

Cointegration and Causality Between Insurance activity and Economic Growth in Morocco

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التكامل المشترك والسببية بين نشاط التأمين والنمو الاقتصادي في المغرب

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Abstract:

This research aims to study the effect of insurance activity on economic growth and causality between both of them in Morocco. Time series data for the period 1980-2017 are used where Augmented Dicky-Fuller test, cointegration test of Johansen and causality test of Granger are used. The stationarity test exhibited that the time series have **been** not stationary at level, and they are stationary after taking their first difference. After implementing Johansen cointegration test, it was shown that there is a relationship between insurance sector and economic growth in the long run which allows to check the direction of causality between both of them. The Granger causality test shows significant bidirectional causality between total insurance premiums and real GDP. These findings accentuate the need of insurance sector in promoting economic growth.

Keywords: Economic growth; Insurance Services; Augmented Dicky-Fuller test; Johansen cointegration test; Granger causality test.

JEL Classification Codes: C11; G22; O11; O16

ملخص:

يهدف هذا البحث إلى دراسة تأثير نشاط التأمين على النمو الاقتصادي والسببية بينهما في المغرب باستخدام بيانات السلاسل الزمنية للفترة 1980-2017 حيث يتم إجراء اختبار ديكي فولر الموسع واختبار التكامل المشترك لجوهانسن واختبار السببية لجرانجر. أظهر اختبار الاستقرار أن السلاسل الزمنية ليست مستقرة عند المستوى وأنها مستقرة بعد أخذ فرقتها الأولى. بعد تنفيذ اختبار جوهانسن للتكامل المشترك، تبين أن هناك علاقة طويلة الأجل بين قطاع التأمين والنمو الاقتصادي مما يسمح بالتحقق من اتجاه السببية بينهما. أظهر اختبار سببية جرانجر علاقة سببية ثنائية الاتجاه معنوية بين إجمالي أقساط التأمين وإجمالي الناتج المحلي الحقيقي. تؤكد هذه النتائج على حاجة قطاع التأمين إلى تعزيز النمو الاقتصادي.

الكلمات المفتاحية: النمو الاقتصادي، خدمات التأمين، اختبار ديكي فولر الموسع، اختبار جوهانسن للتكامل المشترك، اختبار جرانجر السببية.

الترميز الاقتصادي (JEL) : C11; G22; O11; O16

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I- Introduction :

The relationship between economic growth and financial sector is a point of debate. There is mainly two main points of view regarding this relationship. The first one is supply-leading hypothesis while the second is demand-following hypothesis.

Supply-leading hypothesis implies that a good financial system comes first and promotes economic growth. The hypothesis demand-following adopts the idea that financial system is a result of economic growth where the demand for financial services is stimulated by growth in the real economy and that the demand for financial services is created by expanding economy. Alhassan and Fiador (2014)

In examining these two previous hypothesis, most of the researchers studied the contribution of banking sector and financial markets in economic growth and few of them took into account insurance sector as an important part of financial systems. The importance of insurance services has begun to increase gradually in the 20th century as the importance of the insurance-growth nexus is increasing regarding the remarkable increasing part of total written insurance premium to global GDP.

Meanwhile, real economic growth may also have an impact on insurance sector since a higher income from an expanded economy may lead individuals to demand more insurance services. Hence, total written insurance premiums increases.

1 .The Economic Benefits of Insurance:

Insurance companies play the same role as banks and capital markets in serving the needs of financial inter mediation for private household and business units. Insurance is a very important part in financial sector. In US, UK and EU, the insurance sector accounts for a significant portion of the economy.

In addition, financial inter mediation can be achieved by insurers through collecting relative premiums from various small individuals which constitutes a large fund that could be used to invest in short and long term periods. Akinlo and Apanisile (2014)

It is also mentioned that the demand for liquidity in the form of money and durable goods is reduced by life insurance, and shifts the composition of individuals' savings to more productive ways. On the other hand insurers of property/liability help to decrease the chance of distress liquidation of firms in case of catastrophic losses. For example, the interest of shareholders in insuring risk-neutral against losses to avoid bankruptcy costs. Webb, Grace and Skipper (2002)

Another aspect is risk transfer and indemnification. Indemnification and risk transfer services aids individuals to purchase large-expense items, such as cars and real estate as indemnification encourages their innovation. Ward and zurbruegg (2000).

