

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/301796617>

Analysis of the Brazilian Program of Subsidies for Rural Insurance Premium: Evolution from 2005 to 2014

Article in *Modern Applied Science* · April 2016

DOI: 10.5539/mas.v10n7p87

CITATIONS

9

READS

769

3 authors, including:



Vilmar Rodrigues Moreira

Pontifícia Universidade Católica do Paraná (PUC-PR)

64 PUBLICATIONS 150 CITATIONS

[SEE PROFILE](#)



Claudimar Pereira da Veiga

Universidade Federal do Paraná

141 PUBLICATIONS 510 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Management SMEs [View project](#)



Improvements on interprise management [View project](#)

Analysis of the Brazilian Program of Subsidies for Rural Insurance Premium: Evolution from 2005 to 2014

Pedro Loyola¹, Vilmar Rodrigues Moreira¹ & Claudimar Pereira da Veiga^{1,2}

¹ Business School, Pontifical Catholic University of Paraná – PUCPR, Brazil

² School of Management, Federal University of Paraná – UFPR, Brazil

Correspondence: Claudimar Pereira da Veiga, Business School - PPAD, Curitiba, Paraná, 1155 Imaculada Conceição Street, Bloco Acadêmico - Sala 103B - 1º Andar Prado Velho, zip code: 80215-901, Brazil. Tel: 55-41-3271-1476. E-mail: claudimar.veiga@gmail.com

Received: December 21, 2015

Accepted: March 9, 2016

Online Published: April 28, 2016

doi:10.5539/mas.v10n7p87

URL: <http://dx.doi.org/10.5539/mas.v10n7p87>

Abstract

Rural insurance is inserted in the field of agricultural policies to mitigate risks that farmers face. It was an innovation for the Brazilian government from the implementation standpoint, despite the existence of similar programs in other countries. The purpose of this paper is to assess the recent evolution of the Brazilian Rural Insurance Premium Subsidy Program (PSR) and its main variables: amount insured area, policies, average area, benefiting producers, total premiums involved and total subsidy. The study examined in detail the PSR representation by region and farming. In order to evaluate the results of this program on agricultural policy, an exploratory and descriptive analysis was performed with the objective of studying the evolution of the Brazilian rural insurance in the context of PSR, using the information available in the Ministry of Agriculture, Livestock and Supply (MAPA) about the program. The information and data were collected between July and August 2015. The study was based on data collected from 2005 to 2013 with some general data of 2014 program included in the study. Even though the focus of the analysis was on the most recent years, 2009-2013. Data analysis revealed that the increased supply and demand for rural insurance is in the South and in the agricultural modalities for grains and fruits, with growth potential in other sectors and other regions in the country. PSR, as public policy, was responsible for the expansion of the rural insurance market in Brazil, encouraging and providing the access of producers to agricultural insurance by subsidizing the premium fee. Although this expansion has been slow and gradual, Brazil had in 2013 about 13.8% of the agricultural area with rural insurance coverage. This reveals the need for expanding the program to popularize this important risk mitigation tool.

Keywords: rural insurance, agricultural policy, risk mitigation

1. Introduction

The importance of agribusiness in Brazil is evidenced by its contribution to the economic structure of the country. About 1/4 of gross domestic product (GDP) is made by agribusiness. In addition, almost one third of the country's employment is associated in some way to the sector. Among all other economic sectors in Brazil, agribusiness produces the most significant trade balance and has a leadership position in international exports of various agricultural commodities (IBGE 2006; MDIC, 2015). In 2014, Brazil was the world's largest exporter of sugar, coffee, orange juice, beef, chicken and tobacco. It is the world's second largest Cellulose exporter, soy and its derivatives. It is the third largest exporter of corn and pork. In the 1970s, the country was a major importer of food, but nowadays Brazil has the largest agricultural trade balance of the world. (Conab, 2015; IBGE, 2006; MDIC, 2015). Despite all difficulties faced by the sector, particularly regarding the availability of risk mitigation mechanisms, agribusiness contributes very significantly to the growth of the Brazilian economy.

Major instabilities resulting from factors inherent to agricultural production and macroeconomic changes inside the country and abroad generate considerable costs to the success of agriculture. The combination of risks (production, marketing and financial) makes agriculture a sector subject to large income fluctuations (Wang et al., 2015; Kureski et al., 2015; Rocha et al., 2016). Being a basic link in the country's production structure, the multiplier effect resulting from problems faced in agriculture spreads across other sectors of the economy, affecting the well-being of society. Variations in income imply changes in employment and in the collection of municipal, state and federal taxes. Reductions in sales, service delivery, investment in construction, machinery

and equipment industry, among others, are striking facts in years of declining farm income (MB AGRO, 2012; Xu & Liao, 2014; Wang, Zhang, Kimura, & Akter, 2015; Harzer, et al., 2016).

One of the objectives of public policy for agriculture is to mitigate the risks associated with activity through risk transfer mechanisms such as insurance. The rural insurance in the agricultural model provides coverage against a drop in farmers' income because of low productivity, caused by critical weather events, among others. Rural insurance is inserted in the field of agricultural policies to mitigate risks of farmers. It was an innovation for the Brazilian government from the implementation standpoint, despite the existence of similar programs in other countries (Ozaki & Shiota, 2005; Perroni et al., 2015; Moreira et al., 2016). Rural insurance plays a major role in managing risks (Ray, 1981; Moreira et al., 2016). In the US market, for example, insurance covers almost the entire cultivated area with a diversified product mix. A similar situation also occurs in Spain, but with lower product mix available (Ozaki, 2010). Agricultural insurance programs in different countries differ in their characteristics, but are similar with regard to government support received (Dismukes & VanDeveer, 2001; Glauber, 2004; Ozaki, 2010).

