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Demand following or supply leading? A panel data analysis for developed, developing, and less developed countries

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Abstract

In this paper, the linkages between financial development and economic growth in developed, developing and less developed countries are investigated using unbalanced panel cointegration and causality analysis in the period of 1980 – 2011. The results of the Pedroni cointegration analysis show the existence of cointegration relations between financial development and economic growth for whole country groups, but Kao cointegration analysis indicates the long – run relationship between the related variables for the group of less developed countries. The results of Granger causality analysis show that there is bidirectional causality relationship between financial development and economic growth for developed and developing countries. However, for less developed countries only unidirectional causal nexus is obtained running from real economic growth to financial development. This means that demand following process is valid for less developed country group.

Key words: Financial Development, Economic Growth, Panel Cointegration Test, Panel Granger Causality Test

JEL classification: C23, G10, O11, O16, O57.

1. Introduction

Ever since Schumpeter (1911), the relationship between financial development and economic growth has been extensively studied. It is now well recognized that financial development is crucial for economic growth.

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Furthermore, the direction of causality between financial development and economic growth is vital because it has significantly different implications for development policy (Calderon and Liu, 2003). Schumpeter (1911) contends that well functioning financial markets spur technological innovation by identifying and funding entrepreneurs with the best chances of successfully implementing innovative products and production process. Following Schumpeter (1911), most of the studies[1] argue that financial development accelerates the process of economic growth. Specifically, these studies advocate a liberalised financial system which is able to mobilise an increased volume of financial saving and allocate capital to more productive uses, both of which enhance the volume and productivity of physical capital and contribute to economic growth (Luintel and Khan, 1999).

By contrast, several economists are sceptical of the view that finance plays a major role in economic development. Robinson (1952) declares that where enterprise leads finance follows. Kuznets (1955) states that financial markets begin to grow as the economy approaches the intermediate stage of the growth process and develop once the economy becomes matured. According to these views, economic development creates demands for particular types of financial arrangements and financial system responds automatically to these demands (Levine, 1997). Moreover, some economists do not believe that finance – growth relationship is important. Lucas (1988) asserts that economists *"badly over – stress"* the role of financial factors in economic growth. As well as Lucas (1988), Chandavarkar (1992) notes, *"none of the pioneers of development economics…even list finance as a factor in development"*.

Despite Lucas (1988) and Chandavarkar (1992)'s claims, Lewis (1955) postulates a two – way relationship between financial development and economic growth. This view is supported by Patrick (1966). Likewise, a number of endogenous growth models[2] shows a two – way relationship between financial development and economic growth.

In this study, the annual time series for the period of 1980 – 2011 in developed, developing and less developed countries is taken into consideration and the finance – growth nexus is examined by using unbalanced panel data analysis. Therefore, the aim of the paper is to contribute to the literature on the linkage between financial development and economic growth in the context of large scale country groups and to determine the causal links as part of finance – growth nexus for the different country groups. In order to meet this goal, 178 countries are taken into account and to be understood the dynamism between financial development and economic growth 178 countries are divided into three country groups as

[1] See also. Goldsmith (1969), McKinnon (1973), Shaw (1973), Kapur (1976), Galbis (1977), Fry (1978, 1995) and Mathieson (1980).

[2] See also. Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Roubini and Sala-i-Martin (1992), Pagano (1993), King and Levine (1993), Barthelemy and Varoudakis (1996), Greenwood and Bruce (1997) and Levine (1997).

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developed, developing and less developed. For this purpose, this study consists of five sections. The finance – growth nexus and literature review is introduced in the second section, the method and data belonging to the empirical research of the study are described in the third section and research findings are shown in the fourth section. In the last section where a general evaluation is done, the study comes to an end.

2. Finance – Growth Nexus and literature review

The experiences in the market oriented economies using the price mechanism to allocate resources show that one of the most important characteristics of the process of economic development over time, is an increase in the number and variety of financial institutions and a substantial rise in the proportion not only of money but also of the total of all financial assets relative to Gross Domestic Product (GDP) and to wealth. Therefore, the growing importance of financial markets around the world has opened a new avenue of research into the relationship between financial development and economic growth. Because the main arguments indicate that financial system accommodates or restricts growth of real per capita output, financial development – economic growth nexus is gathered around the two basic views. The first view is called as "demand following" phenomenon in which the creation of modern financial institutions, their financial assets and liabilities and related financial services is in response to the demand for these services by investors and savers in real economy. In this case, the evolutionary development of the financial system is a continuing consequence of the pervasive, sweeping process of economic development. The nature of demand for financial services depends upon the growth of real output and upon the commercialization and monetization of various sectors in the economy. The more rapid the growth rate of real national income, the greater will be the demand by enterprises for external funds and therefore financial intermediation. Correspondingly, with a given aggregate growth rate, the greater the variance in the growth rates among different sectors or industries, the greater will be the need for financial intermediation to transfer saving from slow growing industries and from individuals to fast growing industries (Patrick, 1966). Hence, it can be said that as the real side of economy develops, its demands for various new financial services materialize and these are met from the financial side.

