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## **SOCIOECONOMIC INFLUENCE OF THE NATIONAL PROGRAM FOR STRENGTHENING FAMILY AGRICULTURE (PRONAF) IN THE STATE OF PARANÁ**

## **INFLUÊNCIA SOCIOECONÔMICA DO PROGRAMA NACIONAL DE FORTALECIMENTO DA AGRICULTURA FAMILIAR (PRONAF) NO ESTADO DO PARANÁ**

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### **Abstract**

The objective of this research was to analyze the socioeconomic influence of PRONAF in the State of Paraná between the years 2012 and 2017. To achieve this goal, the studied variables were extracted and classified according to the productive, social and economic dimensions. Then, using the statistical software SPSS®, correlations, regressions and an analysis of correspondence between variables were performed. That said, it was found that PRONAF resources are not being directed to the municipalities with the lowest HDI-M, GDP per capita and Gini Index values. For the variables Bolsa Família and Gross Production Value (GPV) there was no direct relationship to the volume of PRONAF contracts. For the Food Acquisition Program (PAA), in general, the correlation between the average annual value of the contracts and the annual average of the PAA is positive, but weak. It was only possible to prove the impact of PRONAF on GPV in Paraná when multiple linear regression was performed, involving the average value of PRONAF contracts, the annual average of PRONAF contracts, the HDI-M and GDP per capita, which demonstrates that the social dimension was the one that showed the greatest positive relationship between PRONAF and socioeconomic indicators.

**Keywords:** Family farming. PRONAF. Public policy. Socioeconomic indicators.

### **Resumo**

O objetivo desta pesquisa foi de analisar a influência socioeconômica do PRONAF no Estado do Paraná entre os anos de 2012 e 2017. Para o cumprimento deste objetivo, extraiu-se as variáveis estudadas as quais foram classificadas de acordo com as dimensões produtiva, social e econômica.

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Em seguida, por meio do software estatístico SPSS© realizaram-se as correlações, regressões e análises de correspondência entre as variáveis. Isto posto, verificou-se que os recursos do PRONAF não estão sendo direcionados para os municípios que apresentam os menores valores do IDH-M, PIB *per capita* e Índice de Gini. Para as variáveis Bolsa Família e Valor Bruto da Produção (VBP) não houve relação direta com o volume de contratos do PRONAF. Para o Programa de Aquisição de Alimentos (PAA), de modo geral, a correlação entre o valor médio anual dos contratos e a média anual do PAA é positiva, porém fraca. Só foi possível comprovar o impacto do PRONAF sobre o VBP no Paraná quando realizada a regressão linear múltipla, envolvendo o Valor médio dos contratos do PRONAF, a média anual dos contratos do PRONAF, o IDH-M e o PIB *per capita*, o que demonstra que a dimensão social foi que a apresentou maior relação positiva entre o PRONAF e os indicadores socioeconômicos.

**Palavras-chave:** Agricultura familiar. PRONAF. Políticas públicas. Indicadores socioeconômicos.

## Introduction

The importance of family farming for local economies is a growing theme in literary approaches to economic development. Today's Brazilian family agriculture comes from a long development process that started with colonization, and it has been suffering political, economic and social influences, especially in the last decades (TEIXEIRA; CRUBELLATE, 2011; MARIONI *et al.*, 2016; DÍAZ-VILLAVICENCIO, SOARES, 2019).

Based on Public Administration concepts, there is the role of the State in developing and implementing certain programs and measures to ensure the minimum requirements for all citizens to have access to work, housing, food, health, education and transportation. In order to meet all these needs, combined with Brazil's great cultural diversity, it has become necessary to create sources of credit, offered by banking institutions, in order to meet the population's needs for credit and investment (SANTOS, 2006). The family agriculture is among the classes that are receiving credit and are benefited by Federal Government Social Programs.

Family farming can be defined as that in which management, ownership and most of the work and activities are carried out by people who have parental ties to each other. However, this concept is not absolute, given that the various social groups and their representations establish their own categories that, depending on the context in which it is used, the term "family farming" may receive a different meaning. Even so, regardless of the situation in which the term is used, the three basic attributes must be present: management, ownership and family work (BITTENCOURT; ABRAMOVAY, 2001).

