



# Welfare in Slovakia and the EU – an alternative to GDP per capita<sup>1</sup>

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GDP per capita is used as the basic measure of economic development and prosperity across the world. However, it is a limited measure of living standards, focussed on capturing changes in economic output per person and neglecting many things central to quality of life. Several alternative approaches to assessing quality of life have been proposed such as the OECD Better Life Index (2017), the UN Human Development Index (HDI), or Gross National Happiness. One notable contribution is the consumption equivalent welfare measure introduced by Jones and Klenow (2016). Our results from using this measure suggest that the quality of life in most EU countries is higher than suggested by GDP per capita relative to the U.S. The primary reasons for this are that, particularly compared to the U.S., countries in the EU tend to have lower income inequality and longer life expectancy.

Implementing this measure for Slovakia, our results indicate that relative welfare is approximately 10 percentage points higher in Slovakia than GDP per capita would suggest. In the medium run, consumption equivalent welfare in Slovakia grew faster than income from pre-crisis levels. Improvements in the quality of living in Slovakia over time have been driven by an increase in life expectancy and consumption, as well as consistently low levels of income inequality. Nevertheless, living standards in Slovakia are still low in comparison to advanced EU economies and the U.S. Lower life expectancy, which reflects the quality of health of the population, accounts for most of the difference in welfare in comparison to these advanced economies.

## **DRAWBACKS OF MEASURING ECONOMIC WELFARE THROUGH GDP AND THE AVAILABLE ALTERNATIVES**

Using GDP per capita as a measure of the standard of living has many difficulties; for example it does not account for important factors which influence the quality of life, such as the amount of leisure the population enjoys, the general health of the population, or the extent of income inequality in the country. The academic literature provides a number of alternative measures which suggest different factors to be included. Nordhaus and Tobin (1972), for example, suggest extending gross national product (GNP) to incorporate data on consumption, leisure, and the value of household work. The widely cited Human Development Index (HDI), introduced by the United Nations Development Programme, extends the standard GDP per capita measure to include data on life expect-

tancy and the level of education. The OECD Better Life Index (2017) incorporates ten areas: housing, income, employment, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance. Fleurbaey (2009) provides a comprehensive overview of the key measures which try to capture the quality of life; grouping these into four categories: corrected GDP, Gross National Happiness, the capability approach (used to account for skills and potential in areas which are hard to aggregate), and synthetic indicators, which are similar to the HDI in nature.

The approach adopted by Jones and Klenow (2016) falls under the category of corrected GDP. They have created a complex measure of welfare ( $\lambda$ ) which is consistent with the microeconomic theory of utility maximisation and it is measured as a consumption equivalent. Their model aims to answer the question: What proportion of consumption in the U.S., given the U.S. values of leisure, mortality, and inequality, would deliver the same expected flow utility to an individual living in a different country?

The model introduced by Jones and Klenow (2016) is unique for its use of the economic concept of expected utility and its applicability for a wide range of countries. It enables us to calculate an alternative measure of economic performance, accounting for the relative position of a given country in terms of life expectancy, consumption, leisure, and income inequality. For simplicity, the measure will be referred to as “welfare” throughout the rest of the paper.

In their study, Jones and Klenow (2016) focus on the world’s most prominent economies. They try to explain the differences in welfare between developed and developing countries and conclude that developing countries are worse off than comparing GDP per capita indicates. This can be explained by significantly lower life expectancy, high inequality, and low consumption.

Comparing the Jones and Klenow (2016) measure and GDP per capita, it seems that GDP per capita is a good indicator of living standards for a wide range of countries (correlation coefficient of 0.98). However, the authors note that this understates the significant variability in welfare amongst the chosen countries (median deviation of 35%).

The authors also examine the change in their measure from 1980 to 2007. They find that while GDP per capita grew by 2.1% on average, welfare grew by 3.1%. They explain this progress as the

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## Box 1

## Welfare according to Jones and Klenow (2016)

Jones and Klenow's (2016) model is based on the following equation:

$$U_i(\lambda) = E_i \sum_{a=1}^{100} \beta^a u(\lambda C_a, l_a) S_i(a)$$

Where  $C$  denotes an individual's annual consumption,  $l$  denotes leisure plus time spent in home production,  $S(a)$  is the probability an individual survives to age  $a$ , and  $U_i(\lambda)$  is the expected lifetime utility in country  $i$  gained from multiplying consumption by a factor of  $\lambda$  at each age.

