

Investigating the Determinants of Happiness Index in EU-27 Countries: A Quantile Regression Approach

Ali İhsan Akgün (✉ ihsan.akgun@ybu.edu.tr)

Ankara Yıldırım Beyazıt University <https://orcid.org/0000-0002-6441-8196>

Serap Pelin Türkoğlu

Ankara Yıldırım Beyazıt University: Ankara Yıldırım Beyazıt Üniversitesi

Süheyla Erikli

Ankara Yıldırım Beyazıt University: Ankara Yıldırım Beyazıt Üniversitesi

Research

Keywords: Happiness index, employment status, financial inclusion, macroeconomics factors, quantile regression analysis

Posted Date: May 4th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-454728/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at International Journal of Sociology and Social Policy on March 18th, 2022. See the published version at <https://doi.org/10.1108/IJSSP-01-2022-0005>.

Investigating the determinants of happiness index in EU-27 countries: a quantile regression approach

Prof.Ali İhsan Akgün

*Health Management, Ankara Yıldırım Beyazıt University,
Esenboğa Merkez Külliyesi Esenboğa/Ankara, TURKEY*

Phone: +903129061886 Gsm: +905325621105

E-mail: ihsan.akgun@ybu.edu.tr

ORCID: 0000-0002-6441-8196

Dr. Serap Pelin TÜRKOĞLU

*Ankara Yıldırım Beyazıt University,
Management and Organization Programme*

Phone: 0312 906 25 01

E-mail: spturkoglu@ybu.edu.tr

ORCID: 0000-0001-9566-9898

Dr. Süheyla ERİKLİ

*Ankara Yıldırım Beyazıt University,
Management and Organization Programme*

Phone: 0312 906 25 01

E-mail: serikli@ybu.edu.tr

ORCID: 0000-0002-5817-6469

Prof.Ali İhsan Akgün

(Corresponding Author)

*Health Management, Ankara Yıldırım Beyazıt University,
Esenboğa Merkez Külliyesi Esenboğa/Ankara, TURKEY*

Phone: +903129061886 Gsm: +905325621105

E-mail: ihsan.akgun@ybu.edu.tr

ORCID: 0000-0002-6441-8196

Investigating the determinants of happiness index in EU-27 countries: a quantile regression approach

Abstract

This paper examines the determinants of happiness index ratings in European countries over 8 time points using unique data from the Eurostat, World Bank and World Happiness Reports. To examine the determinants of happiness index ratings for EU-27 countries over the 2012-2019 period, panel ordinary least square (OLS) and quantile regression model are used to data obtained from all sample. Evidence from European data on happiness index generate some important key outcomes; economic outcomes levels with both current taxes and inflation rate have a positively relationship on happiness index ratings (HIR), while total employment rate has a significant negatively on HIR. Additionally, in a quantile panel regression of 27 countries, the impact of financial inclusion on happiness index looks to change with a country's level of income. On the macroeconomic level, gross domestic product (GDP) improves the happiness index for the individual under certain conditions. Thus, GDP on 0.25th quantile levels positively significant impacts the HIR for leader countries. Overall, empirical evidence suggests that macro-economic variables and the labor market proxies of the countries play a key role in determining happiness index ratings as well.

Keywords: Happiness index, employment status, financial inclusion, macroeconomics factors, quantile regression analysis.

JEL Classification: D63, E24, I31.

1 Introduction

Happiness, which is an ultimate target, is important for people in both developed countries and developing countries. In addition, happiness influences people's actions. Thus, happiness has an important place where the writings of poets, the lyrics of musicians and the other aspects (Rojas **2016**). Consequently, the happiness term is used with different meanings among people and happiness researchers.

However, happiness is a subjective measure, self-reporting but the reliability and truthfulness is questionable. It can also be evaluated objectively using life span, income and education. But question arises, whether if income, lifespan and education level increase, will it increase the level of happiness. In 2009, the Gallup poll system issued a happiness scale in a national survey (Yap and Geetha **2018**). Numerous of the empirical evidence on happiness uses survey data where subjects are asked to evaluate their happiness. Many analyses have been leveled at these survey data calling into question the wording and the openness and validity of the responses. However, empirical evidences suggest that the determinants of happiness are fluctuating through time and across countries (Kacapyr **2008**).

According to Arvin and Lew (**2014**), happiness is one important measure of the subjective well-being of people. Thus, happiness as a key measure of subjective well-being, takes how people judge their lives measured against personal opportunities. On the macro-economic level, previous study on happiness began by examining the relationship between economic growth and happiness. Economists have offered the existence of various associates between happiness and a number of other variables through several studies.

The happiness index is a corresponding indicator of national performance and progress to the leading economic measures. As is well known, the goodness of societies has been usually measured through wealth with Gross National Product (GNP) to describe the dollar value of a nation's output. A different of GNP, Gross Domestic Product (GDP) is now more generally used, indicating the value of all goods and services produced within a nation (Cummins et al. **2003**). More prominently, recent years have observed an extensive debate on whether GDP is a suitable indicator for measuring people's happiness. Happiness has also usually been measured in terms of macro-economic indicators such as income, wealth and government consumption. However, while macro-economic indicators are among the key determinants of

human happiness, it has increasingly become known that they are an insufficient metric for evaluating people's happiness (Niimi **2018**).

One strand of literature focuses on the the relationship between inequality and happiness (Alesina et al. **2004**; Binder and Coad **2011**; Boyce et al. **2013**). A second strand of it examines the relationship between income inequality and happiness inequality (Marks and Flemming **1999**; Delhey and Kohler **2011**; Graafland and Lous **2018**). A third strand of it focus on the the determinations of happiness including some macroeconomics variables (Deeming and Jones **2015**; Di Tella et al. **2001**; Dolan et al. **2008**; Marks and Flemming **1999**). In this study, we add to this third strand of the literature on the determinations of happiness index from EU-27 countries with panel quantile regression analysis in the macro-economic levels.

The study extends the literature on developed countries and suggestions a particular perspective on the relationship between economic outcomes and happiness index. This study offers two main originalities: it simultaneously examines the happiness-macroeconomic level, and happiness-employment status dimension, and it uses a quantile regression approach, including financial inclusion variation.<sup>[1]
[SEP]</sup>

The main research question that we focus on in this study is therefore: How does happiness index ratings facilitate the relationship between macro outcomes in European countries? In order to answer this research question, we focus on two sub questions:

First, how do dimensions of macro level influence happiness index?

Second, how does labor market condition affect happiness index?

By analyzing these questions, the purposes of this study is examined to extend our knowledge of the role of macro levels and labor markets conditions in the influences of various indicators of happiness index in EU-27 countries. Thus, our study contributes to the traditional current literature in three ways. First, this is to concept a data set that enables us properly to identify the impacts of macroeconomic factors on happiness index. Second, contribution is to consider a wide range of potentially influential macro variables such as inflation, current taxes on income, total government expenditure, besides the obvious macroeconomic variables, such as GDP per capita or youth unemployment. Finally, this study also contributes to the determinations of happiness index literature by distinguishing between the different country group effects of financial inclusion on happiness.

This study is mainly structured as follows. Section 2 introduces the literature and hypotheses development. Section 3 describes the data sources and methodology. Section 4 shows the results of the empirical analysis. Section 5 summarizes the main findings conclusion.

2 Literature review

According to Delhey and Kohler (**2011**), happiness can be defined as the extent to which people evaluate their lives positively, and can be measured, among other indicators including life satisfaction. The growing theoretical and empirical literature on happiness has so far focused on the determinants of happiness. For example, some studies focus on the the relationship between income inequality and happiness (Alesina et al. **2004**; Binder and Coad **2011**; Boyce et al. **2013**; Marks and Flemming **1999**; Delhey and Kohler **2011**; Graafland and Lous **2018**), while others focus on the the determinations of happiness on macroeconomics variables (Dolan et al. **2008**; Zagorski et al. **2014**). In contrast, analyses of happiness index ratings remain relatively limited, though there have been an increasing number of studies that examine the of happiness in recent years. Although there is a significant literature looking at the determinants of happiness, the relationship between macroeconomics factors and happiness index ratings is not yet well known. Studies show that the determinants of happiness vary between countries. In particular, Helliwell and Barrington-Leigh (**2010**)'s result suggests that while there are some differences between developing and developed countries, variation between individual countries is less significant.

