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PAPER

Financial Development and Poverty Short and Long Run Causality in Tunisia

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Abstract The purpose of this paper is to examine the impact of financial development on poverty in Tunisia for the period 1970-2013. Our empirical analysis consists of three steps: the unit root test, the Johansen co-integration test, the Granger causality test in the context of an error correction model (ECM). The econometric results show that financial development is conducive to poverty reduction. It is the existence of a unidirectional causality relationship between financial development and poverty reduction.

Keywords Financial development - Poverty - Error-correction model Granger causality

JEL Classification I32 - C32

1. Introduction

The poverty reduction represents a fundamental challenge that all developed and developing countries face. Indeed, our study focuses on the impact of financial development on poverty. This relationship can be composed by the link between financial development and economic growth. But also, a direct relationship is through access to financial services. Few studies have examined the link between financial development and poverty.

The purpose of this article is to focus on the relationship between financial development and poverty reduction in the case of Tunisia. To achieve this, we used an error correction model (ECM). In this respect, the paper is organized as follows: first, it was interested in presenting both theoretical and empirical work regarding

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the relationship between financial development and poverty. Then we presented our econometric model and finally, the results summarized.

2. Review of the theoretical literature

Among the objectives of Millinénaire to development, is the eradication of poverty and hunger. The main idea is that the proportion of people whose income is less than $ 1.25 per day should be halved between 1990 and 2015. The relationship between financial development and poverty has not been widely explored. The economic literature shows that financial development affects poverty directly by improving the access of the poor to financial services and indirectly through its impact on economic growth. Hence, we have two channels: a direct and an indirect channel.

2.1. The Direct Channel

Several economists have emphasized that financial development can contribute directly to poverty reduction, through various ways, such as (Odhiambo, 2009; Pradhan, 2010; Akhter.S, Liu.Y and Daly.K, 2010) among others. Financial development can improve poor people's access to formal finance, addressing the causes of failures of financial markets, such as asymmetric information and the high fixed cost of loans to small borrowers (Stiglitz, 1998; Jallilian and Kirkpatrick, 2001). Financial development also allows the poor to reduce the accumulated savings or borrowed money to start micro-enterprises, causing greater access to financial services, employment growth, higher incomes and therefore, poverty reduction (DFID,2004).
According to **Kpodar**[1] (2004), the provision of financial services is prominently to reduce poverty. These programs adopted by developing countries focus on microcredit. Indeed, microfinance is recognized as a means that can lead to the reduction of poverty, in order to diversify their sources of income through self-employment. Financial development can contribute directly by improving facilities loans and deposits for the poor. Indeed, if the poor have access to financial services, they can increase their productive assets, improve their productivity and therefore their income. Kpodar (2004) distinguishes between two effects: the effect of capital conduit and **the threshold effect**[2].

The first effect means that "*if the poor have access to the financial system as an investor, the theory of "the effect of capital conduit" developed by McKinnon (1973) could justify reducing effect of financial development on poverty* »[3]. McKin-

1 Idée présenté par Kpodar (2004) dans le développement financier et la problématique de la pauvreté.

2 Kpodar.K (2004): « Le développement financier et la problématique de la pauvreté». Document de travail de la série : Etudes et Documents E2004.08.

3 Kpodar.K (2004): « Le développement financier et la problématique de la pauvreté». Document de travail de la série : Etudes et Documents E2004.08.