$$U_{US}(\lambda_i) = U_i$$

Behind the Rawlsian veil of ignorance, the welfare measure indicates by what factor ( $\lambda$ ) we need to adjust an individual's consumption to make him indifferent between living his life in the U.S. and in some other country  $i$ .

$$u(C, l) = \bar{u} + \log C + v(l)$$

The main assumptions of the model are: consumption in each country is lognormally distributed across people at a point in time, independent of age and mortality, with an arithmetic mean  $c_i$  and a variance of logarithmic consumption of  $\sigma_i^2$ . Then  $E[\log C] = \log c_i - \sigma_i^2/2$ . The model also assumes that leisure is constant across ages and known with certainty. Under these assumptions, expected lifetime utility is given by:

$$U_i = \left[ \sum_a \beta^a S_i(a) \right] \cdot \left( \bar{u} + \log c_i + v(l_i) - \frac{1}{2} \cdot \sigma_i^2 \right) + g \cdot \sum_a \beta^a S_i(a) a$$

Assuming  $\beta = 1$  and  $g = 0$  the survival rate equals life expectancy at birth ( $e \equiv \sum_a \beta^a S_i(a)$ ) and the equation becomes:

$$U_i = e_i \left( \bar{u} + \log c_i + v(l_i) - \frac{1}{2} \cdot \sigma_i^2 \right)$$

Lifetime utility from consumption is given by the product of life expectancy and expected flow utility from each year of life. In this case, the consumption equivalent welfare in equation (2) becomes:

$$\begin{aligned} \log \lambda_i &= \frac{e_i - e_{us}}{e_{us}} \left( \bar{u} + \log c_i + v(l_i) - \frac{1}{2} \cdot \sigma_i^2 \right) && \text{Life expectancy} \\ &+ \log c_i - \log c_{us} && \text{Consumption} \quad (6) \\ &+ v(l_i) - v(l_{us}) && \text{Leisure} \\ &+ \frac{1}{2} (\sigma_i^2 - \sigma_{us}^2) && \text{Inequality} \end{aligned}$$

This expression provides for an additive decomposition of the forces which determine welfare in country  $i$  relative to the U.S. The first term captures the effect of differences in life expectancy (the percentage difference in life expectancy weighted by how much a year of life is worth – the flow utility in country  $i$ ). The remaining terms denote the effect of differences in consumption, leisure, and inequality.

To calculate the growth rate of  $\lambda$  the following equation was applied:

$$g_i = -\frac{1}{T} \log \lambda_i. \quad (7)$$

The growth rate can be decomposed into terms reflecting changes in life expectancy, consumption, leisure, and inequality, as in equation (6).

For calibrating the utility function used in the analysis in this paper, the parameters used by Jones and Klenow (2016) were applied.



result of increases in life expectancy across the whole world (apart from sub-Saharan Africa). They also find that Western European economies have welfare at 85% of U.S. levels, whilst on average GDP per capita only reaches 67% of the U.S. level. Higher life expectancy, more leisure, and lower income inequality are found to be key drivers of these differences.

In this study we have updated the values of welfare based on new data and focused on developments during and after the Great Recession. We examine developments in EU countries including Slovakia in greater detail, and compare the relative position of each EU country to the U.S. for comparability with the original study. Our results are based on the methodology explained in Box 1.<sup>2</sup>

### WELFARE ACROSS THE EU

In 2007 the quality of life in EU countries was higher than GDP initially indicates. This was

driven by higher life expectancy, more leisure time and lower income inequality relative to the U.S. New EU member states and the V4<sup>3</sup> countries exhibited comparable levels of consumption equivalent welfare and GDP. The only exceptions were Estonia, Lithuania, Romania, and Bulgaria where short life expectancy pulled the indicator down.

Slovakia reported GDP per capita at 43.6% of the US level, however according to the Jones and Klenow (2016) measure the quality of life was higher than GDP indicates mainly due to low income inequality. As displayed in Table 1, low inequality increased Slovak welfare by 20.3%. On the other hand, lower life expectancy (74.2 years) reduced welfare by 18% and an average of 716 hours worked per annum ensured more leisure time for Slovak people.<sup>4</sup> A slightly positive effect could also be observed by the marginally higher consumption share of GDP vis-à-vis the U.S.

