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RESEARCH ARTICLE

AGRICULTURAL INSURANCE AND AGRICULTURAL PERFORMANCE: GRANGER CAUSALITY TEST: AN APPLICATION IN FRANCE

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ABSTRACT

This article tries to show the existence of the causality between the agricultural performance and the development of the agricultural insurance and this by resorting to an econometric approach using Granger Causality Test. This econometric analysis is made over the period 2000-2012 for one of the European country to know, France. We found interesting results in this connection which reflect the state of the agricultural insurance and the implications of its use to allow the preservation of the agricultural performance. Besides, we showed in term of causality the implications of the application of the agricultural modalities of risk management on the agricultural performance. By applying all of the tests, we show the existence of a causality between the agricultural performance and the development of the agricultural insurance which is measured by the penetration in the agricultural insurance. And this causality is valid in France between 2000-2012. We find a unidirectional causality between the development of agricultural insurance and agricultural performance, a causality which remains true in the short and long term so we can adopt the model estimated for projected effects. In this result is added a causality which puts in relation the action of the State by direct helps granted to the insurants in the form of subsidies of the premiums of agricultural insurance and their effects on the agricultural performance. For these causalities, are added other relations appropriate to every country or for two countries together.

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INTRODUCTION

The relation between insurance development and economic performance has been the subject of considerable academic research. Several other authors tried to show the importance of the insurance in the process of the economic development in particular in developing countries in spite of the difficulty seizing and including the degree of contribution of the insurance in the economic activity. Adam *et al*. (2005) examined empirically the relation between the banking activity, the insurance and the economic growth in Sweden for period 1830-1998 by using the tests of causality of Granger. The results showed that the banking development and not of the insurance (by the total insurance premiums) lead to the economic growth in Sweden in XIX th of Century and that the insurance seems to be motivated by the rhythm of the growth of the economy. According to the World Bank via empirical works of Erik's and Rodney (2011), it was shown that there is a link of causality between the development of the insurance sector and the economic growth, although the results turn out sometimes ambiguous. Piece (2012) showed that the development of the industry of the insurance assurance can contribute to the economic growth as a financial intermediary and a supplier of transfer of risks and compensation to manage the risks in a effective way. The insurance allows insuring the risk management to reduce or master the losses. Craig and Fotis (2013) were able to estimate the impact of the use of the insurance on the economic performance of farms by making an analysis of the determiners of the demand of the agricultural insurance, saw that the demand of the agricultural insurance could affect the agricultural performance and this by using a model in two simultaneous equations.

The first equation describes the impact of the explanatory variables, including the use of the insurance, on the performance of the agricultural activity. And the second equation describes the impact of the explanatory variables, including the agricultural performance at demand of the insurance. Yesuf (2014) identified the insurance collect as an effective institutional mechanism to face the risks of production. It is estimated the impact of the insurance collects on the risks of production. Once used the insurance collects, it will affect the yields on the farmers. Mirela and Silviu (2014)

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tried to analyze the correlation between the insurance and the economic growth by showing the existence of a direct link of causality between both, such as the level of development of the insurance sector depends on the degree of economic development of the country. Various studies have focused on different countries, time periods, modeling techniques and different proxy variables which have been used for insurance activity such us rate of penetration on insurance. The development of the insurance as an economic activity comes from the necessity of facing risks for a behavior of solidarity between the individuals. It is in this spirit that establishes the institutions of insurance which have for principle to insure a solidarity between the various individuals in case of risks. The role of insurance companies is to insure a behavior of mutual insurance between the various individuals to face the risks. And it is the World Bank through studies made for the years eighty that incited so that insurance companies play a role in the reduction of the risks by sharing the risks between the various individuals especially in case of grave risks.

We suppose that the quantitative evaluation of the impact of the insurance in the economic activity is of a big importance to be able to encircle the factors which could contribute to the development of the activity of insurance and as a consequence which could impact on the economic activity. Our work joins from this perspective; it is supposed that the management of agricultural risks by the agricultural insurance could have a significant impact on the growth of the agricultural production and on the agricultural productivity. We shall move forward empirical models which allow estimating the effects of the development of the penetration at the agricultural insurance on the growth of the agricultural production on one hand and on the agricultural productivity on the other hand. From the existing studies, we can use the Granger causality test to study the causality between agricultural insurance development and agricultural performance. The objective of this study is to show the causality between agricultural insurance and the agricultural productivity on one hand and the causality between the development of the agricultural insurance and the real growth of the agricultural production on the other hand. In other words, we shall test the causality between agricultural insurance and agricultural performance.