non's hypothesis is that the mobilization of savings is a prerequisite for any investment. The lack of access to external finance places the poorest in a situation where capital accumulation is compromised. The effect of McKinnon stipulates that in the absence of a financial system, it is unable to finance the most efficient techniques of production, which means a sacrifice in terms of consumption. In developing countries, where the financial system is weak or nonexistent, and characterized by a small amount of external financing, investors are even saving time, while any significant expenditure planned accumulation requires an increase in real money necessary. Furthermore, McKinnon has argued that even if the financial instruments do not provide credit to the poor, they nevertheless provide profitable financial savings opportunities. When economic units are confined to the flow, so that there is no meaningful distinction between savers (households) and investors (firms), the indivisibility of the investment proves a considerable importance. Hence, there are are complementarities between money and capital. However, an increase in real interest rate corresponds to a valuation of liquid short-term portfolio, and thus more opportunities for self-financing. And therefore, the establishment of adequate financial structures to facilitate the establishment of a financial savings would be pro-poor. The second effect is on the threshold effect. When the financial system grows, it may spread financial services to the poor. Indeed, we must reach a certain threshold, so that development can ensure the cost-effective financial services to the poor.

Moreover, according to Kpodar (2004), there are factors that limit the access of the poor to the formal credit market: the lack of sufficient or acceptable security that focuses on information asymmetry, the distance between housing and banking agencies, and the lack of formal financial institutions specializing in financial services to the poor. Akhter.S and Daly.K (2007) examine the transmission channels of financial intermediation through savings and investment. Indeed, Beck et al (2004, 2007) argue that financial development is not only pro-growth (increases economic growth), but also pro-poor (increases poverty reduction). This allows to identify a direct link between financial development and poverty reduction. These authors have shown that the overall credit considered as a measure of financial development has a direct impact on the poor, since the income of the poor is growing at a rapid rate above the average income growth in the economy.

Akhter.S, Liu.Y and Daly.K (2010) supported the existence of doubts about the direct role of financial development in reducing poverty and income inequality, as the two concepts are different, although they are closely related. The hypothesis of a direct link between finance and poverty seems to have found no support, since financial services are expensive and the poor cannot afford to pay. This argument seems true in developing countries, since financial services are proving to be expensive or non-existent for the poor. These are underserved, compared to the rich developed countries. Indeed, the development of financial intermediaries will have

a disproportionately beneficial impact on the poor. And this is due to the fact that the poor have little money to properly take advantage of sophisticated financial services. Where a financial system that works badly will produce a greater income inequality disproportionately. The development of the financial sector reduces information and transaction costs and, therefore, will allow the greatest entrepreneurs, especially those less fortunate to obtain external financing, improve the allocation of capital, and exerting a particularly significant impact on the poor.
In fact, these means are a direct channel. But besides, there is an indirect channel through economic growth. This shows how financial deepening has a positive effect on economic growth, and how the gains from growth are routed to the poor.

2.2. The Indirect Channel

Besides the direct channel between development and poverty, there is the indirect channel through economic growth. The relationship between financial development and economic growth has been the subject of many studies. According to the work of (Bagehot, 1873; Schumpter, 1912) and Gurley and Shaw (1960) and until recently, financial intermediaries stimulate capital accumulation and productivity growth factors and consequently economic growth. Levine (1997) argues that in order to enhance economic efficiency and therefore economic growth, we must allocate capital to its best use. He also argues that financial systems can perform five functions to contribute to the long-term growth. These functions are: to facilitate the improvement of risk, the acquisition of information on investments and allocation of resources, monitoring managers and exert corporate control, mobilizing savings, and facilitating the exchange. These functions facilitate investment and therefore higher economic growth.

Indeed, economic growth can reduce poverty directly or indirectly (Arestis and Caner, 2004). Growth can have a direct impact on the poor through increased inputs and improved conditions in the areas and regions where they live. The indirect effect helps to redistribute the highest revenue growth and from an increase in government revenue that is used to transfer payments and improve resourcing the poor. Beck, Demirguc-Kunt and Levine (2007) study the effect of financial development on both inequality and poverty. They have determined two effects: the first related to credit constraints which may be binding on the poor, but the relaxation of these constraints will have a greater effect on the low-income population. Indeed, the poor can benefit from greater economic growth which could come from a more efficient allocation of capital. The second is related to the fact that financial development can benefit the rich. Indeed, the relationship between financial development and economic growth is positive in all stages of financial development, but has a positive impact on inequality in the early stages of development. At first, it is the rich who benefit in a greater proportion, but then more people have access to finan-

cial services including the poor. According to Beck, Demirguc-Kunt and Levine (2007), financial development promotes growth and reduces inequality. Imperfections in financial markets, such as information asymmetries, transaction costs can be especially hard on the poor because they do not have collateral. These credit constraints may affect the flow of capital to the poor (Galor and Zeira, 1993) which reduces the efficiency of capital allocation and increases income inequality.