- 2 Jones and Klenow (2016) use an algorithm to select the most appropriate measure for consumption inequality in each country. When such a measure of consumption inequality is not available for a given country, they replace it with a measure of income inequality. This affects the results for the EU countries they analyse, since a measure of consumption inequality is used for the U.S. and a methodologically different measure of income inequality is used for EU countries. Here we reduce the range of countries to EU member states and the U.S., and therefore we can use consistent data for income inequality for all countries.
- 3 V4 countries constitute Slovakia, Czech Republic, Poland, and Hungary.
- 4 For calculating  $\lambda$ , the number of hours worked per person was used, rather than hours worked per person in employment.

Table 1 Welfare and income levels and a decomposition of the effect of individual variables (2007)

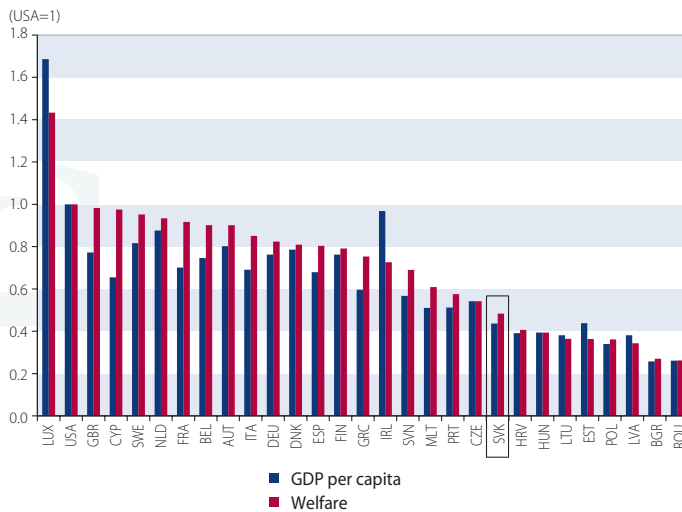
Country	Welfare ( $\lambda$ )	GDP per capita	Log ratio	Decomposition			
				Life expectancy	C/Y	Leisure	Inequality
Luxemburg	143.3	168.6	-0.163	0.081	-0.294	-0.090	0.140
USA	100	100	0.000	0.000	0.000	0.000	0.000
U.K.	98.3	77.2	0.242	0.078	0.055	0.025	0.084
Cyprus	97.5	65.5	0.398	0.047	0.166	0.042	0.142
Sweden	95.2	81.6	0.155	0.151	-0.206	0.026	0.184
Netherlands	93.4	87.6	0.064	0.110	-0.231	0.035	0.150
France	91.7	70.1	0.269	0.161	-0.090	0.073	0.125
Belgium	90.1	74.6	0.188	0.093	-0.129	0.066	0.158
Austria	90.1	80.2	0.117	0.114	-0.152	0.007	0.148
Italy	85.1	69.1	0.209	0.173	-0.117	0.034	0.118
Germany	82.4	76.2	0.078	0.079	-0.184	0.056	0.128
Denmark	80.9	78.6	0.030	0.011	-0.201	0.036	0.184
Spain	80.4	67.9	0.169	0.144	-0.109	0.024	0.110
Finland	79.1	76.2	0.037	0.065	-0.220	0.021	0.171
Greece	75.3	59.6	0.234	0.073	0.088	-0.028	0.101
Ireland	72.6	96.8	-0.288	0.082	-0.489	-0.012	0.133
Slovenia	69	56.7	0.197	0.028	-0.077	0.040	0.206
Malta	60.9	51	0.177	0.085	0.082	0.010	0.000
Portugal	57.5	51.2	0.116	0.016	0.039	-0.012	0.074
Czech Republic	54.2	54.2	-0.001	-0.060	-0.131	-0.002	0.192
Slovakia	48.3	43.6	0.103	-0.180	0.029	0.051	0.203
Croatia	40.7	39.1	0.041	-0.101	-0.033	0.062	0.112
Hungary	39.4	39.4	-0.001	-0.220	0.029	0.015	0.174
Lithuania	36.4	38.1	-0.046	-0.324	0.143	0.034	0.101
Estonia	36.3	43.8	-0.188	-0.230	-0.049	-0.041	0.132
Poland	36.1	34	0.061	-0.118	0.046	0.019	0.115
Latvia	34.3	38.1	-0.105	-0.313	0.130	-0.005	0.083
Bulgaria	27	25.8	0.045	-0.216	0.079	0.010	0.172
Romania	26.2	26.1	0.003	-0.218	0.044	0.026	0.152

Source: World Bank. Penn World Tables 9.0, author calculations.

