Original Paper

Financial Development and Economic Growth: Evidence from the Eurozone

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Abstract

The aim of this paper is to investigate the relationship between financial development and economic growth, within a panel framework that also accounts for trade openness, for the case of Eurozone using data covering the period 1990-2018. We explore this relationship using panel analysis techniques, robust to cross sectional dependence, in order to investigate the presence of causality between the variables. The cointegration results suggested that there is one cointegrated vector between the functions of economic growth, financial development and trade openness. In addition, the causality results of the study revealed, both in the short and long-run, that there is a unidirectional causal relationship between financial development and economic growth with direction from economic growth to financial development, as well as a unidirectional causality running from trade openness to financial development.

Keywords

economic growth, financial development, trade openness, cross section dependence, DOLS, VECM, causality

JEL Classification

C50, C58, E60

1. Introduction

Economic development has always been a major issue for both theoretical and empirical studies. Sustainable growth rates presuppose fundamental changes in the structure of an economy, which differ from country to country.

Financial development is commonly defined as a process that improves the quantity, the quality, and the efficiency of financial intermediation services. Financial development is linked to economic growth through different channels. Financial markets provide liquidity to investors, facilitate risk management and reduce asymmetric information.

We can consider that each of the functions of the financial system can affect economic growth in two ways: through capital accumulation and through technological innovations. In the first case, the functions of financial system affect the production growth by influencing the rate of capital creation (e.g., through positive external economies). Thus, the financial system affects the accumulation of capital by increasing or redistributing the percentage of savings between different production technologies of capital goods. In the second case, the functions of the financial system affect the production growth by increasing the pace of technological innovation, resulting from the introduction of new production methods.

In recent years, the main object of ongoing research has been the relationship between economic growth and other economic indicators such as financial growth and the trade openness. Trade openness can be seen as catalysts for development.

In terms of innovative econometric techniques and new data this study investigates the causality relations among financial development, economic growth and trade openness for the case of Eurozone (19 Euro Area countries viewed as group) using annual panel data over the period 1990-2018.

The structure of the paper is as follows: Section 2 briefly reviews the recent empirical literature. Section 3 presents data and methodology. Empirical results are discussed in section 4. Concluding remarks are given in the final section.

2. Brief Literature Review

In recent years, there is an increasing number of empirical studies concerning the relationship between economic growth and financial development on a certain country level. However, a weak point of these analyses is the absence of a general examination on cross-county level.

In this section, we mention recent empirical studies that rely on panel data and cross-country techniques. Kar et al. (2011) investigated the relation between financial development and economic growth in the Middle East and North African (MENA) countries. The results of their study showed that the direction of causality between the examined variables is sensitive to the measurement of financial development in these countries. The analysis supports both the "demand-following" and "supply-leading" hypotheses. Authors concluded that the direction of causality seems to be country and financial development indicator specific.

A similar study (Hassan et al., 2011) investigated the nexus between financial development and economic growth in low and middle income countries. Hassan et al. (2011) found a positive relationship between financial development and economic growth in developing economies. In addition, their short-term analysis revealed mixed results. For most regions, a bidirectional causality relation

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between economic growth and financial developments is shown. For the poorest regions, a unidirectional causality relation running from economic growth to finance is supported. Authors concluded that the real sector such as trade and government expenditure could play an important role in explaining economic growth.

Rachdi and Mbarek (2011) explored the nexus between economic growth and financial development based on a sample of 10 countries, 6 from the OECD region and 4 from the MENA region during the period 1990-2006. The results of their study revealed that economic growth and financial development are positively and strongly linked. The Granger causality analysis supports the existence of a bidirectional relation for the OECD countries. In addition a unidirectional causality with direction form economic growth to financial development is supported for the MENA countries.

Hsueh et al. (2013) examined the relationship between economic growth and financial development in 10 Asian economies. Their results showed that the direction of causality between the examined variables is sensitive to the financial development indicators used in the analysis. Moreover, the findings support the "supply-leading" hypothesis. Many financial development indicators lead economic growth in some of the countries under examination, especially in China.

Menyah et al. (2014) investigated the relationship between financial development and economic growth for 21 African countries within a framework that also accounts for international trade. Authors supported that the "finance-led" growth and the "trade-led" growth hypotheses are limited. They conclude that the financial development and trade liberalization do not seem to have made a significant impact on economic growth.

Chortareas et al. (2015) examined the effects of financial development on economic growth focusing on the implications of trade and financial openness, for selected advanced and developing economies. Their analysis showed that, in the long run, the typical relationship among finance and economic growth does not hold. Authors supported that this relationship is reestablished in the case they account for economic openness. In the long run causality runs from financial development to economic growth in the advanced economies, while in the developing economies causality is bidirectional.

