

The Effect of Financial Development on the Insurance Activity in Algeria

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Abstract:

Our study describes the co-integration relation between the financial and the insurance sectors. Indeed, it consists in repeating and verifying the empirical results obtained in previous studies concerning the existing link between the insurance sector and the financial sector. The studies that looked at the relationship between financial development or banking development and growth in the insurance sector are very minimal, but all these studies find a positive correlation of these financial variables with the insurance market mainly in Outreville (1990,1996), Carson et al., (2014) and Ward and Zurbruegg (2002). Using the ARDL model to estimate the relationship between the penetration rate and financial variables in Algeria between 1974 and 2015, it is shown that there is indeed a short and long-term relationship between certain variables that measures the level of financial development. These are the quasi-currency rate and the level of credit to the private sector. As for the relationship of insurance to economic growth, we have found an absence of a relationship that ranges from economic growth to penetration rates.

Keywords: Insurance; Financial development; Economic growth; ARDL; Algeria.

(JEL) Classification : G22, G20

I. Introduction:

The insurance activity is specific in relation to its reverse production cycle; in fact the insurer receives insurance premiums in advance from insurance holders. As a result of this gap between the subscription of an insurance policy and the realization of the risk, insurance companies accumulate considerable sums of premiums, mainly in life insurance. These premiums are transferred to other institutions in the financial sector, in particular, the financial market. Outreville (1990) argues that the influence of the insurance industry on macroeconomic activity can be analyzed from two points of view, the first being its role in compensating victims and the second its role as an institutional investor. The first role is played in particular by property and casualty insurance. The second role consists in the intervention of insurers on the financial market via the life insurance funds collected and managed in capitalization.

In addition to the intervention of insurance institutions on the financial market, insurance can have other relationships with other participants in the financial system, like banks. An insurance contract is required in advance to benefit from a loan. When the lender takes out a guarantee or a hypothec, the lender generally obliges the owner (borrower) to take out property insurance. If there are any disruptions in the insurance market, there will be turbulence in the credit market, since it will be almost impossible for these (credit) institutions to assess the damage risk and manage the moral hazard perspective, and consequently, a decline in economic activity. The same reasoning is valid to credit institutions and life insurance.

Despite the importance of insurance to the financial system's stability (Skipper, 1997), due to the provision of risk management services, little things are known about the link between the financial system and the insurance sector, particularly the effect of financial system development on insurance demand. It is this last point that we would like to develop in this paper.

For the present study, the autoregressive model (ARDL) is used to test the existence of a co-integrating relationship between insurance and the financial sector in Algeria between 1974 and 2015.

The rest of the paper is organized as follows: Section 1 presents the importance of insurance for the economy. Section 2 reviews the main empirical work linking the insurance market to economic growth and the studies that have examined financial development. Section 3 presents the empirical results of the study.

1. The importance of insurance in the economy:

The first function of insurance is risk transfer. In fact, risk and uncertainty are part of life that only the modern economy has been able to manage effectively. Insurance companies estimate the costs of risks and events, which can have adverse consequences for economic agents and receive insurance premiums that have a much lower value than the value of the insured property. If the risk occurs, the insurance company will pay the compensation and thus reduce the cost of the risks to a reasonable level.

The second main function of insurance is the function of collecting and accumulating contractual savings. This function is also vital for the economy; all economists are in agreement on the importance of savings for economic growth. This function puts insurers in their role as institutional investors, in which they play the role of capital distributors in the economy. In this role, insurance companies

transform small funds into large funds and the short term into the long term (credits to companies and the government).

In addition, the insurance industry provides risk management services to both businesses and households. And through this function, raised funds (premiums) are made available to other agents to investment. In the same way, the risk management functions of insurance companies guarantee the business- continuity of enterprises and stimulate their growth. However, real economic growth could also have a direct impact on insurance demand; higher revenues and strong corporate profits will tend to boost demand for insurance products. Employees who receive higher incomes as a result of economic expansion improve their ability to purchase insurance products. Similarly, for companies, real economic growth leads to a greater expansion of activities, this increases the level of exposure to risk, hence the need to transfer risks to organizations that are better able to manage them and therefore a higher consumption of insurance products.

Skipper (1997) summarizes the importance of insurance to the economy by the following elements:

- Insurance promotes financial stability and reduces anxiety.
- It can replace government social security programs.
- Trade facilitation
- Mobilizes savings
- More effective risk management.
- Loss mitigation
- Promotes a more efficient allocation of capital

Today, traditional insurance is not the only area covering against risks. Banks have invaded the sector through the creation of their own insurance branches or through bancassurance, but they have taken the front line in providing financial risk coverage.

