Investigating the Relationship Between Country Competitiveness and Financial Market Development in Times of Crisis

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Received: July 19, 2021 Accepted: August 16, 2021 Online Published: September 7, 2021

doi:10.5430/rwe.v12n4p38 URL: https://doi.org/10.5430/rwe.v12n4p38

Abstract

A country's competitiveness depends on many factors related to general governance, effectiveness of markets, social development, and business perspectives. The role of financial markets for economic growth has been the subject of many scientific studies; most of them concluded that a well-developed financial system should improve the efficiency of financing decisions, favouring a better allocation of resources and thereby economic growth. The financial crisis that started in the summer of 2007 is still testing the strength of the global economic system. It started in the financial sector, but is now having an important impact on the real economy. The aim of this paper is to investigate the relationship between a country's financial market development and its competitiveness in particular in times of crisis, with the use of a series of econometric models. We find evidence that financial market development is affected (with the anticipated sign of impact) by the Global Competitiveness Index, the GDP per capita and the (un)employment level of a country. It is also related (with an unexpected direction of impact) with the foreign market size and exports, as well as infrastructure. Our findings can be used by the policymakers of countries which wish to improve their competitiveness so as to steer the determining variables in the desired directions and approach their desired competitiveness levels.

Keywords: competitiveness, financial markets, crisis, economic growth

JEL Classification: G10

1. Introduction

The scientific debate on the term *competitiveness*, as it was recorded at the end of the 20th century, was boosted in the 1980s on both sides of the Atlantic and in the developing countries. This has been mainly the result of technological developments and the gradual widening of the phenomenon of globalisation (Govindarajan & Gurta, 2001) in the wider economic realm (Reinert, 1995). In the 1990s and early 21st century there was a change in the fundamental basis of competition in many areas of business activity, (Tapscott, 2001), setting new ground for the scientific debate on the interpretation of the term competitiveness. Nowadays, it has another dimension since we are now seeing its presence also among the states. 'National' competitiveness could be defined as 'the ability of a state to create, produce and distribute products and services on the international market while at the same time it has an increase in remuneration from sales of finished goods and raw materials' (Scott & Lodge, 1985). As a result, the term 'competitiveness' includes a set of multivariable factors in microeconomic and macroeconomic levels, such as social cohesion, business culture, natural resources, energy, social capital, labour market, education and skills, infrastructure, access to and the level of research and development, technology, the economic and business environment, the level of entrepreneurship, and innovation (Ezeala & Harrison, 1999) and finally the financial sector, which now holds a prominent place in the scientific debate on measuring the competitiveness (Jochem, 2016) as one of the key factors for both economic development and competitiveness. According to the above, the aim of this paper is to investigate the relationship between a country's competitiveness and financial market performance in time of crisis.

2. Literature Review

Considering a more wide framework of the concept of competitiveness, one could possibly suggests that competitiveness runs across the ability to cost-effectively sell products and services in conditions of international competition. This definition is theoretically applicable to a business, an industry, or even a country. However, recent studies have distinguished the definition on the microeconomic and macroeconomic levels, concerning the competitiveness of companies and states. Looking into the microeconomic perspective a firm which manages to survive and to increase its market share within the industry it belongs is likely to be considered as competitive (Porter, 1990). From the other hand, on a macroeconomic level, competitiveness is interpreted as the extent of which a country is able to produce goods and services that can meet market requirements, while at the same time maintains or increases the actual income of its workers (Cohen et al 1994). Considering this approach, workers appear for the first time to be a direct component in shaping and assessing the competitiveness of a state. Another argument concerning this term is the OECD "Program on Technology and the Economy" OECD, TEP (1992), which interprets international competitiveness as of a country in a fully liberalised market can continuously improve the standard of living of its citizens.

Considering macroeconomic interpretations it is obvious that there is a clear differentiation in the interpretation of the term: on the microeconomic level, we focus on market share and productivity, while on the macroeconomic level each country focuses on its level of competitiveness, on its citizens and their standards of living. At the same time, more recent business strategy discussions (Mitchell, 2000) (strategic management) have determined that a company's strategic competitiveness is achieved when it manages to formulate and implement a value-creating strategy. In this way, when a company applies methods that other rival companies cannot duplicate or that are too expensive to imitate, then this company has achieved a competitive edge within the market, maximising its competitiveness (Martin 2001).

According to international literature, the best-known indicators for measuring competitiveness are those of the World Economic Forum (WEF) and the International Institute of Management Development (IMD). These two indicators are general and comprise several different dimensions and sub-criteria. In general, the approach of these two indicators is global in terms of the image of each country's competitiveness: a) the WEF's Global Competitiveness Index, is based on objective and subjective criteria, mainly derived from the processing of questionnaires submitted to senior executives, in the context of surveys conducted by the World Economic Forum. For some variables, the objective criteria that are used are converted to a scale similar to that of the subjective ones in order to make summations, which undoubtedly lead to simplifications. However, both the indicator and the methodology employed are considered fairly reliable, b) the IMD Global Competitiveness Index: The IMD index is also used to explore competitiveness and assumes that the creation of wealth originates on the enterprise level; research in this field is focused on the 'Competitiveness of Enterprises' instead of states. At the same time, businesses operate in a national environment that strengthens or limits their ability to compete domestically or internationally. The estimations are mainly based on subjective questionnaire responses by business executives, which inevitably create reservations about the validity of the rankings.

