpch	country	effch	techch	tfpch
PL	0.976	1.013	0.989	PL	0.999	1.016	1.015	PL	0.968	1.056	1.022	PL	0.945	1.046	0.990	PL	0.999	0.998	0.997
CZ	1.000	0.998	0.998	CZ	1.000	1.091	1.091	CZ	1.000	1.023	1.023	CZ	1.000	1.103	1.103	CZ	1.000	1.013	1.013
Hu	1.000	1.009	1.009	Hu	1.000	1.034	1.034	Hu	0.971	1.056	1.026	Hu	0.997	0.982	0.979	Hu	0.916	0.981	0.899
SK	1.030	1.016	1.046	SK	0.982	1.074	1.054	SK	0.982	1.050	1.031	SK	0.891	1.086	0.968	SK	0.992	1.007	0.999
mean	1.001	1.009	1.010	mean	0.995	1.053	1.048	mean	0.980	1.046	1.025	mean	0.957	1.053	1.008	mean	0.976	1.000	0.976

Year															
2002/2003				2003/2004				2004/2005				2005/2006			
country	effch	techch	tfpch	country	effch	techch	tfpch	country	effch	techch	tfpch	country	effch	techch	tfpch
PL	0.955	1.032	0.986	PL	0.983	0.998	0.982	PL	1.021	0.990	1.012	PL	0.984	0.995	0.979
CZ	1.000	0.995	0.995	CZ	1.000	0.976	0.976	CZ	1.000	1.038	1.038	CZ	1.000	1.042	1.042
Hu	1.047	0.980	1.026	Hu	1.021	1.000	1.021	Hu	0.939	1.030	0.967	Hu	0.968	1.017	0.984
SK	0.983	1.038	1.020	SK	1.048	0.954	1.000	SK	1.185	1.056	1.252	SK	0.796	1.066	0.848
mean	0.996	1.011	1.007	mean	1.013	0.982	0.995	mean	1.032	1.028	1.062	mean	0.933	1.030	0.961

Estimates are processed by DEAP 2.1. computer program.

Legend: effch – efficiency change; techch – technical change; tfpch – total factor productivity change.

Source: Authors' elaboration.

A p p e n d i x 2

Primary Data

Czech Republic

INPUTS	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Public WELFARE expenditure (1 + 2 + 3)	27.904	27.911	28.195	28.936	29.784	31.100	31.882	31.803	32.134	31.950
1. Public expenditure on education	3.767	3.705	3.912	3.968	4.292	4.662	4.910	4.969	4.829	4.820
2. Public expenditure on health	6.050	5.966	5.973	5.870	6.017	6.426	6.645	6.422	6.291	6.000
3. Public social expenditure	18.086	18.240	18.310	19.098	19.475	20.012	20.327	20.412	21.014	21.130
Private WELFARE expenditure (1 + 2 + 3)	1.374	1.422	1.235	1.195	1.342	0.968	1.702	2.061	1.871	2.021
1. Private expenditure on education	0.724	0.707	0.527	0.419	0.421	0.000	0.597	0.990	0.737	0.860
2. Private expenditure on health	0.650	0.634	0.627	0.631	0.683	0.675	0.755	0.778	0.809	0.800
3. Private social expenditure	0.000	0.082	0.081	0.146	0.237	0.293	0.350	0.294	0.325	0.361
OUTPUTS										
Graduates	139 286	86 655	70 115	119 968	113 909	118 920	117 489	119 339	118 152	118 479
School expectancy	15.1	15.1	15.6	16.0	16.2	16.6	17.0	17.2	17.4	17.5
Life expectancy	74.1	74.7	74.9	75.1	75.4	75.4	75.3	75.9	76.1	76.7
Infant mortality	5.9	5.2	4.6	4.1	4.0	4.1	3.9	3.7	3.4	3.3
Gini coefficient	0.268	0.268	0.270	0.275	0.278	0.271	0.269	0.268	0.266	0.268

