

Analysis of the Impact of Selected Macroeconomic Aggregates on the Happiness Index in the Countries of the Czech Republic, Slovakia, Poland and Hungary

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Abstract: The aim of this article is to analyze the impact of GDP per capita and total consumption on the happiness index in the countries Czech Republic, Slovakia, Poland and Hungary for the time period 2012-2020. The happiness index is a UN tool that assesses the happiness and satisfaction of people in each country using its own methodology and then creates a ranking of the happiest countries in the world. The countries analyzed in this article are considered happy in terms of the Happiness Index and hold this position steadily. The analysis is performed using a fixed effects method that works with panel data. The results of the analysis show that only GDP per capita has an effect on the happiness index and total consumption does not have a direct effect on the happiness index. These results are consistent with the findings of other authors who have addressed this issue.

Keywords: happiness; GDP; consumption; panel data; fixed effects

JEL Classification: O1; O4; R11

1. Introduction

Most economic theories agree that money will make people happier. Following this argument, it can be argued that if a person wants to improve their overall satisfaction with their life, the easiest thing they can do to do so is to make more money. If this statement holds true for an individual, it will most likely hold true for a group of people, and hence a nation. That happiness is a fundamental value for a happy life is agreed upon by most researchers who study this topic. The authors Oswald et al. (2015) further add that the happier a person is, the more he or she is able to think critically and also becomes more resilient in solving various problems.

A variety of definitions can be found in the literature. For example, Cherry (2020) defines happiness as "an emotional state characterized by feelings of joy, satisfaction, contentment, and fulfillment". Paul (2015) describes happiness as a certain stable state in which people feel joy. Paul (2015) also adds that there is a difference between happiness and pleasure. He explains this difference on the duration of each state. While happiness, as written above, is a permanent state, pleasure, on the other hand, is a temporary state that can only last for a certain moment. In general, then, happiness can be said to persist for a longer time than pleasure, which is short-lived. Khoddam (2015) defines a happy person as someone who experiences

positive emotions such as joy, interest and pride frequently and negative emotions such as sadness, anxiety and anger less frequently. After examining these definitions, it can be concluded that happiness greatly affects our lives as persons.

Happiness, despite the fact that it is a rather subjective feeling, can be measured using the aforementioned happiness index. It has been published annually by the UN Sustainable Development Solutions Network since 2012, when the first World Happiness Report was published. The Happiness Index is based on the Cantril ladder survey, a questionnaire that represents an imaginary ladder. Thus, respondents answer based on how they would rate their life on a scale from 0 (worst) to 10 (best) (UN, 2020). The factors that influence the respondents' life satisfaction were selected based on research in each area. The main idea of this index is to assess the situation in the countries in question by using the respondents themselves to answer subjectively whether they are satisfied or dissatisfied with their lives. These surveys then result in a ranking of the countries with the happiest citizens.

In the annual report (World Happiness Report, 2021) published by the United Nations, the results of the questionnaire are then compared with the main indicators of certain sectors. These indicators are:

- Gross domestic product per capita,
- Social support,
- Healthy life expectancy,
- Freedom to make life choices,
- Generosity,
- Corruption.

It is with these happiness index results that this article will work further. The main objective of this paper is to find out whether there is a relationship between the happiness index measured in the V4 (Visegrad four) countries between 2012 and 2020, namely the Czech Republic, Slovakia, Poland and Hungary, and selected macroeconomic indicators (total consumption and GDP) of these countries between 2012 and 2020, and then to compare the results with other expert studies dealing with this or similar topics. The existence of a relationship will be verified using the statistical method of panel regression, which will be conducted in Gretl.

2. Literature Review

The topic of the happiness index and its relationship with economics has been addressed by a variety of authors. The research question of whether an increase in the income of all residents will also increase the happiness of all residents was posed by Easterlin (1994) in his study. His findings show that people with more money are indeed happier, but if the income of all residents were increased, it would have no effect on their happiness. Easterlin (1994) explains this conclusion by saying that if everyone's income was increased equally, residents would not have a comparison in how much richer or poorer they are, hence they would have no reason to be happier. The topic of economic growth, happiness and their interrelationship