A key feature of these two systems of measuring competitiveness is their approach through a system of indicators reflect the course of the economy of each country under consideration. In particular, both systems are based on an analysis of individual indicators. A common feature of these systems is the use of a series of indicators and parameters that influence, and in a way flatteringly determine productivity along with the general welfare of the population, without neglecting the need for sustainable economic growth and prosperity.

The majority of the proposed models classifies a number of indicators into categories. Although the calculation of these indicators and groups is implemented individually, it should be noted that they are not independent of each other, and in many cases, they are strongly associated whilst any change in one significantly affects the other. Obviously, it is expected that any change on a case-by-case basis will affect other indicators with a different way. Ultimately it is worth to mention that not all of the criteria are applied in the same way in all countries; for instance, it is easy to understand that the size, the structure, and the nature of a small economy are different, from those of the United States. In any case, both key indicators are based on sub-factors, each of which has been examined in a variety of scientific studies. Particularly, Acs & Szerb, Bosma & Levie (2010), Rebernik et al. (2015), Reynolds et al. 2002; 2005 have noted that entrepreneurship is considered a powerful factor that influences competitiveness. Various studies have shown that the quality of a country's institutions, determined by the legal and administrative framework, within which individuals, businesses and governments interact to create wealth, has proven to be a factor of economic growth and competitiveness, see also Acemoglu et al. (2002), Rodrik et al. (2002) and Miller et al (2014).

Canning & Pedroni (2004) and Calderon & Serven (2004) have shown that competitiveness is mainly affected from different factors such as: infrastructure and, in general, the quality of technological and transport infrastructure. At the same time, several macroeconomic effects have been analysed in the literature. Goodfriend (2007) and Temple (2000) have explored the effects of low and moderate inflation rates, Reinhart and Rogoff (2010) have analysed the impact of public debt levels as well as the impact of the tax level. The structure of taxation and the way the government spends money have been analysed by Johansson et al. (2008), among others.

In addition, both Jones & Teece (1988), and Buckley (1988-1990), as well as Nelson (1992), and Francis (1989), have demonstrated through their studies that competitiveness is a factor that greatly determines a country's ability to stand and develop in a global economic environment (ReiLjan et al 2000), while, at the same time, there is a plethora of scientific research studies that directly links the issue of competitiveness to the components of economic growth. Choudhri & Globerman (2002) have concluded that there is a combination of competitiveness and international competitiveness. A strong correlation amongst unit labour costs and competitiveness and growth has been detected (Fagerberg, 1998; Yap, 2004), and it is directly related with the form of competitiveness to economic growth through the real effective exchange rate (REER) and unit labour cost (ULC).

Consequently, in many scientific studies there is a clear identification of the factors that make up the systems of measuring competitiveness and economic growth, e.g. Harrison (1996), Bosma & Levie (2010), Rebernik et al. (2015). International indicators constitute an emerging 'metric' of the competitiveness of countries; indirectly they tend to function as multiple 'international observatories' whose assessments will be of great concern to us in the future. The indicators are produced by international bodies, which are generally reputable and continuous. The publication of the indicators, regardless of reliability, influences the perception of international investors, businesses, institutions, governments, and the international community for each country, with significant implications. This should be the subject of regular monitoring and scrutiny. The indicators' structure and reliability tends to improve over time, but in any case all the individual factors that compose competitiveness are very much in line with what economic theory calls growth.

3. Competitiveness and the Financial Sector

The link between the notions of financial system development and economic growth/development was introduced in the 1970s by Shaw (1973) and McKinnon (1973). A more empirical, experimental effort appeared in the 1990s with the research of Kind & Levine (1993a, b), Levine et al (2000), Levine et al (2004), De Haas (2001) and a number of other studies that have shown that the level of financial growth has beneficial effects on economic growth, technological progress, and capital accumulation.

The primary function of the financial system is the transfer of capital from various sources of savings to investors. The mediating role of banks in the economy, apart from the mobilisation of savings, consists in collecting and utilising information on the business environment and the economic outlook and, consequently, in the analysis and better management of risk. The financial system consists of three main players: financial institutions, the market, and investors (including depositors). Companies generate demand for cash and investors supply it. The government is not a direct player, but it operates so as to monitor banks, provide market infrastructure, and protect investors when financial institutions are insolvent. Financial institutions are intermediating in the demand and offer of cash in indirect funding. As a financial market develops, it can provide direct financing to businesses. In the simplest case, the funds will flow from investors to businesses; however, not all investors may be willing to invest directly in businesses because of the higher risk and lack of information. At the same time, not all businesses will be able to benefit from the capital market, owing to the lack of security, information, or reliability. As a result, financial markets will need to develop different ways for capital to flow from investors to businesses, and the ability of financial institutions to respond to such needs will become increasingly important and will be a factor of competitiveness. Financial institutions are often divided into wholesale and retail segments, in order to address the different needs of a wide customer base.

Based on the above, on a theoretical level and through the various studies mentioned above, we can see that the financial system contributes to economic growth through factors such as lowering transaction costs, providing faster and fuller information, and facilitating capital transfer and moves for either savings or investment purposes (Levine 2000). At the same time, scientific analysis has demonstrated that the optimal functioning of the financial sector also contributes to other parameters associated with economic growth and competitiveness, such as the efficiency and effectiveness of production factors, and productivity (Rioja, and Valev 2004, Lozano and Pastor 2006). In these studies the scholars conclude that the efficient operation of the banking system has a favourable effect on economic growth. Chortareas et al. (2010), looking at data from nine Latin American countries, find that bank productivity

(measured by a Malmquist index) is higher in countries with more developed financial systems (at the same time there are some signs of two-way causality). Arestis et al. (2010), analysing the results of some 60 published studies, find that any differentiation of quantitative estimates is largely due to the type of data and to the different variables used as financial development indicators.

