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THE LINK BETWEEN THE SHADOW ECONOMY AND THE HAPPINESS ECONOMY IN EU EURO AREA COUNTRIES

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Abstract. *Purpose* – the aim of this study is to assess the relationship and influence between the shadow economy and the level of happiness in the Euro area economies of the European Union by highlighting the theoretical assumptions behind the concept and expression of the shadow economy and happiness.

Research methodology – to calculate the size of the shadow economy will be used Gutmann's index. To calculate the happiness of the economies will used the Happiness Economy Index from the World Happiness Report (2022) including the following 6 indicators (GDP per capita, healthy life expectancy (that derives to life expectancy and mental health evaluation), social support, freedom index, generosity (do-nations to charity), and corruption index. To determine the relationship between the shadow and happiness economy, the Granger causality method.

Research limitations – the study's limitations include data reliability and accuracy, methodological limitations, geographical and cultural differences, and time constraints. The estimation of the size of the shadow economy and the happiness economy index may contain inaccuracies, and the Granger causality method cannot fully confirm causality. The study is limited to the euro area countries of the European Union; therefore, the results may not be fully applicable to other countries. Additionally, the data may not fully capture long-term trends or developments.

Practical implications – the results of this study can help policymakers and economists better understand how to reduce the size of the shadow economy and thereby increase people's happiness. The study's findings indicate a positive correlation between a country's Happiness Economy Index and the size of its shadow economy. This suggests that investing in people's well-being can positively impact the formal economy. Furthermore, the study's findings can inform the development of effective strategies to combat the informal economy. For instance, strategies such as enhancing social support, increasing the freedom index, and combating corruption can potentially reduce the size of the informal economy and improve the overall economic situation in a country.

Findings/Value – the research confirmed the hypothesis that the size of the shadow economy is smaller in countries with a higher happiness economy index. And Granger causality tests show that the shadow economy has a relatively strong effect on happiness in the EU euro area countries.

Keywords: happiness economy, shadow economy, Gutmann's index, Granger causality, Happiness Economy Index.

JEL Classification: O17, O50.

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1. Introduction

At first glance, the shadow economy and the happiness economy may seem to be very different and distant topics. However, both the shadow economy and the happiness economy are relevant at both the individual and the economic level. Heads of state try to minimize

the shadow economy in their countries, and citizens decide whether to participate in the shadow economy (whether to receive part of their salary in an envelope, to hide part of their income, to pay in cash and not pay VAT, etc.). Such examples of the shadow economy cause a number of negative consequences for the state: it reduces state income, worsens the quality of public goods, increases taxation, etc. These negative effects can also affect the happiness economy, because every individual wants to live in a country with a higher level of happiness economy, and the government representatives are able to ensure this for the people of their country. Thus, the effects of the shadow economy can have a negative impact on the happiness economy, so it is relevant to examine what theoretical assumptions can be used to explain the manifestation and causes of the shadow economy and the happiness economy. The subject of this paper is of great relevance as it relates to two important economic indicators: the informal economy and the happiness economy. The informal economy is important because it affects the formal economy, reduces tax collection, and can distort competition. The happiness economy, on the other hand, is becoming increasingly important as more and more countries and organizations recognize that economic well-being is not just about GDP growth, but also about the well-being and happiness of people. This study's relevance stems from its focus on the countries of the European Union's euro area, which are significant players in the global economy. The study contributes to the understanding of how the shadow economy can affect happiness levels in these countries and reveals theoretical assumptions that can be useful for policy and decision-making.

To highlight the complexity of the topic under consideration, it should be noted that there are not many articles analyzing the relationship between the shadow economy and the happiness economy. Achim et al. (2018) investigated whether happy people are more likely to participate in shadow economy activities and concluded that happier people are more likely to behave honestly, thus reducing the size of the shadow economy; this result is valid for both old and new EU countries. Achim (2021) examined the relationship between corruption, the shadow economy and happiness in Romania. The author found that Romanians do not associate happiness with material issues, but rather see it as a consequence of family, professional and spiritual wholeness.

When studying the shadow economy, researchers may choose to study the size of the shadow economy, its causes, consequences, or the relationship with other phenomena. Researchers Chen et al. (2018) measured the size of the shadow economy in Chinese provinces. Authors Đekić et al. (2019) studied the shadow economy and its causes in Serbia. After conducting the study, the authors found that the shadow economy is one of the biggest challenges for the Serbian economy, which is manifested in tax evasion, unfair competition, and market distortion. Petranov (2021) studied the shadow economy and regional development in Bulgaria.

When studying the economy of happiness, researchers choose to study the correlation between the economy of happiness and another economic event, the economy of happiness in a particular area, or the concept of an economy of happiness. Pukelienė and Starkauskienė (2009) conducted a study on the concept, measurement and challenges of quality of life and concluded that quality of life is a multidimensional, universal and complex concept with many dimensions. Arampatzia et al. (2015) investigated the happiness and

financial hardship of employees during the economic crisis. Researcher Yashina (2015) studied urban environments where residents feel safer, more successful, and happier. Studies in the scientific literature show that research is being conducted in different directions, so the following scientific research problem becomes relevant: how does the shadow economy of euro area countries relate to the level of happiness in EU countries?