2. Review of the empirical literature:

An overview of theoretical studies relating to the transmission mechanism between finance and growth reveals the existence of three currents of thought that have not agreed on the direction of the relationship. Some authors recommend "supply leading", others "demand following", while others combine the two approaches. These same relationships (growth - finance) were examined for the insurance segment.

The first school of thought is the "demand-following" school, which affirms that real economic growth stimulates demand for the financial services (Robinson, 1952; and Romer, 1990). When the real income increases, households and enterprises demand more financial services. And create more financial assets and liabilities.

On the other hand, the supply-leading hypothesis argues that developed financial markets allow the efficient use of funds from agents with financing capacity to agents in need of financing, which stimulates economic growth (Patrick, 1966). Through the financial system, the cost of transferring information is reduced to ensure efficient allocation of resources. This allowed easy access to information and an efficient increase in the profitability of the investors' portfolio would facilitate the transfer of funds between agents in surplus and in need of financing as well as the transfer of risks.

These functions of the financial system help to simplify the use of resources leading to increased investment and economic growth.

The third school of thought, is the Feedback, it stipulates that causality is run from both directions. Well-developed financial systems have been shown to promote economic expansion through technological change and innovation in products and services (Schempeter, 1912), which in turn stimulates demand for financial services (Levine, 1997). In response to the demand for financial services, economic growth is also strengthened, leading to bilateral causality (Luintel and Khan, 1999).

Regarding the insurance market, most of the empirical work is interested in completing the relationship between life or non-life insurance demand and economic growth; Ward and Zurbruegg (2000) found, through a cointegration analysis, a unidirectional causality for insurance consumption towards economic growth in Canada and Japan. While a weaker bidirectional relationship has been found for Italy. However, there is no evidence of causality for other countries.

Adams et al. (2009) examined the historical relationship between bank lending, insurance and economic growth in Sweden between 1830 and 1998, by the Granger model, they concluded that insurance consumption caused both bank loan growth and economic growth; this result may be attributed to the capital accumulation function of insurance.

Lee (2011) finds a long-term bidirectional relationship between economic growth and insurance consumption. However, by separating life and non-life insurance, the penetration rate of non-life insurance has a greater impact than that of life insurance.

Olayungbo and Akinlo (2016) studied the dynamic relationship between insurance and economic growth in 9 African countries during the period 1970-2013. Using the Bayesian time varying parameter vector auto regression model (TVP-VAR). The results of the study are divergent from each country.

In sum, the causality between insurance and economic growth remains inconclusive and divergent across countries.

As for the studies that looked at the relationship between financial development or banking development and growth in the insurance sector, they are very minimal, but all these studies note the positive correlation of financial variables with the insurance market. The first who introduce these variables was Outreville (1990, 1996, 2014) followed by Ward and Zurbruegg (2002), Beck and Webb (2003) ; Han et al. (2010); Arena (2008); Chui and Kwok (2008,2009); Nguyen, Avram, and Skully (2010) ; Chen, Lee, and Lee (2012) ; Feyen, Lester, and Rocha (2011); Olayungbo (2015) for South Africa.

For the financial market variable, where the relationship is ambiguous, we find the work of Headen and Lee (1974) Chui and Kwok (2009), Nguyen et al. (2010); Chen, Lee and Lee (2012).

Chui and Kwok (2008) use the cultural dimension to determine its relationship with insurance consumption. The study of 41 countries between 1976 and 2001 examines, in addition to cultural variables, the effect of other economic, institutional and demographic variables on life insurance demand. In the institutional variables, the authors test the effect of financial development on insurance demand by integrating the ratio M2/GDP as a measure of the development of the banking sector, the variable respect of creditors' rights is measured by the Levine index (1999). The results of the analysis argue a positive correlation between insurance density and independent financial variables.

Carson et al. (2014) investigate a panel of 28 developing countries between 1992 and 2009; they test the causality between foreign direct investment and life insurance supply, using the insurance penetration rate as a dependent variable. The results show that countries that attract more foreign direct investment (FDI) have a higher life insurance penetration rate. However, the effect of FDI on life insurance decreases if it is associated with a low level of financial development. The authors use the M2/GDP ratio as a proxy for financial development. And because of the dominance of the banking sector in developing countries, the authors take other financial variables related to the banking sector, like the share of bank credit to the private sector relative to GDP, total bank deposits relative to GDP, and bond market capitalisation relative to GDP.