Overall, Delhey and Kohler (2011) find that income inequality has significant affect associated with happiness. Thus, the relationship between happiness and income distribution and labor markets is complex. For example, Piketty (2014) find that low GDP growth is associated with greater income inequality. In a recognized contribution, Easterlin (1974) detected the lack of relationship between GDP growth and fluctuations in happiness in the United States. Deeming and Jones (2015)'s findings results suggest that income distribution with GDP have a good health and positive happiness. Similarly, Helliwell and Barrington-Leigh (2010) find that the relationship between GDP and happiness is strongly positive among countries, but weakly negative among provinces. This difference outcome about not since the impacts of incomes on life satisfaction differ among countries and provinces, however since the international distribution of income is much more unequal that that among provinces. Therefore, GDP leads the explanation of international differences in life satisfaction. In contrast, Alesina et al. (2004) find that the happiness of the poor is intensely negatively affected by inequality in Europe. Similarly, Kim (2016) find that the negative relationship between income inequality and GDP growth is strong in low-income countries in terms of financial inclusion. Altunbaş and Thornton (2020) find that finance impacts on income inequality within both the financial institutions and financial markets channels. However, Altunbaş and Thornton (2019) find that the coefficients on GDP and inflation are never statistically significant on financial inclusion.

Another important key study, Binder and Coad (2011)'s findings result show that have a decreasing importance of income, and social factors with increasing quantiles of happiness. This is a very comprehensive review of the relationship between income and happiness. Some studies show have positive link with happiness (Diener et al. 2002; Marks and Flemming 1999), while the evidence European data on the impact of income inequality on happiness is mixed. For example, O'Connell (2004) and Alesina et al. (2004)'s finds have a positive relationship between income inequality and happiness. More prominently, the evidence on the importance of Piketty (2014)'s evidence find that income inequality is determined by tax policies. In addition, tax system is an important proxy of the general social morale of a society. Therefore, Piketty (2014)'s findings suggest that income inequality has positive effects on taxes on income. However, Graafland and Lous (2018) find that income inequality has negative effects on life satisfaction. Hajdu and Hajdu (2014)' evidence results show that people in Europe countries are negatively affected by income inequality, while decrease of inequality has a significant positive effect on happiness.

Equality can be based on government expenditure, current tax on income, wealth, consumption or any other reasonable proxy for happiness such as job opportunities and social security. Most of the empirical evidence focuses on inequality of annual income, because data for other types of inequality are less available and less measurable. Thus, income inequality is also important for many other dimensions of human happiness (Piketty 2014; Graafland and Lous 2018).

According to Perovic and Golem (2010), a little inflation positively effects happiness. Furthermore, because of fears of hyperinflation, people to feel more strongly about inflation and overly overstress its effect. Some researcher also included inflation as a macroeconomic factor. When inflation increases, it reduces consumer purchasing price power. Thus, the lower income countries group will be occupied in higher income generating activities compared to the rich countries. Therefore, it reduces happiness. Yap and Geetha (2018) find that statistically significant effect of the relationship between inflation and happiness. Harbi and Grolleau (2012) find that there is a significant and negative relationship between inflation rate and happiness. Bjørnsgov (2003) failed to find a significant effect of inflation on life satisfaction. However, controlling for individual personal characteristics and country and year fixed effects inflation has been found to have a consistent negative effect on happiness in Europe (Alesina et al. 2004;

Di Tella et al. **2001**; Wolfers **2003**). However, Romer and Romer (**1998**)'s evidence shows that inflation is linked with improved happiness of the poor in the long run.

Government participation in the economy, typically measured by the share of total general government expenditures in national output, we might expect influence happiness index through various countries. Because government expenditures are financed partially through taxes paid by the peoples, one can argue that changes in government expenditures directly effect changes in happiness index. Peoples prefer lower taxes to have higher disposable income, which increases their happiness. Perovic and Golem (**2010**) find that government expenditure has positively and significantly influences happiness.

Happiness index ratings might be directly or indirectly determined by income derived from labor market proxy including employment. Therefore, more income can lead to more consumption and thus, more utility and higher happiness. We measure income by GDP per capita and expect a positive coefficient on happiness index. This result consistent with Fleche et al. (**2012**) and Wesselbaum (**2019**)' results. In addition to the relationships of inequality with overall happiness and financial quality of life are negative effects. Likewise, Takahashi et al. (**2018**) find that GDP per capita in Japan is negative and statistically significant effect on happiness. However, Zagorski et al. (**2014**)'s results show that GDP increases happiness and financial quality of life. Therefore, happiness index ratings may become less sensitive to rising GDP in European countries.

Another determinant that employment status shows economic security. This is because employment generates positive externalities like job satisfaction and income. Thus, positive externalities support happiness but negative externalities provide unhappiness. Yap and Geetha (**2018**)' findings result shown that happiness had found to be positively influenced by family relationship and work compared to financial situation. Harbi and Grolleau (**2012**) find that self-employment has a generally negative effect on happiness. In this study, we are divided into three groups employment status: total employment rate, youth employment rate and youth unemployment rate. Our finding result suggest that youth employment rate and youth unemployment rate positively effect on happiness, which is consistent with Yap and Geetha (**2018**)' outcomes. However, Song (**2018**) find have a negative relationship between job displacement and happiness.

Occupational status is supposed to be a key important determinant of happiness index because it provides the employed individual with some degree of financial independence. For example, Clark and Oswald (**1994**)'s findings result show that have the positive relationship between unhappiness and unemployment. Similarly, income and occupational status also influence happiness index with income having consistent effects and status effects declining. Marks and Fleming (**1999**) find that the unemployed have positive effect on income and occupational status. Thus, the unemployment rate significantly decreases the average level of happiness.

According to Marks and Flemming (**1999**), socioeconomic status with unemployment is associated with lower levels of happiness. Frey and Stutzer (**2000**) find that unemployment is linked with a significantly lower level of happiness. Additionally, a higher income level has a statistically significant positive but small effect on happiness. Some studies show have significant negative effect of unemployment on happiness (Di Tella *et al.* **2001**; Alesina et al. **2004**; Dolan et al. **2008**; Fleche et al. **2012**; Wesselbaum **2019**).

3 Data source and methodological framework

3.1 Data

This study aims to determine the variables that affect the happiness index values of the European Union countries. In this study, both panel Ordinary Least Squares (OLS) test and quantile regression were used to investigate the determinants of the happiness index of the

European Union countries. Data are obtained from Eurostat, the World Bank and the World Happiness Reports in our sample. Panel data sets of 27 European Union countries between 2012 and 2019 were used in the analysis. Since the World Happiness Reports have been published since 2012, the analysis was made based on the starting year of 2012.

According to information in the official website of the European Union (EU), “*the purpose of the EU is promoting its values and the happiness of its citizens, offer freedom, sustainable development based on balanced economic growth and price stability, a highly competitive market economy with full employment and social progress, and economic, social and territorial cohesion and solidarity among EU countries respect to establish an economic and monetary union whose currency is the euro*”. However, it is not clear whether the extensive macro-economic factors in EU-27 countries contributes not only to the economic life of a country, but also to increasing the happiness of its citizens as measured in various happiness index surveys. We think that the more happiness index ratings a country has, the more opportunity for macro outcomes in that particular country, thus increasing the level of happiness as people have more income and social benefits to satisfy their needs and wants.

3.2 Estimation strategy

Our empirical strategy consists of a two-step process. First, we running a set of OLS regressions using different measures of variables on determinants of happiness index identified in the relevant literature. In the second step, we run panel quantile regressions to examine the potentially differential impacts of macro outcomes and labor market characterized on happiness index across countries with different levels of financial inclusion. More importantly, quantile regressions have been shown in a panel data framework to explain unobserved time-invariant characteristics of individuals to analyze the determinants of happiness index (Demir et al. **2020**; Fang and Niimi **2015**).