Note: The table shows consumption equivalent welfare, income, and a decomposition of individual variables based on equation (6).

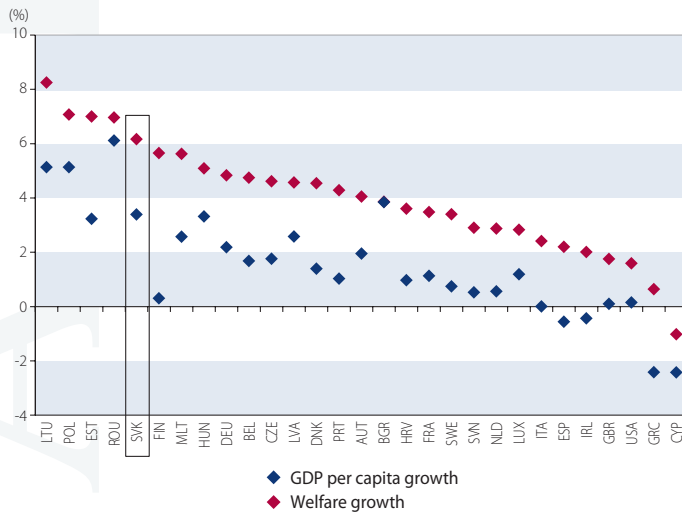


Figure 1 Income and welfare in the EU (2007)



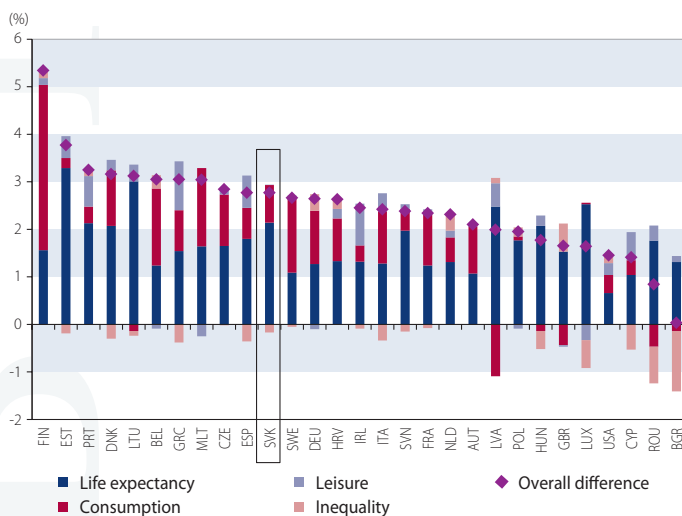
Source: World Bank, Penn World Tables 9.0, author calculations.

Figure 2 Average welfare and income growth in the EU (2007-2014)



Source: World Bank, Penn World Tables 9.0, author calculations.

Figure 3 Decomposition of the difference between welfare and income growth in the EU (2007-2014)



Source: World Bank, Penn World Tables 9.0, author calculations.

Figure 2 displays the growth rate in welfare and income levels between 2007 and 2014. The rate of growth in the EU measured by standard means is undervalued by 2.5% on average. The Slovak economy grew by 3.4% on average according to GDP per capita. The alternative measure revises the growth rate upwards to 6.2%. The difference between income growth and welfare growth was 2.8%. A weak post-crisis recovery is evident in the data for Greece. However, despite a 2.4% contraction in income, welfare grew by 0.6%. Cyprus was the only EU country to experience a contraction in both welfare and income. Growth in Cyprus was mainly hindered by the increase in inequality resulting from the Great Recession (2007-2008) and the Cypriot financial crisis (2012-2013).

Our decomposition of the growth rate to isolate the effect of the individual variables indicates that convergence in EU countries was driven mainly by higher life expectancy relative to the U.S. Figure 3 shows that increases in life expectancy throughout the period contributed 2% to higher welfare growth. The increase in the consumption share of GDP contributed circa 0.8%. Concurrently, the amount of leisure time enjoyed by the Slovak people changed only marginally. A slight increase in relative income inequality in Slovakia could be observed between 2008 and 2014, which contracted the growth rate in welfare by approximately 0.2%.