To be made, we use the technique of causality of Granger. The study is made on France, a country where the agricultural insurance is strongly developed between 2000-2012. France will be the representative country on which is made our test of Granger. The choice of this country was made on the basis of the penetration rate in the agricultural insurance the highest among the countries of the sample in European countries. We use the following variables: the rate of real growth of the agricultural production, the agricultural productivity, the subsidies of the premiums of agricultural insurance, the premiums of agricultural insurance, the agricultural spending and the penetration in the agricultural insurance. The study which we lead use the theory of the cointegration of Engels and Granger to analyze the relation between the development of the agricultural insurance and the growth of the agricultural production on one hand and the agricultural productivity on the other hand in France between 2000-2012. It allows to pull the observations and the teachings and to deduct the implications on the causal relations between the aforesaid variables. In this article we present in section 2 briefly reviews the related literature, followed by section 3 that present the econometric modeling approach and describe the data used, section 4 depicts the empirical findings and the final section, section 5, holds the concluding annotations and presents some policy implications.

Literature Review

Historically, the importance of the activity of insurance is not new because some references to the activity of insurance were mentioned in the works of Adam Smith, the Marshall Island and in that of Knight. However, these works did not specify its contribution to the economic activity and did not really study its role and its modalities of management of risk. It was during 1960s when the economy of insurance knew its peak with the works of Borsh (1962) and Arrow (1970) which showed that it is the theory of insurance that allows the economic analysis of the risk and the uncertainty. Laguerre (1990) supposed that " No society can prosper without mechanisms of risk coverage ".

According to Grace and Rebello, (1993), the activity of the insurance can contribute on the activity of the banking sector. The development of the activity of insurance could encourage the bank loan by increasing the demand of financial services. The evaluation of the relation between the potential activity of the market of the insurance and the economic growth was presented by Ward and Zurbruegg (2000), Webb *et al.* (2002) Kugler and Ofoghi (2006), and Adams, Andersson, Andersson, and Lindmark (2006) For the countries of the OECD, it was Ward and Zurbruegg (2000) which tried to explain the potential relation between the growth of the insurance sector and the economic growth. These authors used the tests of cointegration of Johansen to explain the models of test and correction of errors to explain the relation of causality between the economic growth and the insurance. They examined the relation of potential causality between the economic growth and the activity of the market of the insurance for the countries of the Organization of the Trade and the Economic development for period 1961-1996 and this by using the annual Real Gross domestic product as measure of the economic growth and the annual premiums as the measure of the insurance.

According to Beck and Webb (2003), as financial service, the insurance is considered as a particular service which affects the economic growth. Chun-Ping (2005) explained the relation enter the development of the market of the insurance (via the penetration and the density) and the economic growth. The variables which are used are relative to the demography, to the financial level in the economic profit and in the regional conditions. Kugler and Ofoghi (2006) showed proofs of long-term causality of the insurance in the growth of the Gross domestic product for eight categories of insurance in the United Kingdom. Marco. In (2006) showed that in the developed countries or in the developing countries, the activity of insurance is considered as a financial intermediary and a supplier of transfer of risk. Such an activity allows to insure the compensation of the insurants what could contribute to the economic growth by allowing to manage the risks in a effective way. Arena (2008) found proofs of a link of causality enter the development of the insurance on the economic

growth a wide panel of 56 countries and of 28 years (1976-2004) Curak, Loncar and Poposki (2009) examined the relation between the development of the agricultural insurance sector and the economic growth in ten countries member states of the United States enters the period 1992-2007. Olubiyo and Ajfand (2009) tried to make a comparison between the practices of production between the insured and uninsured farmers by using an econometric analysis and this by referring to functions of which integrate the option agricultural insurance. The results showed that the insured farmers are directed to the choice of the combination of the factors of production such as input what can an increase of the production.

