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MACROECONOMIC VARIABLES INFLUENCING LIFE SATISFACTION IN THE EU, AND ITS IMPACT ON EMIGRATION

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Abstract. *Purpose* of the research is to analyse what variables influence subjective well-being (which is measured as overall life satisfaction in the EU) and how it affects population's decisions on emigration.

Research methodology – a correlation between several independent variables and overall life satisfaction is calculated. Then, a correlation between overall life satisfaction and emigration rates is measured. Finally, regression equations are constructed showing how some variables affect the other.

Findings – analysis helped to identify key variables which influenced overall life satisfaction and its impact on population's decisions on emigration. Those key variables include GDP per capita, income inequality and unemployment.

Research limitations – to analyse more social phenomena and not only the economic ones would contribute to research development in the future. Moreover, analysis of dynamic aspects would provide deeper insight of relationships.

Practical implications – the analysis of emigration problem and the identification of its possible links with life satisfaction will allow economists to assess *a priori* potential of various measures suggested in practice and, consequently, will allow for more targeted formulation of the economic policy.

Originality/Value – scientific analysis of life satisfaction enables to have a new look on emigration problem in theory and practice.

Keywords: emigration, Gini coefficient, income inequality, overall life satisfaction, subjective well-being.

JEL Classification: D63, O15.

Conference topic: Contemporary Issues in Economics Engineering.

Introduction

The search for happiness in the economy as well as in the life is not a new topic. However, it is very often equated with the pursuit of material values. In this way, personal or national income often becomes a synonym of happiness, and countries often measure achievement in the field of happiness by calculating their GDP.

Indeed, economics of "happiness" is a quantitative and theoretical study of happiness, and its positive and negative effects. It is associated with well-being, quality of life, and life satisfaction, linking economics to psychology, health sciences, and sociology.

In the opinion of "happiness" economists, subjective well-being and life satisfaction should be maximized but not assets, income or profits. Fleurbaey and Schwandt (2015) show that close to 90% of the respondents indeed seek to maximize their subjective well-being. Actually, happiness economics as a field of research began rapidly to develop in the United States and Europe at the end 20th century and in Lithuania only in the beginning of 21st century and only in the context of popular articles.

The term "Gross National Happiness" was first used in 1972 by the king of Bhutan which is a small Buddhist kingdom in the Himalayas and it reflected the desire to create an economy that would serve Bhutanese culture based

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on Buddhist spiritual values rather than Western-type material development as measured by Gross Domestic Product (Helliwell et al., 2012). The concept of Gross National Happiness quickly spread beyond Bhutan, inspired modern "political happiness" movements and gradually evolved into socio-economic development models. In 2011 The United Nations General Assembly unanimously adopted a resolution involving "happiness" into the global development agenda (United Nations General Assembly, 2013).

White (2007), from the University of Leicester, ranked 178 countries around the world on a subjective measure of well-being. Bhutan took 8th place. In fact, it was the only country between 20 happiest countries with a very low GDP per capita.

It is quite unbelievable that Lithuania took only 154th place under the results of the research. Meanwhile, in terms of GDP per capita, at that time, Lithuania ranked 70th in the world in nominal terms (and even higher in terms of purchasing power standard). Estonia took 138th place on the same "happiness" list (57th place in terms of GDP per capita) and Latvia took153rd place (65th place in terms of GDP per capita).

Easterlin paradox suggests that higher income does not increase happiness; income only seems to have a large impact on happiness up until the point that basic needs are satisfied (Easterlin, 1974). Therefore, income is related to happiness in the same way as salary is related to employee motivation in Herzberg's motivation-hygiene theory, it is only a hygiene factor, not a motivator (Herzberg, 1964). In other words, once a certain level of national income is achieved, additional factors of happiness have to be searched, and increasing income alone is no longer enough. For example, growing income in the United States in 1946–1970 coincided with an unchanging perception of happiness. In 1970s and 1980s with rising income the perception of happiness even declined (Weimann et al., 2015). Now, americans are unhappier than ever, according to the World Happiness survey in 2019, despite the notable improvements in economic growth (Chiu, 2019).

These results may be driven by the fact that one's place within the income distribution, rather than gross income, is important (Easterlin, 2003). Furthermore, income inequality within a nation has been shown to lower happiness levels (Alesina et al., 2004). Economic inequality tends to lower social cohesion due to mistrust in the social system and excessive anxiety about one's social status (Mishra & Carleton, 2015; Ward & King, 2016; Buttrick & Oishi, 2017; Oishi et al., 2018). Thus, it is predictable that people might be better off in more economically equal societies.