The second view, "supply leading", suggests that financial markets may promote long – run growth. Financial markets encourage specialization as well as acquisition and dissemination of information and may reduce the cost of mobilizing savings, thereby facilitating investments. Well developed financial systems may enhance corporate control by mitigating the principal agent problem through aligning the interests of managers and capitalists, in which case managers would strive to maximize firm value (Diamond and Verrecchia, 1982; Jensen and Murphy, 1990). In addition, financial markets

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make financial assets traded in them less risky because they allow savers to buy and sell quickly and cheaply when they wish to alter their portfolios. Companies at the same time enjoy easy access to capital through equity issues. Less risky assets and easy access to capital markets improve the allocation of capital, an important channel of economic growth. More savings and investments thereby may also ensure the long – run economic growth (Arestis *et al.*, 2001). Therefore, supply leading has two functions: to transfer resources from traditional sectors to modern sectors and to promote and stimulate an entrepreneurial response in these modern sectors. Financial intermediation which transfers resources from traditional sectors is akin to the Schumpeterian concept of innovation financing. Besides, the dynamism of supply leading opens new horizons as possible alternatives, enabling the entrepreneur to "think big". This may be the most significant effect of all, particularly in countries where entrepreneurs in industrial enterprises. They assist in the establishment of firms in new industries or in the merger of firms not only by underwriting a substantial portion of the capital, but more importantly by assuming the entrepreneurial initiative (Patrick, 1966).

Apart from the main views called as "demand following" and "supply leading", there are also two more views in the literature. Firstly, financial activity and economic growth are seen as not causally related. In this view, the observable correlation between them is spurious: economies grow and so do their financial sectors, but the two followed their own logic (Graff, 2002). Secondly, financial activity is an impediment to real economic activity. Thus, the direction of causation runs from finance to real activity; but the focus lies on the potentially destabilizing effects of financial overtrading and crises. Specifically, this view sees the financial system as inherently unstable. Hence, economists holding this view contend that financial development can hinder growth by reducing available credit to domestic firm. This situation arises from the presence of informal curb markets. As the formal financial system develops, households are seen to substitute out of curb market loans, thus reducing the total real supply of domestic credit. The reduction in the supply of credit can lead to a credit crunch, thereby lowering investment and slowing production and growth (Van Wijnbergen, 1983; Buffie, 1984; Xu, 2000).

The case of finance – growth nexus, while not a new one, has been strengthened by a growing body of empirical evidence. Different results have been obtained since the country sample and econometric methods used in the analysis are different. Thus, there is not any consensus about the presence and direction of this relationship. Moreover, some writers call this state "egg – chicken" problem. Nonetheless, although most of the empirical studies have supported the supply leading phenomenon, some of them have reached the results showing the demand following, bidirectional causal links between the related variables, negative effect of financial development on the process of growth and not a nexus between finance and growth. The studies made by Murinde and Eng (1994), De Gregorio and Guidotti (1995),

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Demetriades and Hussein (1996), Ahmed and Ansari (1998), Ghali (1999), Khan (2001), Shan *et al*. (2001), Evans *et al*. (2002), Hermes and Lensink (2003), Bhattacharya and Sivasubramanian (2003), Khan and Senhadji (2003), Christopoulos and Tsionas (2004), Ghirmay (2004), Choong *et al*. (2005), Shan (2005), Papaioannou (2007), Halıcıoğlu (2007), Ang (2008), Abu-Bader and Abu-Qarn (2008), Kıran *et al*. (2009), Ahmad and Malik (2009), Caporale *et al*. (2009), Akinlo and Egbetunde (2010), Hassan *et al*. (2011), Ak and Kara (2011), Eng and Habibullah (2011) and Ağayev (2012) support the concept of supply leading.

As well as the supply leading view, the demand following hypothesis is found in the works made by Agbetsiafa (2003), Waqabaca (2004), Al-Awad and Harb (2005), Liang and Teng (2006), Yılmaz and Kaya (2006), Ang and McKibbin (2007), Odhiambo (2008) and Özcan and Arı (2011).

While Wood (1993), Blackburn and Hung (1998), Akinboade (1998), Al-Yousif (2002), Odhiambo (2005), Apergis *et al*. (2007), Singh (2008), Pradhan (2009) and Oluitan (2012) point out the bidirectional causality between the financial development and economic growth, no such a causal link is detected by Chang (2002), Andersen and Tarp (2003), Dawson (2003), Tang (2006), Lu and Yao (2009) and Chakraborty (2010). Only two researches introduced by Ram (1999) and Halkos and Trigoni (2010) obtain that the financial development have negative impact on the process of economic growth.

Table 1 shows the literature summary containing information on the empirical studies of finance-growth nexus.