Recently, Alomary et al (2019) examine the contribution of financial market development in competitiveness (growth) of developed and higher income countries for the period 2009 – 2017 to find that financial market development, trade openness, labour market efficiency and technological readiness are positive and significant, whereas market size is positive but insignificant.

In conclusion, based on the above, a significant body of literature has been developed on the importance of banks for the operation of the economic system, as well as on their specific role, which is decisive for the long-term process of economic growth and thus competitiveness.

Our paper studies the impact of certain competitiveness proxies to the financial market development. The findings can be used to draft proposals for potential policies that can be followed, supported by quantitative evidence, which is one step ahead of the existing literature in the area that simply acknowledges the problematic, without necessarily coming forward with ways to overcome it. According to our results it has been empirically showed that a country needs to seriously consider its competitiveness in order to secure the desired financial market growth and there lies the contribution of our research on this topic.

4. Data, Variables, and Methodology

4.1 Data

The dataset we used comes mostly from World Economic Forum (WEF, 2017). More specifically, the Global Competitive Index (GCI), the Foreign Market Size Index (FMI), the Infrastructure Index (INFR), the Labour Market Efficiency Index (LME) and Financial Market Development (FM) have been derived from the Global Competitiveness Report which was published in 2017 by the World Economic Forum. All the above indices are scaled and range from 1 to 7 (best).

The control variables set includes Unemployment rate (UN), the real Gross Domestic Product per capita (GDPpc) and the total Exports of goods and services (EXP) as a percentage of GDP. The above control variables have been derived from the World Bank open access dataset (2019) and used to calibrate the proposed model as a set of macroeconomic variables.

The data set used spans the period 2006-2017 and includes 28 European countries organising a panel data set where n = 28, T = 12 and total number of observations N = 336. The period was chosen based on data availability for all key variables and for all 28 European countries. These countries are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

4.2 Variables

For the examined models the paper considers as dependent variables the Financial market development (FM) while country competitiveness proxies have been considered as independent variables along with the macroeconomic variables. The following Table 0 presents the independent and control variables along with a short description and the source where the dataset has been derived.

Table 1. Variables selection

Variable	Coding	Type	Description	Source
Financial Market Development	FM	Dependent	The ability of the financial sector to allocate the resources to entrepreneurial or investment projects with highest expected IRR	World Economic Forum
Global Competitive Index	GCI	Independent	The ability of a country to achieve sustained high rates of growth in gross domestic product (GDP) per capita [1 – 7 (best)]	World Economic Forum

Foreign Market Size	FMI	Independent	The exports of goods and services obtained by the product of exports as % of GDP and GDP valued at PPP [1 – 7 (best)]	World Economic Forum
Infrastructure Index	INFR	Independent	The higher the index the more efficient is the infrastructure of a country and the more operational is its economy [1 – 7 (best)]	World Economic Forum
Labor Market Efficiency	LME	Independent	The effective workers allocation as well as the provision of strong incentives for the employees are demonstrated in this index which also performs the attractiveness of a country [1 – 7 (best)]	World Economic Forum
Unemployment (Note 1)	UN	Control	The share of the labor force that is without work but available for and seeking employment.	Eurostat
Gross Domestic Product per capita	GDPpc	Control	The GDP divided by midyear population	Eurostat
Export of goods & services	EXP	Control	The value of all goods and other market services provided to the rest of the world	Eurostat

Table 2. Definitions of competitiveness

Perspective	Definition	Source	Details
Microeconomic Level	Company's ability to deal with its competitors, to grow and to demonstrate sustainable profitability	Law, 2009	The competitiveness of an enterprise is linked to its ability to compete successfully with its commercial rivals
Macroeconomic Level	National competitiveness is the grid of factors, policies and institutions that determine the level of productivity of a country	WEF, 2007	The level of productivity determines the sustainable level of prosperity that an economy can enjoy
	The term competitiveness was described as the capacity of a country to achieve sustainably high GDP growth rates per capita	WEF, 1996	A more competitive economy is an economy that is likely to grow faster in the medium to long term timeframe
	The degree to which a state can, under conditions of free and fair market, offer goods and services that meet the criteria of international markets, while maintaining and increasing the real income of the people in the long-term	OECD, 1996	In 1996, OECD defines competitiveness as supporting the ability of firms, industries, regions, countries or transnational regions to generate relatively high levels of income and employment rates, while remaining exposed to international competition
Literature	Competitiveness is the ability of a state to create, produce and distribute products and services through international trade, making a profit	Scott & Lodge, 1985	U.S. competitiveness in the world economy
	The ability of a state to increase its share in the international market while, at the same time, improving the living standards of its citizens	Fajnzylber, 1988	International competitiveness: agreed goal, hard task

The rationale of the selection of these variables is almost straightforward; we attempt to identify whether the development of a country's financial market is related with the competitiveness of that country, especially in a period which has been characterised by a broad and global financial crisis.