In Brazil, the first attempt by the government to promote agricultural insurance occurred in 1954 with the creation of the National Agricultural Insurance Company (CNSA) and the establishment of the Stability Fund of the Agrarian Insurance, which aimed to provide guarantees to the system. However, the structuring of products, i.e., the creation of agricultural insurance, was the responsibility of the Reinsurance Institute of Brazil (IRB). In 1966, with the promulgation of the Insurance Law (Decree Law No. 73 of 11.21.1966), CNSA was dissolved and the Rural Insurance Stability Fund (FESR) was created. IRB-Brazil RE S/A currently manages this fund, still in force today, intended to provide supplemental coverage to insurers in disaster eventualities (MAIA, 2011). Despite the fact the rural insurance market was still in the early stages of development, the government created the Agricultural Activity Guarantee Program (Proagro) with the Law 5,969 / 1973. Proagro caters to small and medium producers, ensuring the removal of financial obligations related to rural credit operation costing when their settlement is made difficult by the occurrence of natural disasters, pests and diseases that may reach herds and crops (MAPA, 2015). To minimize the losses of bad weather one of the more effective response mechanisms to risks is crop insurance, which protects agricultural activities against adverse weather events. There is also the revenue or income agricultural insurance, which protects producers against market price fluctuations (XU & Liao, 2014; Gulev & Latif, 2015). However, due to the complexity in developing this market, the high administrative costs and increased likelihood of disasters in agriculture, rural insurance is a high-risk segment worldwide, raising the price of their premium instalment fees enough to cripple its acquisition by the producer (MB AGRO, 2012; XU & Liao, 2014).

By recognizing this difficulty, the Brazilian government created the Brazilian Rural Insurance Premium Subsidy Program (PSR) by Law No. 10,823 / 2003. The PSR is coordinated by the Ministry of Agriculture, Livestock and Food Supply (MAPA) and aims to promote access for the producer to rural insurance. The subsidy was authorized considering the premise that lowering the premium paid by the producer, the insurance market in the country may grow and consolidate.

The purpose of this paper is to evaluate the evolution of the PSR and its main variables: amount insured area, policies, average area, benefiting producers, total premiums involved and total subsidy. The study examined in detail the PSR representation by region and farming. This research was based on official data from the years 2005-2013, considering some data from 2014 from planned values of the Rural Insurance Premium Subsidy Program. The major contribution of this study is to present the importance of subsidies for the insurance premium fee as a public policy to make insurance feasible. Theoretically this paper contributes with presentation of Brazilian case regarding rural insurance with its barriers for adoption and the current research on this topic.

2. Theoretical Framework

2.1 Risks in Agriculture

Agriculture is an economic activity typically characterized by its vulnerability to events that are beyond the producer's control. Notably, one of the main causes of the reduction in agricultural productivity is due to climatic events such as: drought, frost, excessive rain, hail, among others. In addition, biological factors may affect peculiarly diverse cultures in different stages of development. Risks in agriculture come from diverse backgrounds: production risks (weather, pests, health factors); risks in price / market (fluctuations in price and / or demand); institutional risks (action or lack of government action, regulations) and personal / human risks (accidents, diseases) (Börner, 2006; Schnitkey & Sherrick, 2014; Nobre et al., 2016). For certain types of risks, there are no effective means of protection offered by the market or by the government. However, for other types, the producer becomes the sole risk taker (Moreira, Souza, & Duclos, 2014). The development of Brazilian

agriculture did not happen without considerable cost and major instabilities resulting from factors inherent to the agricultural production such as weather risk. Reduction in rainfall causes a decline in agricultural production. Frost, hail and windstorms are highly harmful elements to crops. Temperature variations and luminosity lead to productivity losses. The infestation of pests and weeds are part of everyday life of any farmer in the world (Schnitkey & Sherrick, 2014). Attack of bacteria, fungi and viruses affect both the animal and plant production. All these elements give agriculture a significant production risk (Buanain, Vieira, & Cury 2011; Ozaki, 2008a). The World Bank in Brazil studies integrated risk mitigation policies and uses the typology presented in Table 1.

Table 1. Groups of risks and thematic dimensions in agriculture

Risk Groups	Thematic dimensions	Examples of Events
Production Risk	Extreme weather events and fires	Extended droughts, frost, excessive rain and flooding, strong winds.
	Animal Health	Outbreaks of foot and mouth disease, BSE (Mad Cow), Newcastle, etc.
	Vegetable Health	Introduction of new pests and diseases in the country. (eg. caterpillar <i>Helicoverpa armigera</i>)
	Production Management and Natural Resources	Changes in water grants, supervision, labor availability.
Market Risk	Trading (price of inputs and outputs) and Credit	Significant variation in the prices of products and raw materials, exchange rates, interest rates, changes in terms of credits.
	Foreign Trade	Closing of export markets; changes in access for imports of inputs.
Business Environment	Logistics and Infrastructure	Strikes in ports, locks on highways / waterways / railways; changes in storage incentives.
	Regulatory Framework, Policies, Institutions and Interest Groups	Changes in laws / regulations (environmental, labor, inputs, land) orientation changes in public support institutions (MAPA, MDA, MME, ANA), changes in the interpretation of regulations.

Source: World Bank Brazil (2015).