3. Method and data

In this study, in order to examine the relationship between financial development and economic growth the unbalanced panel data analysis is applied. To estimate the relations between the related variables in total 178 countries, 54 of them are developed, 92 of them are developing and 32 of them are less developed; the annual time series belonging to the period 1980 – 2011 are taken into account. To measure the financial development and the economic growth, the domestic credits (DC) provided by banking sector as a percent of GDP and the percent change of GDP with constant prices (REG) are used, respectively. To determine the financial development the ratio of broad measure of money, namely M2, to GDP; the ratio of total deposits to GDP and the ratio of financial savings to the GDP are used in literature. However, the three data set belong to variables mentioned could not be obtained for all countries taken into consideration, the domestic credits provided by banking sector as a percent of GDP is available for whole

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Table 1

The Literature Summary on the Empirical Studies of Finance – Growth Nexus

The Studies Consistent with the Supply – Leading Response				
Author(s)	**Method**	**Period**	**Country**	**Direction of Causality**
Murinde and Eng (1994)	Bivariate Vector Autoregressive Model (BVAR), Johansen Cointegration Analysis, Granger Causality Analysis	1979-1990	Singapore	Finance → Growth
De Gregorio and Guidotti (1995)	Panel Data Analysis	1960-1985	100 Countries	Finance → Growth
Demetriades and Hussein (1996)	Time Series Analysis, Granger Causality Analysis	1960-1987	16 Countries	Finance → Growth
Ahmed and Ansari (1998)	Time Series Analysis, Granger Causality Analysis	1973-1991	India, Pakistan, Sri Lanka	Finance → Growth
Ghali (1999)	Vector Autoregressive Model (VAR), Engle-Granger Cointegration Analyis, Johansen Cointegration Analysis, Granger Causality Analysis	1963-1993	Tunisia	Finance → Growth
Shan *et al*. (2001)	VAR, Granger Causality Analysis	1960-1998	9 OECD Countries and China	Finance → Growth
Evans *et al*. (2002)	Panel Data Analysis	1972-1992	82 Countries	Finance → Growth
Hermes and Lensink (2003)	Panel Data Analysis	1970-1995	67 Countries	Finance → Growth
Bhattacharya and Sivasubramanian (2003)	Time Series Analysis, Johansen Cointegration Analysis, Granger Causality Analysis	1970-1999	India	Finance → Growth
Khan and Senhadji (2003)	Cross-Section Analysis	1960-1999	159 Countries	Finance → Growth
Christopoulos and Tsionas (2004)	Treshold Cointegration Analysis, Dynamic Panel Data Analysis	1970-2000	10 Countries	Finance → Growth
Ghirmay (2004)	Johansen Cointegration Analysis, Granger Causality Analysis, VAR	1965-2000	13 Countries	Finance → Growth
Choong *et al*. (2005)	Autoregressive Distributed Lag Bounds Test (ARDL)	1978-2000	Malaysia	Finance → Growth
Shan (2005)	VAR	1985-1998	10 OECD Countries and China	Finance → Growth
Halıcıoğlu (2007)	Granger Causality Analysis, Vector Error Correction Model (VECM)	1968-2005	Turkey	Finance → Growth

Table 1 (continue)

Ang (2008)	ARDL	1960-2003	Malaysia	Finance → Growth
Abu-Bader and Abu-Quarn (2008)	Granger Causality Analysis, VECM	1960-2001	Egypt	Finance → Growth
Kıran *et al.* (2009)	Pedroni Cointegration Analysis, Panel Fully Modified Ordinary Least Squares (FMOLS)	1968-2007	10 Countries	Finance → Growth
Ahmad and Malik (2009)	Panel Data Analysis	1970-2003	35 Countries	Finance → Growth
Caporale *et al*. (2009)	Dynamic Panel Data Analysis	1994-2007	10 Countries	Finance → Growth
Akinlo and Egbetunde (2010)	VECM, Granger Causality Analysis	1980-2005	10 Countries	Finance → Growth
Hassan *et al.* (2011)	Panel Data Analysis, Granger Causality Analysis	1980-2007	168 Countries	Finance → Growth
Ak and Kara (2011)	Johansen Cointegration Analysis, VECM	1985-2006	Turkey	Finance → Growth
Eng and Habibullah (2011)	Panel Generalized Method of Moments (GMM)	1990-1998	Africa, Asia, Europe, Westhern Hampshire	Finance → Growth
Ağayev (2012)	Pedroni Cointegration Analysis, Panel Causality Analysis	1995-2009	20 Countries	Finance → Growth
The Studies Consistent with the Demand – Following Response				
Waqabaca (2004)	BVAR, Johansen Cointegration Analysis, Granger Causality Analysis	1970-2000	Fiji	Growth → Finance
Al-Awad and Harb (2005)	Panel Data and Cointegration Analysis, Granger Causality Analysis	1969-2000	10 Countries	Growth → Finance
Liang and Teng (2006)	VAR, Johansen Cointegration Analysis, Granger Causality Analysis	1952-2001	China	Growth → Finance
Yılmaz and Kaya (2006)	Johansen Cointegration Analysis, Granger Causality Analysis	1986-2004	Turkey	Growth → Finance
Ang and McKibbin (2007)	Johansen Cointegration Analysis, Granger Causality Analysis	1960-2001	Malaysia	Growth → Finance
Odhiambo (2008)	Johansen Cointegration Analysis, VECM, Granger Causality Analysis	1969-2005	Kenya	Growth → Finance
Ozcan and Arı (2011)	VAR, Granger Causality Analysis	1998-2009	Turkey	Growth → Finance