In 2014 Luxembourg achieved the highest level of welfare in the EU. Welfare in Luxembourg was propelled by the highest life expectancy amongst member states and low income inequality relative to the U.S. Life in Luxembourg has a higher quality despite low individual consumption and the highest amount of hours worked across the EU (see data in Table 2).<sup>5</sup>

The most significant shift in welfare between 2007 and 2014 was in Finland. Welfare increased from 79% of the U.S. level in 2007 to 107% in 2014. This was driven mainly by an increase in life expectancy to 81.2 years. In the same period, the quality of life in Slovakia grew from 49% to 64% of the U.S. level. The quality of life in Slovakia and the Czech Republic converged, however, the Czechs still retain the highest level from the V4 countries and the fourth highest amongst new member states (after Malta, Cyprus, and Slovenia.)

Even though all EU countries, except for Luxembourg, trail behind the U.S. in terms of levels of income, ten EU countries (Luxembourg, Belgium, Sweden, Austria, France, Finland, Germany, Netherlands, UK, and Denmark) overtook the U.S. in 2014 in terms of welfare. The convergence of welfare amongst Western and Northern member states was driven mainly by improvements in life expectancy and reductions in income inequality relative to the U.S. The inhabitants of these countries (except for Luxembourg and Austria) have lower individual consumption than the U.S., but at the same time more leisure time.



### WELFARE DECOMPOSITION AND LONG-TERM DEVELOPMENTS

Figure 5 shows the additive decomposition of the effect of individual variables on the ratio of the welfare measure and income.<sup>6</sup> In comparison to the U.S. and Central and Eastern Europe, Western EU member states have a higher quality of healthcare reflected in their life expectancy. Concurrently, the low consumption share of GDP reduces their welfare.

In 2014 Slovakia achieved 54.7% of U.S. income and 64.3% of U.S. welfare levels. On a comparative basis, stronger consumption relative to GDP per capita contributed 5.8%, a higher amount of leisure contributed 3.4%, and lower income inequality 18%. Lower life expectancy (74.8 years) reduced Slovak welfare by 11%. Slovakia is among the countries in the EU with the lowest average life expectancy. Only Lithuania, Hungary, Latvia, Romania, and Bulgaria have a lower life expectancy.

Long-term developments indicate a gradual divergence between the quality of life and GDP per capita in Slovakia. At the time of the establishment of an independent Slovak Republic per capita income was only at 34% of the U.S. level. Welfare was approximately one percentage point higher. In 1992 the difference between the quality of life in Slovakia and the U.S. was also marked by large differences in life expectancy. The gap in life expectancy has narrowed over time and growth in personal consumption could be observed. As shown in Figure 7, the key area for improvement in the quality of life is in the short life expectancy in Slovakia, which reflects the poor quality of health and social care. For consumption and leisure, the potential for further growth is perhaps limited.

At the same time, it is important to follow developments in underlying variables of welfare in the U.S., as it forms the benchmark for the whole measure. The IMF (2017) reported that despite the current high level of GDP per capita, economic growth in the U.S. has been too low and unequal. This has been driven by weak productivity growth, an increase in skills premia<sup>7</sup> and an ageing population. Nevertheless, the income Gini coefficient in the U.S. decreased from 41.75 in 2007 to 41.06 in 2014. This resulted from a sharp decrease in capital gains for the top 1 percent of high earners during the crisis (Rose, 2015). Moreover, automatic stabilizers and social reforms, which increased transfers (unemployment benefits and food stamps) for those on low-incomes also played an important role in reducing inequality slightly. However, on a relative basis income inequality in the U.S. is still very high in comparison to the EU average.

### WELFARE VERSUS INCOME ACROSS THE EU

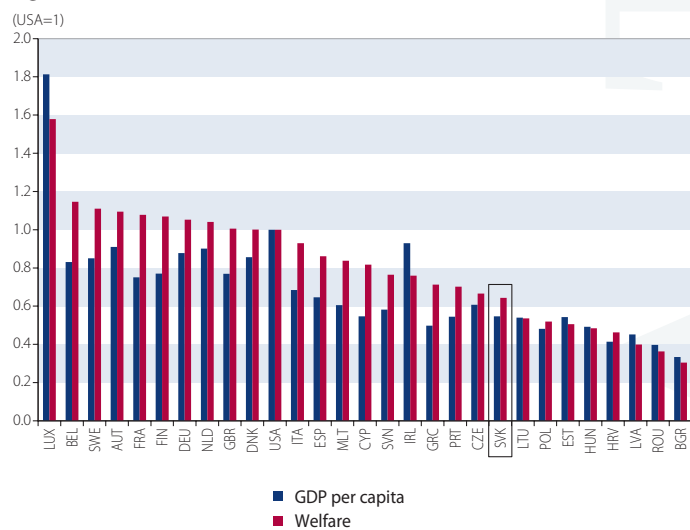
The correlation coefficient of income (GDP per capita) and welfare was 0.88 in 2014. Our results confirm the findings of Jones and Klenow (2016) that income is a good proxy for welfare across most countries<sup>8</sup> due to the high correlation of consumption and income levels.