II. Methods and Materials:

In order to study the relationship between the insurance penetration rate and the financial sector, we undertook three stages of econometric analysis. The first consists of stationarity analysis or integration of the model variable series, using the Dickey-Fuller Augmented (ADF) test and the Phillips-Perron (PP) test. The second step is to verify the existence of a cointegrating relationship and a long and short-term relationship between the variables. Finally we used the CUSUM and CUSUM square tests to check the stability of the model.

1- The variables of the econometric model

The variables used in this analysis concern the Algerian insurance market as well as the financial system. We add some macro-economic variables in order to complete the analysis. The variable used for the insurance sector is the insurance penetration rate, which measures the contribution of insurance premiums to gross domestic product (GDP). This variable is used in several empirical studies alongside insurance density. For the financial sector, the choice of variables was based on work by King and Levine (1993) and Otreville (1990). First, it is the liquidity ratio, calculated by the ratio between money supply in the sense of M2 and GDP. This indicator is the measure of the "financial depth" and overall size of the financial system. The second variable is the quasi-money to GDP, which is a measure of the progress of financial intermediation because it is through term deposits and savings that banks contribute to the optimal allocation of resources in the economy. Another variable is the quasi-currency-to-GDP ratio, which is a measure of the progress of financial intermediation in that it is through term deposits and savings that banks contribute to the optimal allocation of resources in the economy. In fact, these two indicators are the most used in empirical research, because they are available for many developing countries over a long period of time. The third variable is credit to the private sector in relation to GDP. It measures the importance attached to private sector financing by the banking sector.

In addition to these variables, we have retained other complementary variables which are GDP per capita as an indicator of economic development and the share of social contributions GDP to measure the importance of social security and its effect on the demand for economic insurance.

The data are from statistics of the ONS (National Statistical Office) and the Bank of Algeria.

2- Model specification and hypothesis

After a thorough reading of the main works mentioned in the literature review, we drew inspiration from the model developed by Otreville (1999) concerning developing countries. This allows us to establish the following model:

$$\text{pen} = b_0 + b_1 \left(\frac{\text{M2}}{\text{GDP}}\right)_t + b_2 \left(\frac{(\text{M2} - \text{M1})}{\text{GDP}}\right)_t + b_3 \left(\frac{\text{credit to private sector}}{\text{pib}}\right)_t + b_4 \left(\frac{\text{GDP}}{\text{habitant}}\right)_t + b_5 \left(\frac{\text{Social Security}}{\text{GDP}}\right)_t + \varepsilon_t$$

With: b_0 :is a constant
 b_i (i= 1 to 5) ε_t : error term

Globally, we make the hypothesis that the penetration rate depends on all the variables mentioned above. The table 1 summarizes the breakdown of the relationship of each variable with the insurance sector, based on the above empirical work.

The study will be based on a standard linear logarithmic function: the relationship between the penetration rate (dependent variable) and the following independent variables: the level of social contributions (COTS), the quasi-money rate (QM), M2/GDP (LIQU), the level of credits to the private sector (CREP), and GDP per capita (GDP).

$$\text{pen}_t = C + \beta_1 \text{liqu}_t + \beta_2 \text{qm}_t + \beta_3 \text{gdp}_t + \beta_4 \text{cots}_t + \beta_5 \text{crep}_t + \varepsilon_t \dots \dots \dots (1)$$

The first step is to estimate the long-term coefficients of the ARDL model using equation (2):

$$\log \text{pen}_t = \beta_0 + \sum_{i=0}^p \beta_{1i} \log \text{pen}_{t-i} + \sum_{m=0}^{q1} \alpha_m \log \text{cots}_{t-i} + \sum_{n=0}^{q2} \delta_n \log \text{liqu}_{t-i} + \sum_{h=0}^{q3} \gamma_h \log \text{qm}_{t-i} + \sum_{j=0}^{q4} \rho_j \log \text{crep}_{t-i} + \sum_{z=0}^{q5} \mu_z \log \text{gdp}_{t-i} + \varepsilon_t \quad (2)$$

The study of short-term dynamics by the ARDL makes it possible to analyse the rate of convergence of the penetration rate into equilibrium.