Table 1 (continue)

The Studies Consistent with the Bi-Directional Causality Response				
Wood (1993)	Time Series Analysis, Hsiao Causality Analysis	1946-1990	Barbados	Finance ↔ Growth
Akinboade (1998)	Time Series Analysis, Granger Causality Analysis, VECM	1976-1995	Botswana	Finance ↔ Growth
Al-Yousif (2002)	Time Series Analysis, BVAR, Panel Data Analysis	1970-1999	30 Countries	Finance ↔ Growth
Apergis *et al*. (2007)	Panel Data Analysis, Panel Cointegration Analysis	1975-2000	15 OECD Countries and 50 Non-OECD Countries	Finance ↔ Growth
Singh (2008)	Johansen Cointegration Analysis, VECM, Toda-Yamamoto Causality Analysis, Granger Causality Analysis	1951-1996	India	Finance ↔ Growth
Pradhan (2009)	VECM, Johansen Cointegration Analysis, Granger Causality Analysis	1993-2008	India	Finance ↔ Growth
Oluitan (2012)	Panel GMM, Panel Data Analysis	1970-2005	31 Countries	Finance ↔ Growth
The Studies Consistent with the No Causality Response				
Chang (2002)	VAR, Johansen Cointegration Analysis, Granger Causality Analysis	1987:Q1-1999:Q4	China	Finance ⇸ Growth
Andersen and Tarp (2003)	Panel GMM	1960-1995	Latin America, Sub-Saharan Africa, South Asia, Eastern Europe, East Asia and The Pacific, Central Asia, Middle East and North Africa	Finance ⇸ Growth
Dawson (2003)	Panel Data Analysis	1994-1999	13 Countries	Finance ⇸ Growth
Tang (2006)	Panel Data Analysis	1981-2000	APEC Countries	Finance ⇸ Growth
Lu and Yao (2009)	Panel Data Analysis	1991-2001	China	Finance ⇸ Growth
Chakraborty (2010)	Time Series Analysis, Johansen Cointegration Analysis	1993:Q2-2005:Q2	India	Finance ⇸ Growth
The Studies Consistent with the Negative Impact of Finance on Growth Response				
Ram (1999)	Time Series Analysis	1960-1989	95 Countries	Negative Impact of Finance on Growth
Halkos and Trigoni (2010)	Panel Data Analysis, Pedroni Cointegration Analysis	-	European Union Countries	Negative Impact of Finance on Growth

countries considered in the paper and hence it is appropriate to measure the financial development. The data are taken from the offical websites of World Bank – GFDD database and International Monetary Fund (IMF) – WEO database. The countries taken into consideration in the analysis is showed in the Appendix 1.

In panel data analysis, the long – run or else cointegrated relationship between the variables can be tested and to identify this relation Pedroni Cointegration Analysis by Pedroni (1999) is used. Unlike Pedroni test, Kao (1999) test specifies cross – section specific intercepts and homogeneous coefficients on the first – stage regressors.

Following the cointegration analysis, whether or not any causal relations between the variables can be tested via causality analysis introduced first by Granger (1964, 1969) and developed later by Hamilton (1994). In panel Granger approach, if the cointegration relationship is found between the variables, the error correction term obtained from cointegration equations in the context of Vector Error Correction Model (VECM) is needed to be included to the causality model. The following equations should be used as the causal relations between the two variables is investigated:

$$Y_{it} = \sum_{j=1}^{n} \alpha_i Y_{it-j} + \sum_{j=1}^{n} \beta_i X_{it-j} + \varepsilon_{1it} EC_{r,t-1} + u_{1it} \quad (1)$$

$$X_{it} = \sum_{j=1}^{n} \gamma_i X_{it-j} + \sum_{j=1}^{n} \varsigma_i Y_{it-j} + \varepsilon_{2it} EC_{r,t-1} + u_{2it} \quad (2)$$

4. Research findings

In order to obtain the robust results in the panel data analysis, it is important to determine whether the data sets have the some features or not. Therefore, the data are needed to be made stationary in the panel data analysis. As Granger and Newbold (1974) noted, a model which is estimated through non – stationary data may be lead to the spurious regressions that can be described as non – relations seem as if they were. Hence, to determine whether or not the variables used in the model are stationary; LLC, Breitung, IPS, ADF – Fisher, PP – Fisher and Hadri unit root tests are applied. Thanks to unit root test both the problem of spurious regression will be eliminated and the results of the analysis will be reliable (MacKinnon, 1991). Table 2 shows the results of the various types of the unit root tests. According to results of the various types of the unit root tests, the variables used in the model are stationary at the different significance levels for the four groups of countries.