According to White (2007), developed countries lag behind their GDP per capita in terms of subjective perception of well-being (US is 23rd in terms of subjective well-being and 18th in terms of GDP per capita, 35th and 27th places for Germany, 41st and 16th for the United Kingdom, and 62th and 28th for France respectively). However, nowhere else are these differences as drastic as in Lithuania and the other Baltic states. What could be the reasons of this phenomenon? In addition, how those issues are related to emigration? Is emigration just a reflection of an unhappy society?

Thus, the main purpose of our research is to determine the relationship between happiness and GDP, and the objectives are to assess the other factors determining the subjective perception of well-being and to measure how subjectice well-being influences emigration which was the most significant problem of Lithuania since the restoration of Independence.

1. Background

Level of subjective well-being (SWB) may be affected by many factors. Rajani, Skianis, and Filippidis (2019) showed statistically significant effects of socioeconomic factors such financial situation and employment on life satisfaction in 27 European countries. Income is expected to be a major determinant of SWB, since higher income would allow an individual to purchase more goods and thus help enhance utility (Matz et al., 2016). Furthermore, high-income level tends to be positively associated with one's projection for security in the future (Ward & King, 2016).

Quite a few researchers have posed challenges to the above-mentioned Easterlin's finding in recent years. For instance, using the Gallup World Poll data, Deaton (2008) demonstrated a log-linear relationship between average SWB and GDP per capita across countries. Stevenson and Wolfers (2008) found a positive relationship between GDP per capita and SWB across countries. Kahneman and Deaton (2010) found that high income improved evaluation of life but not emotional well-being. Researchers also claimed that an income-SWB link might not be consistent across the income levels. For instance, Diener and Seligman (2004) indicated that the income-SWB link may be less significant when income exceeds certain level. However, using the Gallup World Poll data, Stevenson and Wolfers (2013) studied the income-SWB link at both individual and country level and found a significant and consistent income-SWB link for both poor and rich countries.

Kim (2020) examined the multivariate effect of socio-economic factors that might influence happiness, based on panel data of happiness surveys in 165 countries over more than 10 years. The results suggest autonomy, social support, and generosity lead to a greater subjective well-being. The effect of economic equality on subjective well-being might be heterogenous by individual context. National level inequality, such as Gini coefficient, is not likely to influence happiness significantly.

It is also important to understand the relationship between subjective well-being and the decision to emigrate. If subjective well-being is an important determinant of the decision to emigrate, policy-driven changes in happiness may affect individual migration decisions and the migration flows.

A large and well-established literature has studied the role of socio-demographic, contextual and attitudinal variables in shaping the decision to migrate.

A more recent literature has started to explore the role of subjective well-being, asking whether it is the most or the least happy people who are more likely to move abroad. Several studies have suggested that there is a negative association between subjective well-being and intentions or willingness to migrate.

Blanchflower and Shadforth (2009) analyzed the migration flows from Central and Eastern Europe (CEE). The authors found that the higher number of immigrants in the UK was from those CEE countries that had a lower GDP per capita and average life satisfaction.

Otrachshenko and Popova (2014) used the Eurobarometer data to show that, in Central and Eastern Europe, people less satisfied with life were more likely to report intentions to migrate – both internationally and domestically. They also found differences in migration decisions between the CEE and Western Europe: people were found to have higher intentions to migrate from CEE countries than from non-CEE countries.

In Latin America, people satisfied with their economic situation were less likely to migrate (Graham & Markowitz, 2011), and people with high life satisfaction had less intention to migrate abroad (Chindarkar, 2014).

For a survey conducted in Texas, respondents with "a lot of joy" from their neighbourhood were less likely to move in the next year, as compared to respondents with "little or no joy" (Bucchianeri, 2007).

Cai, Esipova, Oppenheimer, and Feng (2014), using Gallup World Survey data for 116 countries, uncovered a negative association between life satisfaction and desire to migrate internationally (expressed willingness to migrate). They found that at the individual level, the subjective well-being and migration relationship appeared to be more robust than the income-migration relationship. Meanwhile, at the country level, national average subjective well-being better indicated international migration desires for rich countries, while income performed better for poor countries.

A more mixed picture was obtained by Polgreen and Simpson (2011), who studied life satisfaction-emigration relationship at the country level and found that in relatively unhappy countries emigration rates fell as average country happiness increased, while the opposite was true for the relatively happy countries; the highest emigration rates were, thus, observed in the most and the least happy countries. However, their aim was not to find a causal relationship between happiness and migration, but rather a correlation between two.

Ivlevs (2015) studied the link between life satisfaction and one's intentions to move abroad. Using survey data from 35 European and Central Asian countries, he found a U-shaped association between life satisfaction and emigration intentions: it was the most and the least life-satisfied people who were the most likely to express intentions to emigrate. This result was found in countries with different levels of economic development and institutional quality. The results suggest that higher levels of life satisfaction have a positive effect on the probability of reporting intentions to migrate.