Hungary

INPUTS	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Public WELFARE expenditure (1 + 2 + 3)	27.972	28.702	29.267	30.261	31.543	33.264	33.873	33.582	35.143	35.716
1. Public expenditure on education	3.346	3.729	4.133	4.795	5.428	6.288	7.249	7.018	7.215	7.140
2. Public expenditure on health	5.528	5.311	5.213	4.878	4.968	5.335	6.040	5.847	6.027	5.900
3. Public social expenditure	19.098	19.662	19.921	20.588	21.147	21.641	20.585	20.718	21.902	22.676
Private WELFARE expenditure (1 + 2 + 3)	1.832	2.585	2.646	2.646	2.969	2.943	3.043	3.046	3.148	3.159
1. Private expenditure on education	0.553	0.789	0.652	0.617	0.730	0.671	0.670	0.671	0.645	0.710
2. Private expenditure on health	1.272	1.789	1.987	2.022	2.232	2.265	2.360	2.353	2.474	2.400
3. Private social expenditure	0.007	0.007	0.007	0.007	0.007	0.007	0.013	0.022	0.030	0.049
OUTPUTS										
Graduates	138 637	131 891	133 304	111 662	106 283	111 905	119 024	113 024	114 769	114 833
School expectancy	15.6	16	16.4	16.4	16.8	17.2	17.6	17.8	17.9	18
Life expectancy	70.8	70.7	70.8	71.7	72.3	72.6	72.6	72.8	72.8	73.2
Infant mortality	9.9	9.7	8.4	9.2	8.1	7.2	7.3	6.6	6.2	5.7
Gini coefficient	0.291	0.290	0.291	0.293	0.298	0.295	0.291	0.286	0.281	0.288

Poland

INPUTS	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Public WELFARE expenditure (1 + 2 + 3)	32.084	31.380	31.794	31.380	31.369	32.445	31.449	32.640	33.539	33.438
1. Public expenditure on education	4.270	4.392	4.464	4.830	5.613	5.726	5.960	5.976	6.203	6.210
2. Public expenditure on health	4.032	3.859	4.053	3.850	4.242	4.486	4.334	4.253	4.297	4.300
3. Public social expenditure	23.782	23.129	23.277	22.700	21.514	22.234	21.155	22.411	23.040	22.928
Private WELFARE expenditure (1 + 2 + 3)	1.670	2.185	1.813	1.795	2.362	2.836	2.885	2.924	2.820	2.907
1. Private expenditure on education	0.096	0.133	0.143	0.116	0.673	0.987	0.983	0.942	0.886	0.970
2. Private expenditure on health	1.568	2.041	1.647	1.650	1.658	1.814	1.866	1.947	1.903	1.900
3. Private social expenditure	0.006	0.011	0.022	0.029	0.031	0.035	0.036	0.035	0.031	0.037
OUTPUTS										
Graduates	618 265	637 997	647 383	665 301	663 156	646 080	603 817	644 014	596 609	598 170
School expectancy	15.6	16	16.3	16.7	17	17.2	17	17.8	17.9	18
Life expectancy	72.8	73.1	72.7	73.9	74.3	74.6	74.7	75	75.1	75.3
Infant mortality	10.2	9.5	8.9	8.1	7.7	7.5	7	6.8	6.4	6
Gini coefficient	0.372	0.374	0.377	0.373	0.372	0.372	0.381	0.379	0.375	0.372

Slovak Republic

INPUTS	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Public WELFARE expenditure (1 + 2 + 3)	28.587	27.777	27.547	27.016	27.328	28.468	28.277	28.274	28.049	27.397
1. Public expenditure on education	3.640	3.710	3.784	3.916	4.193	4.719	4.992	5.136	4.855	4.980
2. Public expenditure on health	5.227	5.130	5.107	4.917	4.912	4.990	5.210	5.314	5.282	5.100
3. Public social expenditure	19.720	18.937	18.655	18.183	18.223	18.759	18.075	17.824	17.912	17.317
Private WELFARE expenditure (1 + 2 + 3)	1.173	1.443	1.566	1.793	2.070	3.225	3.403	4.937	4.472	5.568
1. Private expenditure on education	0.220	0.310	0.342	0.478	0.479	1.554	1.867	2.191	1.727	1.890
2. Private expenditure on health	0.473	0.470	0.593	0.583	0.589	0.610	0.690	1.886	1.818	2.400
3. Private social expenditure	0.480	0.663	0.631	0.732	1.003	1.060	0.846	0.859	0.927	1.278
OUTPUTS										
Graduates	88 611	90 738	86 516	75 629	65 142	59 130	79 115	81 525	80 210	81 356
School expectancy	14.9	15.1	15.3	15.7	16.0	16.2	16.4	16.7	17.1	17.4
Life expectancy	72.8	72.7	73.1	73.3	73.6	73.8	73.9	74.1	74	74.3
Infant mortality	8.7	8.8	8.3	8.6	6.2	7.6	7.9	6.8	7.2	6.6
Gini coefficient	0.268	0.263	0.263	0.268	0.273	0.270	0.268	0.269	0.264	0.268

Source: OECD Statistics (2008).