In order to determine the long – run relationship between the variables, Pedroni and Kao Cointegration Analysis are applied in the study.

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Table 2
The Results of the Panel Unit Root Tests

Developed Countries												
Variable	LLC *t* Statistic				Breitung *t* Statistic				IPS *W* Statistic			
	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	0.843	-28.058*	54	1403	3.147	-8.259*	54	1343	0.142	-19.058*	54	1397
REG	-16.640*	-	54	1507	-10.104*	-	54	1453	-14.336*	-	54	1507
Variable	ADF – Fisher χ^2 Statistic				PP – Fisher χ^2 Statistic				Hadri *Z* Statistic			
	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	116.891	909.070*	54	1403	121.999	987.215*	54	1429	13.496	0.543	54	1491
REG	413.121*	-	54	1507	412.365*	-	54	1522	12.975	0.726	54	1522
Developing Countries												
Variable	LLC *t* Statistic				Breitung *t* Statistic				IPS *W* Statistic			
	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	-2.801*	-	92	2361	7.064	-15.377*	92	2182	-1.490***	-	92	2361
REG	-24.511*	-	92	2517	-11.734*	-	92	2425	-24.508*	-	92	2517
Variable	ADF – Fisher χ^2 Statistic				PP – Fisher χ^2 Statistic				Hadri *Z* Statistic			
	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	245.002*	-	92	2361	299.176*	-	92	2416	15.315	0.892	92	2416
REG	1063.24*	-	92	2517	1203.82*	-	92	2579	13.062	0.755	92	2579

Table 2 (continue)

Less Developed Countries												
	LLC *t* Statistic				Breitung *t* Statistic				IPS *W* Statistic			
Variable	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	0.727	-24.178*	32	785	2.886	-10.709*	32	745	1.706	-14.686*	32	777
REG	-13.644*	-	32	859	-10.722*	-	32	827	-14.938*	-	32	859
	ADF – Fisher χ^2 Statistic				PP – Fisher χ^2 Statistic				Hadri *Z* Statistic			
Variable	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	56.910	623.428*	32	785	40.849	667.137*	32	789	16.632	0.294	32	826
REG	398.457*	-	32	859	890.611*	-	32	872	8.389	0.632	32	872
All Countries												
	LLC *t* Statistic				Breitung *t* Statistic				IPS *W* Statistic			
Variable	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	-1.523***	-	178	4624	8.233	-19.835*	178	4270	-0.266	-31.400*	178	4448
REG	-32.463*	-	178	4883	-18.228*	-	178	4705	-31.997*	-	178	4883
	ADF – Fisher χ^2 Statistic				PP – Fisher χ^2 Statistic				Hadri *Z* Statistic			
Variable	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS	Level	First Difference	NCS	NOS
DC	418.803**	-	178	4624	462.024*	-	178	4733	24.809	0.789	178	4733
REG	1874.82*	-	178	4883	2506.79*	-	178	4973	20.456	0.470	178	4973

Note: NCS and NOS imply "number of cross – section" and "number of observation", respectively. The statistics for Fisher tests are computed using an asymptotic χ^2 distribution and all other tests assume asymptotic normality. *, ** and *** indicate the stationary of the variables at the significance level of 1 per cent, 5 per cent and 10 per cent, respectively. While the statistics are computed, SIC is taken into consideration to select the optimum lag length. Besides, both Barlett Kernel is made allowance for LLC, PP – Fisher and Hadri tests and Newey – West Bandwith criterion is taken into account to calculate the statistics.

The results of the Pedroni Cointegration Analysis illustrated on Table 3 show the existence of cointegration relations between DC and REG for whole country groups, but according to Kao Cointegration Analysis the long – run relationship between DC and REG is obtained for the group of less developed and all countries. In this context, it is possible to say that the long – run relation is valid between the related variables and hence at least unidirectional causality process is expected between the variables.

Obtaining the long – run relationship between domestic credit and real economic growth demonstrates that there is at least unicausality relations could be between the mentioned variables. Therefore, Table 4 shows the results of the panel Granger Causality Analysis for various country groups.

Because the cointegration relationship is found between the variables, the error correction term obtained from cointegration is included to the causality model. The results of Granger Causality Analysis show that although there is bidirectional causality relationship between DC and REG for developed, developing and all country groups, it is possible to say that the demand following phenomenon is dominant. Besides, because the error correction term, EC, is found negative and statistically significant, it can be said that the variables converge to equilibrium quickly, and short-term imbalances will be overcomed in the long-term. In general, it can be said that financial development and economic growth are mutually reinforcing factors for each other.