Quantile regression methods have been increasingly used to happiness index research. This growing strand of the happiness index literature indeed offers evidence for heterogeneous impacts at different quantiles of the happiness index ratings, underlining the importance of going beyond the average. Identifying such significant features of the determinants of happiness index ratings is of particular interest from a policy perspective. This study examines data on reported determinations of happiness index ratings on European countries. Accordingly, a new set of determinants of happiness index is considered, which expands prior research evidence results showing the effects on happiness of net social contributions, social benefit and youth unemployment, as well as of total employment rate, unemployment rate, inflation and GDP.

To investigate an issue that had so far been ignored in the happiness index ratings literature, the past ten years have witnessed growing efforts in examining heterogeneous outcomes of various factors at determinations of the happiness using panel quantile regressions (Binder and Coad **2011**; Fang and Niimi **2015**). Quantile regression methods agree us to detect heterogeneity across the European countries and identify important relationships between happiness index, macro outcomes, labor markets proxies and determinants of happiness that may not be evident when focusing just on average results.

Quantile regression, developed by Koenker and Bassett in 1978, is a method of estimating functional relationships between variables for all parts of a probability distribution (Cade and Noon **2003**; Koenker and Bassett **1978**). Quantile regression permits the researcher to account for unobserved heterogeneity and heterogeneous covariates effects (Koenker **2004**; Canay **2011**). Quantile regression is a robust regression type. This method is more flexible against extreme values in the data set compared to the classical regression model and neglects the assumption of normal distribution of error terms. Quantile regression method due to its flexible use medicine, economics, engineering, finance and etc. It has application areas in many

fields. In quantile regression, the model is determined in the quantiles selected for the conditional distribution of the dependent variable.

In the happiness research investigates how people observe their happiness in different settings, including different countries, cultures, regions and cities. A large number of different measures have been calculated to capture happiness index. In this study, we determinants the concepts of macro-economic variables and labor market proxies as a key element of the Happiness Index Ratings.

From a policy perspective one of the key principles of measures of happiness is that they allow an empirical evidence investigation of the factors that drive it. Some studies have gone so far as to claim that these events can be considered a proxy for an economist's concept of utility, while others are more careful. Therefore, determinations of happiness have different factors such as gender, age, income, marital status, education level, employment status, the number of children, perception of inequality, feeling of freedom, trust in people, self-reported health status, and the importance of friends in life. For example, much of the literature on happiness focuses on the relationship between happiness and income (Fleche et al. **2012**).

We used as the dependent variable the Happiness Index Ratings (HIR) of the EU-27 countries. Happiness index ratings or subjective well-being (SWB): The survey measure of SWB is from the Feb 28, 2020 release of the Gallup World Poll (GWP) covering years from 2005 to 2019. Unless stated otherwise, it is the national average response to the question of life evaluations. The top of the HIR represents the best possible life for you and the bottom of the HIR represents the worst possible life for you. In our dependent variable, therefore, happiness index, we use the measure "life satisfaction" from the World Database of Happiness. This measure is collected from individual country surveys, and the measure used is the mean per country per year (Arvin and Lew **2014**). These include the World Values Survey, the Gallup World Poll. Happiness is typically measured via a question similar to the following from the World Values Survey: *"Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?"*.

The number of independent variables used usually in estimates of the determinants of macro outcomes and includes the GDP per capita in PPS (GDP), the inflation rate-consumer price (IR), the ratio of total general government expenditure (TGGE); current taxes (CT) on income, wealth, etc., net social contributions (NSC), and social benefit (other than social transfer in kind) paid by general government (SB). In addition, we used labor markets proxies as an independent variables including total employment rate by sex, age group 20-64 (TER), youth employment rate (YER) by age (from 15 to 24 years), youth unemployment rate (YUER) by age (from 15 to 24 years), and inactive population (IP) as a percentage of the population, by gender and age.

Numerous empirical evidence focus on OLS, instrumental variables, and panel regression estimation. In contrast, in this study we examine the impact of certain macroeconomics variables and labor market characterized on happiness index ratings using the quantile regression approach developed by Koenker and Bassett (**1978**). The panel quantile regression model is formulated as follows (Altunbaş and Thornton **2019**; Fang and Niimi **2015**; Zhu et al. **2016**):

$$Q_{yi,t}(\tau_k|\alpha_i, x_{it}) = \alpha_i + X'_{it}\beta(\tau_k) \quad (1)$$

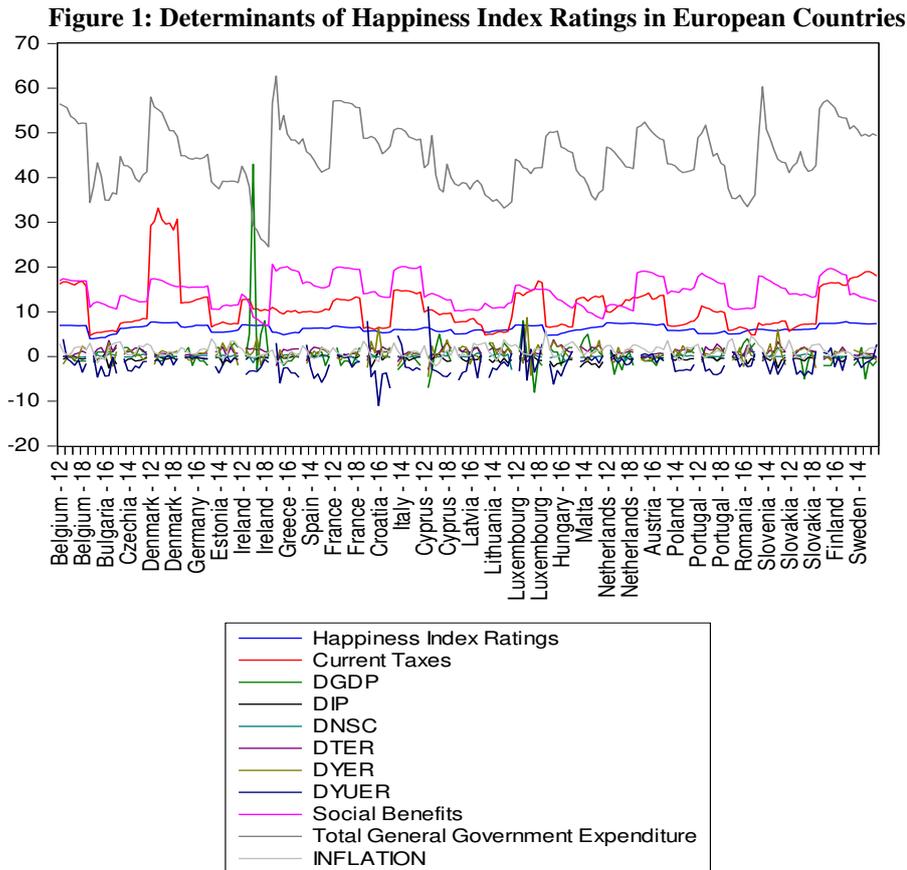
i, the units evaluated; t represents time; y is the argument; x is the vector of the explanatory variables; β is the vector of the estimated parameters; α_i constant term; If, $Q_{yi,t}(\tau_k|\alpha_i, x_{it})$ is k. Quantile refers to the conditional distribution of x with respect to y. In the

light of the data used in our study, the panel quantile regression model can be expressed as follows:

$$Q_{yi,t}(\tau|\alpha_i, \xi_t, x_{it}) = \alpha_i + \beta_{1\tau}CT_{it} + \beta_{2\tau}TGGE_{it} + \beta_{3\tau}NSC_{it} + \beta_{4\tau}SB_{it} + \beta_{5\tau}TER_{it} + \beta_{6\tau}YER_{it} + \beta_{7\tau}YUER_{it} + \beta_{8\tau}GDP_{it} + \beta_{9\tau}IR_{it} + \beta_{10\tau}IP_{it} + \xi_t \quad (2)$$

Where countries are represented by i and time dimension is represented by t , y stands for happiness index ratings (HIR). While CT, TGGE, NSC, SB, TER, YER, YUER, GDP, IR and IP show the arguments, α denotes constant and error term, respectively. In this study, the results of panel quantile regressions were determined as 0.25th, 0.50th, 0.75th, and 0.90th percentiles, respectively.

The various impacts across the HIR can be obviously seen in Figure 1. This figure illustrates have a positive impact on HIR of European countries, which ranged between 12 and 18.



4. Results and discussion

4.1 Summary of descriptive statistics

Descriptive statistics of the variables are presented in Table 1.