were addressed by Kenny (1999) in his study. In his study, he measured happiness in selected countries using a self-developed questionnaire. He then compared the results of this questionnaire with GNP per capita and the Gini coefficient, which is used to measure wealth inequality in a society. Using this comparison, he found that there is a relationship between economic growth and happiness but adds that human happiness is a more complex indicator than economic growth and acknowledges that with small variations the result can vary considerably. Another author who has examined the relationship between happiness and the economy is Guven (2008). In his study, he examined whether happiness influences consumer economic behaviour. For his research, he collected data using a questionnaire that consisted of 6 different areas. Using descriptive statistics and then regression analysis, he concluded that there is indeed a relationship between happiness and consumer economic behavior. According to Guven (2008), happy people spend more on life insurance and usually own valuable assets or securities. At the same time, it turns out that happy people are much more risk averse and therefore prefer less risky investments. In contrast, research has shown that happy people save more because of fears about the future. Another study dealing with happiness and various economic variables is by Guo and Hu in 2011. Their regression analysis results show that there is an inverse relationship between happiness, unemployment and inflation. One of the more recent studies that addresses the relationship between happiness and economic growth is a 2018 study by Esmail and Shili (2018). In their study, they try to find and prove the relationship between the overall happiness of the population, which they divided into several groups, in Jazan region and the overall economic growth, which they represented as GDP per capita. Then they determined their hypotheses using a questionnaire that was distributed in Jazan region. The evaluation of the questionnaire showed that there is indeed a relationship between happiness and economic growth. Then social factors (health care, education, unemployment, ...) and economic growth had the strongest positive correlation with each other. Thus, the interpretation of the results says that the higher the health care, education or lower unemployment, the higher the economic growth.

3. Data and Methodology

Guven (2008), Guo and Hu (2011), and Esmail and Shili (2018) all investigated the relationships between variables using regression analysis, so the question arises whether the relationships will be similar if the more current panel regression method is used. Using panel regression, the panel data will be analyzed and then the effect of selected macroeconomic indicators on the happiness index will be determined. Based on annual data from 2012 to 2020, the impact of aggregate consumption and GDP per capita on the happiness index in selected countries (Czech Republic, Slovakia, Hungary and Poland) will be investigated. The statistical analysis will be performed in Gretl.

3.1. Data

Three variables enter the analysis: happiness index score as the dependent variable and total consumption and gross domestic product per capita as independent variables (Table 1).

Table 1. Description of variables used in the analysis

Variable abbreviation	Description of variable
IH_CZ	Happiness index score of the Czech Republic
IH_SK	Happiness index score of Slovakia
IH_HU	Happiness index score of Hungary
IH_PL	Happiness index score of Poland
C_CZ	Total consumption of the Czech Republic
C_SK	Total consumption of Slovakia
C_HU	Total consumption of Hungary
C_PL	Total consumption of Poland
GDP_CZ	GDP per capita of the Czech Republic
GDP_SK	GDP per capita of Slovakia
GDP_HU	GDP per capita of Hungary
GDP_PL	GDP per capita of Poland

Happiness index scores in selected countries (in this case the V4 countries – Czech Republic, Slovakia, Hungary, Poland) were taken from the World Happiness Report (World Happiness Report, 2020), published annually by the UN Sustainable Development Solutions Network. From the data taken, it can be observed that the Czech Republic holds the highest score for the whole period under review. It has held steadily its position among the 25 happiest countries in the world every year. The second happiest country among the V4 countries is Slovakia, followed by Poland and the least happy country is Hungary. See Table 2 for more details.

Table 2. Happiness Index scores in the V4 countries for the period 2012–2020 (Eurostat, 2022)

Year	Czech Republic	Slovakia	Hungary	Poland
2012	6.334	5.911	4.683	5.876
2013	6.698	5.937	4.914	5.746
2014	6.484	6.139	5.181	5.750
2015	6.608	6.162	5.344	6.007
2016	6.736	5.993	5.449	6.162
2017	6.790	6.366	6.065	6.201
2018	7.034	6.235	5.936	6.111
2019	6.911	6.243	6.000	6.242
2020	6.897	6.519	6.038	6.139

The values in Table 3 were taken from Eurostat, the statistical office of Europe. This is the total consumption in the selected countries for the period 2012 to 2020. Consumption includes all spending by the population in a given year. It goes without saying that the more inhabitants a country has, the higher the total consumption of that country (Campbell & Mankiw, 1989). From the data presented in Table 3, it can be seen that consumption increases over the years in all states. The largest drop, which is the same for all states, can be seen in 2020, when the COVID-19 virus pandemic began and with it triggered lockdowns around the world.

Table 1. Total consumption in V4 countries for the period 2012–2020 (EUR million) (Eurostat, 2020a)

Year	Czech Republic	Slovakia	Hungary	Poland
2012	82,888.5	40,732.7	54,954.0	236,522.8
2013	81,327.0	40,801.3	54,296.3	237,822.4
2014	78,188.7	41,472.3	54,497.9	244,489.5
2015	81,921.3	42,627.7	56,617.9	250,827.6
2016	86,007.1	44,320.6	59,490.8	248,805.3
2017	93,972.1	46,995.7	64,636.2	272,543.3
2018	101,734.2	50,056.7	67,966.9	288,413.6
2019	107,225.2	52,766.0	73,395.3	304,275.1
2020	97,578.2	52,607.5	66,950.1	293,898.1

As Table 4 shows, all the V4 countries have an upward trend in GDP, despite the fact that these economies were struggling with the global financial crisis at the time (Table 3). In 2013 and 2014, the Czech Republic suffered a downturn, which was caused by a reduction in external demand. Since 2015, all V4 economies have shown GDP growth above the EU28 average.