The rates of growth of both indicators also exhibited a high correlation of 0.89 in the period from 2007 to 2014. The only exception which diverges from this relationship is Finland, which experienced a slow revival of post-crisis economic growth (only 0.3% per annum). This can be explained by the weakening of the business environment (especially IT and forestry), a closed economy (a low rate of fixed and direct foreign investment), weak productivity growth and the accumulation of public debt (Mäki-Fränki and Vilmi, 2016). Welfare growth in the country was propelled by a strong consumption share of GDP and the increase in life expectancy.

The data in Figure 10 indicates that between 2007 and 2014 beta convergence<sup>9</sup> in welfare prevailed across the EU. Countries with a lower initial level of welfare achieved higher average welfare growth. As displayed in Figure 2, on average, growth rates of welfare exceeded growth rates of

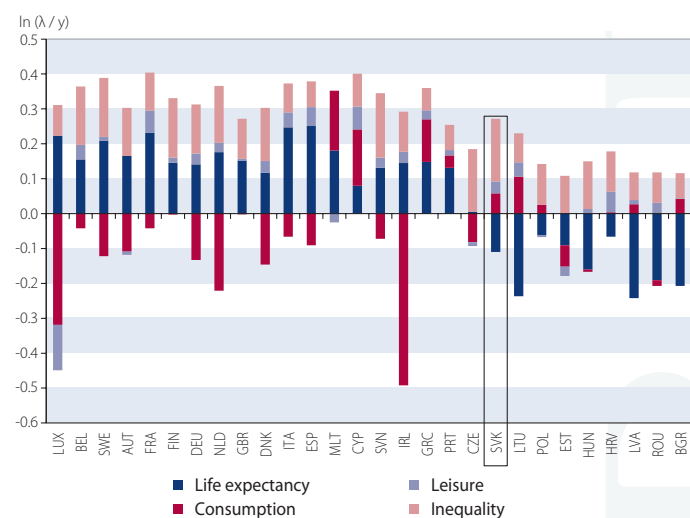
- 5 As in the case of Luxemburg, the difference between welfare and income in Ireland is given by the specific structure of its GDP, which is marked by the low share of domestic consumption. Relative welfare corrects the overstated income measure in these countries, which is given by a large proportion of foreign capital motivated by a low corporate tax rate and a high amount of foreign labour, which is not a part of the domestic population.
- 6 The decomposition shows the natural logarithm of the ratio of  $\lambda$ , and GDP per capita (U.S.=1) and is based on equation (6). The logarithmic ratio is the sum of four variables: the effect of life expectancy, consumption share of GDP, leisure, and income inequality, which together determine  $\lambda$ .
- 7 In most countries, the skill premium is measured as the difference in average income between those with a university education and those with a high school education.

Figure 4 Income and welfare in the EU (2014)



Source: World Bank, Penn World Tables 9.0, author calculations.

Figure 5 Decomposition of the difference between welfare and income (2014)

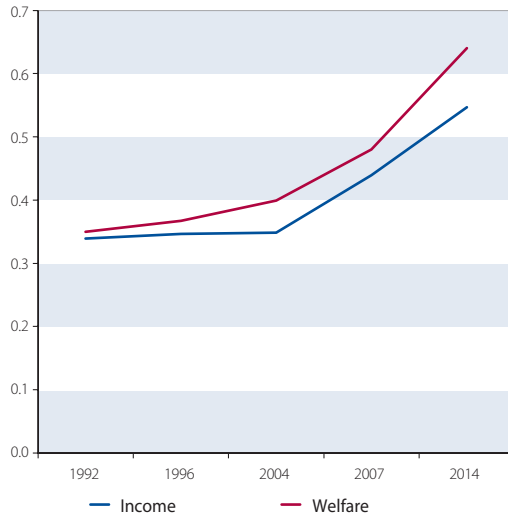


Source: World Bank, Penn World Tables 9.0, author calculations.