One of the underlying hypotheses of the agricultural insurance, it is because its introduction allows to encourage the farmers to change positively the agricultural practices what allows to increase the production further to an effective use of the agricultural inputs. The analysis suggests that the insured farmer would generate more power and a net profit by reducing their current level of the use of the resources compared with the uninsured farmers. Most of the empirical studies which targeted the evaluation of the interaction between the activity of insurance and the economic growth were based on descriptive analyses to analyze the development of the activity of insurance and its effect on the economic activity. On the other hand, concerning the agricultural activity, the activity strongly subjected to the risks that are natural risk or risk of production which is of for the variability of the agricultural yields, the empirical studies were rare. Our work tries to show empirically if there is causality between the development of the agricultural insurance and the agricultural performance for one of the European countries, namely France during period 2000-2012.

Econometric Issues

Model specifications

We specify the model, the sources of the data and our methodological approach and we analyze the stationarity of the series to be able to determine the level of integration of variables. It is a question of identifying the explained variable and the explanatory variables of the model, the signs of the parameters and the equation of the model. Our analysis joins in the theoretical frame of the approach of the institutional adaptation developed by Wilhelms (1998) and who finds his origin in the school of the integration. This approach supposes that the agricultural performance depends on institutional variables and on adopted policies of regulation; in fact, the approach of the institutional adaptation grants an important role to the State in its regulation besides the role of the market. The agricultural performance is estimated by the rate of real growth of the agricultural production (according to the FAO) and by the global agricultural productivity of factors. The variables of the model were specified in the methodology of analysis and both estimated models will be of type:

By retaining the real growth of the agricultural production (VPA)

$$VPA = \beta_0 + \beta_1\, penetration + \beta_2\, Agr\, insur\, Subsidi + \beta_3 \Pr im + \beta_4 \text{Agricultural spending} + \varepsilon_t \qquad (1)$$

In terms of global agricultural productivity of factors (PGFA)

$$PGFA = \beta_0 + \beta_1\, penetration + \beta_2\, Agr\, insu\, Subsidi + \beta_3 \Pr im + \beta_4\, agricu\, spending + \varepsilon_t \qquad (2)$$

The rate of real growth of the agricultural production, noted VPA.

The global agricultural productivity of factors, noted PGFA.
Variable VPA and PGFA measure the agricultural performance of the country.

Penetration: the penetration rate in the agricultural insurance (SER)

Subsidies of the premiums of agricultural insurance, Agr Insu Subsidi, (SAA)

The premiums of agricultural insurance, Prim (PRIM)
The agricultural spending other than the subsidies of production prices, Agri Spending (DPA)

β_0: constant
β_1 β_2 β_3 and β_4 the coefficients relative to every variable
ε_t is the term of error.

DATA AND RESULTS

The data cover the period 2000-2012 and result from the FAO and the publications of the Statistics of the French Ministry of Agriculture. The software used for the estimation is Eviews 8. Variables are taken in real terms. This study on the impact of the agricultural insurance on the agricultural performance in France has for objective to analyze the impact of development of the agricultural insurance on the growth of the agricultural production and on the agricultural productivity in France, to determine the measures of agricultural risk management policies susceptible to minimize the agricultural risks allowing France and farmers assured to maintain stable their agricultural production and them returned. So the Econometric methodology that we adopt comes true in four stages. The first stage consists of the study of the stationarity of the series to determine their orders of integrations.

The second stage tests the existence of a relation of cointegration between the used variables. The third stage is interested in the estimation of the parameters of the model and the last and fourth stage allows making the test of causality. We identify before preceding in these test the descriptive and explanatory analyses of the evolution of the agricultural insurance and its determiners in France. The endogenous variable is the rate of real growth of the annual agricultural production of the country or the agricultural productivity of the country in the period 2000-2012.The explanatory variables are the subsidies of the premiums of agricultural insurance, the premiums of agricultural insurance, the agricultural spending and the penetration in the agricultural insurance. The model allows making the various tests: stationarity and causality. by making these tests, the results relative to the French Economy obtained about the interaction between agricultural insurance and agricultural performance are interesting.

The test of stationarity revealed that all the variables are still in first difference and they are quite significant. The model is globally significant and can be used for the forecast.

