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The inter-linkages between financial and economic development in the European Union Countries

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ABSTRACT

The paper has investigated the relationships between financial and economic development in the European Union countries using annual data over the period of 1998–2016. The authors have done this by looking at descriptive statistics and also by applying econometric methods. This study has combined different approaches prevailing in the scientific literature and contributed to understanding the importance of the interrelationship between the variables. The investigation has led to the conclusions as follows: (1) the countries with the middle GDP per capita indicators have demonstrated the highest level of financial development; (2) unidirectional causality running from real GDP to financial development has been detected in Denmark, Portugal and Latvia; (3) unidirectional causality running from financial development to real GDP has been found in Austria; (4) two-way causal relationships between financial and economic development have been detected in Luxembourg, France and United Kingdom; (5) the results of Finland, Germany, Czech Republic, Slovakia, Croatia and Bulgaria have supported the neutrality approach. The research provides general insights and a better understanding to formulate the directions for sustainable economic development in the countries under consideration.

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1. Introduction

The interrelationship between financial and economic development has been widely debated among scholars both in theoretical and empirical studies. The scientific literature on the finance – economic development nexus has held an inconclusive explanation about the association between these variables. Economists have debated over the nature of causality: whether financial sector causes economic development or economic performance leads financial sector development.

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Earlier scientific literature has suggested significant disagreements on the finance - economic development nexus (Zhuang et al. 2009). For instance, in the early twentieth century, J. Schumpeter (1911) argued that the proper functioning of financial sector can increase economic development by stimulating technological innovation and funding companies with the best chance of successfully implementing innovative procedures. In 1952, Robinson (1952) presented different opinion that the financial sector did not influence economic performance, but it just followed or reflected economic development (Simion et al. 2015; Zhuang et al. 2009). Moreover, Nobel Laureate Robert Lucas (1988) also dismisses finance sector as a determinant of economic growth. On the other hand, Nobel Laureate Merton Miller (1998) argued that the financial sector contributed to economic growth (Zhuang et al. 2009).

According to Simion et al. (2015), traditional neoclassical economic growth theory has not taken into consideration funding, suggesting that the financial system is not essential. In this theory the main way of achieving growth is increasing the technological frontier generated by factor accumulation and innovation.

Recent scientific literature suggests the emergence of a consensus on the vital importance of financial sector development in facilitating and sustaining economic performance. Over the last two decades, research has focused on testing the finance - economic development nexus using cross-country and other data and new econometric tools (Fung 2009; Zhuang et al., 2009). Economists believe that the financial sector is an essential component of a country's economy. It includes all financial relations among different participants in the process of formation, distribution and use of financial resources. Therefore, the main objective of the financial system is to provide long-term economic growth through effective financing.

The fundamental question that has been found in recent studies relates with the financial sector role in the economies. Answering this, it is necessary to investigate causal interrelationship between financial sector and economic development (Ang, 2008; Uddin et al., 2013). Better understanding of this issue is relevant for policy makers. In countries with unidirectional causality running from financial development to economic performance, policy makers should stimulate the development of the financial sector and thus can enhance economic growth in the long run. One particular policy recommendation may be to make the financial sector more accessible for country's inhabitants. In this case, financial sector increases savings and facilitates capital accumulation and thereby leads to greater investment and growth (Samargandi et al., 2014). The causality running from economic growth to financial development implies that policy makers should focus on components promoting economic growth. This shows that as an economy grows the demand for financial services increases and as a result more financial institutions, instruments and services appear in the market (Samargandi et al., 2014). In the case of bidirectional causality, a mutual or two-way causal relationship between financial sector development and economic growth exists.

Statement of the problem: the interrelationship between financial sector and economic development is still a topic of discussion by researchers and economists. Some believe that financial sector leads to economic growth, while others see economic growth leads to financial development. These divergent views on the relationship put many economies in a dilemma of whether to promote financial development as a

productive input or whether they should concentrate on economic activities that will promote financial sector development. Moreover, a number of the studies examining financial – economic development nexus has been scarce for the European Union countries. This research has attempted to solve this issue.

Object of the research: financial – economic development nexus in the European Union countries.

Aim of the research: this research attempts to provide more reliable estimates of the inter-linkage between financial sector and economic development in the EU during the period of 1998–2016.

Limitation of the research: this research has used only one indicator for financial sector (financial sector activities as a percentage of GDP) as well as one indicator for economic development (real-GDP per capita). Therefore, it would be interesting to develop financial and economic development indexes in which other indicators may also be included, but this idea for the future research. Moreover, this research has covered annual data from 1998 to 2016, i.e., the period, which is available in Eurostat. So, the actual results should be interpreted with some caution due to the limited availability of data for longer period. However, despite the limitations, the results may be used as a first indication of the relationships between variables and provide general insights for sustainable economic development of the EU countries.