The hypothesis of the study is that the size of the shadow economy is smaller in countries with a higher happiness index.

The purpose of the study is to assess the relationship and influence between happiness and the shadow economy in the countries of the euro area of the European Union.

Objectives of the study:

- To identify the concept, causes and consequences of the shadow economy.
- After identifying the components of the happiness economy, to compare scientific research on the happiness economy.
- To estimate the size of the shadow economy in the euro area countries of the European Union, based on the methodology developed for the study, and to establish the relationship between the shadow economy and the happiness economy by analyzing changes in the estimates of the happiness economy.

2. Literature review

Almost all countries in the world deal with the shadow economy, so the issue of the shadow economy is particularly relevant. Scientists name and interpret the shadow economy differently, it can be: underground economy, informal economy, gray economy, unnoticed economy, hidden economy, money economy.

Schneider (2006) notes that most authors who try to measure the shadow economy find it difficult to define. A commonly used definition is that the shadow economy is all currently unregistered economic activity that contributes to the officially calculated (or observed) gross national product.

Startienė and Trimonis (2009) describe the shadow economy as an officially unrecorded economy that creates value. Values can be created from activities that are prohibited by law or activities that are taxed and therefore not calculated and included in GDP. Wiseman (2013) states that the shadow economy is an economic activity that takes place without the knowledge of the authorities. Nchor (2021) defines the shadow economy as activities and income that are obtained by circumventing government regulations and taxation. According to Lizina et al. (2020), the shadow economy can be defined as certain illegal economic relations established between individuals, groups of individuals, institutional units for the production, distribution, redistribution, exchange and consumption of material goods and services. These economic relations are determined by the general state of the economy, the standard of living of the population and the restrictions imposed by the government. Scholars David and Dumitrascu (2021) describe the shadow economy as a factor of economic decline resulting from illicit legal and illegal activities that are strongly linked to corruption. Petranov (2021) defines the shadow economy as an economic activity that is not officially reported to state institutions. It can be an activity that remains unregistered by state institutions. Thus, the shadow economy is understood as an economic activity that is hidden, based on illegal

economic relations between individuals, groups of individuals, institutional units, carried out in violation of labor or other laws, focused on income or expenses received or incurred by bypassing state regulation in order to avoid paying taxes, and in a broad sense, as an officially unrecorded economy.

According to Schneider (2013), Startienė and Trimonis (2011) and Chen et al. (2018), one of the reasons for the shadow economy is the increasing tax burden in the formal sector (including social security contributions) and tax evasion. A higher tax burden encourages individuals to remain unaccounted for in the economy. The second reason for the shadow economy identified by Schneider (2006), Startienė and Trimonis (2011) is the high level of regulation. The increase in regulation, measured by the number of laws and other legal acts, is another important factor that reduces the freedom of individuals working in the formal economy. The authors Chen et al. (2018) argue that the complex tax system is also the cause of the shadow economy.

The reason for the shadow economy may be the decreasing GDP per capita. According to Đekić et al. (2019), the declining GDP per capita means that it becomes more difficult to do business in the formal economy, so entrepreneurs will engage in the shadow economy to compensate for the losses in the formal economy. Rising unemployment is also a reason for the informal economy. According to Startienė and Trimonis (2011), Chen et al. (2018), the rising unemployment rate encourages people to find a job in the shadow economy. Unemployment is one of the main causes of the shadow economy, and when individuals have low disposable income, they are expected to prefer working in various jobs, including the shadow economy.

According to Startienė and Trimonis (2011), corruption also promotes the informal economy. The researchers find that more corrupt countries have a larger shadow economy. Petranov (2021) argues that one of the economic consequences is that the official GDP is lower than the actual GDP, which leads to a decrease in public funds. Hutsebaut (2021) argues that the shadow economy leads to a deterioration in the quality of public goods and stresses that this undermines the population's overall satisfaction with the government.

Petranov (2021) argues that the unfair advantage gained by shadow companies because they can produce goods and provide services at lower costs distorts the competitive environment and gives a larger market share to companies operating in the shadow economy. Hutsebaut (2021) adds that this damages the international reputation and reduces the willingness of international investors to invest in a country with prevailing shadow economy.

Another consequence is lower social security contributions collected by the state. This leads to the following disadvantageous effect for natural persons who participated in the shadow economy: lower pensions and lower unemployment benefits, as their amounts directly depend on the contributions officially paid by employees and their employers.

Đekić et al. (2019), Hutsebaut (2021) and Petranov (2021) claim that persons working without formal contracts bypass the normative requirements of working conditions. Thus, persons working without official con-tracts face certain risks, unpaid accidents at work, absence of paid holidays, and unregulated working hours.