The short-term equation is written as follows:

$$\Delta \log \text{pen}_t = \beta_0 + \sum_{i=0}^p \beta_{1i} \Delta \log \text{pen}_{t-i} + \sum_{m=0}^{q1} \alpha_m \Delta \log \text{cots}_{t-i} + \sum_{n=0}^{q2} \delta_n \Delta \log \text{liqu}_{t-i} + \sum_{h=0}^{q3} \gamma_h \Delta \log \text{qm}_{t-i} + \sum_{j=0}^{q4} \rho_j \Delta \log \text{crep}_{t-i} + \sum_{z=0}^{q5} \mu_z \Delta \log \text{gdp}_{t-i} + \theta Z_{t-1} + \varepsilon_t (3)$$

Where, Δ is the operator to the first difference, $Z_{(t-1)}$ is the error correction term derived from the long-term cointegrating relationship equation. And it measures the speed of short-term adjustment.

The estimation of the econometric model takes place in two steps:

Step1: Unit root test

The Dickey-Fuller test (1979, 1981) can detect the existence of a trend, but it also determines the right method to stationary a series. Moreover, this test takes into account that there is no reason for the error to be non-correlated.

The correlograms and graphs show that all series are not stationary. But in order to confirm this, it is essential to determine the process of each series (model 3, TS, model 2, DS with constant or model 1 DS without constant).

The Phillips-Perron test (1988) uses the same models as the Dickey-Fuller Augmented test, but uses a nonparametric correction to process the serial correlation.

Step2: The ARDL autocorrelation test

In order to find a possible long-term relationship, we apply the autoregressive distribution lag (ARDL) proposed by Pesaran et al (1996, 2001). This approach determines the existence of a short- and long-term relationship between variables. The interest of this estimate is that the series are not necessarily of the same integration order (d).

The ARDL is used for small sample sizes, where the use of other cointegration procedures is impossible (such as Johansen and Juselius (1990) and Johansen (1991)). The ARDL does not require a common integration order for all series of variables. However, the series must all be integrated of order 1, or a combination of I(0) and I(1) but in no case integrated of order 2.

The study used the ARDL method to estimate the proposed model for each country. This is driven by the difference in the time series stability grades and because this method provides a set of results on the short and long term as well as the error correction parameter.

According to this method, the time series entering the model must be either stable at the level or the first difference or a combination of them, and certainly not in the second difference. A series of the following diagnostic tests should be performed to ensure that there is a long-term joint integration relationship using the F for bound test and the t-test to detect the model to correct short-term errors to return to the long-term equilibrium.

As for the general shape of the ARDL model, which shows the relationship between the dependent variable Y and the variable X, it takes the following form:

$$(1) \quad \Delta y_t = \mu - \rho y_{t-1} + \theta x_{t-1} + \sum_{j=1}^{\rho-1} a_j \Delta y_{(t-j)} + \sum_{j=0}^{q-1} \pi_j \Delta x_{t-j} + \varepsilon_t$$

Representing the potential of variables at the level and slowing down the long-term information from which the long-term co-integration function is derived. The ρ is the error correction parameter whose significance is tested using the tabular values of Pesaran et al. (2001) and H0 Null Hypothesis There is no cointegration relationship. It should also be noted that it is important that the signal of this parameter or estimate is negative so that we can say that there is a possibility of overcoming the short-term errors to return to equilibrium. The long-term parameter of the co-integration function of X is calculated according to the equation:

$$(2) \quad \beta = -\frac{\theta}{\rho}$$

A cointegration relationship is tested using the Wald test where the null hypothesis is tested:

$$(3) \quad \mu = \rho = \theta = 0$$

π_j estimations also refer to short-term estimations. P and q also indicate the number of adaptations estimated based on one of the criteria, such as the AIC standard or the SIC quartz standard for either the dependent variable or the independent variable.

The refusal to impose nihilism based on Pesaran et al. (2001) at the given level of significance means that there is a long-term equilibrium relationship moving from the independent variable X to the Y variable.

III. Results and discussion :

1. Stationarity of times series:

To check that the series are free of integrated variables I(2), we use the Augmented Dickey-Fuller (ADF) test (1979) and the Phillips Perron (PP) test (1988). To test the zero hypotheses, the estimated statistics must be greater than the critical value.

The use of the ADF and PP test shows that all the series are non-stationary at the level except the LQM series which is stationary at the level. The non-stationarity of the series means that a shock produced at a specific date has sustainable effects, which distorts the series from its original movement. The appropriate method in this case would be to apply first order filter differentiation. Table 2 summarizes the unit root tests and indicates the order of integration of the series.