The research consists of four parts. Introduction presents theoretical background of financial – economic development nexus and relevance of this for policy makers. [Section 2](#) reviews previous studies and research methodology. The investigations of different countries are summarised and the main insights are provided. [Section 3](#) estimates relationships between indicators in the EU countries. [Section 4](#) concludes summarising the main insights.

2. Empirical studies and research methodology

2.1. The overview of studies

Financial sector development is an important determinant of economic growth. Sound and efficient financial systems channel capitals to its most productive uses are beneficial for sustaining development (Saqib, 2016). Many scientific studies (Adeniyi et al., 2015; Akinboade, 1998; De Gregorio & Guidotti, 1995; Durusu-Cifci et al., 2017; Fethi & Katircioglu, 2015; Ghali, 1999; Ghirmay, 2004; Greenwood et al., 2013; Kaya et al., 2011; Levine, 1997; 2005; Odhiambo, 2004; Ogun, 1986; Ohlan, 2017; Patrick, 1966; Petrovski & Kjosevski, 2014; Pradhan et al., 2014; Sbia et al., 2017; Seven & Yetkiner, 2016; Zhang et al., 2012, Hsueh et al., 2013) have been based on examination of financial – economic development nexus. The work of Levine (1997) covers and examines many of the channels through which the emergence of financial markets and institutions affect and are affected by economic growth. A growing number of empirical studies demonstrate a strong positive link between the functioning of the financial system and long-run economic growth (Levine, 1997). According to Ductor and Grechyna (2015), due to the broad definition and interrelationship with other spheres of economic development, the effect of financial sector on economic performance is unclear. As introduction of this paper has presented, the subject of

financial – economic development nexus has been still unresolved issue theoretically and empirically as well. Empirical studies periodically re-evaluate this interrelationship as new insights, datasets and recommendations for policy makers become available. The results of research have varied across the countries due to the levels of socio-economic development, heterogeneous nature of economic structures, institutional quality, financial markets, the period analyzed and methodology used. However, some findings have been revealed and *five different approaches* have been described in recent studies.

The *first approach* is that financial sector development is supply-leading. It fosters economic growth by acting as a productive input (Samargandi et al., 2014). According to Škare and Hasić (2016) almost regardless of how financial development is measured, there is a positive relation between financial sector development and GDP per capita growth. This view has been supported by a large number of recent studies.

The study of Ahmad and Malik (2009) was focused on the role of financial sector development in economic growth and domestic as well as foreign capital accumulation. The authors have analysed 35 developing countries over the period of 1970–2003. A major finding of this study has been that financial sector development impact on GDP per capita mainly through its role in efficient resources allocation rather its effect on capital accumulation. Zhang et al. (2012) examined the nexus of financial intermediation – economic growth in China, using data from 286 Chinese cities over the period of 2001–2006. The authors have studied an empirical relationships between various indicators of financial development and economic growth with a unique city-level dataset. The results have suggested that traditionally used measures for financial development have been generally positively associated with economic growth. The authors have concluded, that with more use of markets and profit-oriented financial transactions and mobilisation of corporate deposits, the development of financial sector has spurred economic growth. The research of Uddin et al. (2013) aimed to re-examine the relationship between financial development and economic growth in Kenya over the period of 1971–2011. Since the financial sector plays a vital role in mobilising and allocating financial resources, the main issue of this investigation remains important for developing countries. The authors have concluded that in the long run, the development of the financial sector has a positive impact on economic growth. It has been an important insight for policy implication in Kenya. Policy makers should focus on financial development to ignite economic growth. Hsueh et al. (2013) analysed the financial development – economic growth nexus among the 10 Asian countries surveyed during the period of 1980–2007. The authors have found that the direction of causality is sensitive to the financial development variables used in the 10 Asian countries. The findings of this study have supported the supply-leading hypothesis, i.e., many financial development variables have led economic growth in some of the 10 Asian countries, especially in China. The research of South African Reserve Bank (2014) revealed some findings for the Southern African Development Community (SADC) with 14 member states. The quantitative approach followed an empirical analysis done using panel data of GDP as the dependent variable and various indicators of financial sector development and other explanatory variables from 1990 to 2012. The results of the study have showed that