3. Review of the Empirical Literature

On the empirical front, very few studies have examined the relationship of causality between financial development and poverty reduction. Among these studies, Beck et al, 2004; Odhiambo.N, 2009; Moreno.S, 2010; Akhter.S, Liu.Y and Daly.K, 2010; Uddin.GS, Kyophilavong.P and Sydee.N, 2012 and Ordóñez.P, 2012.
Beck et al (2004) found that the income of the 20% poorest is growing faster than the average GDP per capita in countries where financial development is higher in a sample of 52 developed and developing countries, with data for the period from 1960 to 1990. Thus, they concluded that financial development is pro-poor, as it amplifies the income growth of the poor, at a faster rate than the rich. But opposite results have been presented by Guillaumont.J Kpodar.K (2005). Indeed, this opposition is due to the use of various econometric techniques.

While Odhiambo.N (2009) concluded that financial development and economic growth induce the reduction of poverty in South Africa, he recommends that policies geared towards economic growth should be intensified in South Africa to make more cash economy, and reduce the high level of poverty prevailing in the country. Through his study, Moreno.S (2010) used a panel of 35 developing countries including 14 countries in sub-Saharan Africa, 14 in Latin America and the Caribbean, 4 from South Asia, and 3 from East Asia and the Pacific. His analysis covers the years 1970, 1980, 1990 and 1998. It was used as a variable, the poverty rate of $ 1 per day (extreme poverty), and the poverty rate of $ 2 per day (moderate poverty), the M3 / GDP ratio, private sector credit to GDP. He concluded that if financial development is measured by private credit to GDP, then whatever the poverty line and the period studied, if we include the financial development, then there will be less good performance. Therefore he noted the absence of causality between financial development and poverty, when focused on access to the private financial intermediation and loans sector. However, the effects of financial development on poverty are sensitive indicators of financial development used. Indeed, they suggest that in developing countries, financial development can promote the population into a state of moderate poverty, the progress in financial intermediation offers real opportunity for their economies, which facilitates physical and human capital investment, in environments with high liquidity constraints. Akhter.S, Liu.Y and Daly.K (2010) used

a sample of 54 developing countries, with a study period extending from 1993 to 2004. They concluded that poverty decreases as the level of financial development increases. The impact of financial development on poverty reduction appears stronger when the level of financial development is measured by the ratio of credit to GDP. They showed a strong correlation between the level of financial development and financial instability, suggesting that financial development helps the poor more generally in countries with stable financial systems. They also concluded that more financial service induces improvement of economic activity, which means less poverty. They led to the idea that financial development is conducive to poverty reduction, and that instability is detrimental to the poor. They also noticed that corruption is an obstacle, and political stability is a catalyst in the fight against poverty through financial development. Indeed, incomplete regulation of financial institutions has also limited the confidence of the poor to financial services. Moreover, the lack of trust leads to a vast majority of the population being excluded from financial services, and therefore retards economic growth and increases poverty and inequality.
Pradhan.R (2010) found a unidirectional causality from poverty reduction to economic growth, economic growth, financial development, economic growth to reduce poverty and financial development to reduce poverty. It is not either of causality between financial development and economic growth, and between poverty and financial development. Indeed, an improvement in economic growth due to the financial development and both has substantial reduction of poverty in economic contributions. The policy implication of this result is that economic growth is seen as the policy variable to accelerate financial development. Therefore, in order to maintain sustainable economic growth and to reduce poverty, the government should strengthen the financial sector and take essential measures to strengthen the long-run relationship between financial development and economic growth.
Through their study Uddin.G.S, Kyophilavong. P Sydee. N (2012) concluded that there is of a long-term relationship between banking sector development and poverty reduction. They were surprised that poverty reduction appears to be a long-term variable leading to the explanation of financial development. They noted the existence of bidirectional causality between financial development and poverty reduction. They led to the idea that policymakers can influence poverty reduction by promoting financial development in the long term. And this by improving access to financial services and credit by the poorest people.
According to Ordóñez.P (2012), there is a negative relationship between financial development and poverty. This inverse relationship between these two variables implies that any measure that promotes financial development will actually have a positive impact on reducing poverty. Expanding access to financial services, improving efficiency and avoiding the failures of financial markets will have a positive impact on the population as a whole, but especially on the poor. It is also clear