2. ARDL cointegration test:

Table 3 shows the results of the Bound test. For a number of independent variables equal to 5, the F-statistics is 5.29. This value is greater than the critical value of the upper limit (Bound I1) at 5% of significance. The bound test demonstrates the existence of a long-term cointegrating relationship as well as a causal relationship between PEN and the independent variables. All short-term imbalances are corrected by a long-term error correction term.

3. Estimating of the long-term relationship:

The estimation of the long-term relationship (equation 4) by the ARDL shows that the variables retained as determinants of financial development have significant relationships at the 5 and 10% level. Indeed, the positive sign of the QM and CREP coefficients means that the insurance penetration rate increases by 29.6% and 87% when quasi-money and loans to the private sector increase by 1% respectively. The coefficient of the third variable representing the financial sector is negative; it is the liquidity ratio coefficient (LIQU). The latter is inversely and significantly related to the penetration rate.

The COTS variable has a positive and significant relationship, while GDP has a positive and non-significant relationship with the penetration rate.

The model equation estimated by the ARDL approach is as follows:

$$\log \text{PEN} = 11.26 + 1.72 \log \text{COTS} - 3.86 \log \text{LIQU} + 0.296 \log \text{QM} + 0.87 \log \text{CREP} + 6(10^{-4}) \log \text{GDP} + \varepsilon_t(4)$$

$$\begin{matrix} [3.95] & [3.29] & [3.71] & [2.07] & [4.07] & [0.12] \\ R^2 = 0.9850 & & R^2_{\text{ajusté}} = 0.9654 & & & \end{matrix}$$

4. Estimation of the short-term equation

Short-term estimation shows that the penetration rate has a positive and significant relationship at the level of 5% with the CREP variable, and a negative and significant relationship at 10% with QM. For the other variables, the coefficients are not significant.

The coefficient of return force is negative (-0.5655) is significantly different from 0 at the 5% level (Student's t is higher than the tabulated value), this is explained by the fact that the penetration rate exceeded equilibrium during the previous period, the error correction term returns the PEN variable to equilibrium. Thus, short-term shocks on the penetration rate are corrected to 56.66% in the long term. The fact that the coefficient is lower than unity indicates that the long-term and short-term distortions are absorbed in less than one year.

5. Stability parameter

The results can be biased by unstable parameters and thus distort the model, our objective here is to test the stability of the estimated long-term parameters by studying their evolution over time. To do this we apply Robustness tests on residues (Appendix 3) and parameter stability tests.

Stability tests require estimating the error correction model given by equation (4) by ordinary least squares. Then apply the recursive cumulative COSUM and COSUM square residue test. The graphical representation (figure 1) of the CUSUM and CUSUM square stability tests applied to the insurance penetration rate function show that the curves are contained within the corridor. This means that the model is temporarily stable.

It appears that in the long run, the liquidity variable has negative repercussions on the penetration rate (for example, if the money supply M2 increases by 1%, the penetration rate decreases by 386%). This explains that a solid banking system has negative effects on the insurance system. This result is in contradiction with those of Outreville (1990) which finds a positive relationship between financial development and the ability of individuals to purchase insurance products.

The quasi-money variable, reflecting the increase in monetary savings, has a positive effect on the penetration rate. As a result, any improvement in the level of savings in banking institutions leads to an increase in the production of the insurance system.

As for credits for the private sector, the positive and significant relationship can be explained by the compulsory nature of credit insurance required by banks in order to benefit from bank credit.

In addition, the sensitivity of the insurance penetration rate to social contributions can be explained by the similarity of the two types of insurance.

However, in the long run, GDP per capita has a positive but not significant relationship with insurance. This means that an improvement in GDP per capital has no effect on the output of the insurance sector. This contact corresponds to the results found by Nemiri and Benahmed (2014) and Sadi and Silem (2016) concerning the relationship between insurance and economic growth. On the other hand, this contradicts the results of Olayungbo.D.O and Akinlo.A (2016) which found a negative relationship between insurance demand measured by the penetration rate and economic growth in Algeria.

IV- Conclusion:

The results of the study are relatively in harmony with previous studies that have evaluated the relation between insurance and economic growth in developing countries where the financial variable is taken as one of the variables of the econometric model.

The study of the relationship between insurance and the financial system in Algeria, using the ARDL cointegration model, revealed a negative cointegration relationship between the insurance penetration rate and the liquidity rate (M2/GDP). On the other hand, there is a positive relationship between insurance and the other financial variables, namely the quasi-currency ratio and loans to the private sector.