the financial sector is important for economic growth. In addition, the econometric results have revealed that in SADC the variables which were used as proxies for financial sector development (money supply and credit extension) were negatively related to economic growth. However, the study of individual SADC countries have revealed mixed results. In half of the countries, financial sector development positively has contributed to economic growth, whereas in the other seven countries financial sector has not supported growth. Therefore, the group of authors have concluded that the financial sector in SADC economies is not yet integrated and that the region would benefit from increased integration (South African Reserve Bank, 2014). The study of Pradhan et al. (2014) examined the relationship between banking sector development, stock market development, economic growth, and four other macroeconomic variables in ASEAN countries for the period of 1961–2012. The authors have made a clear distinction between the short-run and the long-run causal relationships. The study has revealed uniform and robust results for the long-run relationship among the variables. Economic growth has served as the dependent variable. The authors have concluded, that for the sake of stimulating long-run economic growth, banking sector development, stock market development, foreign direct investment, and openness to trade should be encouraged in the countries observed. Taking into consideration financial sector development – economic growth nexus, for the short-run financial sector development Granger causes economic growth. This has supported supply-leading approach. The same supply – leading approach has been supported by the research results of Gokmenoglu et al. (2015). The study has been conducted to investigate the relationship among international trade, financial development and economic growth in Pakistan. The analysis has confirmed for a long-run relationship among international trade, financial sector development and economic performance. The results have indicated that international trade and financial development have spurred economic growth in Pakistan. Using a dataset on the structure of the financial system of Romania and economic growth, Simion et al. (2015) investigated the relationship between these indicators. The data covered the period of 1994–2012. The authors have found that there is a direct relationship between GDP and market capitalisation and banking credit. This shows that any increase in the growth of capitalisation grants and domestic credit growth will lead to economic development. Moreover, the research has revealed an inverse relationship between GDP growth and lending rate and the rate of money supply. It means that a higher loan rate causes a decrease in GDP.

The study of Komal and Abbas (2015) aimed at exploring the finance-growth-energy nexus in Pakistan over the period of 1972–2012. This study has found that financial sector development positively and significantly impact on energy consumption through the economic growth. The analysis has been important for policy makers for effective energy demand planning and conservation policies that would ensure sustainable economic development in Pakistan. Later the findings of Saqib (2016) have supported the core idea that banking sector development stimulates long-term economic growth in Pakistan.

In contrast to the previous approach, the *second view* is demand-following. It means that financial development follows economic growth. In 1966, Patrick noticed

that the lack of financial institutions in the underdeveloped countries indicates a lack of demand for their services. As an economy grows the demand for financial services increases and as a result more financial institutions, financial instruments and services appear in the market (Patrick, 1966; Samargandi et al., 2014). Only several studies have supported the demand-following view.

Hassan et al. (2011) examined the relationship of financial development and economic growth in low-income countries. The research has revealed one-way causality running from growth to finance for the two poorest regions, such as Sub-Saharan Africa and East Asia & Pacific. Menyah et al. (2014) examined the causal relationships between financial sector development and economic growth for 21 African countries during the period of 1965–2008. The results have revealed that out of the 21 countries observed the authors have found support for the demand – following approach in only one country.

The *third approach* relates with bidirectional causality. It implies a mutual or two-way causal relationship between financial development and economic growth. Referring to this approach, the development of the financial sector is as a result of economic growth, which in turn feeds back as a factor of growth. Some studies have approved this hypothesis.

Hassan et al. (2011) examined financial development – economic growth nexus in low and middle-income countries classified by geographic regions. Taking into consideration short-term, the analysis have provided a two-way causality between financial development and economic growth for most regions. Using annual data during the period of 1973–2008, Jedidia et al. (2014) re-investigated the empirical relationship between financial sector development and economic growth in Tunisia. In the light of the findings, the banking sector development has been considered as a policy variable to boost the economic growth. At the same time economic growth has been considered as a policy variable to generate the banking sector development. The authors have recommended that Tunisia continue on the way of financial liberalisation to deepen the financial sector to reach sustainable economic growth. Moreover, it is desirable to further improve the efficiency of the financial system through appropriate regulatory policy such as applying more efficient legal and fiscal systems (Jedidia et al., 2014).

The *fourth approach* of neutrality states that there is no causal relationship between financial development and economic growth. Based on this approach, financial development does not cause economic growth or vice versa. This view has been supported by the study of Menyah et al. (2014). This study examined the causal relationships between financial sector development, trade openness, and economic growth for 21 African countries during the period of 1965–2008. The empirical results have indicated that for almost three-quarters of African countries the neutrality approach has been supported as there is no causality in any direction between financial sector development and economic growth. The researchers have concluded, that despite the past liberalisation efforts in financial development, there is still very limited support for the hypothesis that financial development leads economic growth.

Finally, the *fifth approach* has highlighted the potential negative interrelationship between financial sector development and economic growth. Some recent empirical studies have revealed this negative association.

For example, the paper of Ayadi et al. (2013) explored the relationship between financial sector development and economic growth, using a sample of northern and southern Mediterranean countries for the period of 1985–2009. The results of research have indicated that credit to the private sector and bank deposits are negatively associated with growth. This has suggested weak financial regulation and supervision.

Narayan and Narayan (2013) examined the impact of the financial sector development on economic growth for a panel of 65 developing countries. The most important finding of this study has been statistically significant and negative relationship between bank credit and economic growth. The authors have noticed that this finding has been inconsistent with other empirical studies, which have found statistically significant and positive impact of banking credit on economic growth. The authors have agreed that it may simply be the case that the banking credit-led growth evidence may be arising purely from the developed countries making up the panel.