The Granger causality test in France

Tests of integration and stationarity of the series

A series is said stationnary if it does not contain either trend, or seasonality. More generally no factor evolves in time. To test the stationarity of a series, we make the test of stationarity of Dickey Fuller (ADF) and the test of Philips-Perron (PP). The test ADF takes into account only the presence of autocorrelations in the series, the test of PP consider in more the hypothesis of presence of autocorrelations, a dimension of heteroscedasticity in the series. We make the test of stationarity and the test of causality to answer the objective of our study to know how to show the existence or not of causality between the agricultural insurance and the agricultural performance, expressed in terms of real growth of the agricultural production and the agricultural productivity.

We present in a Table 1 the results of the tests of stationarity

econometric theory. We thus try to explain the causality to the sense of Granger between the agricultural insurance and the agricultural performance in France during period 2000 2012.

The causality Test

The notion of Granger causality is a theoretical approach of the causality which defines in theory the causality (cause - effect) and in more presents a predictive character of the possible cause on the effect. In the sense of Granger, a variable X causes a variable Y if and only if the past and present values of X allow predicting better the values of the variable Y. In other words, it will present a better prediction given a perfect knowledge of the past and present values of the variable X. The Granger causality test allows to examine if the value of Y is significantly connected to variables delayed the same variable and variables delayed of X which is the causal variable. We present the results of The Granger causality test by leading a first real analysis in terms of growth rate of the agricultural production **(Table 2)** and the second analysis in terms of global agricultural productivity of factor for France **(Table 3).**

Table 1. Results of the tests of integration and stationarity of variables

	Test of stationarity (at the threshold of 5 %)							
	Stationarity		Dickey-Fuller (ADF)		Philips-Perron		Stationarity	
Variables	Yes/ No	Order of integration	Value of the statistics	Critical value	Value of the statistics	Critical value	Yes/No	Order of integration
VPA	Yes	I(1)	-7.211	-1.977	-8.303	-1.977	Yes	I(1)
PGFA	Yes	I(1)	-6.073	-1.982	-7.380	-1.977	Yes	I(1)
SAA	Yes	I(1)	-5.617	-1.977	-5.229	-1.977	Yes	I(1)
PRIM	Yes	I(1)	-3.678	-1.982	-11.225	-1.977	Yes	I(1)
PENET	Yes	I(1)	-3.162	-1.977	-3.278	-1.977	Yes	I(1)
DPA	Yes	I(1)	-3.502	-1.977	-3.502	-1.977	Yes	I(1)

Source: the Author from the data of the mode

Table 2. **The Granger causality test by retaining the real growth of the agricultural production**

Pairwise Granger Causality Tests			
Sample: 2000 2012			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
PRIM does not Granger Cause DPA	11	1.51388	0.2936
DPA does not Granger Cause PRIM		1.08242	0.3968
SAA does not Granger Cause DPA	11	0.00321	0.9968
DPA does not Granger Cause SAA		268.479	1.E-06
SER01 does not Granger Cause DPA	11	294.318	1.E-06
DPA does not Granger Cause SER01		5.40405	0.0455
VPA does not Granger Cause DPA	11	4.63016	0.0608
DPA does not Granger Cause VPA		0.20357	0.8212
SAA does not Granger Cause PRIM	11	0.42813	0.6702
PRIM does not Granger Cause SAA		1.50540	0.2952
SER01 does not Granger Cause PRIM	11	2.26397	0.1851
PRIM does not Granger Cause SER01		8.82991	0.0163
VPA does not Granger Cause PRIM	11	2.31586	0.1797
PRIM does not Granger Cause VPA		0.33137	0.7303
SER01 does not Granger Cause SAA	11	20.3258	0.0021
SAA does not Granger Cause SER01		0.50377	0.6277
VPA does not Granger Cause SAA	11	1.43700	0.3091
SAA does not Granger Cause VPA		0.03900	0.9620
VPA does not Granger Cause SER01	11	9.25870	0.0147
SER01 does not Granger Cause VPA		0.33142	0.7303