The analysis of scientific literature made it possible to systematize and visualize the essential (Table 1) causes and effects of the shadow economy.

Table 1. Causes and consequences of the shadow economy (source: compiled by the authors on the basis of an analysis of the scientific literature)

Causes		Consequences
Tax burden	Shadow economy	Official GDP below actual GDP
High level of regulation		Reduction in public spending
Complex tax system		Distorted competitive environment
Corruption		Distorted labour market environment
Declining GDP per capita		Reduced pensions and benefits for participants in the informal economy
Rising unemployment rate		Non-compliance with occupational safety requirements
Low level of public sector services		Increased taxation
		Negative economic efficiency

Happiness is difficult to define because the concept of happiness is individual and changes with time, so scholars define happiness economy quite differently. In recent decades, the economic concept of happiness has increasingly focused on social and psychological needs rather than material goods.

Scholars study the happiness economy by distinguishing between different research objects and fields of study at both theoretical and empirical levels. Arampatzia et al. (2015) investigated employee happiness and financial hardship during an economic crisis. Hallegatte (2014) explained the meaning and measurement of a resilient economy. Researchers: Hirschauer et al. (2015), Crespo and Mesurado (2014), MacKerron (2012) examined the literature related to the economics of happiness, its definitions, theory, research methods, application, and connections with other areas of economic research. Navaitis (2013) examined the prevailing approach to the happiness economy in Lithuania. Researchers Spruk and Kesceljevic (2016) assessed the relationship between the quality of institutions and subjective well-being. Servetkienė (2013) studied the quality of life of Lithuanian residents using a multidimensional assessment, Ribeiro and Santos (2019) studied the happiness economy in Portugal. Pugno (2014) analyzed the unhappy economy and its concepts. Yashina (2015) studied the urban happiness economy in Russia, researchers Gaol and Zhai (2017) studied the well-being of urban residents in China, and Jackson (2016) studied economic freedom and happiness in the United States. In 2020, researchers Helliwell et al. (2020) studied the level of economic happiness around the world. Thus, it can be observed that researchers conduct very different research on the topic of happiness economy. These studies can be divided into 3 categories:

1. Research related to economics of happiness/quality of life in specific areas, regions (Pukelienė & Starkauskienė, 2015; Servetkienė, 2013; Yashina, 2015; Jackson, 2016; Ribeiro & Santos, 2019; Helliwell et al., 2020).
2. Research related to happiness economy and other economic events (Lam & Liu, 2014; Arampatzia et al., 2015; Clark et al., 2016; Spruk & Kesceljevic, 2016; Bennet & Nikolaev, 2017; Mizobuchi, 2017; Frey, 2018).
3. Research related to the concept, notion or definition of the happiness economy (Pukelienė & Starkauskienė, 2009; MacKerron, 2012; Navaitis, 2013; Hallegatte, 2014; Pugno, 2014; Crespo & Mesurado, 2014; Hirschauer et al., 2015 Clark et al., 2016).

Thus, the definition of the happiness economy was changing, at the beginning it was believed that more income means more happiness, later this concept was expanded, because the happiness economy consists of many economic and social components. One of the most debatable components of happiness is income, some researchers say that the level of happiness does not depend on income, other researchers say that only after reaching a certain income level, the level of happiness does not change anymore.

3. Research methods

In this article, it is determined to calculate the extent of the shadow economy of the EU euro area countries, and after analyzing the changes in the level of the happiness economy, to determine the relationship between the shadow economy and the happiness economy in the EU euro area countries.

The sample of the study is 19 EU, euro area countries: Malta, Austria, Belgium, Italy, Spain, France, Portugal, Finland, Ireland, Latvia, Lithuania, Estonia, Slovenia, Slovakia, Cyprus, Germany, Greece, Netherlands and Luxembourg. The EU euro area countries were chosen because the EU is a strong political and economic community that has been operating for more than 30 years, and the EU euro area countries are subject to the same requirements and norms. This reduces differences between countries and allows for a more qualitative study of the relationship between the shadow economy and happiness economy.

The study period is 2012 to 2021. The ten-year period is chosen to allow insight into the ten-year trend. In addition, the majority of researchers have chosen a ten-year period when conducting research on the topic of the happiness economy or the shadow economy.

According to Davidescu et al. (2015), three monetary measurement methods are used to determine the level of the shadow economy: Gutmann's currency ratio method, Feige's transaction method, and Tanzi's currency demand method. The currency demand method (the amount of cash in circulation/overnight deposits) is one of the most popular methods of calculating the size of the shadow economy, which is based on the ratio of currency and demand deposits. The main idea behind this approach is that currency is considered a superior medium of exchange for shadow transactions, as it is more difficult to trace the path between shadow economy participants and the flow of money, thus increasing the likelihood that this money will remain undetected.