Hye and Islam (2012) did research on long-run relationship between financial development and economic growth in Bangladesh. The results have shown negative impact of financial development on economic growth. The authors have concluded, that the findings may help policy makers formulate effective financial sector policies as a tool to promote economic growth in Bangladesh. Also, negative aspect of financial development to economic growth was revealed in study of Herwartz and Walle (2014). Using annual data of 73 economies spanning the period of 1975–2011, the authors have found that the financial development effect could even be negative if low and lower-middle-income countries have very large governments or are extremely open to international trade. Adeniyi et al. (2015) examined financial development – economic growth nexus in Nigeria using annual data covering the period of 1960–2010. The authors have revealed that financial development negatively impacted economic growth. Cecchetti and Kharroubi (2015) studied the real effects of financial sector development to growth and came to two important conclusions. First, higher growth of the financial sector has reduced real-economic growth. Second, credit booms have harmed what we normally think of as the engines for growth. Moreover, Samargandi et al. (2015) revisited the relationship between financial sector development and economic growth in a sample of 52 middle-income countries over the period of 1980–2008. The results of the research have suggested that too much finance might not always be better in the case of the middle-income countries. It can exert a negative impact on growth. The study of Seven and Yetkiner (2016) provided evidence on the role of financial sector development in accounting for economic growth in low-, middle-, and high-income countries. Using panel data from 1991 to 2011, the authors have conducted panel regression to examine whether the relationship between banks, stock markets, and economic growth differs across income levels. The empirical evidence has suggested, that in high-income countries banking development has a negative effect on economic growth. According to the researchers, this is somewhat surprising, given that the banking sector has grown remarkably over the last two decades. The authors have concluded, that a well-functioning financial system may not always be sufficient to achieve economic growth in high-income countries, while it promotes economic growth in developing countries.

To sum up, the studies have revealed that in majority of cases the interrelationship between financial and economic development has been detected. In the biggest part

of the studies increasing financial sector has positively impacted on economic growth while on some cases economic growth has affected the financial development. However, sometimes both financial development and economic growth causes each other and this supports bi-directional approach. Finally, some recent studies have shown the potential negative interrelationship or neutrality between financial sector and economic development. There is no consensus about the causal relationship between indicators due to the levels of socio-economic development of the countries observed, heterogeneous nature of economic structures, institutional quality, financial markets, the period analysed and methodology applied.

2.2. Methodology

By going through the recent empirical studies on financial and economic development nexus, it can be comprehended that, the researchers have applied various methodologies across the countries. To find the direction of causality between variables, Granger testing has been usually used in majority of research (Hsueh et al., 2013; Menyah et al., 2014, Gokmenoglu et al., 2015; Pradhan et al., 2014). Hsueh et al. (2013) applied Granger causality analysis on OECD countries with a panel data approach. The study has considered the issues of cross-sectional dependency and slope heterogeneity among countries investigated simultaneously, analysed the causality between financial development and economic growth among 10 Asian countries. Pradhan et al. (2014) examined the relationship between economic growth, banking sector development, stock market development and other macroeconomic indicators in ASEAN countries. Using principal component analysis and a panel vector autoregressive model for testing the Granger causalities, the study has found the presence of both unidirectional and bidirectional causality links between these variables. Menyah et al. (2014) examined the causal relationship between financial development and economic growth for 21 African countries within a framework of international trade. The study has developed a financial development index based on four different financial development indicators and applied the panel bootstrapped approach to Granger causality. The study of Gokmenoglu et al. (2015) was conducted to investigate the relationship among international trade, financial development and economic growth in Pakistan. The ADF and PP tests have been applied to check the order of integration of the variables. The direction of causality between variables has been identified by employing Granger causality test. Uddin et al. (2013) re-examined the relationship between financial development and economic growth in Kenya. The examination has been based on a Cobb–Douglas production augmented by incorporating financial development. A simulation has been based on ARDL bounds testing and Gregory and Hansen's structural break cointegration approaches. Herwartz and Walle (2014) examined financial and economic development using a flexible semi-parametric approach and a functional coefficient model. Zhang et al. (2012) using data from 286 Chinese cities investigated the relationship between financial development and economic growth at the city level in China. The researchers have applied both traditional cross-sectional regressions and first-differenced and system GMM estimators for dynamic panel data. Correlation analysis has been applied in study of

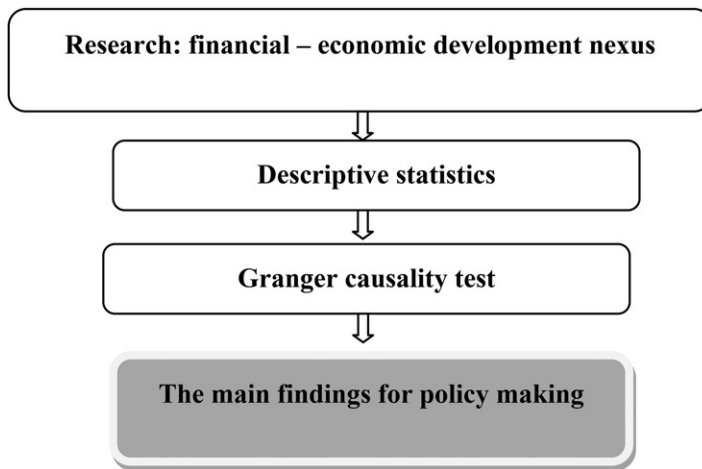


Figure 1. The steps of the research.