In general, we see that SWB and migration may be correlated. However, most of the analyzed studies (with the exception of Polgreen and Simpson (2011)) use emigration intentions as a variable, not the emigration statistics.

2. Methodology

2.1. Research scope

In order to check the assumptions about the effect of macroeconomic indicators on overall life satisfaction in the European Union empirical study was conducted. At the same time the impact of overall life satisfaction on emigration was analyzed.

Analysis was performed with all EU countries (including United Kingdom) first and then with 10 countries of 2004 EU enlargement wave as Lithuania joined EU in 2004. Countries of 2004 EU enlargement wave were chosen for 2 reasons:

- all those countries since 21 December 2007 belong to the Schengen area. Being a member of Schengen area has a major impact on emigration as visa-free access opens the internal EU borders. This issue is important because the impact of overall life satisfaction on emigration is analyzed. Between 10 EU member states from the enlargement of 2004, only Cyprus, due to its split, is not in Schengen area. However, it has not been excluded from the analysis as the whole 2004 EU enlargement wave was selected to be analyzed;
- actual analysis of the impact of overall life satisfaction on emigration expands our research of 2020 (Laurinavičius et al., 2020) about impact of income inequality on emigration. Then, life satisfaction was not assessed in that study. This variable was represented by income inequality. This time, we tried to find out what additional relationships exist between these variables. This is why it was important to choose the same data set.

2.2. Research period and data

Data of 2018 are being analyzed in this study as EU research on individual's subjective well-being was carried out only in 2013 and 2018.

Data on overall life satisfaction come from 2018 research on individual's subjective well-being in the EU provided by Eurostat. It is measured in the scale from 0 to 10 where 0 means no life satisfaction at all and 10 represents maximum life satisfaction.

We use unemployment rates of 4th quarter of 2018, real GDP per capita of 2018, GDP per capita in PPS (purchasing power standard) of 2018, real GDP growth rate of 2018, emigration rate of 2018 which we calculated as a ratio between the number of long-term emigrants of 2018 and the number of permanent residents as of January 1st 2018 in respective country. We have also calculated average emigration rate of 2008–2018 (as population data of 2008 was the earliest data possible on Eurostat). Finally, we use Gini coefficient of 2018.

Gini coefficient measures inequality among values of a frequency distribution (for example, level of income). Zero Gini coefficient expresses perfect equality where all values are the same (for example, where everyone has the same income). Gini coefficient of one (or 100%) expresses maximal inequality among values (e.g., for a large number of people, where only one person has all the income or consumption, and all others have none, Gini coefficient will be very close to one) (Silber, 1999).

All used data are taken from Eurostat.

2.3. Methods

Linear Pearson correlation coefficients among overall life satisfaction and other variables were calculated in the first stage of the research. Overall life satisfaction was considered to be a dependent variable, other variables were considered to be independent:

- unemployment rate,
- real GDP per capita,
- GDP per capita in PPS,
- real GDP growth rate,
- Gini coefficient.

Later on, linear Pearson correlation coefficient between overall life satisfaction and emigration rate was calculated. This time, overall life satisfaction was considered to be an independent variable and emigration rate was analyzed as a dependent variable. That is the way the question how overall life satisfaction affects people's decisions about emigration was assessed.

Values of correlation coefficients may vary in the range from –1 to 1 where –1 and 1 indicate functional dependence. 0 value indicates no relationship, and the values between –1 and 0 and 0 and 1 indicate negative or positive dependence. Dependence is considered moderately strong if a value of correlation coefficient exceeds 0.5 (or it is less than –0.5), and it is very strong if it is greater than 0.7 (or less than –0.7) (Huber, 2004).

Coefficients of determination were calculated after squaring correlation coefficients. Coefficients of determination show what part of variance of a phenomenon (overall life satisfaction) is explained by other phenomena (independent variables).

Analogous calculations, using all above mentioned independent variables, were repeated with 10 countries of 2004 EU enlargement wave.

Dependencies for which significant correlation coefficients were calculated have been analyzed in a more detailed way in the second stage of the study. Parameters of a simple linear regression, intercept and slope, were calculated for such dependencies. Then, simple linear regression equations were constructed, their graphs were drawn and prognostic models were created (Huber, 2004). Graphs also show the scatter of the investigated phenomena in the plane of independent and dependent variables. Once again, overall life satisfaction was considered to be a dependent variable. Student t-test was used to determine the significance of regression parameters (Huber, 2004). The aim was to determine whether the probability of the calculated t-value was less than 0.05, and, if so, the resulting regression was declared statistically significant, if not then it was insignificant.