Table 4. GDP per capita in V4 countries 2012–2020 in EUR (Eurostat, 2020b)

Year	Czech Republic	Slovakia	Hungary	Poland
2012	15,470	13,570	10,070	10,110
2013	15,170	13,710	10,190	10,340
2014	15,000	14,040	10,630	10,770
2015	16,080	14,730	11,190	11,460
2016	16,790	14,920	11,110	11,850
2017	18,330	15,530	12,170	12,980
2018	19,850	16,420	12,960	13,920
2019	21,140	17,250	13,900	14,950
2020	20,120	16,860	13,650	14,010

3.2. Applied Methods

Panel data analysis was chosen to determine the relationship between the variables. First, the data must be correctly divided into so-called panels. Then a panel regression can be created and constructed. The dependent variable in this model is consumption and gross domestic product (GDP) and the independent variable is the happiness index (life ladder). In this case, the panel regression explains whether there is an impact of macroeconomic indicators on the happiness index in the observed countries (Czech Republic, Slovakia, Poland and Hungary). The panel is constructed from data on an annual basis for all V4 countries.

As mentioned above, the analysis works with panel data, so it is therefore necessary to apply the appropriate methodology. Panel data arise when observations of a given group of units are repeated and the group has some common characteristic (in this case, the V4 countries). The panel data must first be organized in a so-called data cube, which has three dimensions: units, measurements (so-called panel waves) and variables. Units are individuals, firms or, as in this study, countries. If each unit is observed T times as the previous one, such

a panel can be called balanced. If there are missing data, for example the number of measurements differs across units, it is an unbalanced panel (Golsch et al., 2013). An unbalanced panel can arise when a data point is missing in a particular year or when a particular unit chooses not to respond. In the case of this study, it is a balanced panel.

The general data structure of a panel regression can be written using a matrix such as:

$$y_i = \begin{bmatrix} y_{i1} \\ y_{i2} \\ \vdots \\ y_{iT} \end{bmatrix} \quad X_i = \begin{bmatrix} X_{i1}^1 & X_{i1}^2 & \dots & X_{i1}^k \\ X_{i2}^1 & X_{i2}^2 & \dots & X_{i2}^k \\ \vdots & \vdots & & \vdots \\ X_{iT}^1 & X_{iT}^2 & \dots & X_{iT}^k \end{bmatrix} \quad \varepsilon_i = \begin{bmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \vdots \\ \varepsilon_{iT} \end{bmatrix} \quad (1)$$

In general, a regression model for panel data, where the index $i = 1, \dots, N$ denotes the cross-sectional component and the index $t = 1, \dots, T$ denotes the time component, is defined:

$$y_{it} = x'_{it}\beta + z'_i\alpha + \varepsilon_{it} \quad (2)$$

where

- Y_{it} is the explained variable i - of that cross-sectional unit in time t ,
- X_{it} is the matrix K of the repressors of the i -th cross-sectional unit in time t ,
- β is the matrix of estimated structural coefficients of the i -th unit over time t
- Z_i is a matrix containing individual and group variables that are observed (e.g., advice, gender, etc.) or unobserved effects that are constant over time t ,
- α indicates the vector of estimated individual effect structure coefficients,
- ε_{it} denotes the random component of the i -th unit over time t .

A panel regression model can be characterized as a modelling approach that incorporates features of both time series analysis and regression analysis (Wooldridge, 2011). Thus, it can be used to evaluate multiple data. At the same time, however, it can also be applied to the treatment of short time series, which also occurred in the case of this analysis. This is because short time series do not allow for a high-quality individual approach, which would generally be considered best. Regression models working with panel data can be divided into three categories - fixed effects regression model, random effects regression model and mixed pooled model. The goodness of fit of the correct model can be determined using the F-test of pooled significance and the Hausmann test, the hypotheses of which are:

- F-test for pooled significance of different means – Hypothesis: pooled OLS is more appropriate than fixed effects method.
- Hausman test – Hypothesis: the random effects model is consistent and more appropriate than the fixed effects alternative (Wooldridge, 2011).

If the p value comes out less than 0.05 the given hypothesis is rejected, and an alternative hypothesis should be accepted.

The reliability of the model used is assessed using an R value that should be as close to 1 as possible.