Simion et al. (2015). The researchers have examined the relationship between financial development and economic growth in Romania. More recently, Seven and Yetkiner (2016) applied correlation analysis and regression model providing evidence on the role of financial development in accounting for economic growth in low, middle and high-income countries.

This research has been based on Eurostat annual data over the period of 1998–2016. It has provided a possibility to compare the EU countries by general financial and economic development indicators. The research has been guided by the estimation of the financial activities as a percentage of GDP and real-GDP per capita in the EU countries. Financial activities of the countries have been expressed in terms of gross value added. It indicates the significance of the financial sector for the overall economy (Deutsche Bank, 2007). Real GDP per capita shows the relative performance of the countries. It is especially useful comparing the economies of different countries. A rise in GDP per capita signals the growth of the economy. The research consists of some steps which are presented in Figure 1.

Firstly, the authors have referred to descriptive statistics analysis, which has allowed assessing the dynamics of financial and economic development indicators over two decades. It has shown the main differences across the countries observed. Secondly, Granger (1969) test has been applied for the estimation of the direction of causality between indicators. Granger causality test has estimated the following two regression equations (Gokmenoglu et al. 2015; Granger 1969; Stern 2011):

$$y_t = \beta_{1,0} + \sum_{i=1}^p \beta_{1,i} y_{t-i} + \sum_{j=1}^p \beta_{1,p+j} x_{t-j} + \varepsilon_{1t} \quad (1)$$

$$x_t = \beta_{2,0} + \sum_{i=1}^p \beta_{2,i} y_{t-i} + \sum_{j=1}^p \beta_{2,p+j} x_{t-j} + \varepsilon_{2t} \quad (2)$$

Where: p is the number of lags, β - parameter, ε - error.

If the p parameters $\beta_{1,p+j}$ are jointly significant then the null hypothesis that x does not Granger cause y can be rejected. Similarly, if the p parameters $\beta_{2,i}$ are jointly significant then the null hypothesis that y does not Granger cause x can be rejected. Granger causality test has been based on the concept of causal ordering and assumption as follows: a variable x Granger causes another variable y if past values of x help predict the current level of y given all other appropriate information (Stern, 2011).

Before using Granger causality test, the authors have checked whether time series data are stationary or non-stationary. For this purpose the Augmented Dickey Fuller (ADF) unit root test has been applied (Fuller, 1976; Heij et al., 2004; Nielsen, 2005). In the ADF test, three different conditions should be checked to any time series: (1) process includes intercept, but no trend; (2) process includes intercept and trend; (3) process includes no intercept and no trend.

$$\Delta y_t = a + \delta y_{t-1} + u_t, \text{ (with intercept, no trend)} \quad (3)$$

$$\Delta y_t = a + \delta y_{t-1} + \beta t + u_t, \text{ (with intercept, with trend)} \quad (4)$$

$$\Delta y_t = \delta y_{t-1} + u_t, \text{ (no intercept, no trend)} \quad (5)$$

Where: a is an intercept and δ , β are coefficients, u_t is white noise, t is a time variable. The number of lagged differenced terms is often determined empirically, but in practice, the appropriate lag may be based on the Akaike Information Criterion.

Applying ADF test, we have to check the hypotheses whether the particular variables have unit root or not:

H_0 : variables are not stationary or have unit root;

Alternative hypothesis H_1 : variables are stationary.

ADF checks the stationarity of the particular variables at significance level of 1%, 5% and 10%.

If particular variables appear non-stationary, they require to be differenced. All calculations have been made applying econometric software Eviews v. 8.0.

Thirdly and finally, the main findings have been presented for policy making.

Next section has examined the situation on financial development and economic growth across the EU countries.

3. The analysis of financial development and economic growth tendencies

3.1. Descriptive statistics analysis

Using annual data from 1998 to 2016, the authors have investigated the main tendencies of financial and economic development in the EU countries. The EU countries according to real-GDP per capita indicator have been grouped into four categories, such as the countries with: (1) very high GDP per capita, (2) high, (3) middle and (4) low GDP per capita (Table 1).

Table 1. Descriptive statistics of financial and economic development.