2. Overview of Insurance in Morocco:

Generally, the African insurance market is can be described as very weak in comparison with other parts of the world since it represents only 1.36% of world's insurance market versus 30.6% in North America and 30.24% in Europe in 2017. Despite this fact, the Moroccan insurance market was ranked in the 50th place in the world and in the second in Africa, after South Africa, with total written insurance premiums of 3718 million USD in 2017. In addition, the volume of total expenditure on insurance services in Morocco has been steadily increasing over the period of the study as total written insurance premiums was approximately tripled, in the period 1980-2013, from 46 million USD to 139 million USD in 2013 as it is mentioned in the 3rd Sigma review publication in 2018.

In light of this remarkable development of insurance activity in Morocco, it seems through statistics that it requires study and investigation to find out the reality of the relationship and causality between this type of activity and economic growth.

3. Literature Review :

(Ward and Zurbruegg, 2000) examined the dynamic long and short term relationship between insurance and economic growth industry in 09 OECD countries between 1961 and 1996. The sample countries included the USA, UK, Austria, Australia, Canada, Switzerland, France, Italy and Japan. The study uses two time series. The first one is total insurance premiums and the second is GDP as an indicator of economic growth. The study concluded that there is a significant causal relation from the evolution of the insurance market towards economic growth in Japan at the level of 10% and a bidirectional causal relationship in Italy and Canada at a significant level of 10%. Moreover, a unidirectional Causal relationship from economic growth towards insurance sector for France and Australia versus the absence of a causal link insurance and economic growth in Switzerland, UK, USA, and Austria.

(Kugler and Ofoghi, 2005) sifted the relationship between economic growth and the size of the insurance market in the UK using incomplete insurance market data using Johansen cointegration Test and Granger causality test. The study found that there is a long-term relationship between the evolution of the size of the economic growth and insurance market at a level of not less than 5% for most variables. The Granger causality test showed a long-term causal relationship between the evolution of the insurance market and the economic growth of 8/9 variables versus a causal relationship running from life insurance and insurance against financial losses, property and liability insurance towards economic growth.

(Haiss and Sumegi, 2008) studied the impact of insurance on economic growth on 29 European countries in the period 1992-2005. They found a positive impact of life insurance on economic growth in some countries and a positive impact of non-life insurance activity on economic growth in other countries.

Using panel data on 10 OECD countries during, lee examined the relationship between insurance activities and economic growth. He concluded that there is a long-run relationship between

real GDP and insurance activities. the long-run panel regression parameter indicated a significant positive relationship between real GDP and insurance market, as well as the impact of non-life insurance market has a greater on real GDP than that of activities in the life insurance market do. By implementing the dynamic panel-based error correction model, it is found that insurance market's development and economic growth present both the long-run and short-run bidirectional causalities(lee, 2011).

(Alhassan and Fiador, 2014) conducted a study on the case of Ghana in an attempt to determine the causal link between insurance and economic growth between 1990 and 2010. The study found out that there is a positive causal relationship in the long term between insurance penetration rate and economic growth, which means that funds of insurance institutions positively affect long-term economic growth. The study also found a unidirectional causal relationship from insurance activity towards economic growth which is consistent with the Supply-Leading Hypothesis.

(Muye and Shiekh Hassan, 2016) studied a sample of 22 member countries of the ASIAN and GCC in order to see the relationship between the development of the Islamic Takaful insurance sector and economic growth during the period 2004 - 2012. The study found out that there is a positive and significant relationship between Islamic Takaful insurance market and economic growth.

(Olayungbo, 2015) used VAR models and Toda-Yamamoto causality test (T-Y) in order to examine the dynamic relationship between economic growth, demand for insurance, financial development and in South Africa for the period 1970-2012. The VECM model showed that financial development stimulates demand for insurance in the short term. Results of Toda-Yamamoto (TY) test showed that financial development and insurance promote economic growth, and unidirectional causal relationship from insurance activity And financial development towards economic growth which supports the Supply Leading hypothesis.