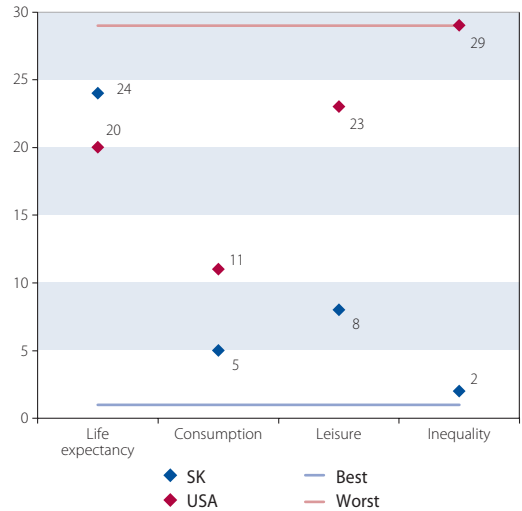
- 8 The coefficient of determination indicates that 77% of the variability in welfare can be explained by a simple regression model for EU member states.
- 9 Beta convergence occurs where poor economies exhibit higher rates of growth than rich economies.

**Figure 6 Long term development in welfare and income in Slovakia (USA=1)**



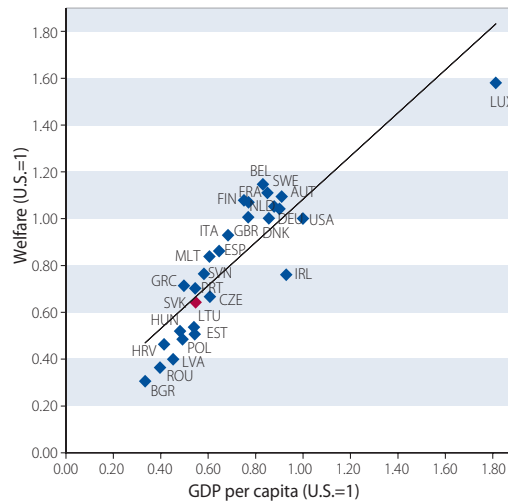
Source: World Bank, PWT Tables 9.0, author calculations.

**Figure 7 Position of SK in input indicators of welfare (order of EU countries and the U.S., 2014)**



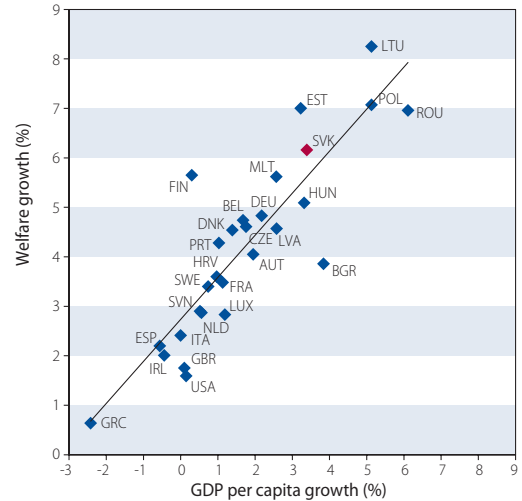
Source: World Bank, PWT 9.0, author calculations.

**Figure 8 Correlation of welfare and income in the EU (2014)**



Source: World Bank, Penn World Tables 9.0, author calculations.

**Figure 9 Correlation of welfare and income growth in the EU (2007-2014)**



Source: World Bank, Penn World Tables 9.0, author calculations.

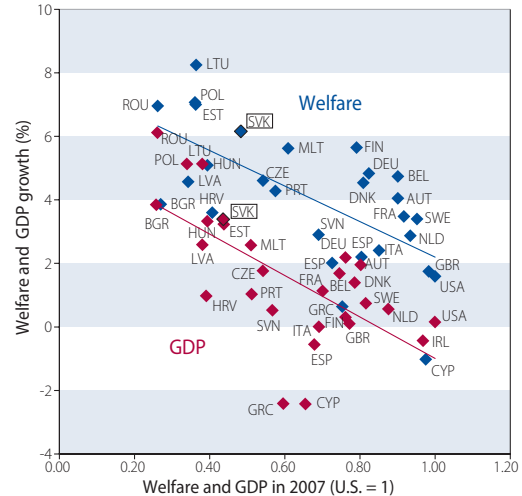
income. However, the convergence rates for the respective measures were similar. The income convergence rate has only marginally exceeded the rate of convergence in welfare.

### CONCLUSION

It has been widely recognised that GDP per capita is not necessarily a useful measure of quality of life and the prosperity of a country. This paper has explored one potential alternative approach to comparing quality of life for a group of European countries using the approach outlined in Jones and Klenow (2016).