A major event that marked the evolution of family agriculture in Brazil was the creation, in 1995, of the National Program for Strengthening Family Agriculture (PRONAF), because through it a new form of State interference in the daily lives of small farmers was possible. However, this fact was initially focused mainly on the impact of the change and the objectives involved, rather than specifically on the amount of resources that would actually be applied to subsidize the sector, given this, the employer agriculture used about 76% of the volume of credit made available to finance national agriculture at that time (MATTEI, 2014).

The Program is an advance in terms of participatory planning, as well as a public policy instrument sensitive to the demand of the beneficiaries, when compared to other policies adopted in the 1990s. However, the lack of a formal definition of the program (development project), in the sense that there is no prior analysis of which variables have the objective of generating impact, hinders the analysis of the program through more detailed studies (SILVA; BERNARDES, 2014).

When work is proposed to measure the effects of a public policy implemented over a decade ago, the first idea that emerges is that this policy is probably generating good results, otherwise it would already be in disuse. Thus, the Government should invest in research in order to analyze the progress of the Program, but it would be necessary to justify the expenditures to measure a policy that is clearly yielding positive results.

In this sense, according to Barros and Lima (2012), there are at least two possible arguments to justify such commitment. First, a research on this level can ascertain whether the theories that served as a basis for such spending of public resources are still valid. On the other hand, and perhaps

more important than checking whether or not there have been effects on the economy, it is to understand the dynamics of these effects.

In addition to these allegations, Guanziroli (2007) states that because it is a public policy that involves considerable subsidy costs, the PRONAF must be constantly assessed in order to justify its existence and its institutionalization. Another advantage in developing research for the purposes listed is the fact that the agents involved in the policy analyzed may have a theoretical basis to evaluate their performance with a view to improving the use of public resources.

Thus, this study was based on the following research question: **What is the socioeconomic influence of PRONAF in the State of Paraná between the years 2012 and 2017?** This research aimed at analyzing the socioeconomic influence of PRONAF in the State of Paraná between the years 2012 and 2017.

Given the context presented, the scientific relevance of this work is justified when analyzing the impact of PRONAF on the economy of Paraná in view of its importance, the large volume of resources taken from the Program, the large number of family farmers in the State, in addition to serving as a basis for other research and measurements that may occur in the future, in addition to analyzing a recent period (2012 to 2017).

The results of public policy evaluations have several uses, whether for public policy planners, taxpayers' or beneficiaries' knowledge. In a more practical way, the most evident utility is the use of the information found in the implementation of improvements in the program design, so that it has a better result in the set of characteristics of the group that suffers the intervention (GERTLER et al., 2016).

It is also expected that this paper will contribute significantly to other research that will be carried out seeking to analyze Public Policies in the context of family agriculture in Brazil.

## Theoretical elements

The PRONAF credit denotes a strong association with the technological level and productivity, i.e. producers who take credit have better equipment in their establishments and are more productive, but no significant association with a higher income is found (KAGEYAMA, 2003).

In case studies, with a more localized focus, some authors verified the problems of targeting the program and few results in terms of income. Damasceno, Kahn and Lima (2011) found a positive and significant impact of PRONAF on employment in the state of Ceará, but for income the result was not significant. Another result of the research for Ceará is the low sustainability of family producers (attended or not by the program). According to Magalhães et al., (2006), PRONAF had not generated significant impact on income and productivity of producers in the state of Pernambuco.

Similarly, Anjos et al. (2004) found a social differentiation between producers who took resources and those who were not served in the state of Rio Grande do Sul, and that there are also factors of discontinuity and contradictions in the program with respect to the target audience and the objectives that drive this public policy. The total number of beneficiaries and the total value of loan contracts showed an increase due to the structural changes that occurred in the source of the resources. There is, however, a contradiction regarding the resources to be taken up in short-term financial operations, while family farming requires a long term.

PRONAF uses resources from various sources and over time the proportions of these sources have changed, which has helped to increase and expand the program. These transformations were great, since initially the resources came from the great majority of the Workers' Support Fund (FAT), and for the 2009/2010 harvest, the greatest dependency was on rural savings. Private sources are applied only in quantities, according to the requirements of the rural credit manual. A greater participation of resources from the National Bank for Sustainable Development (BNDES) should be sought, since the costs of equalizing these resources are lower (CONTI; ROITMAN, 2011).