Agricultural risks are not restricted to the physical and biological environments. Agricultural markets are subject to significant price changes. Since this is a commodity, demand from food varies very little. On the other hand, the supply of these products takes some time respond to price stimuli, as they are products with a long production cycle (Ozaki, 2010; Menapace, Colson, & Raffaelli, 2015). Thus, in the short term, the supply and demand adjustment in agricultural markets always will occur by price and not by adjusting the quantity produced, as it occurs in industry.

In general the volatility of agricultural prices is greater than the volatility of other markets and many agricultural products are priced compared to international markets. Therefore, there is a risk in pricing in local currency associated with fluctuations in the exchange rate. Foreign exchange variations bring additional risk to the activity, as farmers get their revenue in local currency (MB AGRO, 2012). In this paper, the definition of risk in agriculture is associated with negative outcomes resulting from events in the biological, climatic and market variables.

2.2 Rural Insurance

Farmers finance their activities with financial agents, cooperatives, agribusiness, trading, cereal, and adopt marketing strategies to fund their ventures. Climate adversities generate significant production losses and may lead farmers into a vicious cycle that begins with the debt taken before the lost crop planting and reaches the next harvest, creating inability to raise funds to invest in the new crop. When access to credit is restricted by default and with committed assets, producer, steps into a cycle with interminable renegotiations and high costs for all those involved: producers, financiers, government and society. In order to minimize any losses resulting from bad weather, rural insurance protects farming activities from the adverse climatic phenomena and is indispensable to the stability of income, providing financial security to farmers, input suppliers and financial agents.

The business risk in the agricultural insurance is very high for not being a standardized product. It has high administrative costs, and this type of insurance is subject to catastrophic weather events due to lack of reliable statistical data and comprehensive information (Santana et al, 2014; Ozaki, 2008b). In the agricultural sector, among the market failures that inhibit the formation of more secure systems, it is possible to highlight: i) occurrence of asymmetric information between contractor and insurance company; ii) adverse selection, which refers to the definition and arbitration of an average price for all, which is result of the insurance provider's inability to distinguish the clients with high or low risks; and iii) moral hazard, i.e., changing the behavior of an economic agent when not properly monitored by the other party, increasing the likelihood of damage or accident (Stiglitz & Walsh, 2003). The occurrence of simultaneous loss in various properties when the crop failure in some region (correlated events) is a reality associated with this type of insurance, characterizing its main market failure.

Agricultural insurance and market failures in agriculture justify public intervention. The difficulties presented to agents relating to this type of insurance justify state intervention in economic subsidies of rural insurance, without that, practice is not feasible, especially for small producers, the majority in Brazil. The public sector plays a vital role in the development of consistent long-term programs, in all existing large-scale insurance systems in the world (MB AGRO, 2012).

3. Materials and Methods

This research has as its main approach the exploratory analysis of the PSR secondary data provided by MAPA. Ministry data were tabulated from descriptive variables, of activities insured area, number of transactions (policies) and regionalization, the amounts of premiums collected, economic subsidies and Insured amount (IS). The track records of these variables were collected for the period 2005-2013, with greater emphasis to the latest period for which data is available, 2009 to 2013. For 2014, projections of MAP were considered, which are based on the financial resources made available by the government for the subsidy.

3.1 The Rural Insurance within the Brazilian Agricultural Policy

The generation of employment, income, relevant performance in the international market, and ensuring the supply of domestic markets, are purposes which result in high costs to the rural sector and are conditioned to several determining factors, such as price change, adverse weather, capitalization of farmers, temporal distance between revenues and costs, investment capacity and, finally, evolution of technology. Due to the various determinants that allow or not the guarantee of good performance of agricultural activities, rural producers become dependent mainly on three guidelines of agricultural policy: rural credit, agricultural insurance and marketing support. A set of actions for planning, financing and insurance of production is the basis of the Brazilian Agricultural Policy (MB AGRO, 2012).

Under the Agricultural Policy are matters relating to the conditions of production funding grant, the amount of resources for rural credit, the interest rate, the credit limit per producer and quantity of products to be backed by public trade supporting auctions. Figure 1 shows the main items that make up the Brazilian agricultural policy. In the scope of the rural risk management is possible to identify the crop insurance program and the Rural Insurance Premium Subsidy Program (PSR).

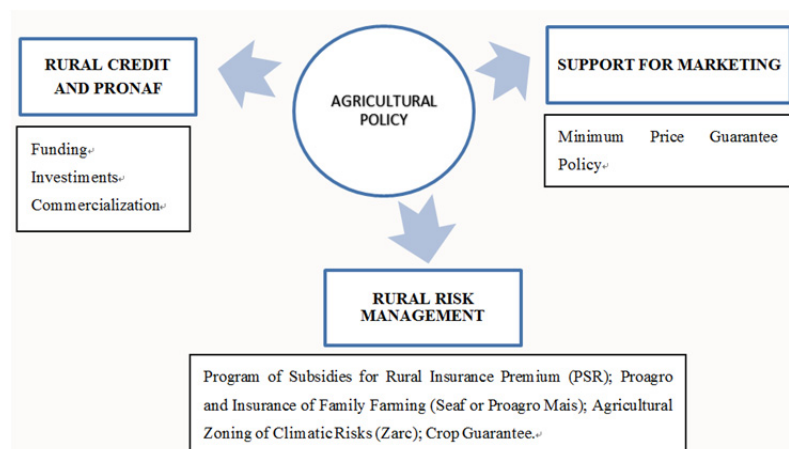


Figure 1. Flow chart of the Brazilian agricultural policy

Source: MAPA 2015^a and research data.