Table 1 Descriptive statistics

| Variables | CT | GDP | HIR | IP | IR | NSC | SB | TER | TGGE | YER | YUER |
|-------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mean | 11.10 | 100.26 | 6.23 | 27.36 | 1.17 | 11.63 | 14.48 | 70.65 | 44.81 | 31.89 | 21.12 |
| Median | 10.10 | 89.00 | 6.14 | 27.10 | 1.09 | 12.40 | 14.10 | 71.20 | 44.15 | 28.40 | 18.95 |
| Maximum | 33.20 | 272.00 | 7.77 | 36.60 | 5.65 | 19.00 | 20.60 | 82.40 | 62.70 | 65.30 | 58.30 |
| Minimum | 4.70 | 46.00 | 3.98 | 17.10 | -2.09 | 0.80 | 6.80 | 52.90 | 24.50 | 11.80 | 5.60 |
| Std. Dev. | 5.24 | 43.06 | 0.86 | 4.59 | 1.28 | 4.14 | 3.26 | 6.17 | 7.02 | 12.14 | 11.27 |
| Skewness | 1.76 | 2.17 | -0.20 | 0.03 | 0.25 | -0.81 | 0.07 | -0.49 | -0.07 | 0.71 | 1.17 |
| Kurtosis | 7.27 | 8.90 | 2.33 | 2.26 | 3.08 | 3.17 | 2.05 | 2.84 | 2.77 | 2.68 | 4.02 |
| Jarque-Bera | 276.98 | 483.54 | 5.43 | 4.85 | 2.37 | 24.37 | 8.23 | 8.98 | 0.64 | 19.21 | 59.35 |

| | | | | | | | | | | | |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|
| Probability | 0.00 | 0.00 | 0.06 | 0.08 | 0.30 | 0.00 | 0.01 | 0.01 | 0.72 | 0.00 | 0.00 |
| Observations | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |

According to the descriptive statistics results, shown in Table 1, regression analysis is a statistical method frequently used in the literature to investigate the relationships between variables. According to the Table I, HIR had a mean value of 6.23% with minimum and maximum values of 3.98% and 7.77% respectively. GDP had a mean value of 100.26% with minimum and maximum values of 46.00% and 272.00% respectively. The skewness ranged between -0.20 and 2.17 while the Kurtosis ranged from 2.33 to 8.90. The skewness and kurtosis show that the data for this sample were normally distributed.

4.2 Analysis of OLS regression results

Our panel data test indicates that there is no basis for rejecting the null hypothesis (H_0) of no correlation between unobserved random error and independent variables. Because the Least Squares test probability ($p=0.99$) is greater than the critical value of 0.05, we consider no inconstant coefficients problem. In this model, therefore, solutions to problems of heteroscedasticity and autocorrelation are required here. Because heteroskedastic models are usually settled with estimated or feasible generalized least squares (EGLS or FGLS), we have tried to explain the error component through a panel EGLS. In addition, since there is autocorrelation in the model ($p=0.2749$), it is necessary to deal with it. We used the Durbin-Watson test for first-order autocorrelation in the residuals to handle balanced panel data (Yaffe, 2006). We therefore observe in a panel regression framework by using three different kinds of error structures: panel Estimated Generalized Least Squares Estimation (EGLS) with cross-section weights, panel Least Squares autocorrelation with Durbin-Watson test and panel OLS regression.

Table 2 Panel OLS regression results in EU-27 countries

| Variables | Panel EGLS test | Durbin-Watson test | Panel OLS regression |
|--------------------------|----------------------------|-------------------------------|---------------------------------|
| CT | 0.1039*** (11.502) | 0.1100*** (11.777) | 0.0288** (2.072) |
| GDP | 0.0085 (0.6702) | 0.011 (0.8833) | 0.0038 (1.4168) |
| TGGE | 0.0007 (0.0689) | 0.0015 (0.1315) | 0.0073** (1.9142) |
| IR | 0.1076*** (3.0379) | 0.1172*** (3.0379) | 0.0179*** (2.4397) |
| NSC | 0.0586 (0.7108) | 0.0545 (0.5426) | 0.0174 (0.8434) |
| SB | -0.0305 (-1.4724) | -0.0295 (-1.3064) | 0.0156 (0.6403) |
| TER | -0.0758 (-0.8220) | -0.0652 (-0.7329) | 0.0361** (1.9911) |
| IP | 0.2406** (2.0144) | 0.1998* (1.6610) | -0.0453* (-1.9144) |
| YER | 0.1218*** (2.9125) | 0.1093** (2.5224) | -0.0202** (-2.3821) |
| YUER | 0.0969* (2.7484) | 0.0761** (2.1333) | 0.0031 (0.4629) |
| Cons | 5.6764*** (17.833) | 5.4672*** (16.264) | 0.0022 (0.1724) |
| R-squared | 0.6142 | 0.5864 | 0.2409 |
| Prob(F statistic) | 28.3412*** | 25.2391*** | 5.6489*** |
| Observation No | 189 | 189 | 189 |

Note: Panel OLS regression results for EU-27 countries are defined in Table 2. The table reports the impacts of the explanatory of countries' variables and t statistics are reported parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 2 shows results of panel OLS regressions results for EU-27 countries. The findings result show that there is a significant and positive effect on between HIR and macro outcomes with CT at the 1% significant level except for panel OLS. We also find that the positive effect macro outcomes with IR at the 1% significant level in all models, while GDP, NSC and SB have no contribution on HIR. In addition, evidence shows that TGGE no contribution to macro levels in the determinations of happiness index, but only panel OLS result at the 5% level. Similarly, labor markets proxy with TER no contribution on the determinations of happiness index, but only panel OLS result at the 5% significant level. We also find that the positive effect labor market proxies such as IP and YER for the both panel EGLS and autocorrelation with Durbin-Watson test, while IP and YER have a negative effect on HIR at the 10% level and 5% level, respectively. In contrast, the panel regression results evidence suggests that have a positive significant effect labor markets proxy with YUER for the both panel EGLS and autocorrelation with Durbin-Watson test at the 10% level and 5% level, respectively, while no contribution with YUER in the determinations of happiness index for OLS regression results.

4.3 Analysis of quantile regression results

Within the scope of the study, the stationarity of the variables used should be tested before performing the panel quantile regression analysis. Panel unit root tests were conducted to determine the stability of the data. Fisher-ADF and Levin, Lin, Chu (LLC) unit root tests, which are the most widely used in the literature, were used as panel unit root tests. In addition, in this study, using a panel co-integration test called the Kao Residual Co-Integration Test, it was examined whether there was a long-term balance relationship between variables. Appendix A shows panel unit root and panel co-integration test results.

According to the unit root test results in Appendix A, it is understood that CT, HIR, IR, SB and TGGE variables do not contain unit root for 5% significance level and the data are stable. It is seen that GDP, IP, NSC, TER, YER and YUER variables contain unit root. In order to eliminate the unit root problem, the first difference values of these variables were taken. It was seen that the data were stationary in the first difference values and the first difference values of these variables were used in the next analysis stages. The co-integration test result is in the last line of Appendix A. It is seen that the value found is statistically significant for 1% significance level, and this result shows that there is a long-term equilibrium relationship between the variables examined during the period considered.

Table 3 shows results of panel quantile regressions results for EU-27 countries. The findings result show that there is a significant and positive effect on between HIR and macro outcomes with CT for all quantiles levels. This results are consistent with Piketty (2014). We also find that the positive effect macro outcomes such as IR (significant only for the 25th and 50th quantiles) and GDP at the 5% level for only for the 25th quantiles. This results are consistent with Arvin and Lew (2014)'s finding suggest that income per capita is significant effect on the happiness. More specifically, our quantile results suggest that the macroeconomic level of CT, GDP, and IR are a determining factors in whether or not there are a statistically significant correlation with happiness. In contrast, the quantile regression results evidence suggests that have a negative significant effect macro outcome with SB (significant only for the 90th quantiles) at the 5% level and labor markets proxy with TER for the quantiles of happiness index at the 10% level. Additionally, evidence shows that no contribution to macro variables such as NSC and TGGE, and labor market proxies including IP, YER and YUER in the determinations of happiness index.