Another study concluded that the objectives of PRONAF are going far beyond strengthening family agriculture and favoring the economic development of those located where it is inserted. There are also actions developed by the Program that promote the valorization of local and regional socio-cultural aspects, guaranteeing not only the financial factor, but also the social factor for local development (AZEVEDO; PESSÔA, 2012).

As a social and productive category, family agriculture takes on significant proportions that in no way can be overlooked in the formulation of a development project in the country. In order to get an idea of the dimensions of this segment, according to data from the last Agricultural Census

carried out in 2006 (IBGE, 2006), out of the more than 5 million Brazilian agricultural establishments 84.4% belong to family farmers. And these 4,366,267 establishments employed about 82.8% of the Economically Active Population (EAP) in the agricultural sector as a whole.

In this sense, the importance of institutionalizing public policies, such as PRONAF, is evident, given that the benefits of it are, as presented above, numerous and of great benefit to the country's economy and development. In this respect, public policies are sources that drive changes in the economic and social scenario, since the actors involved begin to act in accordance with the policy and the changes it promotes (LEE, 2011).

Despite developments that occurred after the implementation of the program, such as the increase in dissemination both to farmers, public managers and society in general, PRONAF still has some limitations, such as its coverage and its distribution that occurs in a variable way in various regions of Brazil (MATTEI, 2006; COSTA et al., 2010; PIRES, 2013; SOUZA; BARBÉ, 2014; GRISA, WESZ, BUCHWEITZ, 2014).

In this direction, recent research has not deepened in carrying out quantitative analyses related to the influence of PRONAF or comparing the evolution of the Program in certain periods, especially in the State of Paraná, and this is therefore a theoretical gap to be filled.

According to data from the 2006 Agricultural Census (IBGE, 2006), Paraná is the 5th Brazilian state with the largest number of rural properties and the 2nd in the southern region, with 81.61% of the 371,063 existing establishments falling into the category of family agriculture, occupying 27.8% of the total area of the establishments. The Gross Production Value (GPV) of non-family agriculture in the State is relatively higher when compared to that of family agriculture, 57.0% and 43.0% respectively. In the comparison with the total of Brazil and the aggregate of the South Region, Paraná shows, for family agriculture, a better result compared to the country (IBGE, 2006).

Another point worth highlighting is the volume of credits contracted. According to data from the Ministry of Agrarian Development (MDA, 2017a) Paraná ranks second in the southern region in relation to the amount of credit used by PRONAF with approximately 3.7 billion invested and 150,000 contracts in the 2015-2016 Harvest Plan.

## Method

The research contemplated exploratory and descriptive stages, with a quantitative approach (Marconi; Lakatos, 2013) of bibliographic and documental research on the subject, with an analysis of the legislation on PRONAF as well as a diagnosis of PRONAF data in Paraná and Brazil.

The descriptive research (RAUPP; BEUREN, 2009) was used, in which a characterization of PRONAF in the state of Paraná was performed, with quantitative data and analyses that consider economic, social and productive impacts.

As for logic, this paper has used deductive logic to draw from empirical data and information that is relevant to corroborate or deny whether PRONAF is impacting on municipal indicators and farmers' lives.

The approach used in this dissertation was the quantitative method. The data regarding the variables used were obtained from the various statistical sources available on the Internet, focused on the social, economic and productive aspects of the studied municipalities, and these are summarized in Table 01.