(Another study of Olayungbo, 2016)where he used the Autoregressive Distributed Lags model (ARDL) to study the effect of non-life insurance and life insurance on economic growth between1976-2013 in Nigeria. He found that there exist a significant positive long and the short run dynamics of life and non-life insurance on economic growth in Nigeria.

(Pradhan et al., 2016) conducted a study to sift the relationship between insurance sector and economic growth in a sample of 18 countries of the ASEAN Regional Forum (ARF) between 1988 and 2012 where they implemented ADF test, cointegration test and Granger causality test. The results show that there is a long run relationship between variables including GDP and insurance sector indicator as well as a bidirectional short term causal relationship between the rate of insurance penetration and economic growth.

II– Methods and Materials:

1. Sources of Data and Variable Definitions:

We employ annual time-series from 1980 to 2017 of real GDP, aggregate insurance premiums, life and non-life insurance premiums, foreign trade volume, gross fixed capital formation and inflation rate. Data of insurance premiums were sourced from Sigma publications which are series of publications about world's insurance and reinsurance sector issued by Swiss Re Institute's research. The other variables were taken from the world development indicators (WDI) database.

This paper uses basically two time series which are:

- **RGDPG**: is the annual percentage growth of real GDP computed using 2010 base year in US dollars.
- **LTIPR**: is the logarithm of total insurance premiums which are the aggregate amount of money that individuals must pay for insurance policies. The logarithm of insurance sector indicators is used for the purpose of making for easy interpretation of regression coefficients.

2. Models Specification and Methodology:

(Ward and Zurbruegg, 2000) argued that because the small number of observations, the issue of small sample bias may arise because the time series is not long. However, it is the length of the period and not the frequency of observations that is paramount in order to examine co-integrating relationships as it is mentioned by (Hakkio and Rush, 1991). Moreover, the results should provide relevant evidence of any long-run trends between the series under review.

After estimation of the relationship between insurance premiums and economic growth in Morocco, Models and the linear time series used in the above previous studies will be adopted, especially those of (Ward and Zurbruegg, 2000) and (Kugler and Ofoghi, 2005). The main regression equation to be evaluated can be specified as follows:

$$Y_t = \beta IP_t + \varepsilon_t \dots\dots\dots(a)$$

Where Y_t is economic growth in year t , IP_t is the insurance premium indicator in year t and ε_t is a disturbance term.

This study consists of three main steps:

The first one is conducting unit root tests to check the order of the variables using the augmented Dickey–Fuller test (ADF) and then conducting Johansen cointegration test to test the existence of long run relationship between variables and finally the Granger causality test will be done to find out the direction of the eventual relationship.

The functional exact relationship between the two variables (life insurance indicator and economic growth indicator) where y_t is a function of x_t can be specified as follows:

$$y_t = f(x_t) \dots\dots\dots(1)$$

where y_t is the economic growth indicator (LRGDP) at time t , x_t is the insurance premiums indicator at time t .

In a linear form and because of the inexact relation between economic variables, equation (1) becomes as follows:

$$y_t = \alpha + \beta x_t + u \dots\dots\dots(2)$$

Where α and β are unknown parameters of the model and u is a disturbance term that represents all those factors that may affect economic growth but are not taken into consideration.

Regarding the equation (2), (Ching ,Kogid and Furuoka, 2010) explained as follows:

$$\Delta Lx_t = \alpha_0 + \sum_{i=1}^P \alpha_{1i} \Delta Lx_{t-i} + \sum_{j=1}^P \alpha_{2j} \Delta Ly_{t-j} + \alpha_3 ECT_{t-1} + \mu_t \dots\dots\dots (3)$$

$$\Delta Ly_t = \beta_0 + \sum_{i=1}^P \beta_{1i} \Delta Ly_{t-i} + \sum_{j=1}^P \beta_{2j} \Delta Lx_{t-j} + \beta_3 ECT_{t-1} + \mu_t \dots\dots\dots (4)$$

Where ECT_{t-1} is the error correction term .. x_t is Granger caused to y_t if α_{2j} in equation (3) is significant without taking into account β_{1i} . Moreover, y_t would Granger cause to x_t if the total of β_{1i} in equation (4) is significant without taking in to account α_{2j} . Bilateral causal relationship exists between y_t and x_t if both the total of α_{2j} and the total of β_{1i} are significant. Coefficient α_3 and β_3 are referred to as error correction coefficients.