Source: The Author from the data of the model

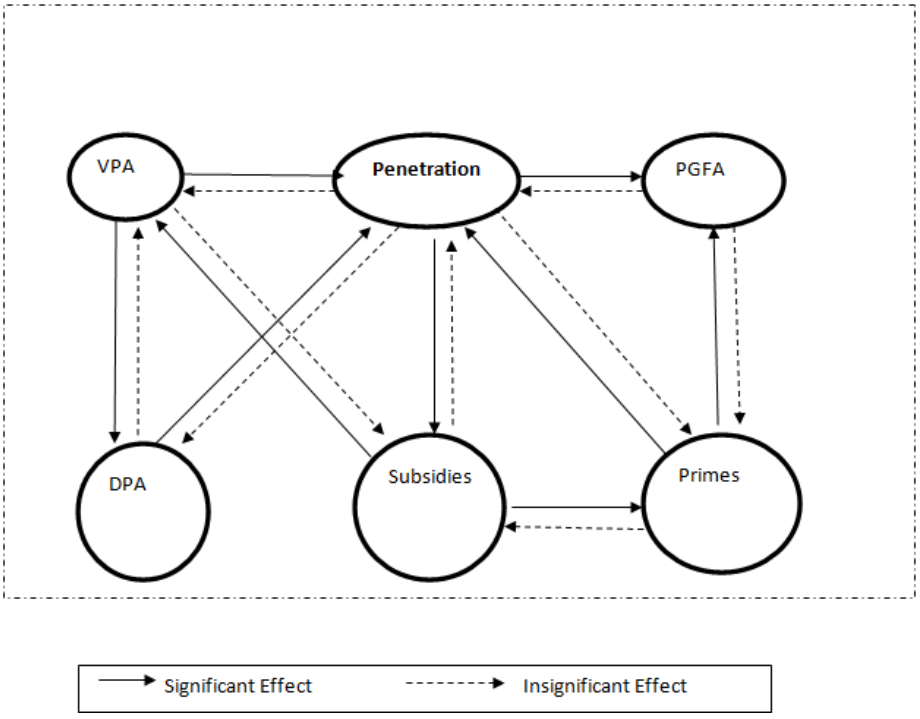
The results of the test of Unitarian root of Dickey-Fuller Augmenté (ADF) and that of Philips-Perron show that all the used variables are stationary in first difference. And because all the variables are integrated by the same order, they can be cointegreted in the sense of Granger according to the

The analysis of the causality in term of real growth of the agricultural production indicated to us that in France, the obtained results are interesting and show that these variables are cointegreted and that at the threshold of 5 %, the shown relations are unidirectional causalities between:

Table 3. The Granger causality test in terms of global agricultural productivity of factors

Pairwise Granger Causality Tests			
Sample: 2000 2012			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
PGFA does not Granger Cause DPA	11	0.02114	0.9792
DPA does not Granger Cause PGFA		2.52481	0.1601
PRIM does not Granger Cause DPA	11	1.51388	0.2936
DPA does not Granger Cause PRIM		1.08242	0.3968
SAA does not Granger Cause DPA	11	0.00321	0.9968
DPA does not Granger Cause SAA		268.479	1.E-06
SER01 does not Granger Cause DPA	11	294.318	1.E-06
DPA does not Granger Cause SER01		5.40405	0.0455
PRIM does not Granger Cause PGFA	11	11.7665	0.0084
PGFA does not Granger Cause PRIM		0.12781	0.8824
SAA does not Granger Cause PGFA	11	2.53795	0.1590
PGFA does not Granger Cause SAA		17.9570	0.0029
SER01 does not Granger Cause PGFA	11	13.1146	0.0065
PGFA does not Granger Cause SER01		1.41823	0.3131
SAA does not Granger Cause PRIM	11	0.42813	0.6702
PRIM does not Granger Cause SAA		1.50540	0.2952
SER01 does not Granger Cause PRIM	11	2.26397	0.1851
PRIM does not Granger Cause SER01		8.82991	0.0163
SER01 does not Granger Cause SAA	11	20.3258	0.0021
SAA does not Granger Cause SER01		0.50377	0.6277

Source: the Author from the data of the model



Source: the Author from the data of the model

Figure 1. The causalities by retaining the real growth of the agricultural production and the global agricultural productivity of factors

VPA : the real growth of the agricultural production
Penetration : The rate of penetration on the agricultural insurance
PGFA : The global agricultural productivity of factors
DPA : Agricultural Subsidies
Subsidies : Subsidies of the agricultural premiums
Primes : Agricultural insurance premiums