**Table 01:** Variables, with their dimensions and data source

Variable	Dimension	Data source
Average annual number of PRONAF contracts	PRONAF	Banco Central do Brasil
Average annual value of PRONAF contracts	PRONAF	Banco Central do Brasil
GDP per capita	Economic	IBGE
PAA (Family Agriculture Food Acquisition Program)	Economic	Ministério do Desenvolvimento Social – MDS/PAA Data
Gross Production Value in Paraná	Productive	Secretaria de Estado da Agricultura e Abastecimento/DERAL
Bolsa Família Program	Social	Ministério do Desenvolvimento Social - MDS
Gini Index	Social	Atlas do Desenvolvimento Humano, PNUD/IPEA/Fundação João Pinheiro
HDI-M (Municipal Human Development Index)	Social	Atlas do Desenvolvimento Humano, PNUD/IPEA/Fundação João Pinheiro

The first procedure after collecting the data in their sources was to table them in Microsoft Excel© software and to separate the municipalities into **quartiles**, and the municipalities were separated into four similar groups, based on the average annual value of the contracts for the period, classifying the municipalities from the lowest to the highest average annual value of the contracts. The first, second and third quartiles were left with 99 municipalities and the fourth quartile with 101 municipalities.

Then, the data from each quartile were transposed into the SPSS Statistics© software. The data analysis consisted in making correlations and regressions between the annual average of the number of contracts and the average of each of the variables of each quartile of municipalities. Thus, the effects of PRONAF on local economies were evaluated and the impacts on each of the variables of the three dimensions were verified.

For the variables Gini Index and HDI-M, as these data refer to the last Demographic Census in 2010, they are outside the analysis period of the research. In this case, the cross-table method was used to evaluate whether there is dependence or association between the dependent variables (Gini Index and HDI-M) and the independent variable (average contract volume). In order to facilitate the cross table, we opted to divide the data of the average number of annual contracts into value ranges.

A Multiple Linear Regression was also performed between the dependent variable Y 'Gross Production Value' and the independent variables X: 'Average contract value,' 'Annual average of contracts,' 'HDI-M,' 'GDP per capita' and 'quartile,' using the SPSS Statistics© statistical software, using the stepwise regression method, where variables are included and excluded from the model in order to obtain the best possible model.

In multiple linear regression, the following coefficients were analyzed: the square R adjusted in order to identify which model best explains the Dependent Variable; the test of absence of serial autocorrelation (Durbin-Watson) in order to detect the serial correlation. Finally, the significance level of the selected independent variables was chosen, which must present values lower than 5%.

In addition to multiple linear regression, data were run in Microsoft Excel© in order to obtain the F-Test of Significance to determine if there is a linear relationship between the response variable Y and some of the regressor variables.

Based on the studies carried out for the theoretical contribution, six hypotheses were elaborated and tested during this research. The hypotheses are listed in Table 02.

**Table 02:** Research assumptions

Hypothesis
H1. The HDI-M and the Gini Index have positive effects on the allocation of PRONAF resources in Paraná.
H2. PRONAF funding has positive impacts on GDP per capita.
H3. Investments in PRONAF generate positive effects by reducing the number of Bolsa Família benefits.
H4. PRONAF funding has positive impacts on the resources paid by the PAA.
H5. The average value of PRONAF financing in Paraná has a positive impact on the Gross Production Value.
H6. PRONAF numbers allied to the HDI and GDP per capita generate positive effects on the Gross Production Value.

### Descriptive statistics of PRONAF in the State of Paraná between 2012 and 2017

From the data collected regarding the quantities and average values of the contracts in the municipalities of Paraná, the descriptive statistics were carried out, which is the initial stage of the analysis used to describe and summarize the data.

The numbers of rural properties with up to four fiscal modules (basic condition to participate in the Program) per mesoregion were collected, based on the 2006 Agricultural Census, the last one available in May 2018 (IBGE, 2006). Based on the data obtained, it was verified that the Mesoregion Central East is the one with the smallest number of rural properties with up to four fiscal modules (19,174), representing 5.17% of the total State properties. In contrast, there are 54,277 rural properties in the North Central region with up to four fiscal modules, that is, 14.63 of the total.

Regarding the total number of contracts and the total value of contracts in the municipalities of each mesoregion between 2012 and 2017, it was observed that the mesoregion Central East not only has the lowest number of rural properties, but also has the lowest number of contracts in the period analyzed with a total of 15,860 contracts, representing 1.87% of the amount. The Southwest mesoregion was the one with the highest volume of contracts of the Program, obtaining 218,934 contracts, representing 25.83% of the total, together with the West mesoregion which obtained 213,359 or 25.17%, both representing more than half of the number of contracts in the period.