Multiple linear regression analysis with statistically significant variables was performed in a later stage of the research. Multiple regression analysis is best suited to predict dependent variable when all independent variables are strongly correlated with dependent variable and at the same time, they do not correlate with each other or they are weakly correlated with each other. When there are strong correlations between independent variables the problem of multicollinearity arises. Due to the multicollinearity of the variables, it is not possible to distinguish the influence of the correlating variables on the prognosis of the dependent variable. The variance inflation factor VIF was calculated to determine multicollinearity of multiple linear regression independent variables.

Then, the magnitude of multicollinearity was analyzed by considering the size of the VIF_i. If $VIF_i <= 5$ there is no problem of multicollinearity. If $5 < VIF_i < 10$ it can be suspected that variable X_i is multicollinear (level of mul-

ticollinearity varies from medium to strong). If VIF_i >=10 variable X_i is too multicollinear and has to be removed from multiple linear regression analysis model (Kutner et al., 2004; Sheather, 2009).

By removing such a variable, a multiple linear regression equation is constructed again and multicollinearity of independent variables is tested again. The operation is repeated until all remaining independent variables no longer have a multicollinearity problem.

After solving the problem of multicollinearity of independent variables, correlation and determination coefficients of multiple linear regression model were calculated. Student t-test has been used to determine the significance of regression parameters. If the probability of calculated t-value was less than 0.05, regression parameter was declared statistically significant, if not, it had to be removed from multiple regression model.

Finally, after finding out that there was no multicollinearity problem and that all parameters were statistically significant, a final multiple linear regression equation was constructed.

All calculations were performed in Microsoft Excel.

3. Results and discussion

3.1. Correlation analysis

Initially, correlation coefficients between independent variables as described in section above and overall life satisfaction in all EU countries were calculated. The results of the analysis are presented in Table 1.

It can be stated that there is a positive moderately strong correlation between GDP per capita and overall life satisfaction. On the contrary, there is a negative moderately strong correlation between income inequality measured by Gini coefficient and overall life satisfaction and a negative low correlation between unemployment rate and overall life satisfaction. Other relationships are insignificant.

Respectively, coefficients of determination show that more than a third of overall life satisfaction can be explained by GDP per capita alone (other variables being constant). Almost a third of variance of overall life satisfaction can be explained by the data of income inequality measured by Gini coefficient (other variables being constant).

Later on, correlation coefficients between independent variables and overall life satisfaction in 10 countries of 2004 EU enlargement wave were calculated. The results of the analysis are presented in Table 2.

It can be stated that there is a positive low correlation between GDP per capita and overall life satisfaction. On the contrary, there is a negative moderately strong correlation between income inequality measured by Gini coefficient and overall life satisfaction and a negative low correlation between unemployment rate and overall life satisfaction. There is also a negative low correlation between overall life satisfaction and average emigration rate. Other relationships are insignificant.

Table 1. Correlation coefficients between overall life satisfaction and other variables in all EU countries in 2018 (source: authors' calculations)

Variable	Correlation coefficient	Determination coefficient
Unemployment rate	**–0.29**	0.08
Real GPD per capita	**0.64**	0.41
GDP per capita in PPS	**0.59**	0.35
Real GDP growth rate	0.01	0.00
Emigration rate	0.08	0.01
Average emigration rate (2008–2018)	0.12	0.01
Gini coefficient	**–0.55**	0.30

Table 2. Correlation coefficients between overall life satisfaction and other variables in 10 countries of 2004 EU enlargement wave in 2018 (source: authors' calculations)

Variable	Correlation coefficient	Determination coefficient
Unemployment rate	**–0.43**	0.19
Real GPD per capita	**0.39**	0.15
GDP per capita in PPS	**0.35**	0.12
Real GDP growth rate	0.14	0.02
Emigration rate	0.00	0.00
Average emigration rate (2008–2018)	**–0.20**	0.04
Gini coefficient	**–0.55**	0.30

When comparing all EU countries to 10 new EU member states it can be stated that correlation between GDP per capita and overall life satisfaction is lower in 10 new EU member states. On the contrary, correlation between unemployment rate and overall life satisfaction is higher in 10 new EU member states. Finally, correlation between income inequality measured by Gini coefficient and overall life satisfaction is identical in both group of countries.

Another difference which can be concluded from correlation analysis is a relationship between life satisfaction and average emigration rate: it is more significant in 10 new EU member states than in all EU countries.