3.2 Rural Insurance Premium Subsidy Program – PSR

PSR was created in December 2003 by Law No. 10,823 in order to enhance protection of farmers in relation to production risks, attracting and enabling the participation of the private industry in the rural insurance market. Thus, federal government recognizes the peculiar characteristics of the market and aimed to reduce the burden imposed on the Treasury by default / debt renegotiation and production disruptions caused by weather problems, changing the higher cost of renegotiation by the subsidy of the premium paid by the producer to opt for a private insurance scheme. PSR supplemented the Farm Activity Guarantee Program - PROAGRO whose effectiveness had collapsed in the mid-90s due to design, implementation and problems execution, which was redesigned in 1994 and in 1996 with new rules (Santana et al, 2014).

The subsidy was important to reduce the premium paid by the producer and, thus, develop and popularize the agricultural insurance in the country. Thus the government takes over the costs of certain percentage of the premium (acquisition of rural insurance fee), and producer pays the other remaining part. Without the PSR access to insurance is prohibitive, if sold at market price, which includes production risks and the high operating costs of rural insurance.

The first PSR operations started in a pilot project in late 2005, benefiting crops in agricultural mode. In 2006 the program was extended to other modalities and even in an incipient way, began to show greater subsidy resources, attracting new insurers in this segment.

As a rule for all types of agricultural insurance, regardless of culture / subsidisable activity and producing region, the agricultural insurance subsidy percentage is 40% of the premium stated in the policy. Nevertheless, there are different rules to encourage participation of specific groups of producers, such as organic producer, the type of forest producer and medium producer included in the National Program to Support the Middle Producer - Pronamp. These groups have 60% subsidy support. For soybean, corn, rice, beans, cotton, tomato, persimmon, plum, apple, peach and grape, which are located in areas characterized as priorities for the PSR by the Federal Government this subsidy percentage, is also 60%. Note that the micro regions cover areas where these activities have substantial economic importance, at the same time they are subject to greater climate vulnerability, as extracted parameters of the agricultural zoning of climate risk and claims history registered in the program (MAPA, 2015th).

Table 2 presents the modalities, the subsidy percentage and annual PSR limits. Farmers can receive subsidies for more than one crop as long as the sum of the benefits does not exceed the maximum subsidisable value. Regardless of the producing region for winter crops the subsidy percentage is 60%. For wheat is 70% (MAPA, 2015b).

Table 2. Rural insurance arrangements under PSR to subsidy percentage on the premium and subsidies annual limits per producer

Insurance modalities	Activities Groups	% Subsidy	Annual (R\$ mil)	Limits
Agricultural	Wheat	70%		96
	2nd harvest corn, oats, canola, barley, rye, sunflower and triticale	60%		
	All others in priority regions *	60%		
	All others	40%		
Livestock	Poultry, cattle, buffaloes, goats, horses, sheep and pigs	40%		32
Forestry	(planted forests)	60%		32
Aquaculture	Shrimp farming, mariculture and fish farming	40%		32
MAXIMUM VALUE IN SUBSIDIES PER PRODUCER				192

Source: SPA/MAPA (2015b).

3.3 Rural Insurance Modalities

In order to distinguish rural insurance from other types of insurance, Table 3 shows the definitions of the Superintendence of Private Insurance - SUSEP, autarchy which is under the Ministry of Finance and is responsible for the control and supervision of insurance markets. It has to be noted that not all insurance types of

the rural sector rely on economic subsidy of the PSR, such as life insurance, rural producer bond insurance and rural pledge insurance.

Table 3. Modalities of Rural Insurance and Coverage

Agricultura Insurance	This insurance covers farms against losses resulting mainly from meteorological phenomena. It basically covers the life of the plant, from its emergence to harvest, against most foreign origin risks such as fire and lightning, waterspout, high winds, hail, frost, excessive rain, drought and excessive temperature variation.
Livestock Insurance	This insurance aims to guarantee compensation in case of death of animals intended exclusively for the consumption, production, breeding, rearing, fattening or traction work. Animals for breeding by natural mating, semen collection or transfer of embryos, whose purpose is exclusively the growth and / or improvement of herds of such animals mentioned in the previous paragraph, are also classified in the form of livestock insurance.
Aquaculture Insurance	This insurance guarantees compensation for death and / or other risks inherent in aquatic animals (fish, crustaceans) as a result of accidents and illnesses.
Improvements and Agricultural Product Insurance	This insurance is designed to cover losses and / or damage to property, directly related to agricultural activities, livestock, aquaculture and forestry, which are not offered as collateral for rural credit operations.
Rural Surety Insurance	Rural Surety Insurance aims to cover losses and / or damage to property, directly related to agricultural activities, livestock, aquaculture and forestry, which have been offered as collateral for rural credit operations. According to the nature of the financial institution, the Rural Surety insurance is divided into two distinct branches: Rural Surety - Public Financial Institutions and Rural Surety - Private Financial Institutions.
Forestry Insurance	This insurance is intended to ensure payment of compensation for damage caused to insured forests, identified and characterized in the policy, provided they have passed directly from one or more risks covered.
Life Insurance	This insurance is intended for farmers, rural credit borrower, its duration is limited to the period of funding, and the beneficiary will be the financial agent.
Rural Product Bond Insurance - CPR	The CPR insurance aims to ensure the policyholder the payment of compensation in the event of proven lack of fulfillment by the borrower of obligations under the CPR.

Source: SUSEP (2015).