The total value of the contracts, again the Central East mesoregion obtained the lowest value, representing 2.19% of the import. On the other hand, the Western mesoregion received the most resources from PRONAF, which accounted for 23.86% of the sum.

As regards the data concerning the annual average of the period from 2012 to 2017, the number of contracts per mesoregion, it was found that as well as the number of properties with up to four fictional modules and the volume of contracts, the mesoregion Central East has the lowest index of the average number of contracts (1.82%) with an average of 2,555 contracts per municipality of this mesoregion. In contrast, the Southwest mesoregion shows the highest average of contracts per municipality (35,752), representing a quarter of the amount.

The average annual values of the contracts of the municipalities of each mesoregion between 2012 and 2017, it was found that the mesoregion that has the lowest average value of contracts is the Southwest with an average value of R\$ 21,198.24. On the other hand, the Northwestern region has the highest average value with R\$ 93,887.06.

As for the annual average Gross Production Value (GPV) per mesoregion, it was observed that the Northwest mesoregion presents the lowest average GPV, with an annual average of R\$113,409,991.23. On the other hand, the West mesoregion shows the highest amount of GPV, with R\$317,468,040.44.

Regarding the annual average number of Bolsa Família benefits per mesoregion, it was attested that the Northwest mesoregion has the lowest annual average of the Bolsa Família, with 6,689 benefits. The Central East mesoregion, which had the lowest average volume of PRONAF contracts, is the one that has more benefits of the Bolsa Família, with an annual average of 43,059 registrations.

As for the average Gini Index per mesoregion, according to data from the last Demographic Census of 2010, it was concluded that the Southeast mesoregion shows the lowest average Gini Index with 0.450, which shows that the income concentration of this mesoregion is more equal when

compared to the Central West mesoregion which presented an average Index of 0.472. In general, it can be verified that the average Index in all mesoregions is similar and the difference between the smallest and the largest Index is only 0.021.

In addition, a correspondence analysis was carried out using data from the municipalities on the Gini Index according to the latest demographic census (2010) and the average annual volume of PRONAF contracts (2012-2017) in order to verify that the municipalities with the highest Gini Index also have the highest number of PRONAF contracts.

According to the results obtained from the crossing of variables in the SPSS© software, it was observed that only 1.3% of the number of contracts are in the municipalities with Gini Index above 0.600; 4.8% of the contracts are in the municipalities with Index between 0.560 and 0.600; 16.6% of the contracts are in the municipalities with an index between 0.510 and 0.550; 35.2% of the number of contracts are in the municipalities with an index between 0.460 and 0.500; 28.6% of the contracts are in the municipalities with an index between 0.410 and 0.450 and 13.6% of the contracts are in the municipalities with an index between 0.330 and 0.400.

This shows that most of PRONAF resources are not being allocated to the municipalities that present the greatest social inequality, that is, those with the highest Gini Index, which goes against the distributive function of public policies. Costin (2010) highlights that Public Policies should seek to make society less unequal in terms of income and wealth, through taxation and financial transfers, subsidies, tax incentives, allocation of resources to poorer sections of the population.

In this sense, it is observed that in a study carried out by Batista and Neder (2014), also using the Gini index, the authors concluded that PRONAF expenditures tend to indirectly reduce poverty, simply by increasing household income. Therefore, as PRONAF is a program capable of providing this reduction, most of its resources should be directed to municipalities with more social inequality, which, according to the results obtained in this research, does not occur in the State of Paraná.

In another study, conducted by Souza, Ney and Ponciano (2011), the authors found that the distribution of PRONAF resources between 1999 and 2009 in Brazil, even though the program was restructured in 2006 to serve other regions, was still concentrated in regions with higher production and income, which also shows that most resources are not used effectively, i.e., directed to regions with higher levels of inequality.

Regarding the average of the Municipal Human Development Index (HDI-M) per mesoregion according to data from the last Demographic Census of 2010, it was an evidence that the Central South mesoregion shows the lowest average of the Human Development Index with 0.665, which places it within the average range of HDI-M (between 0.600 and 0.699). The Southeast, Central East, Curitiba Metropolitan and Central West mesoregions are also within this range. In contrast, the West mesoregion shows the highest average of the HDI-M, being within the high range (between 0.700 and 0.799) with an Index of 0.718. The Pioneer North, Northwest, Southwest and Central-North mesoregions are also within the high HDI-M range.