This article will use the Gutmann's method to calculate the size of the shadow economy. This method requires the following data: the amount of cash in circulation and overnight deposits, the size of the GDP and the size of the informal economics in the base year (Gutmann, 1977).

The base year was chosen to be the beginning of the period, 2012, this was decided because, according to Gutmann's (1977) method (Gutmann, 1977), the base year is when the shadow economy is equal to 0. However, nowadays such an assumption is impossible, so the base year captures the shadow economy as an average.

The size of the shadow economy, as reported by the World Bank (2022), was used to calculate a country's money demand ratio. This demand coefficient was used for each year of the period under study. Thus, once the relevant statistics have been collected (amount of

cash in circulation, overnight deposits, size of the shadow economy in the base year), all these indicators are added together in formulas below. However, the size of the shadow economy makes it difficult to determine the situation of the shadow economy in a country, so the size of the shadow economy is compared relatively to the size of the country's GDP, the data for the GDP indicator are from the Eurostat database (Eurostat 2012, 2021).

This article will use the Happiness Economy Index from the World Happiness Report (2022) (Heliwell et al., 2022) to systematize and compare changes in the estimate. According to World Happiness Report (Heliwell et al., 2022), well-being index of countries is calculated based upon the 6 indicators (GDP per capita, healthy life expectancy (that derives to life expectancy and mental health evaluation), social support, freedom index, generosity (donations to charity), corruption index.

In compiling this report, researchers take into account the most important aspects of those years, for example, the 2021 happiness report was linked to the COVID-19 pandemic (World Health Organization, 2022), 2020 to subjective well-being and analyzed how the social, urban and natural environment affects our happiness. 2019 – with community happiness. The 2018 report was linked to migration between countries, 2017 – to happiness, its development in the world. The 2016 report was linked to an interest in happiness and subjective well-being. 2015 was associated with changes in happiness, 2013 with economic and social development. In 2012, the first report was released that looked at the state of happiness in the world today and showed how the new science of happiness explains individual and national differences in happiness.

In order to assess the relationship between the shadow economy and the happiness economy and to confirm or reject the research hypothesis – the scale of the shadow economy is larger in countries with a smaller happiness economy – a graphical analysis method was used. In order to determine the relationship between the shadow economy and the happiness economy, the Granger causality method according to Dumitrescu and Hurlin (2012) was chosen, the method was per carried out using the SPPS program. According to Lopez and Weber (2017), Granger (1969) sought to answer the question of whether *x* causes *y* and to see how much of the current *y* can be explained by past values of *y* and to see whether adding lagged values of *x* improves the explanation. *y* is said to be Granger-caused *x* if *x* helps to predict *y*, or equivalently if the coefficients of the lagged *x* are statistically significant. However, bidirectional causation can also occur; *x* causes *y*, *y* causes *x*. "Granger cause" does not mean that it is an effect or a result. Thus, Granger (1969) stated that:

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t; \tag{1}$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t, \tag{2}$$

where: *x* and *y* variables; *t* – observation; *a*, *b*, *c*, and *d* coefficients; *m* – lagging series (not more than the length of the time series); ε and η white noise.

Dumitrescu and Hurlin's (2012) causality test assumes that all coefficients differ across cross-sections. This is the main difference between Granger causality (1969) and the Granger causality approach according to Dumitrescu and Hurlin (2012). Granger (1969):

$$\alpha_{0,i} = \alpha_{0,j}, \alpha_{1,i} = \alpha_{1,j,\cdots}, \alpha_{l,i} = \alpha_{l,j,} \forall_{i,j}; \tag{3}$$

$$\beta_{1,i} = \beta_{1,j,\cdots}, \beta_{l,i} = \beta_{lj} \forall_{i,j}, \tag{4}$$

where: α and β coefficients.

Dumitrescu-Hurlin (2012):

$$\alpha_{0,i} \neq \alpha_{0,j}, \alpha_{1,i} \neq \alpha_{1,j,\cdots}, \alpha_{l,i} \neq \alpha_{l,j,} \forall_{i,j}; \tag{5}$$

$$\beta_{1,i} \neq \beta_{1,j,\cdots}, \beta_{l,i} \neq \beta_{lj} \forall_{i,j}. \tag{6}$$

Limitations of the study: the following problems were encountered in the course of the study:

1. When calculating the shadow economy, it was noted that the European Central Bank (n.d.) lacked data on overnight deposits in Lithuania and Latvia (in 2011, 2012, 2013 and 2014), which required a search for data at central banks.
2. The Dutch Central Bank issued 9 times less cash into circulation in 2021 than in 2020. This may have distorted the size of the shadow economy in the Netherlands, as the amount of cash in circulation is one of the most important indicators for calculating the size of the shadow economy.
3. In Latvia, twice as little overnight deposits were issued in 2014 as in 2013, which may also have had an impact on the performance of the shadow economy, and may have distorted the size of the shadow economy in Latvia, as overnight deposits are one of the most important indicators in calculating the size of the shadow economy.
4. Lithuania halved the amount of cash in circulation in 2014 in preparation for the euro adoption in 2015. This may have distorted the size of the shadow economy in Lithuania, as the amount of cash in circulation is one of the most important indicators for calculating the size of the shadow economy.
5. In 2014, the World Happiness Report did not report for 2013, so the 2014 data was replaced by an average of the 2015 and 2013 annual results.