4. Presentation and Data Analysis

This section presents historical data of the PSR, discussion analysis. Data were tabulated according to the variables activity types, covered area, number of policies, Insured amount values (IS), premium (insurance acquisition rate) and applied economic subsidy.

4.1 PSR Evolution (2005-2014)

Table 4 shows a brief outline of the evolution of the variables that make up the PSR and the history of the aggregated data of the program over the period (2005-2014). The program has shown a positive trend in most of the aspects evaluated, although the problems in its implementation, which will be discussed later, have resulted in uncertainty regarding the future of the program. Even this evolution is slow compared to the total area of cultivation in Brazil and international experience. Data for 2014 were not yet available at the Ministry of Agriculture, Livestock and Supply (MAPA) at the time of data collection for this study, but the information resources available for the subsidy enabled the estimation of other information (MAPA, 2015a, 2015b). For analysis purposes, the nominal data for each calendar year were placed, considering that the main parameters of evaluation are insured acreage and the number of policies, the activities / cultures, and regions or units of the federation, benefited, resulting from applications and targeting capabilities of the subsidy.

Table 4. Rural Insurance Premium Subsidy Program (PSR) 2005-2014*

Year	Amount Insured	Insured Area	Insurance Policies	Average Area	Producers	Insurance Premium**	Subsidy **
------	----------------	--------------	--------------------	--------------	-----------	---------------------	------------

	**	(Hectares)		(hectares)			
2005	126,638	68,148	849	80.3	849	8,684	2,315
2006	2,869,326	1,560,349	21,779	71.6	16,653	71,119	31,122
2007	2,706,036	2,276,245	31,637	71.9	27,846	127,741	60,962
2008	7,209,177	4,762,902	60,120	79.2	43,642	324,744	157,545
2009	9,684,245	6,669,296	72,737	91.7	56,306	477,786	259,611
2010	6,541,635	4,787,641	52,880	90.5	38,211	368,169	198,278
2011	7,339,469	5,582,137	57,885	96.4	40,109	466,393	253,452
2012	8,782,215	5,243,272	63,328	82.8	43,538	571,375	318,168
2013	16,843,680	9,603,429	101,850	94.3	65,556	1,001,347	557,852
2014*	20,000,000	12,000,000	125,000	96.0	80,000	1,250,000	700,000

Source: Authors

Notes: * Estimated values for 2014 based on the subsidy resources

** Amounts in thousands (R\$)

The average size of properties benefited from rural insurance coverage, calculated from the division between the insured acreage and the number of policies carried out shows that, in 2009, an average of 91.7 hectares and in 2013, an average of 94.3 hectares. In the same period, an upward trend can be seen in the Insured amount (IS), especially in the last two years with available official data. The amount increased from R\$ 8,782,214,959 in 2012 to R\$ 16,843,679,547 in 2013, representing a nominal increase of 91.79%. Such behavior is above the growth line with the total premium collected, which is directly leveraged by funds allocated for the total subsidy applied to the PSR. The insurance premium presented in the same period 2012 to 2013, a total nominal growth of 75.25%, and the total nominal subsidy an increase of 75.33%. This relationship of greater relative growth of IS compared to the growth of the premium and the subsidy, indicates an improvement in the calculation of the coverage offered of concomitant rural insurance at a lower cost of acquisition of the premium fee to producers.

The number of policies increased from 849 in 2005 to 72,737 in 2009, reaching 101,850 in 2013, an increase of 40% between 2009 and 2013. It is also worth mentioning, the increase in the number of policies from 2013 to 2014. It is a result of the growing amount of resources allocated to the subsidy. However, throughout the period analyzed it is observed that the program has had an increasing trend until 2009, but from 2010 the number of policies suffered a decline compared to the previous period, returning to normal growth only in 2013 and 2014. The main reason for this movement was that, from 2010 on, PSR began to show problems in the planning and execution due to the contingencies of funds from the federal government, which have affected MAP. The funds approved in the Annual Budget Law (LOA) in this period were lower than the plan provided for in the PSR Three-Year Plan. The release of resources was carried out tardily with frequent delays and smaller values due to the contingency budget, which generated uncertainty about the future of the program. (Santana et al, 2014). Figure 2 shows the evolution of the number of policies with subsidy from PSR during the study period.

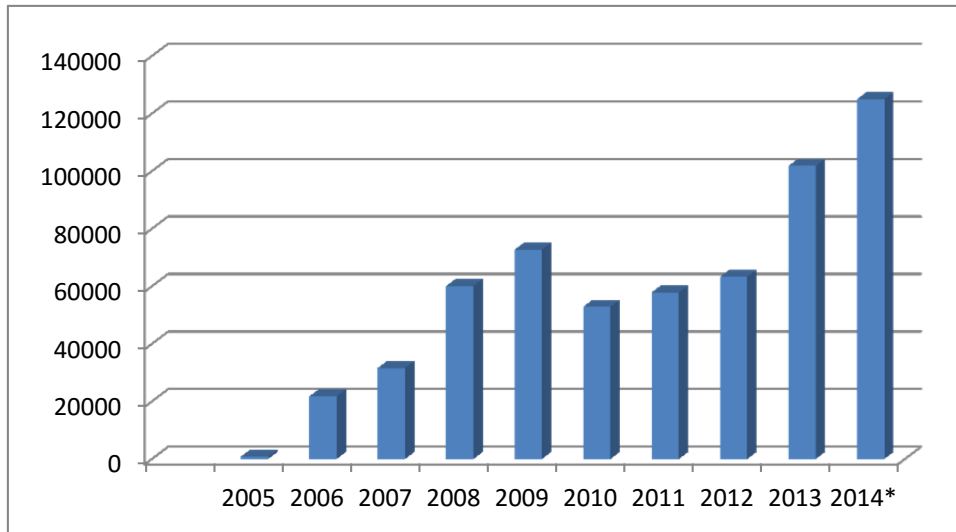


Figure 2. Operations with rural insurance coverage PSR - 2005-2014* (in units)

Source: Authors.