GDP per capital, as a measure of economic growth, has proved not to contribute to improving the productivity of the insurance sector. This result is relatively contradictory to the financial theory of a two-way relationship between the financial system and economic growth.

As a result of our results and given the relative lack of an insurance culture, awareness and education policies on the benefits of insurance must be conducted. Secondly, financial and insurance reforms such as recapitalisation and consolidation policies that can support and deepen the insurance market should be pursued by the government. This is particularly important in an industry where 75% of production is carried out by public insurance companies. Finally, insurance products such as Takaful can be implemented and generalized for all companies in order to attract more consumers and bank-insurance partnerships can be generalized for a better approximation of the two functions.

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Appendix:

Table 1: Hypotheses on the signs of the coefficients variable

variable	M2/GDP	M2-M1/GDP	credit to the private sector/GDP	GDP per capita	Social Security/GDP
coefficient	b ₁	b ₂	b ₃	b ₄	b ₅
Expected sign	+	+	+	+	-

Source: the authors

Table 2: Unit root test of variables

Variable	Test ADF			Test PP			integration ordre
	Level	1 st dif	cv5%	niveau	1 st dif	cv5%	
LPEN	-1,31	-5,33	-1,94	-2,50	-5,18	-3,52	I(1)
LQM	-2,67	-----	-1,94	-224	-----	-1,94	I(0)
LLIQU	-2,22	-5,40	-2,93	0,65	-4,96	-1,94	I(1)
LCREP	-0,66	-5,27	-1,94	-0,67	-5,27	-1,94	I(1)
LPIB	2,72	-4,12	-2,93	-1,38	-4,04	-2,93	I(1)
LCOTS	0,34	-5,93	-1,94	-2,44	-5,92	-2,93	I(1)

Source: the authors

Table 3: ARDL cointegration test

Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2,26	3,35
5%	2,62	3,79
2.5%	2,96	4,18
1%	3,41	4,68

Source: the authors

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1,763865	Prob. F(2,14)	0,2074
Obs*R-squared	7,648095	Prob. Chi-Square(2)	0,0218

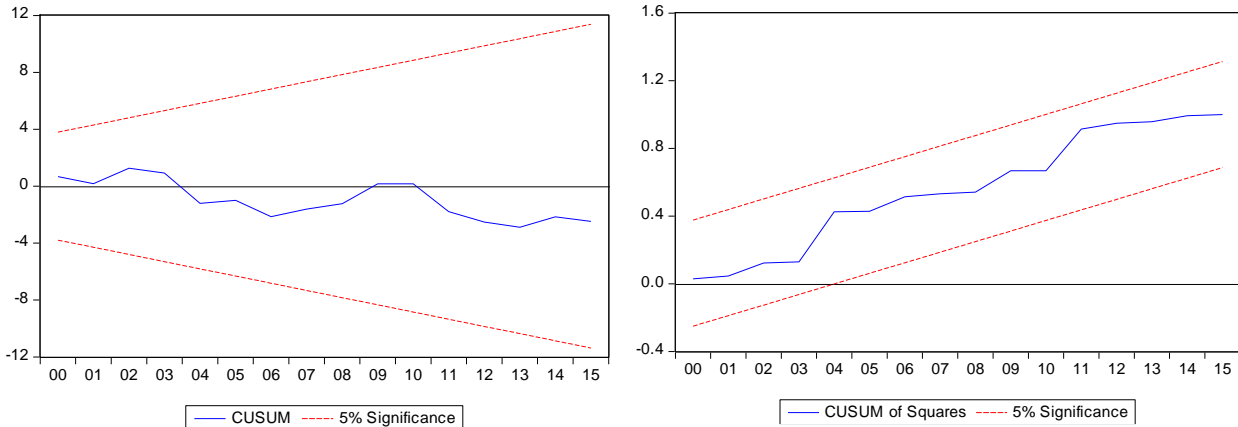
Source: the authors

Table 5: Breusch-Pagan-Godfrey Test of Heteroskedasticity

F-statistic	0,906923	Prob. F(21,16)	0,5898
Obs*R-squared	20,65107	Prob. Chi-Square(21)	0,4804
Scaled explained SS	3,453068	Prob. Chi-Square(21)	1,0000

Source: the authors

Figure 1: Tests CUSUM and CUSUM SQUARE



Source: the authors

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