that the positive impact of financial development in reducing poverty goes beyond the positive effect it has on economic growth.

Through their study, Uddin and Kyophilavong Sydee (2012) estimate the relationship between financial development and poverty in Bangladesh during the period from 1976 to 2010 through an approach of autoregressive distributed lag model (ARDL). They conclude that there is a long-term relationship between the development of the banking sector and poverty reduction. They also concluded that there is a bidirectional causality between banking sector development and poverty reduction. Therefore, this finding implies that policy makers can influence the reduction of poverty by encouraging financial development in the long term. Indeed, the development of the financial sector will enable the poor to better access institutional credit. But a retrieval system organized and efficient loan might encourage microcredit that the poor could use as a step out of poverty. On the other hand, measures of poverty reduction would put the economy on a higher growth trajectory, which will facilitate the continuation of reforms in the financial sector development.

Uddin, Shahbaz, Arouri and Teulon (2014) use an approach of autoregressive distributed lag model (ARDL) to study the relationship between financial development, economic growth and poverty reduction in the case of Bangladesh for the period 1970-2011. They conclude that the political leaders of Bangladesh can influence the reduction of poverty through financial sector development by providing loans to SMEs that will be useful to reduce poverty by creating jobs in the country.

4. The Relation between Financial Development and Poverty: The Econometric Analysis

To investigate the relationship between financial development and poverty in Tunisia, we base our analysis on the different studies Odhiambo (2009), Moreno.S (2010), Pradhan.R (2010), through methodology for estimating time series. Our empirical strategy proceeds in three steps: first, the unit root test, then the test of Johansen co-integration. Finally, the estimation of the model error and the Granger causality test corrections.

Our analysis extends from 1970 to 2013. The data are from the World Bank's World Development Indicators (2014). **Table 1 of Appendix 1** provides descriptive statistics of the variables used in this study and their changes during the study period.

4.1. Test of Stationary

The traditional methodology of the analysis of stationary is to perform the test of unit root in the variables used. This test helps to identify the stationary or not a

chronic, by determining a deterministic or stochastic trend. In fact, you can use the following approaches: Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). In our analysis we focus more precisely on the approach of Augmented Dickey-Fuller (ADF).

Indeed, the DFA test is applied and the results are shown in **Table 2 in Appendix 2**. The results indicate that the series in first difference D (LDCF), D (LC), D (LM3), D (LINF), D (LOUV) are stationary and integrated of order 1(I(1)). Indeed, in terms of results in the first difference ADF statistic is below the critical value at the 1%, 5% and 10%.

4.2. Co-Integration Test

The co-integration test is used to establish the long-term equilibrium relationship between the variables. In our study, we will proceed to test Johansen (1988, 1991). This test provides a multivariate approach based on the method of maximum likelihood. This approach is used to check the co-integration different sets by rank test for co-integration. The results appear in **Table 3 in Appendix 2**.