Figure 03 shows the evolution of the insured area with subsidy from PSR. It is possible to verify the insured area showed negative fluctuations between 2009 and 2012, which influenced the growing results seen in the previous period (2005-2009). From 2009 to 2013, the insured acreage increased from 6,669,296 to 9,603,429 hectares, i.e. 43.9% growth in four years. However, this area accounts for only 13.8% of the country's agricultural area (IBGE, 2013), demonstrating that there is still much room for development for the Brazilian rural insurance market.

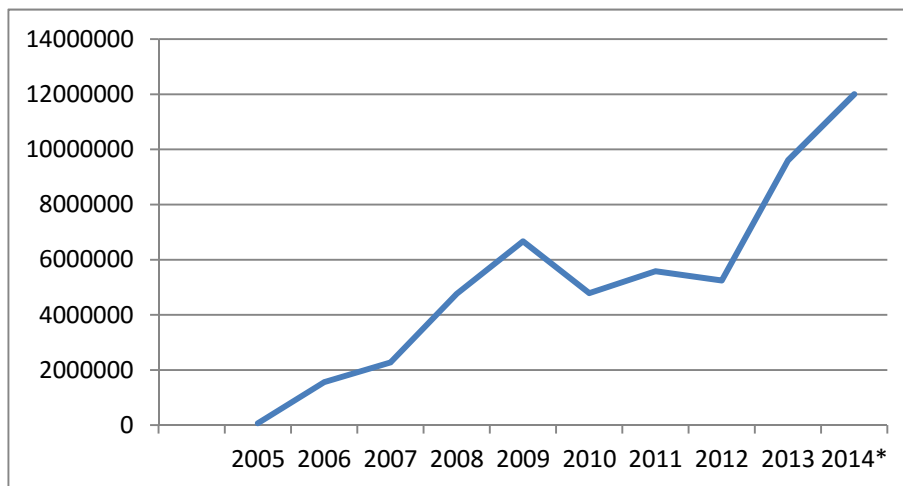


Figure 3. Agricultural area with rural insurance from PSR - 2005-2014* (in hectares)

Source: Research Data.

4.2 Evolution of the PSR (Rural Insurance Premium Subsidy Program) by Activity Type

The evolution of the PSR, by activity type shows that, throughout the period, there was greater participation of grains in all aspects. Figure 4 shows the accumulated result of policies contracted in the most recent period from 2009 to 2013. The percentage of policies aimed grain cultivation reached 75% of total transactions, followed by the agricultural fruit insurance with 18%. The area with insurance coverage for grains accounted for 89.5% of the total area of agricultural insurance under the RSP in the nine-month period from 2009 to 2013.

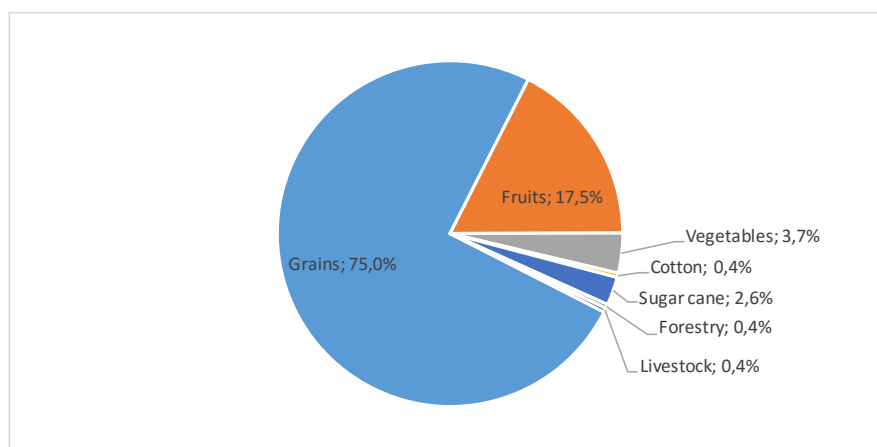


Figure 4. Accumulated Results of operations by activity in the PSR - 2009-2013

Source: Research Data.

4.3 Concentration of the PSR in Southern Brazil

Table 5 shows the comparison between historical regions of the PSR. It is possible to verify an application of a subsidy and demand for most agricultural insurance in Southern Brazil than in other regions in all aspects analyzed in this study. In the period 2009-2013 it is observed that the total number of contracted policies, 66.14% were from the South, which also accounts for 50.74% of the insured area, 49.72% of IS, 55.83% of premiums collected and 57.72% of the funds invested by the subsidy. This phenomenon is also detected in PROAGRO and complies with the concentration of productivity gaps in the region, which makes the values of Premiums and the demand for more insurance in the South compared to the Midwest (MB AGRO, 2012), i.e. Producers of the southern region are more exposed to production risks than those producers in other regions are.