Doing this, we showed that between 2007 and 2014 – for most EU countries – improvements in this alternative measure of economic wellbeing were greater than suggested using a GDP per capita measure. The key factors driving this improvement were increases in life expectancy and reductions in income inequality.

**Figure 10 Beta convergence of EU member states in welfare**



Source: World Bank, Penn World Tables 9.0, author calculations.



The decisive factor in Slovakia, which exhibits one of the lowest income inequalities in the EU, seems to be a gradual increase in the quality of healthcare over time. From a cross-sectional perspective, current relative welfare exceeds relative income and this is driven mainly by consistently lower inequality, higher consumption, and more leisure time. Lower life expectancy still has a significantly negative impact on overall quality of life and explains the persisting welfare gap between Slovakia, advanced EU economies, and the U.S.

The selected alternative measure of economic growth and welfare considers many im-

portant aspects which influence social progress on a nonmarket level and are not reflected in GDP. At the same time, the measure focuses on a small range of data available for most countries in the world. For a more comprehensive picture of living standards other factors such as morbidity, the quality of the natural environment, crime and corruption, and political freedom could be incorporated. The current position of Slovakia in rankings focusing on these areas suggests that an extension of the metric for these factors would probably lead to a decrease in relative welfare.

Table 2 Basic underlying data from the model for calculating welfare

Country	Life exp. (2007)	Life exp. (2014)	C/Y (2007)	C/Y (2014)	Hours worked (2007)	Hours worked (2014)	$\sigma$ (2007)	$\sigma$ (2014)
Lithuania	70.9	74.5	0.932	0.923	769	689	0.634	0.645
Poland	75.2	77.6	0.846	0.851	817	836	0.613	0.591
Estonia	72.8	77.0	0.769	0.781	977	895	0.583	0.606
Romania	72.6	75	0.844	0.817	796	724	0.549	0.639
Slovakia	74.2	76.8	0.832	0.88	716	714	0.446	0.472
Finland	79.3	81.2	0.649	0.827	809	779	0.512	0.490
Malta	79.8	81.9	0.877	0.985	843	891	0.763	0.763
Hungary	73.2	75.8	0.832	0.824	828	782	0.506	0.555
Germany	79.5	81.1	0.672	0.727	698	722	0.591	0.547
Belgium	79.8	81.3	0.710	0.796	665	687	0.537	0.499
Czech Republic	76.7	78.8	0.709	0.765	877	851	0.469	0.472
Latvia	71	74.1	0.921	0.853	884	785	0.662	0.651
Denmark	78.2	80.7	0.661	0.717	766	715	0.485	0.527
Portugal	78.3	81.1	0.840	0.861	904	775	0.676	0.662
Austria	80.2	81.5	0.694	0.744	850	846	0.556	0.554
Bulgaria	72.7	74.5	0.874	0.866	842	815	0.510	0.662
Croatia	75.7	77.5	0.782	0.833	673	622	0.616	0.593
France	81.1	82.7	0.738	0.796	636	608	0.595	0.605
Sweden	80.9	82.3	0.658	0.735	796	788	0.487	0.494
Slovenia	78.6	81.1	0.748	0.772	753	730	0.439	0.462
Netherlands	80.1	81.7	0.641	0.665	768	736	0.552	0.507
Luxemburg	79.4	82.2	0.602	0.603	1090	1140	0.569	0.638
Italy	81.4	83.1	0.719	0.777	771	684	0.606	0.645
Spain	80.9	83.2	0.724	0.758	802	643	0.619	0.659
Ireland	79.6	81.3	0.495	0.507	904	721	0.583	0.593
U.K.	79.4	81.3	0.854	0.828	799	806	0.660	0.594
USA	78	78.7	0.808	0.830	871	820	0.777	0.763
Greece	79.4	81.4	0.883	0.938	945	740	0.634	0.675
Cyprus	78.9	80.1	0.954	0.975	745	596	0.566	0.628

Source: World Bank. Penn World Tables 9.0, author calculations.

Notes: C/Y is the ratio of consumption to GDP per capita and includes the consumption of individuals and the government. The number of hours worked was calculated based on 8 working hours per day per person.  $\sigma$  is an indicator of inequality and was calculated by the following equation:  $\sigma = \sqrt{2} * \text{norminv}((1 + \text{gini}/100)/2)$ .

#### References

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