3.2. Simple regression analysis

After finding out that the highest correlation of all analyzed variables (correlation coefficients in bold in Table 1 and Table 2) is between unemployment rate, real GDP per capita, GDP per capita in PPS, Gini coefficient and average emigration rate on the one hand, and overall life satisfaction on the other hand, it has been decided to include mentioned variables into the regression analysis. As it has already been stated, overall life satisfaction is considered to be a dependent variable and unemployment rate, real GDP per capita / GDP per capita in PPS and Gini coefficient are considered to be independent variables in the first regression analysis, meanwile, overall life satisfaction is considered to be an independent variable and average emigration rate a dependent variable in the second regression analysis (only for 10 new EU member states).

The results of the first simple linear regression analysis are presented in Table 3.

P-value of T-test (two-tailed) shows that regression between unemployment rate and overall life satisfaction is insignificant. Other 3 regression equations are significant and described below:

$$OLS = 6.59 + 0.02GDP_{Real}; \quad (1)$$

$$OLS = 6.34 + 0.01GDP_{PPS}; \quad (2)$$

$$OLS = 9.61 - 0.08GINI, \quad (3)$$

where: OLS is overall life satisfaction; GDP_{Real} stands for real GDP per capita; and GDP_{PPS} represents GDP per capita in PPS; finally, GINI is for Gini coefficient.

Equations (1) and (2) show that, depending on GDP calculation method, overall life satisfaction when GDP is 0 will be 6.59 or 6.34. Surprisingly, both values are about the value of overall life satisfaction in Lithuania (6.4). The result that any country would obtain with zero GDP! Analysis of slopes shows that increase in GDP by one thousand euros will increase overall life satisfaction by 0.02 and increase in GDP by one point of PPS will increase overall life satisfaction by 0.01 other variables being constant.

Equation (3) shows that overall life satisfaction when Gini coefficient is 0 will be 9.61 which means that without income inequality life satisfaction would almost reach its maximum value. Slope of –0.08 means that when Gini coefficient increases by one percent overall life satisfaction decreases by 0.08 (Figure 1) other variables being constant.

Simple linear regression analysis with 10 new EU member states is described in Table 4.

P-value of T-test (two-tailed) shows that regressions with all independent variables are statistically significant including unemployment rate and that is the first difference when comparing 10 new EU member states with all EU countries. All 4 regression equations are depicted below:

$$OLS = 7.61 - 0.11UNEMPL; \quad (4)$$

$$OLS = 6.40 + 0.04GDP_{Real}; \quad (5)$$

$$OLS = 5.90 + 0.01GDP_{PPS}; \quad (6)$$

$$OLS = 8.55 - 0.05GINI, \quad (7)$$

where: OLS is overall life satisfaction; UNEMPL stands for unemployment rate; GDP_{Real} represents real GDP per capita; and GDP_{PPS} represents GDP per capita in PPS; finally, GINI is for Gini coefficient.

Equation (4) shows that increase in unemployment rate by 1 percentage point decreases overall life satisfaction by 0.11 in 10 new EU member states. This equation also shows that overall life satisfaction without unemployment would be 7.61 which is far away from the maximum point. This probably means that it is not enough to have a job to be happy. It also makes a good reference to Herzberg's motivation-hygiene theory which was briefly described in the first chapter of this research. It states that a salary is only a hygiene factor, not a motivator. This is why upon reaching a certain level of personal or national income, one needs to look for additional factors of life satisfaction, merely higher income is not enough.

Equations (5) and (6) describe relationship between GDP per capita and life satisfaction in 10 new EU member states and are similar to Eqs (1) and (2) of all EU countries. A difference is that the starting point in 10 new EU member states is a little bit lower when talking about real GDP per capita (intercept of Eq. (5) comparing to Eq. (1) and GDP per capita in PPS (intercept of equation 6 comparing to Eq. (2). This means that with 0 income 10 new

EU member states would feel less happy than all EU countries (and especially old EU countries). On the other hand, increase in overall life satisfaction is twice bigger in 10 new EU member states than in all EU countries when talking about a change in real GDP per capita (slope of Eq. (5) comparing to Eq. (1). Obviously, the difference would be even greater if we compared 10 new EU member states to old ones.

As for relationship between income inequality measured by Gini coefficient and overall life satisfaction in 10 new EU member states when comparing to all EU countries (Eq. (7) comparing to Eq. (3), it can be stated that decrease in overall life satisfaction is lower in 10 new EU member states than in all EU countries when income inequality increases. This might be because a starting point (initial overall life satisfaction without any income inequality when Gini coefficient is 0) is higher in all EU countries than in 10 new EU member states (Figure 2).