Table 5. PSR - Representation of the southern region - 2009-2013

Year	Insurance Policies (Units)	Insured (hec)	Area Insured (hectares)	Amount (R\$)	Premium (R\$)	Subsidy (R\$)
2009	46.368	3.118.023		4.607.145.443	252.712.243	142.549.820
2010	37.353	2.606.254		3.541.839.614	218.618.372	120.872.417
2011	41.098	2.699.280		4.095.798.517	281.605.230	155.143.168
2012	44.760	3.045.001		4.918.639.999	345.069.459	195.481.235
2013	61.035	4.612.557		7.296.756.928	512.759.662	302.244.485
Southern 2009-13	230.614	16.081.115		24.460.180.501	1.610.764.966	916.291.125
Brazil 2009-13	348.680	31.863.791		49.191.242.800	2.885.071.194	1.587.360.707
Southern /Brazil	66,14 %	50,47%		49,72%	55,83%	57,72%

Source: Research Data.

5. Conclusion

This paper was aimed at evaluating the evolution of the Subsidy Program for Rural Insurance Premium, part of the agricultural policy of the federal government and coordinated by the Ministry of Agriculture, Livestock and Supply. The study was based on official data from the years 2005-2013, with some data from 2014 included.

Data analysis revealed that the PSR, as public policy, was responsible for the expansion of the agricultural insurance market in Brazil, encouraging and providing the access of producers to agricultural insurance by subsidizing the premium fee. Although this expansion has been slow and gradual, Brazil had in 2013 about 13.8% of the agricultural area with rural insurance coverage. This shows that despite being in its infancy, the program

has much room for growth, both in the South, where it is more advanced, as in other producing regions.

The concentration of the agricultural insurance market in the southern region results in a challenge for the creation of a portfolio that promotes risk dilution geographically with different cultures. There is a potential for growth in types of activities that still do not present much representation in the program, such as cotton, forests and livestock, for example. There is also potential in parts of the Midwest and the new Brazilian agricultural frontier known as MATOPIBA (Maranhão, Tocantins, Piauí and Western Bahia). On the one hand from 2005 to 2009 there was a period for the PSR implementation with steady growth, in the latest period (2010-2012), there was a reduction in invested resources, jeopardizing the progress of the program. This can present a barrier to the rural insurance market, unless there is predictability. There is an administrative structure of insurance companies, with brokers, experts and other professionals depending on the proper operation and management of the PSR.

The program once again presented growth in all aspects analyzed in 2013, but there is a need for a long-term planning to offer a horizon to investors - reinsurers and insurers companies - and farmers, thereby achieving the goal of extending the rural insurance nationwide. Having the PSR developed more in the South, it is noted that the country goes through an acculturation process of rural insurance and still faces difficulties in spreading this risk mitigation tool.

This research was limited to examining the general variables that make up the PSR. As a recommendation for future research, it is suggested the study of evolution by activity types in each state, as well as an assessment of the PSR management. These studies may bring contributions to interpret the development of agricultural insurance in Brazil.

References

- Banco Mundial Brasil. (2015). Revisão rápida e integrada da gestão de riscos agropecuários no Brasil: Caminhos para uma visão integrada. Banco Mundial Brasil, Brasília, 12 mai.
- Börner, J. A bio-economic model of small-scale farmers' land use decisions and technology choice in the eastern Brazilian Amazon. Bonn, Deutschland, 2006. 202 f. Tese – Rheinischen-Friedrich-Wilhelms-Universität zu Bonn. Disponível em: <http://hss.ulb.uni-bonn.de/diss_online> Acesso em: 24 jun. 2015.
- Buainain, M., Vieira, P. A., & Cury, W. J. M. (2011). *Gestão do risco e seguro na agricultura brasileira*. Rio de Janeiro: Funseg.
- CONAB. (2014). Acompanhamento da Safra Brasileira de Grãos. Disponível em: <http://www.conab.gov.br/OlalaCMS/uploads/arquivos/14_11_13_09_19_35_boletim_graos_novembro_2014.pdf>. Acesso em: 04 ago. 2015
- Damodaran, A. (2009). *Gestão estratégica do risco: uma referência para tomada de riscos empresariais*. Porto Alegre: Bookman.
- Dean, M. (1999). Risk, calculable and incalculable. In Deborah Lupton (Ed.), *Risk and Sociocultural Theory: New Directions and Perspectives*. Cambridge: Cambridge University Press.
- Dismukes, R., & Vandever, M. U. S. (2001). Crop insurance: premiums, subsidies, and participation. *Agricultural Outlook*, 287, 21-24.
- Fischhoff, B., Lichtenstein, Slovic, P., Derby, S., & Keeney, R. (1984). *Acceptable Risk*, New York: Cambridge University Press.
- Glauber, J. W. (2004). Crop insurance reconsidered. *American Journal of Agricultural Economics*, 86(5), 1179-1195.
- Gulev, S. K., & Latif, Mojib. (2015). Ocean science: the origins of a climate oscillation. *Nature*, 521(7553), 428.
- Harzer, J. H., Souza, A., Silva, W. V., Cruz, J. A. W., & Veiga, C. P. (2016). Probabilistic Approach to the MARR/IRR Indicator to Assess Financial Risk in Investment Projects. *International Research Journal of Finance and Economics*, 144, 131-146.
- IBGE. (2013). Levantamento Sistemático da Produção Agrícola - Pesquisa mensal de previsão e acompanhamento das safras agrícolas no ano civil, 26(12), 1-84.
- IBGE. Censo Agropecuário (2006). Rio de Janeiro, 2006. Disponível em: <<http://www.sidra.ibge.gov.br/>>. Acesso em: 12 jul. 2015.
- Kureski, R., Moreira, V. R., Veiga, C. P., & Rodrigues, J. A. (2015). Agribusiness gross domestic product (GDP) in the Brazilian region of paran and, the economic development of its agricultural cooperatives. *African*