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Table 3
The Results of Pedroni and Kao Cointegration Analysis

Developed Countries			**Developing Countries**		
Pedroni Test $REG_{it} = \alpha_{it} + \delta_{it}t + \Delta DC_{it}\beta_i + \varepsilon_{it}$			**Pedroni Test** $REG_{it} = \alpha_{it} + \delta_{it}t + DC_{it}\beta_i + \varepsilon_{it}$		
Test	**Statistic**	**Probability**	**Test**	**Statistic**	**Probability**
Panel *v* Statistic	-6.193	1.000	Panel *v* Statistic	-1.601	0.945
Panel *rho* Statistic	-18.002*	0.000	Panel *rho* Statistic	-0.026	0.489
Panel *PP* Statistic	-29.407*	0.000	Panel *PP* Statistic	-4.209*	0.000
Panel *ADF* Statistic	-26.388*	0.000	Panel *ADF* Statistic	-4.784*	0.000
Group *rho* Statistic	-9.113*	0.000	Group *rho* Statistic	4.734	1.000
Group *PP* Statistic	-24.817*	0.000	Group *PP* Statistic	0.348	0.636
Group *ADF* Statistic	-21.188*	0.000	Group *ADF* Statistic	-1.116	0.132
Kao Test $REG_{it} = \Delta DC'_{it}\beta + z'_{it}\gamma + \varepsilon_{it}$			**Kao Test** $REG_{it} = DC'_{it}\beta + z'_{it}\gamma + \varepsilon_{it}$		
Test	**Statistic**	**Probability**	**Test**	**Statistic**	**Probability**
Kao – ADF	0.611	0.270	Kao – ADF	-0.850	0.197
Less Developed Countries			**All Countries**		
Pedroni Test $REG_{it} = \alpha_{it} + \delta_{it}t + \Delta DC_{it}\beta_i + \varepsilon_{it}$			**Pedroni Test** $REG_{it} = \alpha_{it} + \delta_{it}t + DC_{it}\beta_i + \varepsilon_{it}$		
Test	**Statistic**	**Probability**	**Test**	**Statistic**	**Probability**
Panel *v* Statistic	-7.852	1.000	Panel *v* Statistic	-3.721	0.999
Panel *rho* Statistic	-7.675*	0.000	Panel *rho* Statistic	1.830	0.966
Panel *PP* Statistic	-26.375*	0.000	Panel *PP* Statistic	-2.842*	0.002
Panel *ADF* Statistic	-13.643*	0.000	Panel *ADF* Statistic	-4.383*	0.000
Group *rho* Statistic	-6.321*	0.000	Group *rho* Statistic	7.405	1.000
Group *PP* Statistic	-24.662*	0.000	Group *PP* Statistic	2.156	0.984
Group *ADF* Statistic	-18.026*	0.000	Group *ADF* Statistic	-0.178	0.429
Kao Test $REG_{it} = \Delta DC'_{it}\beta + z'_{it}\gamma + \varepsilon_{it}$			**Kao Test** $REG_{it} = DC'_{it}\beta + z'_{it}\gamma + \varepsilon_{it}$		
Test	**Statistic**	**Probability**	**Test**	**Statistic**	**Probability**
Kao – ADF	-9.594*	0.000	Kao – ADF	3.254*	0.000

Note: The computed test statistics implying the cointegration relationship are determined by taking into consideration both Barlett Kernel and Newey – West Bandwith criterion. The optimum lag length for the related variables is computed by taking SIC into account. * shows the significance of the statistics at 1 per cent significance level.

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Table 4

The Results of Granger Causality Analysis

Developed Countries

$$REG_{it} = \sum_{j=1}^{n} \alpha_i REG_{it-j} + \sum_{j=1}^{n} \beta_i \Delta DC_{it-j} + \varepsilon_{1it} EC_{r,t-1} + u_{1it}$$

$$\Delta DC_{it} = \sum_{j=1}^{n} \alpha_i \Delta DC_{it-j} + \sum_{j=1}^{n} \beta_i REG_{it-j} + \varepsilon_{2it} EC_{r,t-1} + u_{2it}$$

Variable Pairs	The Direction of Causality	*F* Statistic	EC_{t-1}
REG-ΔDC(2)	→	7.681*	-0.144**
ΔDC-REG(1)	→	3.339**	-0.205**

Developing Countries

$$REG_{it} = \sum_{j=1}^{n} \alpha_i REG_{it-j} + \sum_{j=1}^{n} \beta_i DC_{it-j} + \varepsilon_{1it} EC_{r,t-1} + u_{1it}$$

$$DC_{it} = \sum_{j=1}^{n} \alpha_i DC_{it-j} + \sum_{j=1}^{n} \beta_i REG_{it-j} + \varepsilon_{2it} EC_{r,t-1} + u_{2it}$$