4. Results and discussion

The study examines 19 shadow and happiness economies. The results are presented in terms of GDP per capita in 2021. The GDP per capita indica-tor was chosen because it not only shows which country has produced the largest gross domestic product, but also how much of that product is per capita. The country with the highest indicator is considered the richest and the country with the lowest indicator the poorest.

According to Figure 1, Luxembourg is the richest country, with a per capita income of €115838. Luxembourg is followed by Ireland with a lower GDP per capita (€101454). This is followed by the Netherlands with half the GDP per capita (€56516). The Netherlands is followed closely by Austria (€54117), Germany (€53030) and Belgium (€51205) and Finland (€48631). Portugal (€33815), Latvia (€31899), Slovakia (€31365) and Greece (€29383) had one of the lowest GDP per capita in 2021, almost 4 times lower than Luxembourg.

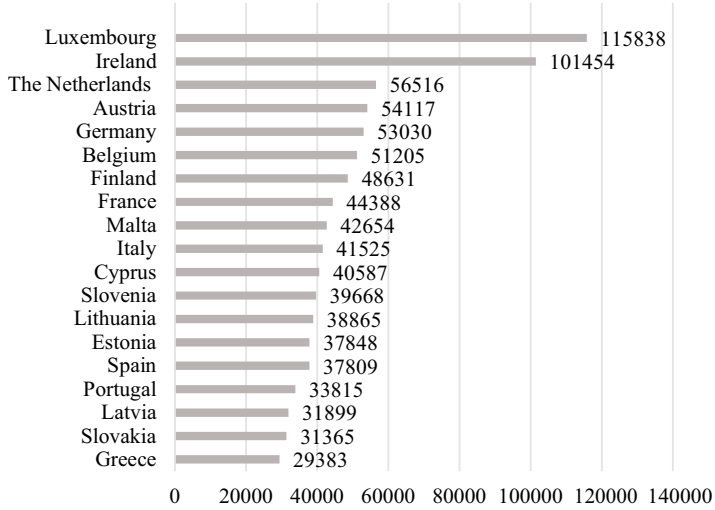

Figure 1. GDP per capita in euros, 2021
(source: compiled by the authors on the basis of Eurostat, 2021)

The size of the shadow economy is further analyzed by calculating the size of the shadow level in a country according to the Gutmann (1977) currency rate. However, the final result is not presented in absolute terms, but as a percentage of GDP.

Figure 2 shows that Austria has the smallest shadow economy. In Austria, the shadow economy has been declining over the last decade. At the beginning of the period, the shadow economy accounted for 9.8% of GDP, and at the end of the period, in 2021, it was 5.2%. The size of the shadow economy peaked in 2012 at €3196.1 million, and at the end of the period at €21082.4 million.

The highest levels of the shadow economy are observed in Cyprus and Latvia. In Cyprus, the size of the shadow economy was highest in 2019 at €7075.4 million and lowest in 2014 at €5934.7 million. The ratio of the shadow economy to GDP was lowest in 2012 at 29% and highest in 2015 (34.4%). Since 2015, there has been a decline in the shadow economy in Cyprus. Latvia had one of the highest shadow economies, as the country changed its currency from the lats to the euro in 2014, which may have influenced the data. The highest shadow economy was in 2014 (EUR 15225.2 million) and the lowest in 2013 (EUR 4387 million). The ratio of the shadow economy to GDP was highest in 2014, just after the euro, at 64.4%, and lowest in 2013, before the euro, at 19.2%.

Figure 3 shows the average ratio of the shadow economy to GDP over the period analyzed (2012–2021). Austria had the lowest ratio of just 7%, while Latvia had the highest shadow economy at 48.5%.

Thus, for the period 2012–2021, the highest shadow economy-to-GDP ratios are found in the Baltic countries (Latvia, Estonia and Lithuania) and in Southern Europe (Greece, Italy and Cyprus). The shadow economy was lowest in central Europe (Slovakia, Austria) and Western Europe (Luxembourg and France).