- Journal of Agricultural Research*, 10, 4384-4394. <http://dx.doi.org/10.5897/AJAR2015.10208>
- Maia, G. B. S., Roitman, F. B., & De Conti, B. M. (2011). *Instrumentos de Gestão do Risco Agrícola: O Caso do Brasil*. Informativo Técnico, 1, BNDES/SEAGRI.
- MAPA - Ministério da Agricultura, Pecuária e Abastecimento (2015a). Política agrícola: seguro rural. Disponível em: <<http://www.agricultura.gov.br/politica-agricola/seguro-rural>>. Acesso em: 20 jul. 2015a.
- MAPA - Ministério da Agricultura, Pecuária e Abastecimento (2015b). Política agrícola: seguro rural e limites percentuais de subvenção. Disponível em: <<http://www.agricultura.gov.br/politica-agricola/seguro-rural/limites-percentuais-de-subvencao>>. Acesso em: 20 jul. 2015b.
- MB AGRO. (2012). *Seguro Agrícola no Brasil: uma visão estratégica de sua importância para a economia brasileira*. São Paulo.
- MDIC. Ministério do Desenvolvimento, Indústria e Comércio Exterior. Comércio Exterior. Retrieved from <http://www.mdic.gov.br/sitio/>
- Menapace, L., Colson, G., & Raffaelli, R. (2015). Climate change beliefs and perceptions of agricultural risks: An application of the exchangeability method. *Global Environmental Change*, 35, 70-81.
- Moreira, V. R., Freier, Axel., & Veiga, C. P. (2016). A Review of Concepts, Strategies and Techniques Management of Market Risks in Agriculture and Cooperatives. *International Business Management*, 10(6), 739-750. <http://dx.doi.org/10.3923/ibm.2016.739.750>
- Moreira, V. R., Kureski, R., Veiga, C. P. (2016). Assessment of the economic structure of Brazilian agribusiness. *The Scientific World Journal*, 2,1-22.
- Moreira, V. R., Souza, A., & Duclós, L. C. (2014). Avaliação de retornos e riscos na comercialização do milho: estudo de caso usando Value-at-Risk. *Revista de Economia e Sociologia Rural – RESR*, 52(2), 303-322.
- Nobre, L. H. N., Grable, J. E., Silva, W. V., Veiga, C. P. (2016). A Cross Cultural Test of Financial Risk Tolerance Attitudes: Brazilian and American Similarities and Differences. *International Journal of Economics and Financial Issues*, 6, 314-322.
- Ozaki, V. A. (2008^a). Síntese dos desafios do seguro rural no Brasil: onde falhamos e até onde avançamos. In: Seminário Risco e Gestão do Seguro Rural no Brasil. Campinas (SP): UNICAMP.
- Ozaki, V. A. (2008b). Em busca de um novo paradigma para o seguro rural no Brasil. *Revista de Economia e Sociologia Rural*, Brasília, 46, 97-119.
- Ozaki, V.A. (2010). Uma digressão sobre o programa de subvenção ao prêmio do seguro rural e as implicações para o futuro do mercado do seguro rural. *Revista de Economia e Sociologia Rural*, 48, 757-776.
- Ozaki, V.A., & Shirota, R. (2005). A experiência do seguro agrícola nos EUA: evolução e performance. *Revista Brasileira de Risco e Seguro*, 1(2), 69-87.
- Perroni, M., Dalazen, L., Silva, W. V., Veiga, C. P., & Gouvêa Da Costa, S. E. (2015). Evolution of Risks for Energy Companies from the Energy Efficiency Perspective: The Brazilian Case. *International Journal of Energy Economics and Policy*, 5, 612-623.
- Ray, P. K. (1981). Crop Insurance in Developing Countries. *Agricultural Insurance (Second Edition)*, 1, 309-324.
- Rocha, C., Duclós, L. C., Veiga, C. P., Bischof-Dos-Santos, C., & Neves, N. A. F. (2016). The control mechanisms on the performance of the strategic initiatives management: analysis of critical sales process in a metallurgical business. *International Business Management*, 10, 357-369, 2016. <http://dx.doi.org/10.3923/ibm.2016.357.369>
- Santana, C. A. M., Buanain, A. M., Silva, F. P., Garcia, J. R., & Loyola, P. (2014). Política agrícola: avanços e retrocesso ao longo de uma trajetória positiva. In: O mundo rural no Brasil do século 21. A formação de um novo padrão agrário e agrícola. Brasília: Embrapa Estudos e Capacitação (coedição com o Instituto de Economia da Unicamp), 2014.
- Schnitkey, G., & Sherrick, B. (2014). Crop Insurance. *Encyclopedia of Agriculture and Food Systems*.
- Stiglitz, J. E., & Walsh, C. E. (2003). *Introdução à macroeconomia*. Rio de Janeiro: Campus.
- SUSEP. (2015). Informações ao Público: Planos e Produtos. Seguro Rural. Disponível em:

<<http://www.susep.gov.br/menu/informacoes-ao-publico/planos-e-produtos/seguros/seguro-rural>>. Acesso em: 20 jul. 2015.

Wang, K., Zhang, Q., Kimura, S., & Akter, S. (2015). Is the crop insurance program effective in China? Evidence from farmers analysis in five provinces. *Journal of Integrative Agriculture*, 14(10), 2109-2120.

XU, J. F., & Liao, P. (2014). Crop Insurance, Premium Subsidy and Agricultural Output. *Journal of Integrative Agriculture*, 13(11), 2537-2545.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).