According to our results, the null hypothesis for the trace test and the test for the maximum eigenvalue is rejected at 5%. This follows from the fact that the calculated values for the two statistics, namely 69.83for trace statistical and 33.87 for maximum eigenvalue statistics is greater than the critical values at the 5% (respectively 69.81 and 24.51).

Indeed, these two tests conclude that there is one co-integrating relationship. We can conclude the existence of long run relationship between financial development and poverty, which is consistent with the results obtained by Uddin.GS, Kyophilavong. P Sydee.N(2012). Moreover, the justification for the co-integration relationship justifies the adoption of an error correction model.

Through their study, Uddin.G.S, Kyophilavong. P Sydee. N (2012) concluded that there is a long run relationship between banking sector development and poverty reduction. They were surprised that the poverty reduction appears to be a long-term variable leading to the explanation of financial development. They led to the idea that policymakers can influence poverty reduction by promoting financial development in the long run. And improve access to financial services and credit to the poorest people.

4.3. Error Correction Model

The error correction model allows to distinguish between long-term and short-term relationship. Alternatively, one can distinguish the vector of co-integration, that is to say the long-term relationship and coefficients of adjustment or short-term equations. Note that the dependent variable is LDCF. Each independent variable has three numbers: the first corresponds to the coefficient of the variable that is associ-

ated with the second parenthesis is presented Student's t, and the last is the p-value. Indeed, non-stationary series, particularly that have a unit root, must be represented in the form of error correction model if they are co-integrated, that is to say if there is a stationary linear combination between them. The estimation of the vector error correction model requires the determination of the long-term relationship or the relationship of co integration by standardizing the variable LDCF:

LDCF= 0,805+1,116 LC-0,368 LM3+0,078 LINF+0,027 LOUV

According to this relationship, long run, LDCF, LC, LINF and LOUV go together since their coefficients are positive. An increase of 1% of LC, LINF and LOUV, LDCF leads to an increase of 1.116%, 0.078% and respectively LC, LINF and LOUV, while LM3 are a negative sign. A 1% decrease in LM3 resulted in a decreased of % LDCF.

The estimated error correction model is given in **Table 4 in Appendix 2**. We note that in the short term the DCF depends on its lagged one period to the 5% level, LC lagged one period to the 10% level, LM3 lagged one period to the 5% level, LINF lagged one period at the 5% and LOUV lagged one period to the 10% level. According to table 4, the setting of the error correction term is negative and significant, confirming the existence of long run relationship between LDCF, LC, LM3, LINF and LOUV. Indeed, in case of short run disequilibrium, the value of this parameter indicates that the LDCF seems slower to return to its equilibrium path. To deepen our analysis, the Wald test which has shown the existence of short run relationship between the variables is used.

The quality of the estimation of this model looks good in terms of the Fisher statistic and the coefficient of determination (R^2 = 0.729 and F-statistic = 4.61). According to the Breusch-Godfrey test (**Table 5, Appendix 2**), we note that the likelihood Chi-square is equal to 0.1208= 12.08% > 5%. In this case we reject H_0 and conclude that the variables are not correlated. Heteroskedasticity test for the Breusch-Pagan-Godfrey (**Table 6, Appendix 2**), we note that the probability of Chi-square is equal to 0.2113= 21.13% > 5%. In this case we reject H0, and we conclude that there is no heteroscedasticity. Finally, through the test of normality of residuals (**Table 7, Appendix 2**), we note that P-value of Jarque-Bera equal to 0.36 > 0.05. So we conclude that the residues of the error correction model are normally distributed. As these results, we can conclude that our model is a good model.

4.4. Granger causality test

The relationship between financial development and poverty is not analyzed in the different studies. However, the direction of causality remains a controversial topic. Indeed, the existence of co-integration relationship between the different variables

induces the existence of a causal relationship between these variables at least one direction. At this level, we will use the test causality Granger based on the vector error correction model. The results are presented in (**Table 8, Appendix 2**).
The Granger causality test reveals the existence of a unidirectional causality LM3 to LDCF; this result is consistent with the work of Pradhan.R (2010) and therefore supports the idea that financial development is pro-poor. We also found a causal LM3 to LC. However, we note that there is no causality between LDCF and indicators of financial development, which is also consistent with the work Pradhan.R (2010). There is also the existence of unidirectional causality LOUV to LC and LM3 to LOUV.