Variable Pairs	The Direction of Causality	*F* Statistic	EC_{t-1}
REG-DC(1)	→	11.193*	-0.105***
DC-REG(1)	→	4.489**	-0.095***

Less Developed Countries

$$REG_{it} = \sum_{j=1}^{n} \alpha_i REG_{it-j} + \sum_{j=1}^{n} \beta_i \Delta DC_{it-j} + \varepsilon_{1it} EC_{r,t-1} + u_{1it}$$

$$\Delta DC_{it} = \sum_{j=1}^{n} \alpha_i \Delta DC_{it-j} + \sum_{j=1}^{n} \beta_i REG_{it-j} + \varepsilon_{2it} EC_{r,t-1} + u_{2it}$$

Variable Pairs	The Direction of Causality	*F* Statistic	EC_{t-1}
REG-ΔDC(1)	→	3.111*	-0.429*
ΔDC-REG(5)	-	1.228	-1.274

All Countries

$$REG_{it} = \sum_{j=1}^{n} \alpha_i REG_{it-j} + \sum_{j=1}^{n} \beta_i DC_{it-j} + \varepsilon_{1it} EC_{r,t-1} + u_{1it}$$

$$DC_{it} = \sum_{j=1}^{n} \alpha_i DC_{it-j} + \sum_{j=1}^{n} \beta_i REG_{it-j} + \varepsilon_{2it} EC_{r,t-1} + u_{2it}$$

Variable Pairs	The Direction of Causality	*F* Statistic	EC_{t-1}
REG-DC(1)	→	24.315*	-0.820*
DC-REG(1)	→	8.287*	-0.531**

Note: Values in parenthesis show the optimum lag lengths determined by taking AIC and SIC into consideration. *, ** and *** indicate the significance at 1 per cent, 5 per cent and 10 per cent significance level, respectively.

5. Conclusion

In this paper, the relationship between financial development and economic growth for 178 countries; 54 of them are developed, 92 of them are developing and 32 of them are less developed is investigated in the period 1980 – 2011 using unbalanced panel cointegration and causality analysis. For this purpose, firstly to determine the stationary information of the variables the various types of unit root tests are applied and the results show that for different country groups the stationary levels of variables are different. Following unit root process, Pedroni and Kao Cointegration Analysis are used to investigate the long – run relationship between the financial development and economic growth. The results of the Pedroni Cointegration Analysis for whole country groups show the existence of cointegration relations between DC and REG, but according to Kao Cointegration Analysis the long – run relationship between DC and REG is obtained for the group of less developed and all countries. Because the cointegration findings indicate the long – run relationship between financial development and economic growth, at least unidirectional causality nexus between the related variables is expected and hence Granger Causality Analysis is applied. Because the cointegration relationship is found between the variables, the error correction term obtained from cointegration is included to the causality model. The results of Granger Causality Analysis show that although there is bidirectional causality relationship between DC and REG for developed, developing and all country groups; the demand following phenomenon is dominant. Besides, because the error correction term, EC, is found negative and statistically significant, it can be said that the variables converge to equilibrium quickly, and short-term imbalances will be overcomed in the long-term. In general, it can be said that financial development and economic growth are mutually reinforcing factors for each other. However, for less developed countries only unidirectional causal nexus is obtained running from real economic growth to financial growth.

According to whole results of the analysis, financial development and economic growth are mutually reinforcing factors for each other in developed and developing countries. This result confirms that financial development and economic growth are interdependent in mentioned countries in the period 1980 – 2011. Therefore, the dynamism of economic growth process in the country will foster financial development and dynamism of financial development will faster economic growth. The policy implication of this result is that financial development is considered as the policy variable to accelerate economic growth and economic growth could be used as the policy variable to generate financial development in the economy. Hence to maintain sustainable economic growth, governments have to deepen the financial sector and undertake essential measures to strengthen the long – run relationship between financial development and economic growth. Besides, for less developed countries only unidirectional

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causal nexus is obtained running from real economic growth to financial growth. This means that demand following process is valid for less developed country group and as with enhanced economic growth, the country opts for financial development. The findings support the view that countries, which have a less sophisticated financial system tend to experience more of a demand following relationship where economic growth induces financial development. It seems that financial development may not be crucial for economic growth in less developed countries, instead, it reacts to economic growth. The results in the paper may be explained by weak financial sector in this country group which is unable to support a sustainable economic growth. Therefore, less developed countries should take more measures to reduce financial repression to help increase financial development which results in more efficient allocation of funds and connections between savers and investors. Otherwise, the Lucas (1988) argument that the financial sector has no important role in real economic activity may find its greatest support in less developed countries. Being increased the volume of savings and capital accumulation and being transferred of these factors to real side of economy are important components to sustain the process of economic growth. For less developed countries the elements that faster the economic growth must be warranted urgently and the evolutionary development of the financial system will be a continuing consequence of the pervasive, sweeping process of economic development. The nature of demand for financial services will depend upon the growth of real output and upon the commercialization and monetization of various sectors in the economy. The more rapid the growth rate of real national income, the greater will be the demand by enterprises for external funds and therefore financial intermediation. Correspondingly, with a given aggregate growth rate, the greater the variance in the growth rates among different sectors or industries, the greater will be the need for financial intermediation to transfer saving from slow growing industries and from individuals to fast growing industries. At the end of the process, the long – run relationship between financial development and economic growth will take place and they will be mutually reinforcing factors for each other.