The groups of countries	Real GDP per capita (Euro)				Financial activities as a percentage of GDP			
	Average over 1998–2016	MIN	MAX	STD DEV.	Average over 1998–2016	MIN	MAX	STD DEV.
<i>Very high real GDP per capita</i>	76400	61700	84400	5943	23.2	18.9	26.6	1.9
Luxembourg	76400	61700	84400	5943	23.2	18.9	26.6	1.9
<i>High real GDP per capita</i>	35906	27500	51400	4707	4.8	2.1	10.2	1.7
Denmark	43758	39800	46200	1751	4.7	3.8	5.4	0.6
Sweden	37726	30900	42500	3292	3.7	3.1	4.2	0.3
Ireland	37621	27500	51400	5570	7.7	5.6	10.2	1.3
Netherlands	36847	32300	39400	2025	6.3	4.9	7.7	0.8
Austria	34111	29700	36200	2108	4.2	3.8	4.8	0.3
Finland	33521	27800	37300	2531	2.5	2.1	3.0	0.2
Belgium	32432	28400	34400	1806	5.2	4.3	5.7	0.4
Germany	31232	27600	34500	2206	4.2	3.5	4.9	0.4
<i>Middle real GDP per capita</i>	25015	16500	31800	4359	5.1	3.2	10.7	1.7
France	30374	27400	31800	1201	3.6	3.2	4.1	0.3
United Kingdom	29042	25000	31400	1826	6.3	4.6	8.3	1.1
Italy	26989	25400	28700	1085	4.7	4.2	5.2	0.3
Spain	22668	19600	24500	1263	4.2	3.4	5.3	0.5
Cyprus	21932	19000	24700	1597	7.6	5.7	10.7	1.7
Greece	19084	16500	22700	2164	4.1	3.5	4.6	0.3
<i>Low real GDP per capita</i>	14083	7000	20100	3073	4.3	1.9	7.3	1.2
Slovenia	16542	12800	19200	1860	4.0	3.3	4.7	0.4
Portugal	16479	15300	17200	477	5.6	4.3	7.1	0.7
Malta	15888	13800	20100	1854	5.6	3.1	7.3	1.4
Czech Republic	13768	10500	16400	1931	3.5	2.5	4.3	0.6
Slovakia	10984	7700	14500	2403	3.3	1.9	4.0	0.6
Estonia	10837	7000	13500	2258	3.6	2.7	4.8	0.4
<i>Very low real GDP per capita</i>	7825	2800	12000	2466	3.7	1.7	7.9	1.3
Croatia	10100	8000	11500	927	5.0	3.2	6.2	0.8
Hungary	9521	7300	11200	1147	3.6	3.0	4.3	0.4
Lithuania	8474	5000	12000	2345	2.1	1.7	3.1	0.4
Poland	8426	5900	11200	1739	3.6	3.3	4.2	0.2
Latvia	8200	4700	11000	2106	3.8	3.0	5.0	0.6
Romania	5568	3600	7600	1319	2.9	1.8	4.0	0.8
Bulgaria	4484	2800	6000	1049	4.8	1.8	7.9	1.8

Source: authors' calculations based on Eurostat data (Eurostat 2016a, b).

Using linkage analysis among groups of the EU countries, some important tendencies have been revealed. It is not surprising that financial sector has been the best developed in Luxembourg, which also has very high real-GDP per capita. Ireland, Cyprus, Netherlands, United Kingdom, Portugal, Malta, Belgium and Croatia have also relatively well-developed financial sector. In these countries the share of financial sector has varied from 5.0 to 7.7 percent in GDP. It is notable, that some of these countries (Ireland, Netherlands, and Belgium) have high GDP per capita indicator, while other countries (Cyprus, United Kingdom) have middle GDP per capita and finally other countries (Portugal, Malta, Croatia) have relatively low GDP per capita. Romania, Finland and Lithuania have relatively low-developed financial sector, which contribution makes from 2.1 to 2.9 in GDP. Generally, the results of descriptive statistics have shown that the financial development level is highest in the group of countries with middle GDP per capita indicator. However, over the period from 1998 to 2016, maximum value of financial development have been detected in Luxembourg (26.6 percent) and Cyprus (10.7 percent). The standard deviation has shown that the most homogeneous group of the EU countries in terms of financial development has been the group of countries with relatively low GDP per capita indicator.

Several countries from each group by real-GDP per capita have been selected for more detailed study. Below, we have analyzed thirteen countries, such as Luxembourg, Denmark, Austria, Finland, Germany, France, United Kingdom, Portugal, Czech Republic, Slovakia, Croatia, Latvia and Bulgaria.

The Granger causality test has been introduced to assess the interrelationships between financial and economic development in the selected countries.

3.2. The examination of the interrelationships

In the next step, we have continued our investigation to test the causal nexus between financial and economic development in the selected countries. By causality, we mean causality in the Granger's sense. Before using the Granger causality test, the stationarity of the variables should be checked. For this purpose, we have applied unit root test.