5. Conclusion

The purpose of this paper is to study the causal long and short term in Tunisia for the period 1970-2012. The estimation results show the existence of an error correction mechanism that allows catching up to equilibrium. Indeed, long run imbalances between different variables are compensated, so that the series have similar trends. This result is consistent with that of UddinG, Kyophilavong.P and Sydee.N (2012), which states the existence of a long-term relationship between financial development (presented in our model by the LM3 and LC indicators) and poverty (presented by LDCF). Note that financial development is conducive to poverty reduction. And there is a unidirectional causality relationship between financial development and poverty reduction thereby encouraging financial development through improved access to financial services and credit to the poor. In addition, the opening introduced variable in our model, can benefit from better access to goods and services to the poor. While inflation appears with a negative sign and deteriorate a situation of the poor.

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Appendix 1

Table 1 Descriptive statistics

Variables	Description	Sources of data	Descriptive statistics					
			Value in 1970	Value in 2013	Mean	Std. Dev	Min	Max
					1970-2013	1970-2013		
LDCF	Household final consumption expenditure, etc. (% of GDP)	World Development Indicators (WDI)	4.17	4.22	4.12	0.03	4.05	4.22
LC	Domestic credit to private sector (% of GDP)		3.57	4.32	4.02	0.21	3.51	4.33
LM3	Liquid liabilities (M3) as % of GDP		3.53	4.23	3.92	0.17	3.53	4.25
LINF	Inflation, consumer prices (annual %)		2.18	1.80	1.72	0.46	0.68	2.18
LOUV	Trade (% of GDP)		3.84	4.63	4.39	0.21	3.84	4.74

Appendix 2

Table 2 Stationarity Test Summary for Tunisia

Variables	Level (none)				First difference (none)				Order of integration
	Test ADF	1%	5%	10%	Test ADF	1%	5%	10%	
LDCF	0.889	-2.618	-1.948	-1.612	-2.660	-2.619	-1.948	-1.612	I(1)
LC	1.336	-2.618	-1.948	-1.612	-5.970	-2.619	-1.948	-1.612	I(1)
LM3	2.712	-2.618	-1.948	-1.612	-5.909	-2.619	-1.948	-1.612	I(1)
LINF	-0.714	-2.618	-1.948	-1.612	-12.188	-2.619	-1.948	-1.612	I(1)
LOUV	1.366	-2.618	-1.948	-1.612	-5.876	-2.619	-1.948	-1.612	I(1)

Table 3 Johansen cointegration test

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value
None *	69.83	69.81	None *	33.87	24.51
At most 1	45.32	47.85	At most 1	21.41	27.58
At most 2	23.90	29.79	At most 2	14.16	21.13

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value
At most 3	9.73	15.49	At most 3	7.62	14.26
At most 4	2.10	3.84	At most 4	2.10	3.84

Table 4 Error Correction Model

Variable	Δ LDCF$_t$	ΔLC$_t$	ΔLM3$_t$	ΔLINF$_t$	ΔLOUV$_t$
ε_{t-1}	-0.074***	0.171	0.064	0.083	0.260
	[-5.18]	[2.617]	[1.206]	[0.287]	[2.466]
ΔLDCF$_{t-1}$	-0.247**	-0.929	-0.093	2.646	0.328
	[-2.41]	[-1.989]	[-2.397]	[2.069]	[0.706]
ΔLC$_{t-1}$	-0.033*	0.184	0.070	-0.676	-0.130
	[-2.009]	[1.064]	[0.806]	[-1.428]	[-0.756]
ΔLM3$_{t-1}$	-0.094**	-0.299	-0.056	0.914	0.623
	[-2.662]	[-0.787]	[-0.295]	[0.878]	[1.645]
ΔLINF$_{t-1}$	-0.025**	0.044	0.010	-0.663	-0.002
	[-2.795]	[0.720]	[0.345]	[-3.947]	[-0.043]
ΔLOUV$_{t-1}$	0.043*	-0.114	0.117	0.325	-0.023
	[2.088]	[-0.670]	[1.365]	[0.699]	[-0.136]
Constante	-0.002***	0.025	0.013	-0.067	0.023
	[-6.376]	[3.662]	[6.789]	[-1.615]	[1.549]