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Appendix 1

The Countries Taken into Consideration in the Analysis

Developed Countries
Antigua and Barbuda, Australia, Austria, The Bahamas, Bahrain, Barbados, Belgium, Brazil, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, St. Kitts and Nevis, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, Uruguay
Developing Countries
Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Belarus, Belize, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Bulgaria, Cameroon, Cape Verde, China, Colombia, Republic of Congo, Costa Rica, Côte d'Ivoire, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Gabon, Georgia, Ghana, Grenada, Guatemala, Guyana, Honduras, India, Indonesia, Iran, Iraq, Jameica, Jordan, Kazakhstan, Kyrgyz Republic, Lao, Lebanon, Lesotho, Libya, Macedonia, Malaysia, Maldives, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Namibia, Nicaragua, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Samoa, Sâo Tomé and Principe, Senegal, Serbia, Seychelles, Solomon Islands, South Africa, Sri Lanka, St. Lucia, St. Vincent and The Grenadines, Sudan, Suriname, Swaziland, Syria, Thailand, Democratic Republic of Timor Leste, Tonga, Tunisia, Turkey, Turkmenistan, Ukraine, Vanuatu, Venezuela, Vietnam, Yemen, Zambia
Less Developed Countries
Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Eritrea, Ethiopia, The Gambia, Guinea, Guinea Bissau, Haiti, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Tajikistan, Tanzania, Togo, Uganda, Zimbabwe

The World Bank's main criterion known as *Atlas Method* for classifying countries according to Gross National Product (GNI) is used in the paper. Based on per capita GNI, every economy is classified as low income, middle income and high income. The groups are: low income, $1.025 or less; lower middle income, $1.026 - $4.035; upper middle income, $4.036 - $12.475 and high income, $12.476 or more. The following formulas describe the calculation of the *Atlas Conversion Factor* for year *t*:

$$e_t^* = \frac{1}{3}\left[e_{t-2}\left(\frac{P_t}{P_{t-2}} \Big/ \frac{P_t^{S\$}}{P_{t-2}^{S\$}} \right) + e_{t-1}\left(\frac{P_t}{P_{t-1}} \Big/ \frac{P_t^{S\$}}{P_{t-1}^{S\$}} \right) + e_t \right] \tag{3}$$

The calculation of per capita GNI in U.S. dollar for year *t*:

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$$Y_t^{\$} = \left(Y_t / N_t\right) / e_t^* \tag{4}$$

Where e_t^* is the Atlas Conversion Factor for year t, e_t is the average annual exchange rate for year t, P_t is the GDP deflator for year t, $P_t^{S\$}$ is the SDR deflator in U.S. dollar terms for year t, $Y_t^{\$}$ is the Atlas per capita GNI in U.S. dollar in year t, Y_t is current local currency GNI for year t and N_t is the midyear population for year t.

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Özet

Talep takibi mi, arz önderliği mi? Gelişmiş, gelişmekte olan ve azgelişmiş ülkeler için bir panel veri analizi

Bu çalışmada; gelişmiş, gelişmekte olan ve azgelişmiş ülkelerde finansal kalkınma ile iktisadi büyüme arasındaki ilişkiler dengesiz panel eşbütünleşme ve nedensellik analizleri kullanılarak 1980 – 2011 dönemi için araştırılmıştır. Pedroni eşbütünleşme analiz sonuçları dikkate alınan bütün ülkeler için finansal kalkınma ile iktisadi büyüme arasında eşbütünleşik ilişkilerin varlığını ortaya koymuş, ancak Kao eşbütünleşme analizi ise azgelişmiş ülkeler için ilgili değişkenler arasında uzun dönemli bir ilişkinin geçerli olduğunu göstermiştir. Granger nedensellik analizi bulguları, gelişmiş ve gelişmekte olan ülkeler için finansal kalkınma ile iktisadi büyüme arasında çift yönlü bir nedensellik ilişkisinin olduğunu ortaya koyarken, azgelişmiş ülkeler için reel iktisadi büyümeden finansal kalkınmaya doğru sadece tek yönlü bir nedensellik ilişkisine ulaşılmıştır. Bu durum, azgelişmiş ülke grubu için talep takibi sürecinin geçerli olduğunu yansıtmaktadır.

Anahtar kelimeler: Finansal Kalkınma, Ekonomik Büyüme, Panel Eşbütünleşme Testi, Panel Granger Nedensellik Testi.

JEL sınıflandırması: C23, G10, O11, O16, O57.

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