3.2.1. Unit root test

Economical time-series data are often found to be non-stationary, containing a unit root. Therefore, we start our analysis with unit root testing for all the variables. Augmented Dickey Fuller (ADF) method has been employed (Fuller, 1976; Heij et al., 2004; Nielsen, 2005) for this purpose. Applying ADF, we have to check whether the particular variables have unit root or not. ADF checks the hypothesis about the stationarity of the particular variables at significance level of 1%, 5% and 10%. As usual for economic variables, in this case the time series data turned out to be non-stationary. Therefore, we have used the differencing. After taking first or second difference, non-stationary at level variables become stationary in all examined countries. Table 2 reports the results of ADF tests.

3.2.2. Granger causality test

Granger causality test has been used in order to study the forerunner-lag causal relationship between financial and economic development. A variable – financial development (FD) is said to Granger cause another variable – economic development (GDP) – if past values of financial development help predict the current level of economic development. The Granger testing is based on the concept of causal ordering. Similarly, if economic development in fact causes financial development, then given the past history of economic performance, the values of financial development can be predicted. The maximum lags are based on the Akaike Information Criterion (AIC) and make 3 lags. Table 3 has presented the results of Granger causality test of the countries observed. The null hypothesis has been rejected if probability associated to F-statistic is ≤ 0.05 . Conversely, the null hypothesis has been accepted if the associated probability of F statistic is > 0.05 .

The results of Granger causality test have shown that out of the EU 13 countries observed, the authors have found causal relationships between financial and economic development in seven countries. Unidirectional causality running from GDP to financial development has been detected in Denmark, Portugal and Latvia. This has shown that financial sector does not play a significant role in promoting economic

Table 2. Augmented Dickey Fuller stationarity test.

Countries	Variables	First difference		
		Intercept	Intercept & Trend	None
Bulgaria	Economic development	-3.563913**	-3.664943	-1.360182
	Financial development	-5.876392***	-5.851923***	-5.603572***
Czech Republic	Economic development	-2.675188	-2.690719	-1.849361*
	Financial development	-3.865308***	-3.657512*	-3.982401***
Denmark	Economic development	-3.082140**	-3.052151*	-2.991906***
	Financial development	-4.536212***	-4.515132***	-4.132329***
Germany	Economic development	-4.678331***	-4.485932**	-3.374280***
	Financial development	-5.199355***	-4.988431***	-5.117966***
France	Economic development	-3.421190**	-3.445766*	-3.046272***
	Financial development	-5.207411***	-5.266241***	-5.250671***
Croatia	Economic development	-2.302176	-2.234478	-2.168090**
	Financial development	-1.410707	-6.401982***	-1.486176
Latvia	Economic development	-3.931471***	-4.008856**	-1.222104
	Financial development	-3.713091**	-3.641890*	-3.744344***
Luxembourg	Economic development	-3.877511***	-3.791062**	-3.152725***
	Financial development	-4.335634***	-4.031798**	-4.513857***
Austria	Economic development	-3.881276**	-4.553840**	-2.919487***
	Financial development	-7.308551***	-7.292256***	-7.127822***
Finland	Economic development	-4.005814***	-4.526443**	-2.547441**
	Financial development	-4.186612***	-4.084725**	-4.208834***
Portugal	Economic development	-3.101872**	-2.874253	-3.113907***
	Financial development	-3.416090**	-3.964840**	-3.466975***
Slovakia	Economic development	-3.340097**	-3.212895**	-1.921974*
	Financial development	-3.893403***	-3.759910**	-3.910852***
United Kingdom	Economic development	-2.484241	-2.495117	-3.957247**
	Financial development	-4.866936***	-5.097922***	-4.881973***
Second difference				
Bulgaria	Economic development	-5.273429***	-4.898200***	-5.466102***
	Financial development	-5.427712***	-5.195919***	-5.657616***
Czech Republic	Economic development	-4.290937***	-4.118964***	-4.466070***
	Financial development	-7.855937***	-8.072210***	-8.108086***
Croatia	Economic development	-4.570706***	-4.524317**	-4.760598***
	Financial development	-10.52228***	-10.13801***	-10.83855***
Latvia	Economic development	-4.916173***	-4.713912***	-5.117746***
	Financial development	-5.722130***	-5.497642***	-5.871067***
Portugal	Economic development	-4.462257***	-4.772685***	-4.647817***
	Financial development	-5.084558***	-4.865363***	-5.257254***
United Kingdom	Economic development	-4.545508***	-3.957247**	-4.687885***
	Financial development	-10.02670***	-9.920038***	-10.37227***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: calculations based on Eviews v. 8.0.

development. It has supported demand-following approach that is financial development follows economic performance. As an economy grow the demand for financial services increases. This implies that policy makers should focus on components of economic development in order to stimulate the demand for financial services. Moreover, unidirectional causality running from financial development to GDP has been detected in Austria. In this case financial sector is supply-leading and impacts on GDP changes by acting as a productive input. The economic policy should be addressed to financial development. Two-way causal relationships between financial and economic development have been found in Luxembourg, France and United Kingdom. It has revealed, that financial development is as a result of economic performance, which in turn feeds back as a factor of changes in financial system. Finally, the results have indicated that for Finland, Germany, Czech Republic, Slovakia,

Table 3. The results of Granger causality test.