Table 5 Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	4.462.074	Prob. F(2,28)	0.1208
Obs*R-squared	1.015.092	Prob. Chi-Square(2)	0.1162

Table 6 Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.417.058	Prob. F(15,26)	0.2113
Obs*R-squared	1.889.176	Prob. Chi-Square(15)	0.2187
Scaled explained SS	1.440.369	Prob. Chi-Square(15)	0.4952

Table 7 Normality Test

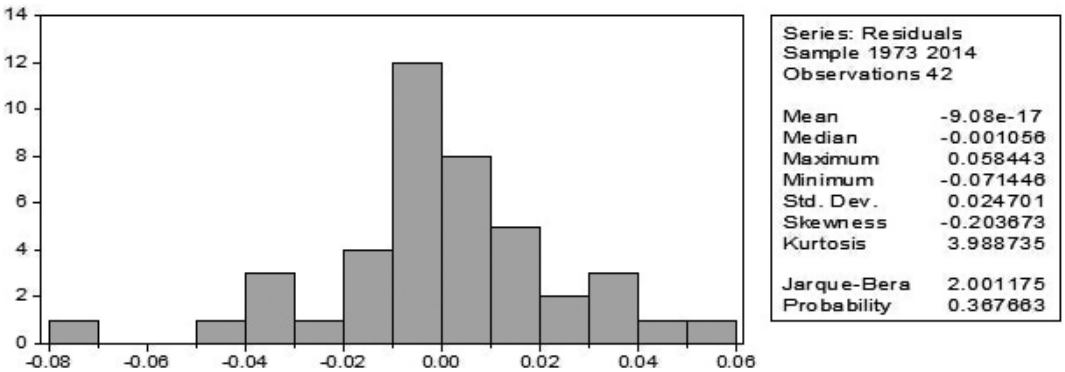

Table 8 Granger causality test

Pairwise Granger Causality Tests
Date: 01/05/15 Time: 23:32
Sample: 1970 2014
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LC does not Granger Cause LDCF	43	2.89681	0.0675
LDCF does not Granger Cause LC		1.14512	0.3289
LM3 does not Granger Cause LDCF	43	7.48655	0.0018
LDCF does not Granger Cause LM3		1.27423	0.2913
LINF does not Granger Cause LDCF	43	0.80266	0.4556
LDCF does not Granger Cause LINF		1.41577	0.2553
LOUV does not Granger Cause LDCF	43	2.78641	0.0743
LDCF does not Granger Cause LOUV		0.87538	0.4249
LM3 does not Granger Cause LC	43	4.57974	0.0165
LC does not Granger Cause LM3		1.16590	0.3225
LINF does not Granger Cause LC	43	0.18021	0.8358
LC does not Granger Cause LINF		0.35373	0.7044
LOUV does not Granger Cause LC	43	6.77327	0.0030
LC does not Granger Cause LOUV		0.40049	0.6728
LINF does not Granger Cause LM3	43	0.47216	0.6273
LM3 does not Granger Cause LINF		1.99466	0.1501
LOUV does not Granger Cause LM3	43	1.84813	0.1714
LM3 does not Granger Cause LOUV		4.65401	0.0156
LOUV does not Granger Cause LINF	43	0.21303	0.8091
LINF does not Granger Cause LOUV		0.75724	0.4759