Table 3. Summary statistics

Variable		Mean	Std.Dev.	Min	Max	Observations
FM	Overall	4,504	0,671	2,494	6,400	N = 336
	Between		0,543	3,416	5,468	n = 28
	Within		0,405	3,335	6,039	T = 12
UN	Overall	8,958	4,415	2,750	27,470	N = 336
	Between		3,378	5,073	18,440	n = 28
	Within		2,908	-1,250	18,620	T = 12
GDPpc	Overall	32,700	21,370	4,490	118,800	N = 336
	Between		21,480	7,070	106,600	n = 28
	Within		3,241	15,820	44,940	T = 12
GCI	Overall	4,729	0,498	3,860	5,662	N = 336
	Between		0,496	4,010	5,508	n = 28
	Within		0,099	4,437	4,991	T = 12
FMI	Overall	4,985	0,787	2,720	6,562	N = 336
	Between		0,762	3,534	6,458	n = 28
	Within		0,240	4,171	5,497	T = 12
EXP	Overall	62,450	32,890	18,670	195,800	N = 336
	Between		32,250	24,800	170,600	n = 28
	Within		8,711	35,490	105,000	T = 12
INFR	Overall	4,973	0,878	2,561	6,650	N = 336
	Between		0,836	3,214	6,341	n = 28
	Within		0,310	3,989	5,919	T = 12
LME	Overall	4,460	0,439	3,290	5,600	N = 336
	Between		0,414	3,599	5,333	n = 28
	Within		0,164	4,001	4,949	T = 12

UN: Unemployment, total (% of total labor force), GDPpc: GDPpc: GDP per capita (current KUS$), GCI: Global Competitive Index 1-7 (best), FMI: Foreign market size, Index 1-7 (best), EXP: Exports of goods and services, total (% of GDP), INFR: Infrastructure, Index 1-7 (best), LME: Labor market efficiency, Index 1-7 (best), FM: Financial Market Development, Index 1-7 (best)

Table 3 illustrates the behavior of the data covering the full-sample period. It provides the means, standard deviations, variance, minimum and maximum values for the different cross sections. As it can be seen from the Table 3, the variation of the GCI is less than 0,01 within the years and almost 0,5 between countries. The rest of the proxy variables of financial market development are characterized by considerable variations mainly between cross sections while the FM dependent variable appears to have great variation between and within the countries and the

time respectively. In particular, for the INFR index, the EXP and the FMI the difference between the minimum and the maximum value confirms the observed variability in a heterogeneous panel of countries, such as the one presented here.

4.3 Methodology

Since we have a strongly balanced panel of observations from countries spanning 12 years it is clear that there is persistence in most of our variables of interest. Given that, we make use of dynamic panel data analysis. The dynamic panel methodology allows to deal more efficiently and effectively with any econometric problems occur.

Table 4. Correlation matrix

	FM	UN	GDPpc	GCI	FMI	EXP	INFR	LME
FM	1							
UN	-0,5731*	1						
GDPpc	0,5026*	-0,3085*	1					
GCI	0,6610*	-0,4307*	0,7080*	1				
FMI	0,0383	-0,0543	0,2871*	0,5044*	1			
EXP	0,1590*	-0,2742*	0,3994*	0,0854	-0,1487*	1		
INFR	0,3340*	-0,0776	0,6447*	0,7880*	0,4922*	-0,0052	1	
LME	0,5890*	-0,3818*	0,4358*	0,6657*	0,0669	0,2441*	0,3181*	1

*0,05 level of significance

UN: Unemployment, total (% of tatal labor force), GDPpc: GDPpc: GDP per capita (current KUS$), GCI: Global Competitive Index 1-7 (best), FMI: Foreign market size, Index 1-7 (best), EXP: Exports of goods and services, total (% of GDP), INFR: Infrastructure, Index 1-7 (best), LME: Labor market efficiency, Index 1-7 (best), FM: Financial Market Development, Index 1-7 (best)

Table 4 presents the correlation matrix among all variables used in our models. As it can be seen apart from the EXP variable, the rest of the control set variables are seriously and significant correlated with the financial market development (FM). In particular, only the unemployment rate appears to negatively correlated with the FM (-0,573). In contrast, the GDPpc, the INFR and LME are positively strongly correlated (0,503; 0,334 and 0,590 respectively) with financial market development regardless of the country and the time level.

Our study contributes to the existing literature by adopting a fixed effects and a random effects model to properly account for the imposition of possible effects on financial market development. We supplement our analysis by using parametric techniques (GMM estimators) in order to compare and contrast our findings.

Before proceeding to unit root and cointegration tests we test for cross-section dependence. We use the cross-section dependence test (CD test) proposed by Pesaran (2004). CD test strongly rejects the null hypothesis of cross-section independence for all the sample variables. In face of this evidence, we proceed to test for unit roots using the so-called "second generation" tests for unit roots in panel data that are robust to cross-section dependence (see Pesaran, 2015). To examine the stationarity properties of the variables in our models we use the second-generation panel unit root tests developed by Maddala and Wu (1999) and Pesaran (2003) both suitable for balanced panel data set and cross-section dependence. The null hypothesis of a unit root (non-stationarity) cannot be rejected for all the sample variables. This means that the variables contain a unit root (e.g., integrated of order one) as expected by the visual inspection of their time series. In order to investigate whether a long-run equilibrium relationship exists among the sample variables we implement Pedroni's (1999) ADF-based and PP-based cointegration tests as well as Kao's (1999) ADF-based tests. Both tests suggest the rejection of the null hypothesis of no cointegration null at any significance level.