Table 3. Coefficients of simple linear regressions between independent variables and overall life satisfaction in all EU countries in 2018 (source: authors' calculations)

	Unemployment rate	Real GDP per capita in thousand EUR	GDP per capita in PPS	Gini coefficient
Intercept	7.54	6.59	6.34	9.61
Slope	–0.05	0.02	0.01	–0.08
P-value of T-test	0.14	0.00	0.00	0.00

Table 4. Coefficients of simple linear regressions between independent variables and overall life satisfaction in 10 new EU member states in 2018 (source: authors' calculations)

	Unemployment rate	Real GDP per capita in thousand EUR	GDP per capita in PPS	Gini coefficient
Intercept	7.61	6.40	5.90	8.55
Slope	–0.11	0.04	0.01	–0.05
P-value of T-test	0.00	0.00	0.00	0.00

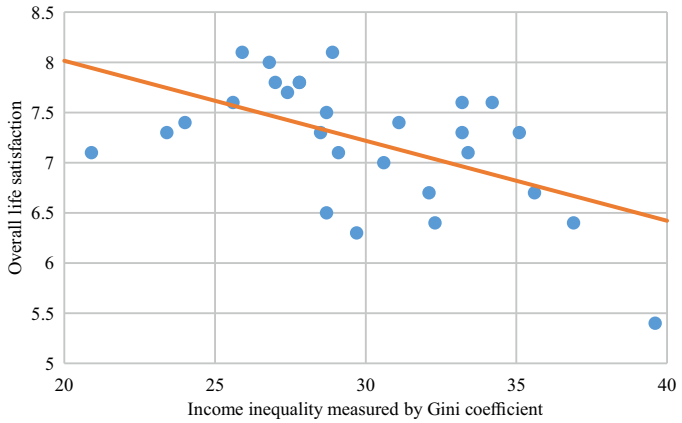

Figure 1. Impact of income inequality on overall life satisfaction in all EU countries in 2018 (source: Eurostat and authors' calculations)

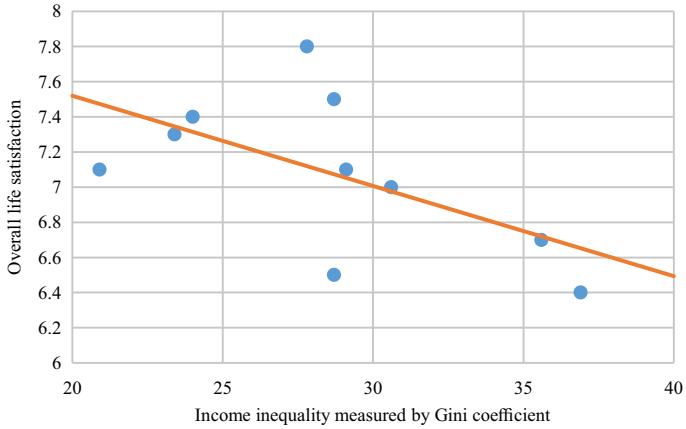

Figure 2. Impact of income inequality on overall life satisfaction in 10 new EU member states in 2018 (source: Eurostat and authors' calculations)

Another difference between 10 new EU member states and all EU countries is that the relationship between overall life satisfaction and emigration is significant only in 10 new EU member states. This relationship is described in Eq. (8) where overall life satisfaction is a dependent variable and emigration rate is an independent variable:

$$EMIGR = 0.025 - 0.002OLS, \tag{8}$$

where: EMIGR is average emigration rate of 2008–2018; OLS represents overall life satisfaction.

P-value of T-test (0.00) shows that regression is statistically significant. Slope of –0.002 means that an increase in overall life satisfaction by 1 point would have decreased average emigration rate by 0.2 percentage point during entire period of 2008–2018 which means additional almost 6000 emigrants a year for Lithuania and additional almost 1 million a year for the EU. On the other hand, as actual overall life satisfaction fluctuates in a very narrow range (from 6.3 to 8.1 except Bulgaria) it can be stated that the impact of overall life satisfaction alone on decisions about emigration is limited. Moreover, emigration from 10 new EU member states would have not stopped even with a maximum value of overall life satisfaction which means that there were plenty of other reasons which tended people to emigrate. Some of those reasons were analyzed in our previous researches (Laurinavičius et al., 2018, 2020; Laurinavičius A. & Laurinavičius Alg., 2017; Smilga et al., 2017).

3.3. Multiple regression analysis

Three independent variables that statistical significance was determined in previous stage of the research, i.e. real GDP per capita, GDP per capita in PPS and income inequality measured by Gini were used for a multiple linear regression analysis of all EU countries. Overall life satisfaction was considered as a dependent variable.

Results of independent variables multicollinearity analysis are presented in Table 5.