Table 3 Panel quantile regression results in EU-27 countries

| Variables | Quantile Levels | | | |
|-----------------------|------------------------|-----------------------|-----------------------|------------------------|
| | 0.25 | 0.50 | 0.75 | 0.90 |
| CT | 0.0999*** (10.2949) | 0.1131*** (3.6081) | 0.1301*** (3.9535) | 0.1641*** (3.9848) |
| GDP | 0.03146** (2.5366) | 0.0072 (0.1099) | 0.0028 (0.3056) | 0.0008 (0.0955) |
| TGGE | -0.0066 (-0.3279) | -0.0138 (-0.8402) | -0.0004 (-0.0185) | 0.0333 (1.6311) |
| IR | 0.1229*** (2.6756) | 0.1229** (2.3731) | 0.0529 (0.9978) | 0.0763 (1.5131) |
| NSC | 0.0814 (0.6490) | 0.1194 (1.2829) | -0.0928 (-0.6441) | -0.0248 (-0.1183) |
| SB | -0.0232 (-0.8397) | 0.0144 (0.3329) | -0.0488 (-0.8822) | -0.1246** (-2.9633) |
| TER | -0.2524* (-1.8766) | -0.1016 (-0.6128) | -0.1033 (-0.6012) | -0.0703 (-0.6260) |
| IP | -0.0161 (-0.0953) | 0.1766 (0.8915) | 0.1448 (0.6861) | 0.0313 (0.1555) |
| YER | 0.0514 (0.8771) | 0.1038 (1.4009) | 0.0609 (0.6693) | -0.0168 (-0.3004) |
| YUER | 0.0201 (0.3512) | 0.0799 (1.3082) | 0.0437 (0.8798) | 0.0068 (0.1358) |
| Cons | 5.4478*** (7.8374) | 5.5808*** (8.8330) | 6.0743*** (8.5780) | 5.4468*** (9.4813) |
| Pseudo R ² | 0.3419 | 0.3853 | 0.3962 | 0.3860 |
| Quasi-LR Statistic | 102.1090*** | 142.2490*** | 140.0270*** | 116.7922*** |
| Observation No | 189 | 189 | 189 | 189 |

Note: Panel quantile regression results for the 0.25, 0.5, 0.75 and 0.90 quantile levels in EU-27 countries are defined in Table 3. The table reports the impacts of the explanatory of countries' variables and t statistics are reported parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

According to Table 3, when the Quasi-LR test results, which are the measure of the goodness of fit of the quantile regression model, are examined, it is understood that the models are significant since $p < 0.05$ for the 0.25, 0.5, 0.75 and 0.90 quantile levels. When the Pseudo R² values are examined at the end of the models, the independent variables explain 34.19% of the HIR variable at the 0.25 quantile level. Our result also shows that there is approximately 34.19% correlation between the independent variables and the HIR variable.

Table 4 Quantile slope equality test

| Estimated equation quantile tau = 0.25, 0.50, 0.75 | | | |
|--|-------------------|--------------|--------|
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Wald Test | 26.52892 | 20 | 0.1490 |
| Estimated equation quantile tau = 0.90 | | | |
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Wald Test | 47.19716 | 30 | 0.0238 |

Table 4 includes the results of the quantile slope equality test and Table 5 includes the results of the symmetric quantiles test. According to quantile slope equality test result, the chi-square statistic of the Wald test of the slope equality test is 26.52892 and the respective p-value is 0.1490, which suggests no rejection of null-hypothesis for the 0.25th, 0.5th and 0.75th quantile levels. Therefore, we can say that the slope coefficients are equal across the quantiles, they are indifferent from each other. In addition, Table 4 shows that there is 47.19716 and the respective p-value is 0.0238, which suggests no rejection of null-hypothesis for the 90th quantile levels.

Table 5 Symmetric quantiles test

| Estimated equation quantile tau = 0.25, 0.50, 0.75 | | | |
|--|-------------------|--------------|--------|
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Wald Test | 15.70914 | 11 | 0.1523 |
| Estimated equation quantile tau = 0.90 | | | |
| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| Wald Test | 20.42705 | 11 | 0.0398 |

According to symmetric quantile test result, the chi-square value of the Wald test of symmetric quantiles is 15.70914 and the respective p-value is 0.1523 for the 0.25th, 0.5th and 0.75th quantile levels. Therefore, the null hypothesis cannot be rejected in this case and it can be concluded that there is symmetry, no asymmetry exists. In addition, Table 5 shows that there is 20.42705 and the respective p-value is 0.0398, which suggests no rejection of null-hypothesis for the 90th quantile levels.

Our quantile regression analysis to examine whether effects differ across countries with different levels of income. We posit that happiness index affects macroeconomics factors directly and indirectly through financial inclusion. Thus, we reveal new evidence that financial inclusion is a key channel within the reduces income inequality. Demir et al. (2020) find that while financial inclusion significantly reduces inequality at all quantiles of the inequality distribution, these effects are mainly linked with higher-income countries. Similarly, Altunbaş and Thornton (2019) find that all the measures of financial inclusion have a statistically significant and negative effect on income distribution.

Table 6 Quantile regression for financial inclusion scores in the leaders and other performers countries

| Variables | Leaders Quantile Levels | | | | Other performers Quantile Levels | | | |
|-----------------------|----------------------------|-------------------------|------------------------|------------------------|-------------------------------------|----------------------|----------------------|------------------------|
| | 0.25 | 0.50 | 0.75 | 0.90 | 0.25 | 0.50 | 0.75 | 0.90 |
| CT | 0.2104 (1.2569) | 0.0888 (0.4551) | 0.0132 (0.1428) | 0.0247 (0.3345) | 0.0006 (0.2101) | -4.3115 (-0.0098) | -0.0024 (-0.5072) | -0.0145** (-2.0367) |
| GDP | 0.0568*** (2.8290) | 0.0260 (1.2055) | -0.0064 (-0.4222) | -0.0155 (-1.2218) | 0.0038 (0.6790) | 0.0073 (0.7928) | 0.0087 (1.4361) | -0.0093 (-0.6428) |
| TGGE | 0.0766*** (2.8288) | 0.0681** (2.0452) | 0.0621** (2.0959) | 0.0555** (1.9371) | 0.0174*** (4.1549) | 0.0096 (1.0680) | 0.0011 (0.0787) | -0.0127 (-0.8332) |
| IR | 0.1843* (1.8504) | 0.0574 (0.4283) | -0.0221 (-0.1415) | 0.1075 (0.5498) | 0.0153* (1.7516) | 0.0052 (0.4501) | 0.0006 (0.0505) | -0.0050 (-0.2837) |
| NSC | 0.4042* (1.7851) | 0.1475 (0.5118) | -0.3262 (-1.2505) | -0.4867** (-2.2781) | -0.0119 (-0.3111) | 0.0059 (0.1291) | -0.0125 (-0.7463) | -0.0008 (-0.0499) |
| SB | -0.1225* (-1.9079) | -0.1572*** (-3.1082) | -0.1255** (-2.2063) | -0.0832 (-1.3161) | -0.0086* (-1.8334) | -0.0064 (-1.1591) | -0.0044 (-0.7337) | -0.0025 (-0.2638) |
| TER | 0.2448 (0.6683) | 0.0256 (0.0604) | 0.1975 (0.3977) | 0.3494 (0.8775) | -0.0008 (-0.0503) | 0.0284 (1.0849) | 0.0580 (1.4366) | 0.0525 (1.2389) |
| IP | 0.9514** (2.2332) | 0.7956 (1.3436) | 0.2486 (0.3807) | 0.3048 (0.5837) | -0.0137 (-0.5163) | 0.0063 (0.1569) | 0.0268 (0.5085) | -0.0268 (-0.3250) |
| YER | 0.3065** (2.0442) | 0.3171* (1.7543) | 0.1114 (0.8262) | 0.0608 (0.5422) | -0.0049 (-0.6411) | -0.0019 (-0.1850) | 0.0029 (0.2021) | 0.0041 (0.2833) |
| YUER | 0.2503* (1.8536) | 0.2392 (1.4467) | 0.1774 (0.9082) | 0.1327 (0.8501) | -0.0054 (-0.9807) | 0.0018 (0.1967) | 0.0129 (0.8577) | 0.0205 (1.2680) |
| Cons | 4.7497*** (5.1541) | 6.2676*** (5.5853) | 6.2451*** (6.3103) | 5.9595*** (7.4500) | 0.0817 (1.1063) | 0.1106 (1.3949) | 0.1693 (1.6233) | 0.3271* (1.8214) |
| Pseudo R ² | 0.2439 | 0.2860 | 0.2218 | 0.2079 | 0.1469 | 0.1400 | 0.1256 | 0.1473 |
| Quasi-LR Statistic | 28.8911*** | 38.0744** * | 22.6323*** | 14.6746 | 25.5096*** | 23.5786*** | 19.3507** | 17.5452* |
| Observation No | 77 | 77 | 77 | 77 | 112 | 112 | 112 | 112 |