Null hypothesis	Observations /Lags	F-statistic	Probability	Test results
<i>Luxembourg</i>				
FD does not Granger cause of GDP	Obs.: 17	13.8257	0.0023	Rejected
GDP does not Granger cause of FD	Lags: 1	5.57576	0.0332	Rejected
<i>Denmark</i>				
FD does not Granger cause of GDP	Obs.: 15	0.13399	0.9370	Accepted
GDP does not Granger cause of FD	Lags: 3	4.84400	0.0331	Rejected
<i>Austria</i>				
FD does not Granger cause of GDP	Obs.: 11	2.60000	0.0000	Rejected
GDP does not Granger cause of FD	Lags: 4	0.14981	0.9468	Accepted
<i>Finland</i>				
FD does not Granger cause of GDP	Obs.: 15	0.69157	0.5824	Accepted
GDP does not Granger cause of FD	Lags: 3	0.21218	0.8852	Accepted
<i>Germany</i>				
FD does not Granger cause of GDP	Obs.: 15	0.14259	0.9316	Accepted
GDP does not Granger cause of FD	Lags: 3	0.06648	0.9762	Accepted
<i>France</i>				
FD does not Granger cause of GDP	Obs.: 17	6.16800	0.0263	Rejected
GDP does not Granger cause of FD	Lags: 1	11.4670	0.0044	Rejected
<i>United Kingdom</i>				
FD does not Granger cause of GDP	Obs.: 16	6.19989	0.0271	Rejected
GDP does not Granger cause of FD	Lags: 1	6.62496	0.0231	Rejected
<i>Portugal</i>				
FD does not Granger cause of GDP	Obs.: 16	2.13357	0.1678	Accepted
GDP does not Granger cause of FD	Lags: 1	8.85768	0.0107	Rejected
<i>Czech Republic</i>				
FD does not Granger cause of GDP	Obs.: 14	0.57887	0.6472	Accepted
GDP does not Granger cause of FD	Lags: 3	1.51777	0.2917	Accepted
<i>Slovakia</i>				
FD does not Granger cause of GDP	Obs.: 15	0.24010	0.8660	Accepted
GDP does not Granger cause of FD	Lags: 3	0.95549	0.4590	Accepted
<i>Croatia</i>				
FD does not Granger cause of GDP	Obs.: 12	0.26739	0.8466	Accepted
GDP does not Granger cause of FD	Lags: 3	0.60712	0.6385	Accepted
<i>Latvia</i>				
FD does not Granger cause of GDP	Obs.: 16	1.34515	0.2670	Accepted
GDP does not Granger cause of FD	Lags:1	12.9425	0.0032	Rejected
<i>Bulgaria</i>				
FD does not Granger cause of GDP	Obs.: 16	3.69841	0.0766	Accepted
GDP does not Granger cause of FD	Lags: 1	1.88746	0.1927	Accepted

Source: authors' calculations based on E views v. 8.0.

Croatia and Bulgaria the neutrality approach has been supported since there is no causality in any direction between financial development and economic performance.

To conclude, taking into consideration that the EU countries demonstrate various results regarding financial – economic development nexus, the systematic approach should be applied by policy makers to support sustainable economic development in the EU.

Next section summarises the main results of the research.

4. Conclusions

The objective of this research is to examine the inter-linkages between financial and economic development in the European Union countries. The scientific literature on the finance – economic growth nexus has held an inconclusive explanation about the association between these variables. Economists have debated over the nature of

causality: whether financial sector causes economic performance or economic growth leads financial development. Moreover, a number of the studies examining financial – economic development nexus has been scarce for the European Union countries. This research has attempted to fill in this gap.

Taking into consideration empirical insights from this research, it could be concluded that the EU countries demonstrate various results of financial – economic development nexus. Descriptive statistics has revealed that the financial development level is highest in the group of countries with the middle real-GDP per capita indicator.

Granger causality test has shown that the authors have found causal relationships between financial and economic development in seven out of the EU 13 countries observed. Unidirectional causalities have been detected in Denmark, Portugal and Latvia (causalities running from GDP to financial sector); Austria (causality running from financial sector to GDP). Moreover, two-way causal relationships between financial development and economic performance have been found in Luxembourg, France and United Kingdom. Finally, the Granger test has indicated that for Finland, Germany, Czech Republic, Slovakia, Croatia and Bulgaria the neutrality approach has been supported since there is no causality of any direction between the variables. Taking into consideration that the EU countries demonstrate various results regarding financial – economic development nexus, the systematic approach should be applied by policy makers to support sustainable economic development in EU.

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