In the presence of cointegration, (Granger, 1988) said that the ECT should be taken into account when testing for causality due to the concern of model misspecification. The Granger causality can be investigated through the Error-Correction Model (ECM) of RGDPG and LTIPR expressed previously in equations (3) and (4).

III- Results and discussion :

1. Unit Root Test:

Using ADF test and based on the SIC criteria, the results in Table01 show that all our time series are not stationary at level where the null hypothesis of having a unit root cannot be rejected which means they are not stationary. After using the same test on the first difference, all time series are found stationary i.e. they are I(1) which implies alternative hypothesis of no unit root is accepted.

2. Johansen Cointegration Test :

Before conducting the Johansen cointegration test, it is very important to find the optimal lag length as follows :

From Table02, the lowest value of Schwarz information criterion (SC) is when an interval of 2 lags is taken. Hence, the optimal lag length that will be used in the Johansen cointegration test is 2.

From the Trace test results in Table03, it appears that there is one cointegrating equation where the Trace Statistic (19,835) is greater than the 5% critical value (15,49). This implies that the hypothesis of no cointegrating equations is rejected. In addition, the hypothesis of having at most one cointegration equation cannot be rejected as its corresponding Trace statistic (1.083) is lower than the 5% critical value (3.841) which means that there exists at most one long run equilibrium relationship between RGDPG and LTIPR.

The Maximum Eigenvalue test results in Table04 support those of Trace test since the hypothesis of no cointegrating equations is rejected due to the fact that the Maximum Eigenvalue statistic (18,751) is greater than the 5% critical value (14,264) and also the hypothesis of "at most one cointegrating equation" between RGDPG and LTIPR is accepted because its corresponding Trace Statistic (1,083) is lower than the 5% critical value (3,841).

The fact of having a long run relationship between RGDPG and LTIPR leads to expect that at least one direction of causality among the variables exists as it is mentioned by Engle & Granger (1987).

III-Error correction model and Granger causality test:

Equations (3) and (4) to be used after finding The long-term cointegration relationship.

Generally when RGDPG is taken as a dependent variable the R-squared of 0.8772 and that higher changes in growth are explained by LTIPR unlike the case where LTIPR is taken as a dependent variable since the R-squared of 0.368 is very weak.

The coefficient of ECT is negative and significant at the 1% level which implies that the previous annual deviation from long run equilibrium is corrected at a speed of 184% when RGDPG is taken as a dependent variable. In the short run, the lag 2 of total insurance premiums LTIPR₋₂ has a significant and positive effect on RGDPG at 5% level where a 1% change in LTIPR₋₂ is associated with 7,13% increase in RGDPG. When LTIPR is taken as a dependent variable, the lag 2 of real GDP growth RGDPG₋₂ has also a significant and positive effect on LTIPR at 5% level where a 1% change in RGDPG₋₂ is associated with 0.018% increase in LTIPR. Having two different and significant sides of effects means that there is a bilateral relationship between insurance premiums and real GDP growth.

4. VEC Granger causality:

We must have at least one causal relationship exists among the variables since we have a long run relationship. The VEC Granger causality test result in Table06 shows that the relationship between the two variables in Morocco is bidirectional at 1% level which means that insurance activity and economic growth in Morocco improve each other. this result is consistent with the findings of Ward and Zurbruegg (2000) for the cases of Canada and Italy and also with the result of Kugler and Ofoghi (2005) on the case of UK. It is also similar to the findings of lee (2011) for case of OECD Countries. Hence, these findings support the supply-leading hypothesis and demand-following hypothesis and reveals that insurance activities and real GDP are endogenous variables and they mutually influence each other in the long run.