3. Data and Methodology

3.1 Data

The variables that are used in this study are Gross Domestic Product (GDP) measured in constant 2010 prices, Financial Depth (FD) measured by the total bank deposit to GDP, and Trade Openness (TO) measured by the sum of exports and imports as a percentage of GDP at 2010 constant prices. The sample used is annual data covering the period 1990-2018 for the 19 Euro Area countries, The data are taken from the World Development Indicators (WDI, 2020) and the Annual Macro-Economic Database (AMECO, 2020).

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3.2 Methodology

The purpose of this paper is to investigate the relationship between economic growth and financial development in a panel framework that also accounts for trade openness for the case of Eurozone over the period 1990-2018.

Following Kaushal and Patahk (2015) we specify the functional form as follows:

$$FD_{it} = a_i + \beta_1 GDP_{it} + \beta_2 TO_{it} + u_{it} \tag{1}$$

where: $GDP_{i,t} =$ Gross Domestic Product, $FD_{i,t} =$ Financial Depth, $TO_{i,t} =$ Trade Openness, $a_i =$ Intercept,

$\beta_1 =$ Estimated coefficient of GDP, $\beta_2 =$ Estimated coefficient of TO, $u_{i,t} =$ Error term, $i =$ the number of individual members and $t =$ the number of observation over time.

The methodological approach of the study includes the following steps:

    i. The first is to test the cross sectional dependence in order to decide which panel unit roots would be appropriate, first or second generation panel unit root tests. In this study, the cross-sectional dependence proposed by Breusch-Pagan (1980) test is applied.

    ii. Since the presence of cross sectional dependence exists, we continue applying the second generation unit root tests in order to specify the integration order of the series (Breusch & Pagan 1980, Pesaran, 2004). In our analysis, the Cross Sectionally Augmented IPS (CIPS) test proposed by Pesaran (2007) is presented.

    iii. After the order of integration has been defined the next step is to examine the long run relationship among the variables using panel cointegration analysis robust to cross sectional dependence. For this purpose, the Westerlund's (2007) test is applied.

    iv. The fourth aim is to estimate the long run relationship with the panel Dynamic Ordinary Least Square (DOLS) approach (see also Dritsakis & Stamatiou, 2016, 2017).

    v. Finally, a dynamic vector error correction model (VECM) is used in order to find the causality relations.

4. Empirical Results

4.1 Cross-Sectional Dependence Test

In the empirical investigation, it is necessary to test for cross sectional dependence in the units in order to avoid biased estimates. For this reason, we begin our analysis applying the cross-sectional dependence test proposed by Breusch and Pagan (1980). The Breusch-Pagan (1980) approach is more appropriate in the case that time dimension is larger than cross section dimension.

Table 1. Cross-Sectional Dependence Results

Test	Statistic	Probability	d.f
Breusch-Pagan (LM)	15.55***	0.004	154

Note. ** indicates rejection of null hypothesis at 5% level of significance.

As can be seen from Table 1, the Breusch-Pagan (1980) test strongly rejects the null hypothesis of no cross sectional dependence at 1% level of significance.

4.2 Second Generation Panel Unit Root Test

We continue applying the Cross Sectionally Augmented IPS (CIPS) test proposed by Pesaran (2007). This approach is an augmented ADF test with the cross section averages of lagged levels and first differences of the time series. The results of level and first difference unit root test are shown in Table 2.

Table 2. Unit Root Results

	Level			
		GDP	FD	TO
CIPS	Intercept	-1.532	-2.122	-2.092
Statistic	Interceptandtrend	-1.873	-2.766	-2.911
	First Differences			
		GDP	FD	TO
CIPS	Intercept	-2.114***	-5.460***	-5.104***
Statistic	Interceptandtrend	-3.130**	-5.846***	-5.000***

Notes. *** denotes rejection of null hypothesis at at 1% level of significance.

The results of Table 2 support that all variables are not stationary in levels but in their first differences. So, we conclude that GDP, FD and TO are integrated of order one (i.e. $I(1)$).

4.3 Cointegration Analysis

Since unit root analysis has been applied, the next step is to use panel cointegration methodology to test if there is long run relationship among the examined variables. The results of Westerlund (2007) tests are provided in the next table.

Table 3. Panel Cointegration Results

Westerlund (FD as dependent variable)			
Statistic	**Value**	**Z-value**	**P-Value**
Gt	-3.879	-2.954	0.003***
Ga	-12.457	-0.346	0.509
Pt	-12.911	-11.159	0.000***
Pa	-30.253	-5.893	0.000***

Notes. Under the null tests, all variables are distributed normal, N(0, 1). *** significant at 1% level. In Westerlund test Akaike Information Criterion is used for optimal lag/lead length selection.

The results of Table 3 show that there is a long run relationship between the examined variables, for the group of the 19 Euro Area countries. In other words, the results show that GDP, FD and TO are cointegrated.

4.4 DOLS Estimates

Having define the order of integration, the next step is the estimation of the long run equilibrium relationship. In this study the dynamic OLS (DOLS) approach proposed by Kao and Chiang (2000) is applied. According to Kao and Chiang (2000) the Dynamic OLS estimator allows for greater flexibility for the case with heterogeneous cointegrating vectors. The results of Dynamic OLS estimations are provided in the next table.