Note: This table reports estimates of the panel quantile regression for the 0.25, 0.5, 0.75 and 0.90 quantile levels. The explanatory independent variables of leaders and other performers' countries' and t statistics are reported parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6 shows results of quantile regressions results for leaders and other performers' countries. The findings result show that there is a significant and negative effect on between

HIR and macro outcomes with CT at the 5% level for other performers countries, while no contribution to macro levels and labor market proxies in the determinations of happiness index in the leaders group countries. Our results findings also suggest that there is a significant and positive effect on between HIR and macro variable with GDP at the 1% level for leaders, while no contribution to macro levels in the determinations of happiness index in the other performers' countries. On a macro level, if we look at the cross section to find out how a financial inclusion of country's income with GDP and its happiness index are significantly correlated. However, the value of the coefficient becomes smaller, and therefore, the impact of GDP on HIR decreases for other performers groups than leaders countries. This outcome is consistent with Takahashi et al. (2018)'s results. As for the quantile regression analysis between economic growth and happiness by a country, on the other hand, we were unable to confirm the Easterlin Paradox in the other performers, which suggests that there is no relationship between GDP and the happiness index of its people.

We also find that the positive effect macro outcome with IR (significant only for the 25th) at the 10% level for both leaders and other performers' countries. This results are consistent with Yap and Geetha (2018)'s findings. In contrast, the quantile regression results evidence suggests that have a negative significant effect macro level with SB on HIR for both leaders and other performers' countries. Our results findings show that there is a significant and positive effect on between HIR and macro outcome with NSC for leaders, but have negative significant only for the 90th, while no contribution to macro levels in the determinations of happiness index in the other performers' countries. Additionally, the quantile regression results evidence suggests that have a positive significant effect macro outcome with TGGE on HIR for both leaders and other performers' countries. This results are consistent with Perovic and Golem (2010)'s findings.

Our results findings suggest that there is a significant and positive effect on between HIR and labor market proxies with YER and YUER at the 5% level and 10% level, respectively, for leaders, while no contribution to income distribution and labor market proxies in the determinations of happiness index in the other performers' countries. For leaders countries, YER and YUER results are consistent with Yap and Geetha (2018)'s findings. We also find that there is a significant and positive effect on between HIR and labor market proxies with IP at the 5% level for leaders, while no contribution to macro variables and labor market proxies in the determinations of happiness index in the other performers' countries. Additionally, evidence shows that no contribution to macro levels and labor market proxies with TER in the determinations of happiness index for both leaders and other performers' countries.

Table 7 Quantile regression for financial inclusion scores in the old members and new members'

| Variables | countries | | | | | | | |
|-----------|-------------------------|-------------------------|------------------------|----------------------|-----------------------|----------------------|----------------------|----------------------|
| | Old Members | | | | New Members | | | |
| | Quantile Levels | | | | Quantile Levels | | | |
| | 0.25 | 0.50 | 0.75 | 0.90 | 0.25 | 0.50 | 0.75 | 0.90 |
| CT | 0.0125 (0.0452) | -0.0399 (-0.1542) | 0.0063 (0.0400) | -0.0011 (-0.0164) | 0.0022 (0.1694) | 0.0019 (0.1402) | -0.0020 (-0.1287) | 0.0067 (0.1494) |
| GDP | -0.0027 (-0.1169) | -0.0163 (-0.3252) | -0.0270 (-0.7381) | -0.0228 (-0.6918) | -0.0057 (-0.4416) | -0.0090 (-0.9013) | -0.0098 (-0.8999) | -0.0083 (-0.1597) |
| TGGE | -0.0024 (-0.0535) | -0.0556 (-0.1616) | -0.1344 (-0.5758) | -0.0882 (-0.3884) | 0.0017 (0.3530) | 0.0003 (0.0781) | -0.0002 (-0.0436) | -0.0013 (-0.1477) |
| IR | 0.2717** (2.3409) | 0.1523 (1.0449) | 0.0838 (0.6594) | 0.0687 (0.4861) | 0.0232* (1.8242) | 0.0157 (1.2485) | 0.0044 (0.2478) | 0.0001 (0.0021) |
| NSC | -0.3659 (-1.3491) | -0.2098 (-0.6046) | -0.0336 (-0.1386) | -0.0300 (-0.0964) | -0.0154 (-0.2917) | -0.0062 (-0.1884) | -0.0037 (-0.1350) | 0.0228 (1.0118) |
| SB | -0.1049*** (-4.3696) | -0.0832*** (-2.6988) | -0.0590** (-2.2052) | -0.0031 (-0.1342) | -0.0199* (-1.8889) | -0.0126 (-1.1266) | -0.0183 (-1.2554) | -0.0303 (-1.3783) |
| TER | -0.1436 (-0.7157) | -0.2595 (-1.3599) | -0.2042 (-0.9679) | -0.1997 (-0.8167) | 0.0007 (0.1175) | -0.0001 (-0.0231) | -0.0002 (-0.0238) | 0.0001 (0.0084) |
| IP | -0.0677 (-0.1705) | -0.1781 (-0.5299) | -0.4098 (-1.3295) | -0.2548 (-0.6342) | -0.0145 (-0.6106) | -0.0172 (-0.6127) | -0.0635 (-1.4133) | -0.0475 (-0.4329) |
| YER | 0.0769 | 0.0529 | 0.0645 | 0.0653 | -0.0049 | -0.0040 | -0.0032 | -0.0117 |

| | | | | | | | | |
|-----------------------------|------------|------------|-----------|------------|-----------|-----------|-----------|-----------|
| | (1.1270) | (0.6340) | (0.6619) | (0.4535) | (-1.0628) | (-0.8830) | (-0.5457) | (-0.5901) |
| YUER | 0.0755 | 0.0799 | 0.1216 | -0.0187 | -0.0048 | -0.0047 | -0.0075** | -0.0092 |
| | (1.3188) | (1.1362) | (1.2597) | (-0.2837) | (-0.9685) | (-1.3016) | (-2.2028) | (-1.3504) |
| Cons | 7.9591*** | 8.1751*** | 8.0264*** | 7.3231*** | 0.3159 | 0.3812 | 0.6059 | 1.0858 |
| | (15.8992) | (11.8920) | (15.0221) | (15.67479) | (0.5294) | (0.6765) | (0.8193) | (0.5440) |
| Pseudo R² | 0.3479 | 0.2369 | 0.1800 | 0.0516 | 0.1616 | 0.1507 | 0.1569 | 0.2683 |
| Quasi-LR Statistic | 54.0585*** | 35.9689*** | 25.4261** | 4.9874 | 21.3937** | 20.1658** | 18.2112** | 22.9737** |
| | | | * | | * | | * | * |
| Observation No | 98 | 98 | 98 | 98 | 91 | 91 | 91 | 91 |

Note: This table reports estimates of the panel quantile regression for the 0.25, 0.5, 0.75 and 0.90 quantile levels. The explanatory independent variables of old and new members' countries' and t statistics are reported parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7 shows results of quantile regressions results for old members and new members' countries. The national level of macro outcome and labor market proxies have no statistically significant effect, suggesting that labor market characterized does not contribution determination happiness index ratings in both old and new members' countries. The findings result show that no contribution to macro outcomes such as CT, GDP NSC, and TGGE and labor market proxies including IP, TER, and YER in the determinations of happiness index for both old members and new members' countries. Thus, the quantile regression results tell us that the determinant of happiness are roughly similar in almost both old members and new members European countries. In other words, among the macroeconomic variables measured here, the determinants of happiness do not differ a lot between countries. This is consistent with Helliwell and Barrington-Leigh (2010).