All the above results may be in line with the explanation of Pradhan (2015) who said that Increased domestic savings on the basis of insurance schemes can enable the economy to diversify its sources of investment for economic development. Furthermore, underwriting risks for natural calamities will enable government and community to allocate the resources more efficiently for productive activities that contribute to sustained economic development. Essentially, the insurance

sector plays the role of “shock-absorber” by mitigating risks associated with volatility in FDI inflows and natural disasters

IV- Conclusion:

This paper is an attempt to study the effect of total expenditure on insurance services on economic growth and causality between both of them in Morocco using time series data for the period 1980-2017. The ADF unit root test exhibited that the two time series have a unit root at level and are stationary at the first difference. As the two time series have the same degree of integration, a cointegration test is needed. After implementing Johansen cointegration test, it is found that there is a long run relationship between economic growth and insurance sector. Having a long run link leads to investigate the direction of causality. The VEC Granger causality test shows a significant bidirectional between the logarithm of total insurance premiums (LTIPR) and real GDP (RGDPG). These results mean that on one hand insurance activity in Morocco supports economic growth through risk transfer and indemnification and on the other hand an expanded and productive economy stimulates individuals and companies to buy more insurance policies. Hence, insurance sector in Morocco is a crucial component that should be encouraged. These results are interesting and lead to wonder about the relation between insurance companies and other financial institutions in Morocco

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Appendix:

Table01: UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root			
At Level			
With Constant		RGDPG	LTIPR
	t-Statistic	-13.0012	-2.1455
	Prob.	0	0.2291
		***	n0
With Constant & Trend	t-Statistic	-12.8672	-0.844
	Prob.	0	0.9518
		***	n0
Without Constant & Trend	t-Statistic	-0.7211	0.9836
	Prob.	0.397	0.9108
		n0	n0
At First Difference			
With Constant		d(RGDPG)	d(LTIPR1)
	t-Statistic	-12.4585	-4.3458
	Prob.	0	0.0015
		***	***
With Constant & Trend	t-Statistic	-12.3419	-4.3709
	Prob.	0	0.0071
		***	***
Without Constant & Trend	t-Statistic	-12.657	-4.3305
	Prob.	0	0.0001
		***	***

Source: Eviews 10

Table02: Optimal Lag Length According to SC Criterion.

Lags	SC Values
0	7.497701
1	4.71566
2	4.469302*
3	4.64219
4	4.868124

Source :Eviews 10

notes:

- * indicates lag order selected by the criterion
- SC: Schwarz information criterion.

Table 03: Unrestricted Cointegration Rank Test (Trace) of : RGDPG - LTIPR

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.414776	19.83504	15.49471	0.0104
At most 1	0.030481	1.083414	3.841466	0.2979

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Source :Eviews 10

Table 06: VEC Granger causality test result

VECM Granger causality test result			
VEC Granger Causality/Block Exogeneity Wald Tests		Sample: 1980 2017	
Date: 10/02/18 Time: 22:52		Included observations: 35	
Dependent variable: D(RGDPG)			
Excluded	Chi-sq	df	Prob.
D(LTIPR1)	11.24675	2	0.0036
All	11.24675	2	0.0036
Dependent variable: D(LTIPR)			
Excluded	Chi-sq	df	Prob.
D(RGDPG)	10.40108	2	0.0055
All	10.40108	2	0.0055

Source :Eviews 10

Table 04: Unrestricted Cointegration Rank Test (Maximum Eigenvalue) of: RGDPG-LTIPR

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.414776	18.75163	14.2646	0.0091
At most 1	0.030481	1.083414	3.841466	0.2979

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Source :Eviews 10

Table 06: VEC Granger causality test result

Table 66: VEC Granger causality test result			
VEC Granger Causality/Block Exogeneity Wald Tests			Sample: 1980 2017
Date: 10/02/18 Time: 22:52			Included observations: 35
Dependent variable: D(RGDPG)			
Excluded	Chi-sq	df	Prob.
D(LTIPR1)	11.24675	2	0.0036
All	11.24675	2	0.0036
Dependent variable: D(LTIPR)			
Excluded	Chi-sq	df	Prob.
D(RGDPG)	10.40108	2	0.0055
All	10.40108	2	0.0055

Source :Eviews 10

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