- The real growth of the agricultural production and the penetration to the market of the agricultural insurance. In other words, the growth of the agricultural production led to a penetration to the market of agricultural insurance in France.
- The penetration in the agricultural insurance and the subsidies of the premiums in the agricultural insurance. It means that the penetration in the agricultural insurance is determined by the subsidies of the premiums of agricultural insurance.
- The premiums of agricultural insurance and the penetration in the agricultural insurance. A relation which supposes that the development of the agricultural insurance depends on premiums of agricultural insurance.
- The agricultural spending and the penetration in the agricultural insurance. This supposes that the development of the agricultural insurance is dependent on agricultural spending supplied by the French State to the farmers.
- And the real growth of the agricultural production and the agricultural spending. A relation which supposes that the growth of the agricultural production depends on agricultural spending supplied by States to the insurants.
- By analyzing the causal relations in terms of agricultural productivity, the unidirectional causalities shown are the following ones:
- The penetration in the agricultural insurance and the agricultural productivity. In France, the penetration in the agricultural insurance causes the agricultural productivity growth.
- The agricultural productivity and the subsidies of the premiums of agricultural insurance. A relation who supposes that the agricultural productivity depends on the risk management policy agricultural and in particular subsidies of the premiums of agricultural insurance; aids supplied by States to the insurants to face the agricultural risks.
- The penetration in the agricultural insurance and the subsidies of the premiums of agricultural insurance.
- In other words, the development of the agricultural insurance depends on subsidies of the premiums of agricultural insurance.
- Insurance premiums and penetration in the agricultural insurance. A causality which allows us to deduct that the development of the agricultural insurance depends on premiums of agricultural insurance.
- And the premiums of agricultural insurance and the agricultural productivity. A relation whom allows us to pull that the premiums of agricultural insurance cause the agricultural productivity growth.

Statistical and Economic interpretations of the results

As a matter of fact, according to the results of the **Table 1**, in short or long-term the real growth of the agricultural production causes the development of the agricultural insurance because the p – value is lower than 5 %, that is the previous information on the rate of real growth of the agricultural production allows a better forecast of the level of the development of the agricultural insurance, measured by the penetration in the agricultural insurance. Thus, the results of the test allow to reject the no hypothesis and to conclude the existence of causality between the real growth of the agricultural production and the penetration in the agricultural insurance. It emerges from **Table 2** the causal relations which translate relations in short or long-term between the development of the agricultural insurance and the subsidies of the agricultural insurance premiums supplied by the State to minimize the agricultural risks. A causality which we try to clarify to show the role of the State in the management of agricultural risks by the application of the subsidies of the premiums of agricultural insurance on the growth of the agricultural production. Besides, we conclude the existence of a relation of causality between the premiums of agricultural insurance and the subsidies of the premiums of agricultural insurance. The relation of causality between the agricultural spending and the development of the agricultural insurance is shown by the test of causality and finally the causality between the growth of the agricultural production and the agricultural spending is demonstrated well.

It emerges from **Table 3** concerning the analysis in terms of global agricultural productivity of factors, explanatory causalities of the state of the French agricultural market of insurance and of that of the agricultural activity in this country. In fact, in the short and long term the causality enters the penetration the agricultural insurance and the global agricultural productivity is based and justified in France. Then, the causality between the agricultural productivity and the subsidies of the premiums of agricultural insurance is valid short and long-term in France.. The causality between the penetration in the agricultural insurance and the subsidies of agricultural insurance is also shown by Granger causality test. Also it is demonstrate two causalities relative to the agricultural insurance premium which engenders the penetration in the agricultural insurance and the agricultural insurance premium which causes the agricultural productivity.

This study targeted as main objective the demonstration of the existence or not the causality between the agricultural insurance and the agricultural performance in France during period 2000-2012. The test of stationarity showed that all the used variables are stationnary in first difference and they are quite significant, where from the predictive effect of the model used for our estimation.