Table 4. DOLS Estimations Results (GDP as dependent variable)

	DOLS	
	IndependentVariables	
	GDP	**TO**
Coefficient	1.87	0.99
	(4.001***)	(-4.055***)
R^2	0.987	
Adj. R^2	0.912	

Notes. The numbers in parentheses denotes t-statistic. Asymptotic distribution of t-statistic is standard normal as T and N go to infinity. *** significant at 1% level. Lag and lead method selected by Akaike.

The estimation results show that there is a positive relationship between financial development and economic growth, as well as between financial development and trade openness in 1% level of significance.

4.5 The VECM Granger Causality

After the long-run relationship, we continue applying the VECM in order to examine the causality relations among the examined variables. The equations that are used to test Granger causality are the following:

$$
\begin{bmatrix} \Delta FD_{i,t} \\ \Delta TO_{t,i} \\ \Delta GDP_{i,t} \end{bmatrix} = \begin{bmatrix} \alpha_{1,i} \\ \alpha_{2,i} \\ \alpha_{3,i} \end{bmatrix} + \sum_{k=1}^{p} \begin{bmatrix} \beta_{1,1,i,k} & \beta_{1,2,i,k} & \beta_{1,3,i,k} \\ \beta_{2,1,i,k} & \beta_{2,2,i,k} & \beta_{2,2,i,k} \\ \beta_{3,1,i,k} & \beta_{3,2,i,k} & \beta_{3,3,i,k} \end{bmatrix} \begin{bmatrix} \Delta FD_{i,t-k} \\ \Delta TO_{i,t-k} \\ \Delta GDP_{i,t-k} \end{bmatrix} + \begin{bmatrix} \lambda_{1,i} \\ \lambda_{2,i} \\ \lambda_{3,i} \end{bmatrix} ECM_{i,t-1} + \begin{bmatrix} u_{1,i,t} \\ u_{2,t,t} \\ u_{3,i,t} \end{bmatrix} (2)
$$

Where Δ is the first difference operator, $k=1,\ldots,p$ is the optimal lag selected by the Schwarz, $ECT_{i,t-1}$ stands for the lagged error correction term from the long-run cointegration equation, $\lambda_{j,i}$ is the adjustment coefficient (j=1, 2, 3) and $u_{j,i,t}$ is the disturbance term assumed to be uncorrelated with zero means.

The causality results on the short and long-run dynamics between economic growth, financial development and trade openness for the Eurozone are provided in the Table 5.

Table 5. Panel Causality Results

Dependent Variable	Source of Causation (independent variables) F-statistic			t-test
	Short-run			**Long-run**
	ΔFD	**ΔGDP**	**ΔTO**	**ECT**
ΔFD		7.77***	4.85**	-2.01**
ΔGDP	0.02		0.35	0.78
ΔTO	0.09	7.75		0.53

Notes. Δ denotes first difference operator, ** significant at 5% level, short-run causality is determined by the statistical significance of the partial F-statistics associated with the right hand side variables. Long-run causality is revealed by the statistical significance of the respective error correction terms using a t-test.

From the results of Table 5 we see that there is a short run unidirectional causal relationship between economic growth and financial development with direction from economic growth to financial development, as well as a short run causality running from trade openness to financial development.

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The estimated coefficient $\lambda_{1,i}$ of $ECT_{i,t-1}$ in equation of FD (financial development as dependent variable) is statistically significant at 5% level of significant implying that FD could play an important adjustment role in the long run equilibrium. Consequently the results imply that in the long run, there is a unidirectional causality running from economic growth to financial development, as well as a unidirectional causality relation running from trade openness to financial development.

5. Conclusion and Policy Implications

The present study investigates the relationship between economic growth and financial development within a framework that also accounts for trade openness for the case of the nineteen Euro Area economies over the period 1990-2018.

In our analysis, panel unit root tests, panel cointegration tests and dynamic panel causality test with error correction model are applied. The panel cointegration tests by Westerlund's (2007) suggest that there is a strong evidence of cointegration among the variables. The DOLS method is used for the estimation of the long run relationship. The obtained results, for the group of the 19 countries, show that both financial development and trade openness affect positively economic growth in 1% level of significance.

Causality results reveal that there is a long run unidirectional causality running from trade openness and economic growth to financial development. Findings suggest that sustainable growth rates in combination with trade liberalization could have a significant impact on financial development.

The results of the study support the "openness-led" growth hypothesis as suggested by the endogenous theory. Trade liberalization could enhance technological progress which in turns makes long run growth permanent. The promotion of technological progress could be happened by the stronger capital goods imports, the attraction of more foreign direct investments and the incentives for innovation in fields that are positively linked to trade liberalization (Nowak-Lehmann, 2000) (see also Stamatiou & Dritsakis, 2019).

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