The quantile regression results evidence suggests that there is a significant and positive effect on between HIR and macro outcome with IR at the 5% level for old members' countries, while have contribution to macro levels with IR at the 10% level in the determinations of happiness index in the new members' countries (significant only for the 25th quantiles). For old members group, IR results are consistent with Romer and Romer (1998)'s findings. In contrast, we also find that have a negative effect macro outcome such as SB (significant only for the 25th, 50th and 75th quantiles) for old members and SB at the 5% level for only for the 25th quantiles in the new members' group countries. In addition, our results findings suggest that there is a significant and negative effect on between HIR and labor market proxies with YUER at the 5% level for new members, while no contribution to income distribution and labor market proxies in the determinations of happiness index in the old members' countries. This results show that macroeconomics factors can effect happiness index ratings.

5 Conclusion

The paper explores the determinants of happiness across 27 European countries from 2012 to 2019. Based on a panel quantile regression analysis, the ours test result how some macro-factors from the existing studies affect the level of happiness. The findings result show that there is a significant and positive effect on between HIR and macro outcomes with IR for panel OLS regression. The main finding of this study is that the estimation of quantile regression results show that GDP per capita and happiness index have a positive coefficient. The finding asserts that they have found evidence that higher GDP per capita influences estimates of subjective well-being for a time series analysis of 27 European countries over the 8 period.

The quantile regression estimation results display statistically significant effects of several economic factors determinants of happiness index. This study has examined the determinants of happiness inequality in European with the purpose of extending the literature that has so far focused on happiness index in other parts of the world. The key contribution of this study was to examine in detail the impact of the macro economic factors that people face in their daily lives on happiness index. For example, the estimation of quantile regression results of this study show that GDP per capita and happiness index have a positive coefficient. This outcome consistent with Fleche et al. (2012) and Wesselbaum (2019)' results. Similarly,

evidence result show that CT and happiness index have a positive coefficient. This outcome consistent with Piketty (2014)' results.

Our results findings also suggest that there is a significant and positive effect on between HIR and GDP, which is consistent with Takahashi et al. (2018)'s results, for leaders countries, while no contribution to macro levels in the determinations of happiness index in the other performers' countries. In addition, our results findings suggest that there is a significant and positive effect on between HIR and labor market proxies with YER and YUER, which are consistent with Yap and Geetha (2018)'s findings, for leaders, while no contribution to income distribution and labor market proxies in the determinations of happiness index in the other performers' countries. However, the quantile regression results show that youth unemployment is find to be negatively linked with happiness for new members group, while SB as a macro-economic indicator is find to be negatively linked with happiness for old members group.

Acknowledgements

Not applicable

Authors' contributions

All authors read and agreed the final manuscript.

Funding

Not applicable

Availability of data and materials

Not applicable

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

References

- Alesina A, Tella RD, MacCulloch R (2004) Inequality and happiness: are Europeans and Americans different?. *J.Public Econ.* 88: 2009-2042
- Altunbaş Y, Thornton J (2019) The impact of financial development on income inequality: A quantile regression approach. *Econ. Lett.* 175: 51-56
- Altunbaş Y, Thornton J (2020) Finance and income inequality revisited. *Finance Res. Lett.* <https://doi.org/10.1016/j.frl.2019.101355>
- Arvin M, Lew B (2014) Does income matter in the happiness-corruption relationship?. *Journal of Economic Studies.* 41(3): 469-490
- Binder M, Coad A (2011) From Average Joe's happiness to Miserable Jane and Cheerful John: using quantile regressions to analyze the full subjective well-being distribution. *J. Economic Behavior & Organization.* 79(3): 275-290

- Bjørnskov C (2003) The happy few: Cross-country evidence on social capital and life satisfaction. *Kyklos*. 56(1): 3-16
- Boyce CJ, Wood AM, Banks J, Clark AE, Brown GDA (2013) Money, well-being, and loss aversion: Does an income loss have a greater effect on well-being than an equivalent income gain?. *Psychological Sci*. 24(12): 2557-2562
- Cade BS, Noon BR (2003) A gentle introduction to quantile regression for ecologists. *Frontiers in Ecology and the Environment*. 1(8): 412-420
- Canay IA (2011) A simple approach to quantile regression for panel data. *Econometrics J*. 14: 368-386
- Clark AE, Oswald AJ (1994) Unhappiness and unemployment. *The Economic J*. 104(424): 648-659 ^[1]_[SEP]
- Cummins RA, Eckersley R, Pallant J, Van Vugt J, Misajon R (2003) Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Soc. Indicators Res*. 64: 159-190 ^[1]_[SEP]
- Deeming C, Jones K (2015) Investigating the Macro Determinants of Self-Rated Health and Well-Being Using the European Social Survey: Methodological Innovations across Countries and Time. *International J.Sociology*. 45(4): 256-285
- Delhey J, Kohler U (2011) Is happiness inequality immune to income inequality? New evidence through instrument-effect-corrected standard deviations. *Soc.Sci.Res*. 40: 742-756
- Demir A, Pesqué-Cela V, Altunbas Y, Murinde V (2020) Fintech, financial inclusion and income inequality: a quantile regression approach. *The European J.Finance*. DOI: 10.1080/1351847X.2020.1772335.
- Di Tella R, MacCulloch R, Oswald A (2001) Preferences over inflation and unemployment. Evidence from surveys of happiness. *The American Econ. Rev*. 91(1): 335-341
- Diener E, Lucas RE, Oishi S, Suh E (2002) Looking up and looking down: Weighting good and bad information in life satisfaction judgements. *Pers. Soc. Psychol. Bull*. 28(4): 437-445
- Dolan P, Peasgood T, White M (2008) Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *J. Econ. Psychol*. 29: 94-122
- Easterlin RA (1974) Does Economic Growth Improve the Human Lot? Some Empirical Evidence. pp.89-125 in *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, (ed.) P.A. David, M.W. Reder. Academic Press, New York ^[1]_[SEP]
- Fang Z, Niimi Y (2015) Do Losses Bite More than Gains? Evidence from a Panel Quantile Regression Analysis of Subjective Well-being in Japan. Online at <https://mpr.ub.uni-muenchen.de/68059/> MPRA Paper 68059.
- Fleche S, Smith C, Sorsa P (2012) Exploring Determinants of Subjective Wellbeing in OECD Countries: Evidence from the World Value Survey. *OECD Statistics Working Papers* 2012/01, OECD Publishing. <http://dx.doi.org/10.1787/5k9ffc6p1rvb-en>.
- Frey BS, Stutzer A (2000) Happiness, Economy and Institutions. *The Econ. J*. 110: 918-938
- Graafland J, Lous B (2018) Economic Freedom, Income Inequality and Life Satisfaction in OECD Countries. *J.Happiness Stud*. 19: 2071-2093
- Hajdu T, Hajdu G (2014) Reduction of income inequality and subjective well-being in Europe. *Economics: The Open-Access, Open-Assessment E-J*. 8(35): 1-29
- Harbi SE, Grolleau G (2012) Does self-employment contribute to national happiness?. *The J. Socio-Econ*. 41: 670-676
- Helliwell JF, Barrington-Leigh CP (2010) Measuring and Understanding Subjective Well-being. NBER Working Paper 15887, National Bureau of Econ. Res. <http://www>.