- The real growth of the agricultural production causes the development of the agricultural insurance in France and the global agricultural productivity led to the penetration in the agricultural insurance. The analysis of the causality showed us that the previous information on the growth of the agricultural production allows a better forecast of the level of the development of the agricultural insurance measured by the penetration in the agricultural insurance. Besides, it indicates to us that the agricultural productivity leads to the penetration to the market of insurance. In other words, the agricultural performance leads to the development of the penetration in the agricultural insurance. A unidirectional causality is demonstrated in France.
- The causality enters the penetration the agricultural insurance and the subsidies of the premiums of agricultural insurance is shown that is by retaining the agricultural productivity or the real growth of the agricultural production what confirms that the development of the

industry of agricultural insurance is dependent on the risk management policy agricultural applied in the country. In France, it is the management of agricultural risks by the direct aids that is applied to face the risks.

- Other causalities were shown expressing a relation between the premiums and the subsidies of insurance premiums, between insurance premiums and penetration in the agricultural insurance and between insurance premiums and agricultural productivity.
- The Granger causality test indicated causality between the agricultural spending and the penetration to the agricultural insurance.
- Causality between the growth of the agricultural production and the agricultural spending.
- And finally a causality between the agricultural productivity and the premiums of agricultural insurance.

It emerges from this study, that in France, the agricultural performance led to the development of the agricultural insurance, the development measured by the penetration in the agricultural insurance, the penetration which is dependent on subsidies of insurance premiums.

Conclusions and policy implications

Throughout our study, we targeted for main objective to study the impact of the development of the agricultural insurance, measured in term of penetration in the agricultural insurance on the agricultural performance in one representative European countries such us France, during period 2000-2012. To do it, we used the Granger Causality Test. By these tests, we were able to make important which reflect the reality of the agricultural activity in France. For France, the test of stationarity showed that all the variables are stationary in first difference. The model used to estimate the impact of the agricultural insurance on the growth of the agricultural production and to estimate the impact of the penetration at the insurance on the agricultural productivity or the one who is used to study the impact of the subsidies of the premiums of agricultural insurance on the growth of the agricultural production are globally significant. The model is not autocorreleted, homoscedastic and follows a normal distribution, so it can be used for the forecast. From the study led on the French economy concerning the existence or not of an interaction between the activity of agricultural insurance and the agricultural performance, we were causalities in Figure 1) namely:

The first causality demonstrates that the growths of the agricultural production have an influence on the development of the agricultural insurance and the agricultural productivity causes the penetration in the agricultural insurance in France. As a consequence, the analysis of the causality supplies us with previous information on the level of growth of the agricultural production and this for a forecast of the development of the agricultural insurance. Besides, the previous information on the agricultural productivity in France allows preventing better the penetration in the agricultural insurance.

The second Causality is a unidirectional one between the penetration of the agricultural insurance and the subsidies of the premiums of agricultural insurance. Causality between the development of the agricultural insurance and the application of the agricultural modality of risk management. In this country, States supply the direct aids to the farmers insured to minimize the agricultural risks.

And the third Causality presents the relation between the agricultural productivity and the premiums of agricultural insurance: A unidirectional causality which supposes that the agricultural productivity depends on volumes of the agricultural insurance premiums in the economy. We note besides these important results, other unidirectional causalities which are verified. In France, the causality between growth of agricultural production and agricultural spending is justified. It supposes that the growth of the agricultural production depends on the availability of the agricultural spending supplied by States, aids other than the subsidies of the agricultural price or the subsidies of the premiums of agricultural insurance. In France, it defines a relation between premiums of agricultural insurance and the agricultural penetration. The analysis of the causality by retaining the subsidies of the premiums of agricultural insurance allowed us to release the following unidirectional causalities: the subsidies of the premiums of agricultural insurance affect the growth of the agricultural production and the volume of the premiums of agricultural insurance which led to the penetration in the agricultural insurance.

The main policy implications arising from our study can be presented as follows. The development of agricultural insurance implies the promotion of agriculture performance.

Yet, the development of the agricultural insurance supposes that the State intervenes in the management of agricultural risks by subsidizing the premiums of agricultural insurance, the volume of insurance premiums which will impact the industry of agricultural insurance. Besides, it is for the effective agricultural risk management policy and an agricultural development policy that comes true the durability of the agricultural insurance. As a matter of fact, the development of agricultural insurance exerts a positive impact on agricultural performance in France. Our analysis in terms of causality can be improved by integrating other data relative to the agricultural development, to the risk management policy agricultural and to the development of insurance activity.

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