4.4 Fixed Effects Model

The fixed effects model is simply a linear regression model in which the intercept terms vary over the individual units *i*, i.e.

$$y_{it} = a_i + x_{it}^{'}\beta + \varepsilon_{it}, \varepsilon_{it} \sim IID(0, \sigma_{\varepsilon}^2) \quad (1)$$

where it is usually assumed that all x_{it} are independent of all ε_{it}. We can write this in the usual regression framework by including a dummy variable for each unit *i* in the model (Verbeek, 2008). That is,

$$y_{it} = \sum_{j=1}^{N} a_j d_{ij}\, x_{it}^{'}\beta + \varepsilon_{it} \quad (2)$$

where $d_{ij} = 0$ when $i = j$ and 0 elsewhere. We have also assumed the strictly exogenous regressors case in the conditional moments (see Woolridge, 2009). We have not assumed equal sized groups in the panel. The vector β is a set of parameters of primary interest, α_i is the group specific heterogeneity. We have included time specific effects but, they are only tangential in what follows. Since the number of periods is usually fairly small, these can usually be accommodated simply by adding a set of time specific dummy variables to the model. Our interest here is in the case in which *N* is too large to do likewise for the group effects.

4.5 Random Effects Model

It is commonly assumed in regression analysis (Verbeek, 2008) that all factors that affect the dependent variable, but that have not been included as regressors, can be appropriately summarized by a random error term. In our case, this leads to the assumption that the α_i are random factors, independently and identically distributed over individuals. Thus, we write the random effects model as:

$$y_{it} = \mu + a_i + x_{it}'\beta + \varepsilon_{it}, \varepsilon_{it} \sim IID(0, \sigma_{\varepsilon}^2); \alpha_i \sim IID(0, \sigma_{\alpha}^2) \quad (3)$$

where $a_i + \varepsilon_{it}$ is treated as an error term consisting of two components: an individual specific component, which does not vary over time, and a remainder component, which is assumed to be uncorrelated over time. It is also assumed that a_i and ε_{it} are mutually independent and independent of x_{js} (for all j and s).

4.6 Arellano & Bond – GMM

With the intention to examine the dynamic aspects we use dynamic panel data techniques such as Difference Generalized Method of Moments (DIF-GMM) estimators attributed to Arellano and Bond, (1991) and System Generalized Method of Moments (SYS-GMM) estimators proposed by Arellano and Bover (1995) and Blundell and Bond (1998) respectively. The use of the latter is mainly justified as it improves significantly the estimates' accuracy and enlarges efficiency when the lagged dependent variables are considered as poor instruments as in the first-differenced regressors (Greene, 2003, Baltagi, 2002). As a consequence, the SYS-GMM gives more robust results than the first-differenced GLS and GMM estimation methods (Bond et al., 2001).

The GMM estimators rely on moments of the form:

$$h(\beta) = \sum_{i=1}^{N} h_i(\beta) = \sum_{i=1}^{N} \Psi_i' u_i'(\beta) \quad (4)$$

where, Ψ_i is a $T_i \times p$ matrix of instruments for cross section i and $u_i(\beta) = \left(Y_i - f\left(X_{it}, \beta\right)\right)$. Specifically, GMM minimizes the following quadratic form with respect to β

$$M(\beta) = \left(\sum_{i=1}^{N} \Psi_i' u_i(\beta)\right)' W \left(\sum_{i=1}^{N} \Psi_i' u_i(\beta)\right) = \zeta'^{(\beta)} W \zeta(\beta) \tag{5}$$

where W is a pxp weighting matrix.

The coefficient covariance matrix is estimated as:

$$V(\hat{\beta}) = (G'WG)^{-1}(G'W\Xi WG)(G'WG)^{-1} \tag{6}$$

Where Ξ is estimated as

$$E\left(\zeta_i(\beta)\zeta_i(\beta)'\right) = E\left(\Psi_i' u_i(\beta) u_i(\beta)' \Psi_i\right) \tag{7}$$

And G is a $T_i \times k$ matrix given as:

$$G(\beta) = \left(-\sum_{i=1}^{N} \Psi_i' \nabla f_i(\beta)\right) \tag{8}$$

The weighting of matrix W can be calculated using the White robust covariances, which are given as:

$$\left(\frac{M^*}{M^* - k^*}\right)\left(\sum_t X_t' X_t\right)^{-1}\left(\sum_t X_t' \hat{u}_t \hat{u}_t' X_t\right)\left(\sum_t X_t' X_t\right)^{-1} \tag{9}$$

The first parenthesis is an adjustment to the degrees of freedom relying on the total number of observations; M^* is the total number of stacked observations and k^* the number of estimated parameters. The general form of the equation estimated with panel data dynamic models is one with individual effects like the following:

$$Y_{it} = \lambda_t + \eta_i + \sum_{k=1}^{p} \alpha_k Y_{i(t-k)} + \beta'(L) X_{it} + v_{it} \tag{10}$$

for $i = 1,2,\ldots,T$, where λ_t and η_i correspond to specific and individual effects, X_{it} is a vector of explanatory variables, $\beta(L)$ is a vector of associated polynomials in the lag operator and q is the maximum lag length. Identification of the model requires restrictions on the serial correlation of the error term v_{it} and on the properties of the independent variables X_{it} allowing only for MA or white noise errors. If the error term was originally autoregressive, the model is transformed.

Orthogonal deviations as proposed by Arellano and Bond (1988) express each observation as the deviation from the average of future observations in the sample and weight each deviation to standardize the variance:

$$x_{it}^* = \left[x_{it} - (x_{i(t+1)} + \ldots + x_{iT})/(T-t)\right]\sqrt{(T-t)} / \sqrt{T-t+1} \tag{11}$$

for $t = 1,2,\ldots,T-1$.