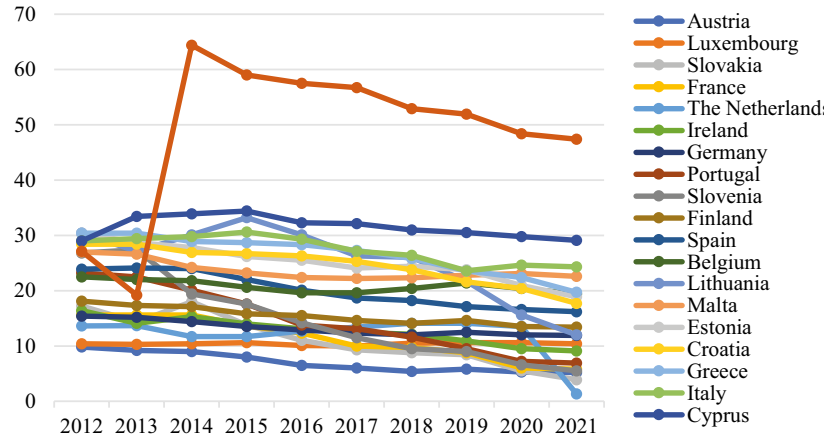

Figure 2. Level of shadow economy (ratio to GDP), 2021
(source: compiled by the authors on the basis of Eurostat, 2021)

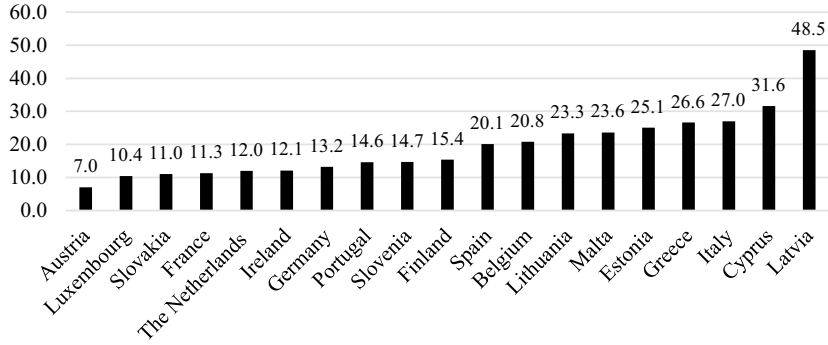

Figure 3. Average ratio of shadow economy to GDP, per cent, 2012 to 2021
(source: compiled by the authors on the basis of Eurostat 2012, 2021)

The analysis is based on information collected on happiness indices in the euro area countries of the European Union, based on the World Happiness Report (2022) (Heliwell et al., 2022).

This report uses the following key criteria: GDP per capita, social support, healthy life expectancy, freedom of choice, generosity, and perceptions of corruption. Table 2 is based on the World Happiness Report. The analysis of the data shows that in 2012 and 2013, the Netherlands was the happiest country in the EU Euro area, while Portugal was the least happy. In 2014, Latvians were the least happy. From 2014 until the end of the period, the happiest society was Finland. From 2015 to 2021 (except for 2016, when the Portuguese were the unhappiest), the unhappiest society was Greece.

Table 2. Happiness economy scores for EU euro area countries (source: compiled by the authors on the basis of an analysis of the scientific literature)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Finland	7.389	7.398	7.406	7.413	7.469	7.632	7.769	7.809	7.842	7.821
Netherlands	7.512	7.445	7.378	7.339	7.377	7.441	7.488	7.449	7.504	7.415
Austria	7.369	7.285	7.200	7.119	7.006	7.139	7.246	7.294	7.268	7.163
Luxembourg	7.054	7.000	6.946	6.871	6.863	6.910	7.090	7.238	7.324	7.404
Ireland	7.076	7.008	6.940	6.907	6.977	6.977	7.021	7.094	7.085	7.041
Germany	6.672	6.711	6.750	6.994	6.951	6.965	6.985	7.076	7.155	7.034
Belgium	6.967	6.952	6.937	6.929	6.891	6.927	6.923	6.864	6.834	6.805
France	6.764	6.670	6.575	6.478	6.442	6.489	5.592	6.664	6.690	6.687
Malta	5.964	6.133	6.302	6.488	6.527	6.627	6.726	6.773	6.602	6.447
Spain	6.322	6.326	6.329	6.361	6.403	6.310	6.354	6.401	6.491	6.476
Slovakia	5.969	5.982	5.995	6.078	6.098	6.173	6.198	6.281	6.331	6.391
Italy	6.021	5.985	5.948	5.977	5.964	6.000	6.223	6.387	6.483	6.467
Slovenia	6.060	5.954	5.848	5.768	5.758	5.948	6.118	6.363	6.461	6.630
Cyprus	6.466	6.078	5.689	5.546	5.621	5.762	6.046	6.159	6.223	6.221
Lithuania	5.426	5.630	5.833	5.813	5.902	5.952	6.149	6.215	6.255	6.446
Estonia	5.426	5.428	5.429	5.517	5.611	5.739	5.893	6.022	6.189	6.341
Latvia	5.406	5.252	5.098	5.560	5.850	5.933	5.940	5.950	6.032	6.180
Portugal	5.101	5.102	5.102	5.123	5.195	5.410	5.693	5.911	5.929	6.016
Greece	5.435	5.146	4.857	5.033	5.227	5.358	5.287	5.515	5.723	5.948

Summary data on the happiness economy are presented in Figure 4. Analyzing the data for 2012–2021, the best happiness economy was found in Finland with a score of 7.59. This was followed by the Netherlands (7.43); Austria (7.21); Luxembourg (7.07); Ireland (7.01); Germany (6.93); Belgium (6.90); France (6.51); Malta (6.46); Spain (6.38); Italy (6.15); Slovakia (6.15); Slovenia (6.09); Cyprus (5.98); Lithuania (5.96); Estonia (5.76); Latvia (5.72); Portugal (5.46) and the unhappiest were the Greek citizens (5.35).