It can be seen that real GDP per capita was distinguished by the highest VIF coefficient and the highest multicollinearity. As it exceeds the numerical value of 10, it has to be excluded from the multiple linear regression analysis. Actually, this result of multicollinearity analysis was very probable as this independent variable was very similar to GDP per capita in PPS.

After removing real GDP per capita from multiple linear regression model, VIF coefficients are recalculated. Both of them (GDP per capita in PPS and income inequality measured by Gini coefficient) are now equal to 1.0, and the problem of multicollinearity of independent variables is solved. Multiple linear regression model with only two independent variables, GDP per capita in PPS and income inequality, is being made. The results are presented in Table 6.

It can be stated that multiple correlation coefficient is positive and very strong. Respectively, coefficient of determination is positive and moderately strong and means that GDP per capita in PPS and income inequality measured by Gini coefficient both together explained 58 percent of distribution of overall life satisfaction in all EU countries in 2018.

It can also be stated that intercept and both independent variables, GDP per capita in PPS and income inequality, are statistically significant. Multiple linear regression equation is presented below:

$$OLS = 8.54 + 0.01GDP_{PPS} - 0.07GINI, \tag{9}$$

where: OLS is overall life satisfaction; GDP_{PPS} represents GDP per capita in PPS; GINI stands for Gini coefficient.

It is important to notice that values of independent variables coefficients of multiple linear regression do not differ much from those determined in simple linear regression analysis (Eqs (2) and (3)) and intercept stands in the middle of both (Eqs (2) and (3)).

Four independent variables that statistical significance was determined in previous section of the study (simple linear regression analysis), i.e., unemployment rate, real GDP per capita, GDP per capita in PPS and income inequality measured by Gini, were used for a multiple linear regression analysis of 10 new EU member states. Overall life satisfaction was considered as a dependent variable.

Table 5. VIF (variance inflation factors) of independent variables in all EU countries (source: authors' calculations)

	VIF
Real GPD per capita	16.4
GDP per capita in PPS	16.2
Gini coefficient	1.1

Table 6. Multiple linear regression statistics in all EU countries (source: authors' calculations)

	Coefficient	P-value
Multiple R	0.76	
R Square	0.58	
Intercept	8.54	0.00
GDP per capita in PPS	0.01	0.00
Gini coefficient	–0.07	0.00

Results of independent variables multicollinearity analysis are presented in Table 7.

It can be stated that real GDP per capita was distinguished by the highest VIF coefficient and the highest multicollinearity. As it exceeds the numerical value of 10, it has to be excluded from the multiple linear regression analysis.

After removing real GDP per capita from multiple linear regression model, VIF coefficients were recalculated. New results are presented in Table 8.

It can be stated that the problem of multicollinearity of independent variables was solved. Multiple linear regression model with three independent variables, unemployment rate, GDP per capita in PPS and income inequality measured by Gini coefficient, can be made. The results are presented in Table 9.

It can be stated that multiple correlation coefficient is positive and moderately strong. Respectively, coefficient of determination is positive and means that unemployment rate, GDP per capita in PPS and income inequality measured by Gini coefficient all together explained 44 percent of distribution of overall life satisfaction in 10 new EU member states in 2018.

It can also be stated that intercept and all independent variables (unemployment rate, GDP per capita in PPS and income inequality) are statistically significant. Multiple linear regression equation is presented below:

$$OLS = 7.71 - 0.05UNEMPL + 0.01GDP_{PPS} - 0.04GINI, \quad (10)$$

where: OLS is overall life satisfaction; UNEMPL represents unemployment rate; GDP_{PPS} stands for GDP per capita in PPS; and GINI is Gini coefficient.

It is important to notice that values of independent variables coefficients of multiple linear regression do not differ much from those determined in simple linear regression analysis (Eqs (6) and (7)) except for unemployment. On the other hand, if we compare equation 10 of multiple regression analysis in 10 new EU member states to Eq. (9) of multiple regression analysis in all EU countries, we can see that the impact of income inequality on overall life satisfaction is weaker in 10 new EU member states than in all EU countries. The result is similar to the one we got in simple regression analysis when comparing Eqs (7) to (3): slope in 10 new EU member states is lower than in all EU countries which means that decrease in overall life satisfaction is lower in 10 new EU member states than in all EU countries when income inequality increases.

Design of the research and its methodology also reveal its limitations. First, it is important to emphasize that correlation analysis does not indicate causal dependence. Meanwhile, in the regression analysis, the assignment of variables to dependent and independent was performed by the authors on the basis of the studies performed by other authors described in the first theoretical part of the research and it was based on the assumptions formulated in the same section. It may also be the case that the dependencies provided are not the only ones. There can be other factors that influence overall life satisfaction.