The $T_i - q$ equations for individual unit i can be written as:

$$Y_i = \delta w_i + d_i \eta_i + v_i \tag{12}$$

where δ is a parameter vector including α_κ, β and λ; and w_i is a data matrix containing the time series of the lagged endogenous variables, the *x*' s, and the time dummies. The d_i is a $(T_i - q) \times 1$ vector of ones. Following Arellano and Bond (1998), linear GMM estimators of δ may be computed by the following expression:

$$\hat{\delta} = \left[\left(\sum_i w_i^{*\prime} Z_i \right) . \frac{1}{\frac{1}{N} \sum_i Z_i' H_i Z_i} . \left(\sum Z_i' w_i^* \right) \right]^{-1} . \left(\sum_i w_i^{*\prime} Z_i \right) \frac{1}{\frac{1}{N} \sum_i Z_i' H_i Z_i} \left(\sum_i Z_i' Y_t^* \right) \quad (13)$$

where w_i^* and Y_i^* denote some transformation of w_i and Y_i such as first differences, orthogonal deviations or levels. Z_i is the matrix of instrumental variables and H_i is an individual specific weighting matrix. We may have one-step estimates, which use some known matrix as the choice for H_i. For a first - difference procedure, the one-step estimator uses H_i, while for orthogonal deviations or for a levels procedure the one-step estimator sets H_i to an identity matrix. If the v_{it} are heteroskedastic, a two-step estimator is used.

5. Results and Implications

5.1 Results

From the regressions run, we realize that the financial market development is positively correlated with the global competitiveness index (GCI) at all significance levels with all three approaches, i.e. fixed effects, random effects and Arellano-Bond. It is positively correlated with the GDP per capita will all three methods as well; however, different significance levels are observed. Namely, the financial market development is positively correlated with the GDP per capita at all significance levels when the random effects and the Arrelano-Bond methods are used and at the 10% significance level when the fixed effects method is employed.

The financial market development is negatively correlated with the unemployment rate also with all three models. It is negatively correlated with the fixed effects and random effects models at all significance levels, whereas it is negatively correlated with the Arellano-Bond model at the 5% significance level. It is negatively correlated with the foreign market size index and the exports (as a percent of GDP) at all significance levels with all three models, i.e. fixed effects, random effects and Arellano-Bond. It is negatively correlated with the infrastructure index at all significance levels with the Arellano Bond approach and at the 5% significance level with the random effects approach.

The constant term is statistically significant at all levels with all three methods. For the remaining of the variables (per approach) there seems to be no statistical significance; however, they were incorporated in the model as they contribute to the goodness of fit.

5.2 Interpretation and Implications

The regressions ran indicate that when the GCI is tested, there is a positive correlation with the financial market development. This finding is probably anticipated, as countries that exhibit high competitiveness have at the same time achieved high levels of financial market development. There are a number of reasons that could explain this. High competitiveness fosters the efficiency of the financial sector, attracts domestic and foreign resources and directs them effectively to entrepreneurial or investment projects. Highly competitive economies most likely have sophisticated financial markets, sound banking sector and well regulated capital and OTC markets. They have secured transparency and inspire trust to all the interested stakeholders. Consequently, their financial markets enjoy higher development levels.

The same is observed when the GDP per capita is considered. A potential interpretation is that countries that are more prosperous have more resources flown into the financial markets, which as a results become more mature and developed. Inevitably the banking sector is comparatively more solid. The citizens could be more demanding and consequently the supervision, regulation, transparency and trustworthiness are at higher levels compared to countries that have a lower GDP per capita.

When we look at the unemployment rate, we realize that it is negatively correlated with the financial market development. The rationale is probably symmetric with the aforementioned one; higher unemployment most likely leads to lower flows towards the financial markets from the domestic investors and is potentially associated with less entrepreneurial and investment projects and therefore less sophisticated and less developed financial markets.

However, there is a negative correlation of the financial market development and the foreign market size and exports as well as infrastructure. One would probably expect the opposite, i.e. that higher foreign market size and exports or even infrastructure would lead to highly developed financial markets. Looking for potential interpretations we realize that our period of examination (2006 to 2017) is around - and thus influenced - by the 2008 crisis. Consequently, most of the country's experiences decreasing financial market development (Figure 2), whereas their exports and foreign market size did not drop; it remained stable or even increased (Figure 1). The drop of the financial market development could be explained by the impact the crisis had in the financial markets, which for some countries where rather turbulent. At the same time the banking sector is still not as solid as it was thought to be; in some cases, it is still rather fragile. This has diminished the trustworthiness towards the financial and capital markets and has led to lower investment flows. On the contrary, it seems that exports and foreign market size have increased, especially in the post crisis period. The same holds true for the infrastructure index. It could be that the countries paid more attention in strengthening their economies by performing additional exports and addressing the foreign markets on one hand and directing public spending towards infrastructure on the other hand. This is not a paradox; countries needed to boost their economies, reduce unemployment – that in some cases skyrocketed – and create conditions that would help them whether the crisis. This was done by acting outside and inside their borders. The former increased exports and foreign market size. The latter led to increased infrastructure. Consequently, all three of them improved for the majority of the countries over the years. Besides the explanation we offer though, we feel that these variables need to be further researched.

Impacting the GDP per capita and the unemployment may be a challenging target for a country. Steering though the (perceived) competitiveness of the country is not beyond reach. The common playing field of the European Union definitely helps in this direction. Consequently, policy makers can find value in the aforementioned findings as evidence is provided that there are ways to increase the financial markets development. No need to say that when this is achieved, other metrics of the economy are expected to improve, as a solid banking sector and a well-regulated, trustworthy financial market can attract additional investors and entrepreneurs; this in its turn is anticipated to be beneficial for the economy as a whole, potentially reducing the unemployment rate and increasing the GDP per capita.