After calculating the size of the shadow economy and its relation to GDP, and analyzing the situation of the happiness economy in the EU countries of the euro area, the relationship between the shadow economy and the happiness economy is further assessed. By calculating

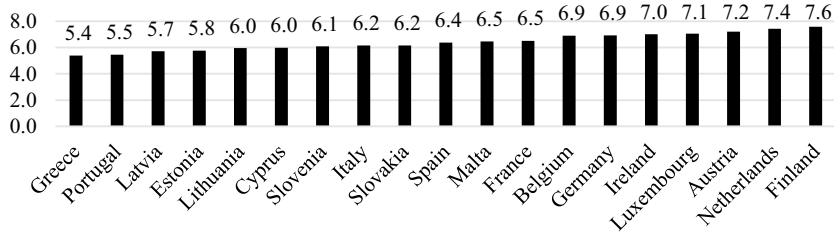

Figure 4. The size of the Happiness Economy in 2012–2021
(source: compiled by the authors on the basis of Heliwell et al., 2022)

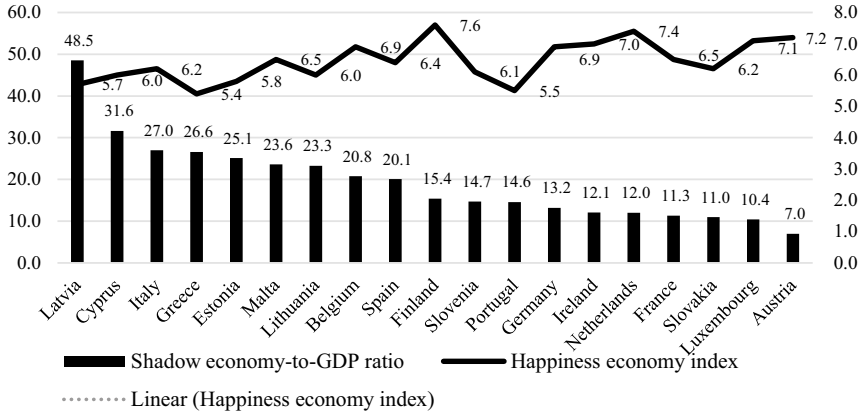

Figure 5. Shadow economy-to-GDP ratio and the relationship of the happiness economy in EU euro area countries in 2012–2021 (source: compiled by the authors)

the Pearson correlation coefficient $r = -0.53389$ and $p < 0.05$, we can state that there is a moderate negative relationship between the variables, which means that as the ratio of the shadow economy to GDP decreases, the happiness economy index increases. The aggregated data of the study are presented in Figure 5, where this trend can be observed.

This is best reflected in Germany, Ireland and the Netherlands. This is also the case in France, Slovakia and Austria. These countries have the lowest ratio of the shadow economy to GDP and have the highest happiness indices. Latvia, Cyprus, Italy, Greece and Malta, the countries with the highest shadow economy-to-GDP ratios, have the lowest happiness indices. Exceptions to this trend are the cases of Finland and Portugal. Finland has the highest happiness index, but the ratio of the shadow economy to GDP in Finland is average, not one of the lowest. In the case of Portugal, the ratio of the shadow economy to GDP is not the highest, but the happiness economy index is the lowest.

Once the relationship between the shadow economy and happiness economy was established, a Granger causality study was carried out, following the methodology of Dumitrescu and Hurlin (2012), with the aim of determining whether the shadow economy is a cause of the happiness economy. The SPSS software was used to calculate the relationship. The average size of the shadow economy in the EU euro area countries between 2012 and 2021 was 19.43% of the countries' GDP and the average happiness index was 6.43. The median ratio of the shadow economy to GDP was 17.24% and the median happiness score was 6.40. The shadow economy was at its highest when it accounted for 64.44% of the country's GDP and at its lowest when it accounted for 1.32%. The highest happiness index in the country was 7.84 points and the lowest was 4.86 points. The standard deviation for the shadow economy is 10.74, while the standard deviation for the happiness economy is 0.69. The number of observations is the same because the same 19 countries are compared over a 10-year period.