- nber.org/papers/w15887.
- Kacapyr E (2008) Cross-country determinants of satisfaction with life. *International J.SocioEcon.* 35(6): 400-416
- Kim JH (2016) A Study on the Effect of Financial Inclusion on the Relationship Between Income Inequality and Economic Growth. *Emerging Markets Finance and Trade.* 52(2): 498-512
- Koenker R (2004) Quantile regression for longitudinal data. *J.Multivariate Analysis.* 91: 74-89
- Koenker R, Bassett JrG (1978) Regression quantiles. *Econometrica: J.Econ.Soc.* 33-50
- Marks GN, Fleming N (1999) Influences and Consequences of Well-Being among Australian Young People: 1980-1995. *Social Indicators Res.* 46(3): 301-323
- Niimi Y (2018) What Affects Happiness Inequality? Evidence from Japan. *J.Happiness Stud.* 19: 521-543
- O'Connell M (2004) Fairly satisfied: Economic equality, wealth and satisfaction. *J.Econ. Psyc.* 25: 297-305
- Perovic LM, Golem S (2010) Investigating Macroeconomic Determinants of Happiness in Transition Countries. *Eastern European Econ.* 48(4): 59-75
- Piketty T (2014) *Capital in the 21st century*. London: Beldknap/Harvard. ^[1]_{SEP}
- Rojas M (2016) *Handbook of Happiness Research in Latin America*, (Ed.) Rojas, M., Happiness, Research, and Latin America. Springer Dordrecht Heidelberg, New York ^[1]_{SEP}
- Romer CD, Romer DH (1998) Monetary policy and the well-being of the poor. NBER Working Paper 6793
- Song Y (2018) Job displacement and subjective well-being: findings from the American Time Use Survey Well-Being Modules. *J.Labour Market Res.* 52(13): 1-13
- Takahashi Y, Fukushima S, Hagiwara R (2018) Determinants of Happiness in Japan and the Netherlands: Macro and Micro Analysis and Comparison. *Asia-Pacific Rev.* 25(1): 124-150
- Wesselbaum D (2019) Happiness over the financial crisis. *Oxford Development Studies.* 47(1): 113-133
- Wolfers J (2003) Is business cycle volatility costly? Evidence from surveys of subjective well-being. *International Finance.* 6(1): 1-26
- Yaffe R (2006) A Primer for Panel Data Analysis, available at: www.nyu.edu/its/pubs/connect/fall03/yaffee_primer.html (accessed: March 21, 2021).
- Yap SS, Geetha C (2018) Factors that Influence Happiness among Sabahans. *Malaysian J.Bus.Econ.* 5(1): 19-58
- Zagorski K, Evans MDR, Kelley J, Piotrowska K (2014) Does National Income Inequality Affect Individuals' Quality of Life in Europe? Inequality, Happiness, Finances, and Health. *Social Indicators Res.* 117(3): 1089-1110
- Zhu H, Duan L, Guo Y, Yu K (2016) The Effects of FDI, Economic Growth and Energy Consumption on Carbon Emissions in ASEAN-5: Evidence from Panel Quantile Regression. *Econ. Modelling.* 58: 237-248

Appendix A Panel unit root and co-integration test results

| Variables | LLC t statistic | LLC p value | Fisher-ADF t statistic | Fisher-ADF p value |
|-----------|--------------------|----------------|---------------------------|-----------------------|
| CT | -6.3278 | 0.0000 | 79.4098 | 0.0138 |
| GDP | -0.8334 | 0.2023 | 43.6551 | 0.8418 |
| HIR | -5.5184 | 0.0000 | 104.0450 | 0.0001 |
| IP | -0.9639 | 0.1675 | 18.7780 | 1.0000 |
| IR | -9.7447 | 0.0000 | 101.5220 | 0.0001 |
| NSC | -3.9668 | 0.0000 | 56.0551 | 0.3977 |
| SB | -22.2214 | 0.0000 | 80.6223 | 0.0109 |
| TER | -5.2871 | 0.0000 | 42.5299 | 0.8703 |
| TGGE | -13.6274 | 0.0000 | 79.5916 | 0.0133 |
| YER | -5.7581 | 0.0000 | 50.4403 | 0.6125 |
| YUER | -3.8459 | 0.0001 | 41.2478 | 0.8987 |

| Variables | 1st Difference LLC t statistic | 1st Difference LLC p value | 1st Difference Fisher-ADF t statistic | 1st Difference Fisher-ADF p value |
|-----------|--------------------------------------|----------------------------------|---|---|
| GDP | -7.9816 | 0.0000 | 77.1211 | 0.0211 |
| IP | -15.5230 | 0.0000 | 118.5510 | 0.0000 |
| NSC | -10.7383 | 0.0000 | 104.462 | 0.0000 |
| TER | -15.8592 | 0.0000 | 132.2820 | 0.0000 |
| YER | -10.7572 | 0.0000 | 117.9670 | 0.0000 |
| YUER | -30.4531 | 0.0000 | 149.1210 | 0.0000 |

Kao Residual Co-integration Test statistic: -2.5762. p value: 0.0050

Appendix B Country classification 1

| Leaders | Other Performers |
|-------------|------------------|
| Sweden | Belgium |
| Denmark | Italy |
| Finland | Luxemburg |
| Ireland | Greece |
| France | Portugal |
| Cyprus | Austria |
| Slovenia | Lithuania |
| Germany | Czech Republic |
| Latvia | Estonia |
| Spain | Hungary |
| Netherlands | Malta |
| | Poland |
| | Slovakia |
| | Bulgaria |
| | Romania |
| | Croatia |

Source: This table is listed according to countries score the Financial Inclusion Index from National Financial Inclusion Strategies Resource Center for the World Bank.

Appendix C Country classification 2

| Old Countries | Participation Date | New Countries | Participation Date |
|----------------------|---------------------------|----------------------|---------------------------|
| Germany | 1951 | Czech Republic | 2004 |
| Belgium | 1951 | Estonia | 2004 |
| France | 1951 | Cyprus | 2004 |
| Netherlands | 1951 | Latvia | 2004 |
| Italy | 1951 | Lithuania | 2004 |
| Luxembourg | 1951 | Hungary | 2004 |
| Denmark | 1973 | Malta | 2004 |
| Ireland | 1973 | Poland | 2004 |
| Greece | 1981 | Slovakia | 2004 |
| Portugal | 1986 | Slovenia | 2004 |
| Spain | 1986 | Bulgaria | 2007 |
| Austria | 1995 | Romania | 2007 |
| Finland | 1995 | Croatia | 2013 |
| Sweden | 1995 | | |

Source: This table is listed from the official website of the European Union.

Figures

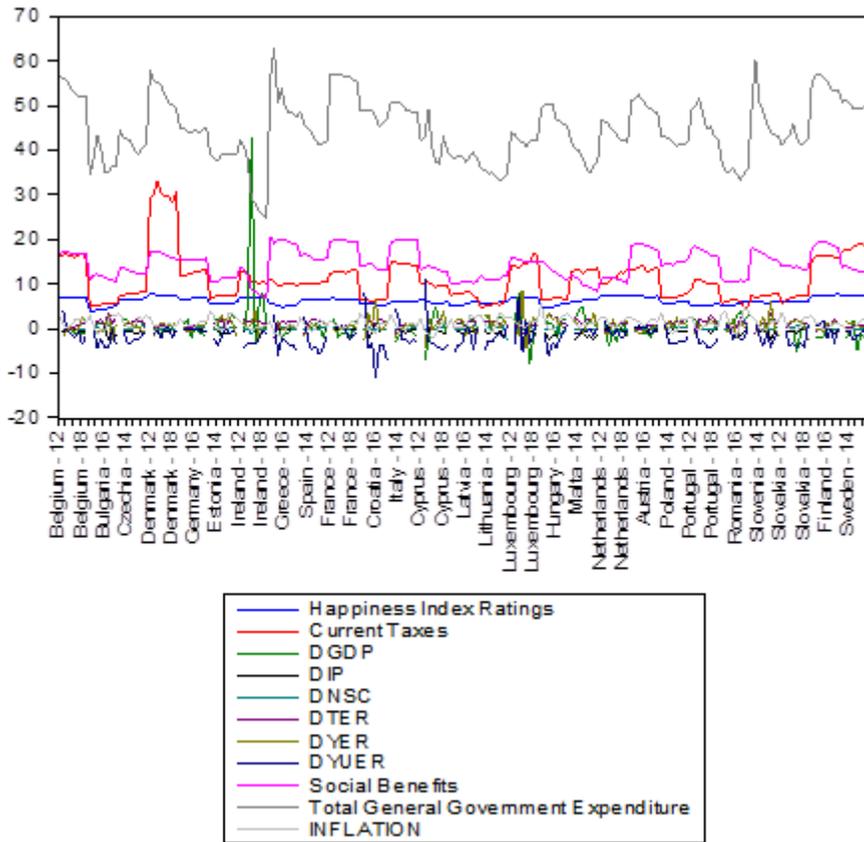


Figure 1

Determinants of Happiness Index Ratings in European Countries