Table 5. Regression summary

	Pooled OLS	Fixed Effects	Random Effects	Arellano - Bond GMM
	b/se	b/se	b/se	b/se
UN	-0.032***	-0.043***	-0.045***	-0.027**
	(0.01)	(0.01)	(0.01)	(0.01)
GDPpc	0.004**	0.022*	0.015***	0.039***
	(0.00)	(0.01)	(0.00)	(0.00)
GCI	1.209***	1.077***	1.079***	0.821***
	(0.12)	(0.29)	(0.24)	(0.29)
FMI	-0.272***	-0.514***	-0.454***	-0.543***
	(0.03)	(0.13)	(0.07)	(0.06)
EXP	-0.002*	-0.013***	-0.009***	-0.011***
	(0.00)	(0.00)	(0.00)	(0.00)
INFR	-0.240***	-0.196	-0.257**	-0.592***
	(0.05)	(0.13)	(0.10)	(0.12)
LME	-0.00900	-0.176	-0.131	0.0280
	(0.09)	(0.16)	(0.16)	(0.11)

constant	1.624***	4.229***	4.002***	5.807***
	(0.35)	(1.27)	(0.66)	(0.80)
R-sqr	0.646	0.639		
Dfres	328	27		
BIC	381.1	43.50	.	.

* p<0.10, ** p<0.05, *** p<0.01

UN: Unemployment, total (% of tatal labor force), GDPpc: GDPpc: GDP per capita (current KUS$), GCI: Global Competitive Index 1-7 (best), FMI: Foreign market size, Index 1-7 (best), EXP: Exports of goods and services, total (% of GDP), INFR: Infrastructure, Index 1-7 (best), LME: Labor market efficiency, Index 1-7 (best), FM: Financial Market Development, Index 1-7 (best)

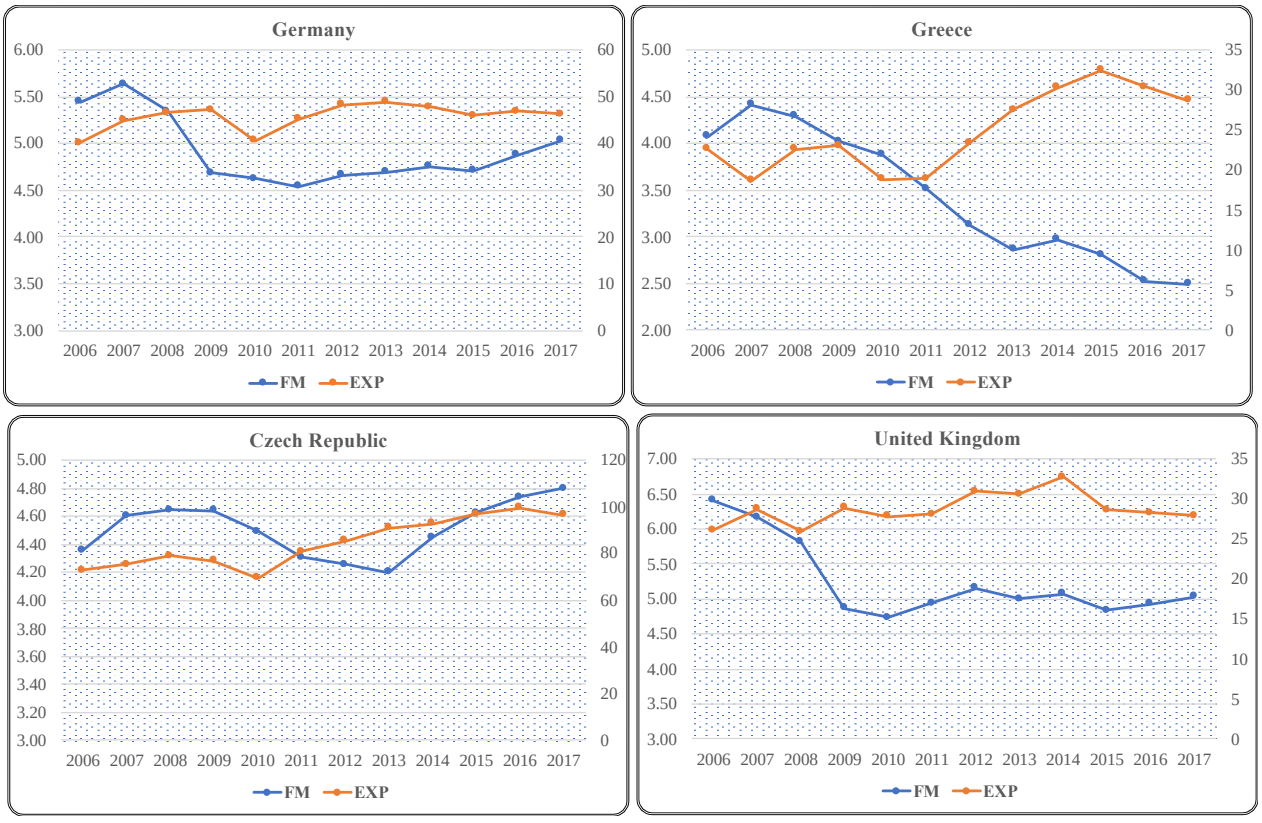

Figure 1. Financial Market Development and Exports of Goods and Services (% of GDP)