The panel unit root test is used to test for stationarity of the variables, i.e., the shadow economy and the happiness economy, using Levin et al. (2002), Fisher-type tests using ADF and PP tests (Choi, 2001). For both the shadow and the happiness economies, the p-values for all methods are less than 0.05, which means that the data are stationary.

According to Dumitrescu and Hurlin (2012), the null Hypothesis is accepted if p > 0.05. Therefore, the Hypothesis that the shadow economy is not a cause of happiness economy is rejected because 1.E-14 < 0.05. This implies that the shadow economy has an impact on happiness economy in the EU euro area countries. The second Hypothesis states that the happiness economy is not a homogeneous cause of the shadow economy and this Hypothesis is accepted as p > 0.05, p = 0.7974 (Figure 6).

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 12/03/22 Time: 01:53
Sample: 2012 2021
Lags: 1

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
SHADOW does not homogeneously cause HAPPIN	7.42963	7.70598	1.E-14
HAPPINESS does not homogeneously cause SHA	1.69752	0.25669	0.7974

Figure 6. Relationship between the shadow economy and the happiness economy in EU euro area countries in 2012–2021 (source: compiled by the authors)

Thus, calculating the size of the shadow economy and its ratio to GDP, and comparing the happiness economy indices, it can be seen that in 2012–2021, the highest ratio of the shadow economy to GDP in the EU countries of the euro area was in Latvia, and the lowest in Austria. The highest happiness index over the period analyzed was in Finland and the lowest in Greece. When the data were compared, there was a trend that the happiness index increases as the shadow economy decreases. And based on the results of the Granger causality test according to Dumitrescu and Hurlin (2012), the hypothesis that the shadow economy affects happiness economy was confirmed.

A central issue in the debate is the development of reliable methods for measuring the size of the shadow economy and the level of happiness. While the Guttmann Index and the Happiness Economy Index are recognized methods, they may have limitations and inaccuracies. For instance, quantifying the size of the informal economy can be challenging due to its clandestine nature and the heterogeneity of its various forms. Another salient issue in the debate pertains to the impact of various policy measures on both the informal economy and overall happiness levels. While the study indicates a correlation between the two indicators, further research is necessary to ascertain the most effective policy measures. For instance, does investing in social assistance or combating corruption yield more effective results in reducing the size of the informal economy?

This study is significant because it offers novel insights into the relationship between the shadow economy and the happiness economy. Utilizing novel data and methodologies, including the Guttmann Index and Granger Causality, the study examines the dynamic interplay between these two key indicators. This study offers valuable insights into how economic and social policies can influence both economic and social well-being. Furthermore, the study's focus on the countries of the European Union's euro area is significant, as these countries are major players in the global economy. This allows us to extrapolate the study's findings to other countries, with the aim of enhancing their economic and social conditions.

5. Conclusions

An analysis of various academic articles has defined the shadow economy as economic activity that is hidden, based on an illegal economic relationship between individuals, groups of individuals, institutional units, carried out in violation of labor or other laws, and oriented toward income or expenses earned or incurred by circumventing government regulation in order to evade taxes. These activities are caused by: tax burdens, high levels of regulation, a complex tax system, low levels of public service, declining GDP per capita, rising unemployment, and corruption.

Today's understanding of the happiness economy can be based on a number of components: higher incomes, availability of jobs, low unemployment, low-income inequality, safe environment (absence of terrorism), attractive, comfortable cities, new discoveries, independence and self-employment, religion, volunteering and helping others. One of the most discussed components of happiness is income. A review of the research shows that most studies deal with concepts specific to the happiness economy (joyless economy, resilient economy, etc.). Other studies relate the happiness economy to other economic events (inequality, financial hardship) or to the happiness economy/quality of life in specific places, mostly in the European region. However, there has been little research on the COVID-19 pandemic and the war in Ukraine, which also have a negative impact on the happiness economy.

The Gutmann money demand method was used to calculate the size of the shadow economy in the EU euro area countries. The results show that Latvia had the largest shadow economy in the period under review, accounting for almost half of its GDP. In Cyprus, Italy, Greece and Estonia the shadow economy accounted for almost one third of GDP. In Malta, Lithuania, Belgium, Spain and Finland the shadow economy accounts for around a fifth of GDP. In Luxembourg, Slovakia, France, the Netherlands, Ireland, Germany, Portugal and Slovenia, the shadow economy accounted for between 10% and 15% of national GDP. The smallest shadow economy was in Austria. The highest happiness indices were found in Finland, the Netherlands, Austria, Luxembourg and Ireland, with values above 7. Germany, Belgium, France, Malta, Spain, Italy, Slovakia and Slovenia had happiness indices above 6. Cyprus, Lithuania, Estonia, Latvia, Greece and Portugal had happiness indices above 5. Using Pearson's correlation coefficient and graphical analysis, the hypothesis that the size of the shadow economy is smaller in countries with a larger happiness economy is confirmed. Using Granger causality according to Dumitrescu and Hurlin (2012), it was found that the shadow economy affects the happiness economy.

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