Such perception of the limitations of the study also defines further directions of the research: in order to determine which other variables can influence overall life satisfaction factor analysis can be used. In addition, further research should treat lagged data of independent variables. Lagged data were not analyzed in this research due to its limited extent.

Table 7. VIF (variance inflation factors) of independent variables in 10 new EU member states (source: authors' calculations)

	VIF
Unemployment rate	4.9
Real GPD per capita	17.0
GDP per capita in PPS	14.9
Gini coefficient	4.3

Table 8. VIF (variance inflation factors) of independent variables in 10 new EU member states after removing real GDP per capita (source: authors' calculations)

	VIF
Unemployment rate	1.2
GDP per capita in PPS	1.1
Gini coefficient	1.2

Table 9. Multiple linear regression statistics in 10 new EU member states (source: authors' calculations)

	Coefficient	P-value
Multiple R	0.66	
R Square	0.44	
Intercept	7.71	0.00
Unemployment rate	–0.05	0.00
GDP per capita in PPS	0.01	0.00
Gini coefficient	–0.04	0.00

Conclusions

Economics of "happiness" is a quantitative and theoretical study of happiness, and its positive and negative effects. It is associated with well-being, quality of life, and life satisfaction, linking economics to psychology, health sciences, and sociology.

Easterlin paradox suggests that higher income does not increase happiness; income only seems to have a large impact on happiness up until the point that basic needs are satisfied. In other words, once a certain level of national income is achieved, additional factors of happiness have to be searched, and increasing income alone is no longer enough.

Level of subjective well-being may be affected by many factors: poor health, separation, unemployment and lack of social contact, and they are all strongly negatively associated with subjective well-being. Income is expected to be a major determinant of subjective well-being but it only seems to have a large impact on happiness up until the point that basic needs are satisfied.

Quite a few articles have studied the relationship between subjective well-being and the decision to emigrate. Several studies have suggested that there is a negative association between subjective well-being and intentions or willingness to migrate. Some of them found a U-shaped association between life satisfaction and emigration intentions: it is the most and the least life-satisfied people who are the most likely to express intentions to emigrate. However, most of these studies use emigration intentions as a variable, not the emigration itself.

Coefficients of determination in all EU countries show that more than a third of overall life satisfaction can be explained by GDP per capita alone (other variables being constant). Almost a third of variance of overall life satisfaction can be explained by the data of income inequality measured by Gini coefficient (other variables being constant).

Respectively, coefficient of determination of multiple regression in all EU countries shows that GDP per capita in PPS and income inequality measured by Gini coefficient both together can explain more than a half of distribution of overall life satisfaction in all EU countries in 2018.

Increase in overall life satisfaction is twice bigger in 10 new EU member states than in all EU countries when talking about a change in real GDP per capita. Obviously, the difference would be even greater if we compared 10 new EU member states to the old ones.

Regression analysis in all EU countries shows that overall life satisfaction would be equal to 9.61 if Gini coefficient was equal 0 which means that life satisfaction would almost reach its maximum value if income inequality was eliminated.

As for relationship between income inequality measured by Gini coefficient and overall life satisfaction in 10 new EU member states when comparing to all EU countries, it can be stated that decrease in overall life satisfaction is lower in 10 new EU member states than in all EU countries when income inequality increases. This might be because a starting point (initial overall life satisfaction with nonexistant income inequality) is higher in all EU countries than in 10 new EU member states.

Another difference which can be concluded from correlation analysis is that a relationship between life satisfaction and unemployment rate is significant only in 10 new EU member states.

Regression analysis in 10 new EU member states shows that overall life satisfaction would be 7.61 if unemployment was eliminated, which is far away from the maximum point. This probably means that it is not enough to have a job to be happy.

One more difference which can be concluded from correlation analysis is that a relationship between life satisfaction and average emigration rate is more significant in 10 new EU member states than in all EU countries. An increase in overall life satisfaction by 1 point would have decreased average emigration rate from 10 new EU member states by 0.2 percentage point during entire period of 2008–2018 which means additional almost 6000 emigrants a year for Lithuania and additional almost 1 million a year for the EU. On the other hand, as actual overall life satisfaction fluctuates in a very narrow range (from 6.3 to 8.1 except Bulgaria) it can be stated that the impact of overall life satisfaction alone on decisions about emigration is limited. Moreover, emigration from 10 new EU member states would have not stopped even with a maximum value of overall life satisfaction which means that there were plenty of other reasons which forced people to emigrate. Some of those reasons were analyzed in our previous researches, some of them should be analyzed in future ones.

Contribution

All three authors equally contributed to all sections of the paper.

Disclosure statement

The authors declare no conflict of interest.

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