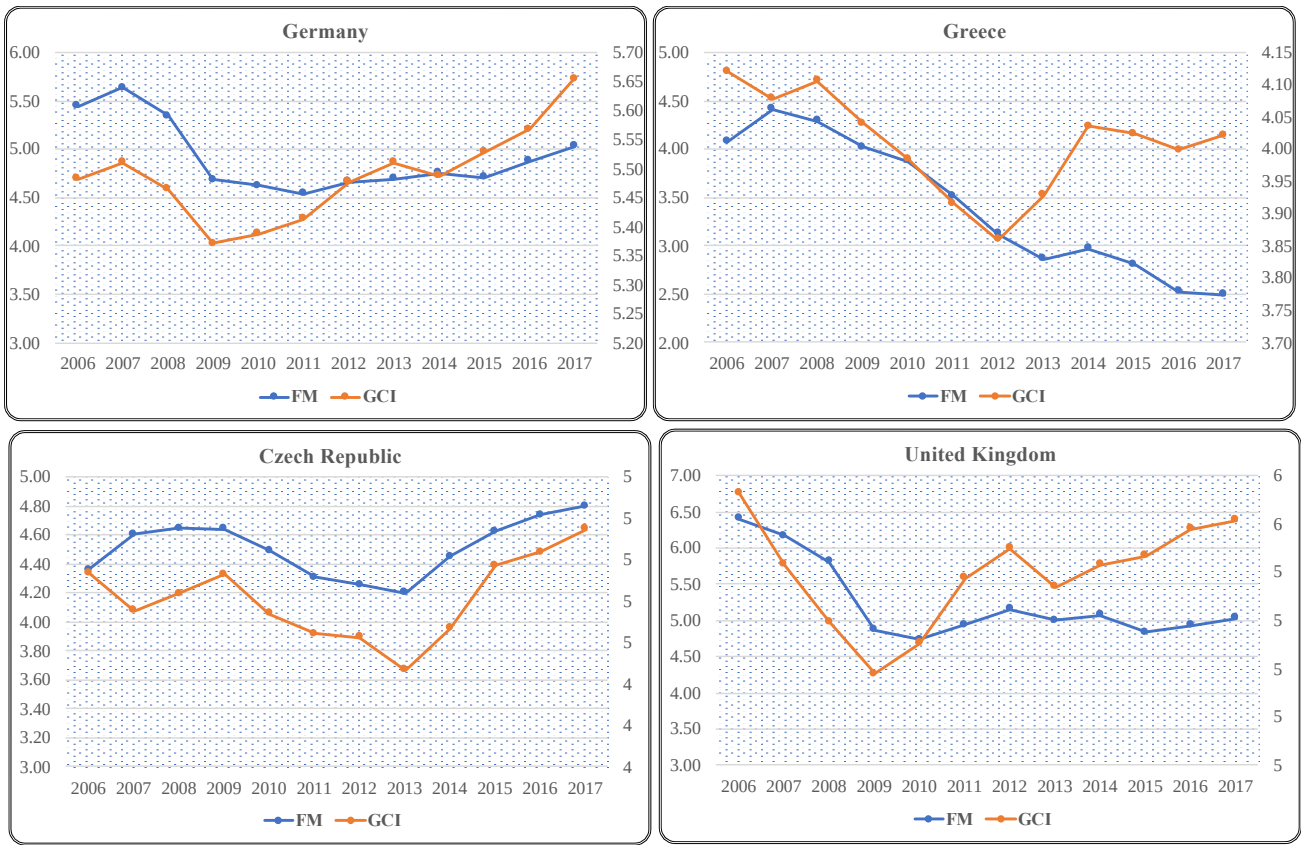

Figure 2. Financial Market Development and Global Competitive Index

6. Future Research

In this paper we used a set of competitiveness factors to demonstrate the dependence with the development of a country's financial market from competitiveness. However, as noted by our findings, the impact of some variables needs to be reevaluated. More precisely, we deem necessary to revisit the (co)relation of the financial markets development with the foreign market size, the exports and the infrastructure. Furthermore, we would like to study the link between competitiveness and the equity or debt markets separately. In addition, provided we gain access to data that go several years before the 2008 financial crisis, we will distinguish the periods before, during and after the crisis, especially in reference to the aforementioned variables. These targets lie beyond the scope of this paper, which focuses specifically in times of crisis, and is thus left for future research. We consider among future research venues the study of the opposite relation, i.e. the impact of financial market development of competitiveness.

7. Conclusions

The development and the performance of financial markets in the European Union is of high interest, as they can become a source of funding for enterprises and a source of income for potential investors. The investment attractiveness of a country is a proof of trust by investors. A clear example of this outcome is Greece, a country that seems to have suffered the most from the financial crisis. Investors have stayed for many years out of the financial markets of the country, which may have assisted in extending the crisis period for the country and in making it even harsher.

In this paper we found evidence that there is a clear link between the financial market development of a country and its competitiveness as measured by the Global Competitiveness Index, the GDP per capita and the (un)employment. This indicates that the competent authorities of a country need to seriously consider its competitiveness, as measured by these variables, in order to secure the desired financial market growth. Consequently, they need to review their globally perceived competitiveness, their level of GDP per capita and their (un)employment rate. Greece is again a member state to which this approach is extremely relevant. We found unexpected direction of the correlation between financial market development and the foreign market size, the exports and the infrastructure, which although was explainable, needs to be further investigated.

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Note

Note 1. As for the limitations of this study, it should be mentioned that the definitions of labor force and unemployment may differ by country; however, for this study we consider the European countries where there are not any fundamental differences