4. Empirical Results

Data analysis consists of several steps that are interrelated and interdependent. The first step is to construct the data into a panel, which means that the data is grouped into a three-dimensional data cube that contains input variables such as GDP per capita, total consumption and happiness index score. These variables are then further analyzed using statistical tests. The first is the F-test of pooled significance and the second is the Hausman test, which are used to determine the optimal model to be used to determine the effect of macroeconomic aggregates on the happiness index. This analysis could serve for understanding the relationships between the variables and for identifying measures that could lead to improvements in the standard of living and happiness of the population.

4.1. Analysis of the Impact of GDP Per Capita and Total Consumption on the Happiness Index

The first test conducted is the F-test of pooled significance, which verifies the correctness of the method, in this case the Ordinary Least Squares (OLS) method. The test was performed in the Gretl program, and the result showed a p-value of less than 0.05, which means that the null hypothesis H_0 – the OLS method is adequate should be rejected and the alternative hypothesis H_1 – the OLS method is not adequate should be accepted. Having established this result, we can proceed by conducting a Hausman test to compare the adequacy of different models and to determine the most appropriate model for the panel data.

The Hausman test is a statistical test used to compare the adequacy of different models and to determine the most appropriate model for the data. This test is most often used to compare the random effects method with the fixed effects method, which are two ways we can examine the effect of one variable on the change in another variable within panel data. The p-value after conducting Hausman test came out to be less than 0.05, so the null hypothesis H_0 – The random effects method is consistent must be rejected, and the alternative hypothesis H_1 – The random effects method is not consistent must be accepted.

Table 2. Results of the first step of the analysis (F-test of pooled significance and Hausman test)

Dependent variable: LifeLadder	p-value	Result	Interpretation of the observed results
F-test of pooled significance	0.00643976	H_0 rejected	the OLS method is not adequate
Hausman test	0.000244581	H_0 rejected	The random effects method is not consistent

Table 5 shows the results from running the two tests that need to be performed to determine the optimal model to work with later in the analysis. The results show that the optimal model for finding the relationship between the variables is the fixed effects method, since the result of the F-test was necessary to reject the use of the OLS method and the result of the Hausman test was necessary to reject the use of the random effects method. Thus, this part of the analysis shows that the fixed effects method is the optimal model for finding the effect of macroeconomic aggregates on the happiness index.

4.2. Discussion of the Results

The aim of the paper was to investigate the impact of GDP per capita and total consumption on the happiness index in the V4 countries. For this purpose, we used the fixed effects model in Gretl. Our results (Table 6) show that GDP turned out to be a significant regressor, which means that it has a statistically significant effect on the happiness index. This is confirmed by the low p-value, which is less than 0.05. However, the results also show that a 1% change in GDP causes only a negligible change in the happiness index. On the other hand, the effect of total consumption on the happiness index is found to be insignificant, which is confirmed by a p-value greater than 0.05.

These results are consistent with research conducted by other authors, such as Guven (2008), who found that happier people spend more on life insurance but less on luxury goods and services, and Kenny (1999), who found a relationship between economic growth and people's happiness. However, both authors also point out that the results can vary considerably depending on the regions selected.

It should also be mentioned that the reliability of the model used was high, with a predictive power of 87%. This means that the model reflects well the actual relationship between the selected variables.

Table 3. Results of the fixed effects model

Fixed effects model		
Dependent variable: LifeLadder	Coefficient	p-value
Regressor		
Consumption	-0.00000374509	0.341
GDP per capita	0.000161005	0.0000193
R-squared	0.874452	

5. Conclusion

The aim of this paper was to investigate the influence of certain macroeconomic variables on the happiness index in the V4 countries (the Czech Republic, Slovakia, Hungary, and Poland). The happiness index is a measure of well-being that is published annually by the United Nations. For this study, two macroeconomic variables were chosen: GDP per capita and total consumption.

The findings of the analysis indicated that only GDP per capita had a significant impact on the happiness index, while total consumption was not significant. These results are consistent with those found in previous studies by Guven (2008) and Kenny (1999).

The Czech Republic, Slovakia, Hungary, and Poland are not only geographically, but also demographically similar, which raises the question of how the relationship between macroeconomic variables and well-being might differ in countries that are less similar. It would be interesting to investigate whether the findings from this study can be generalized to other countries with different demographic and economic characteristics.

Future research could explore the relationship between macroeconomic variables and well-being in a broader range of countries, in order to understand how these factors may vary

across different regions and societies. This could provide valuable insights into the factors that contribute to well-being, and how different policy interventions might impact well-being in different contexts.

This research contributes to the understanding of the relationship between well-being and macroeconomic variables, and further research will be needed to explore this topic in more detail, not just in the V4 countries, but also in other regions around the world.

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