In the same way as in the Gini Index, the analysis was carried out by means of a correspondence analysis, based on the data from the municipalities on the HDI-M according to the latest demographic census (2010) and the average annual volume of PRONAF contracts (2012-2017), in order to verify whether the municipalities with the lowest HDI-M are those with the highest number of PRONAF contracts.

According to the result of crossing the variables in the SPSS© software, it was found that only 0.5% of the volume of contracts were used by municipalities with HDI-M above 0.800 (considered too high). 59% of the credits were contracted by municipalities with HDI-M between 0.700 and 0.799 (considered high). 39.4% of the contracts were accessed by municipalities with HDI-M between 0.600 and 0.699 (considered average) and 1% of the number of contracts were used by municipalities with HDI-M between 0.500 and 0.599 (considered low). Thus, the allocation of PRONAF resources occurs more frequently among municipalities with medium and high HDI-M is observed, which again refutes the distributive function of public policies.

Among the aspects that can influence the conditions of access of farmers to PRONAF are the components of HDI-M (education, work and income), with a large number of farmers not accessing credit due to lack of literacy and qualification.

As consequences, Sousa and Fonseca (2011) show the inability to market, the low scale of production, the lack of value aggregation to production, excessive diversification, the existence of incompatible technologies, the low availability of training and information, the unfavorable relations and the non-existence of agricultural policies.

Therefore, hypothesis **H1** could not be confirmed, since the results showed that the allocation of PRONAF resources does not occur based on socioeconomic indicators (Gini Index and HDI-M).

With regard to the average GDP per capita per mesoregion, at the time of the survey (May 2018), data were only available up to the year 2015. Therefore, from the collected data it was verified that the North Pioneer mesoregion showed the lowest annual average of GDP per capita in the analyzed period, with R\$ 19,007.50. On the other hand, the Western Mesoregion showed the highest average GDP per capita with R\$ 27,969.57.

Regarding the average of the Food Acquisition Program (PAA) per mesoregion, at the time of the survey (May 2018), data were only available up to the year 2016. Thus, it was verified that the Central North mesoregion showed the lowest annual average of R\$ 54,194.27 of resources paid by the Federal Government to farmers participating in the PAA. On the other hand, the Northwest mesoregion received more resources from the PAA with an annual average of R\$ 123,765.27.

From this point on, correlations and regressions of the variables used in this research will be presented.

### Average annual value of PRONAF contracts versus GDP per capita

Based on the regression model summary values of the "Annual average value of PRONAF contracts" regression coefficients versus the dependent variable "Annual average of GDP per capita" for the first quartile of municipalities.

According to the results, it was observed that the correlation coefficient  $R=0.045$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.002 was also verified. This value indicates that only 0.2% of the variation in the "Annual average of GDP per capita" is explained by the variable "Annual average value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.008, it is concluded that the regression line has a low degree of adjustment.

Based on the model summary values of the regression coefficients "Annual average value of PRONAF contracts" versus the dependent variable "Annual average of GDP per capita" for the second quartile of municipalities.

According to the results, it was observed that the correlation coefficient  $R=0.229$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.052 was also observed. This value indicates that only 5.2% of the variation in the "Annual average of GDP per capita" is explained by the variable "Annual average value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.043, it is concluded that the regression line has a low degree of adjustment.

From the model summary values and the values of the regression coefficients "Annual average value of PRONAF contracts" versus the dependent variable "Annual average of GDP per capita" for the third quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 24188.614 - 0.013X$$

This shows that since the angular coefficient value of the regression straight line is negative (-0.013), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower will be the annual average of the GDP per capita. From the value of "sig" (0.942) the confidence level of the model was calculated. In this case, we have that the significance level is 94.2%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

From the results, it was observed that the correlation coefficient  $R=0.007$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.000 was also observed. This value indicates that the variation in the "Annual average of GDP per capita" cannot be explained by the variable "Annual average value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.010, it is concluded that the regression line has a low degree of adjustment.

From the model summary values and the values of the regression coefficients "Annual average value of PRONAF contracts" versus the dependent variable "Annual average of GDP per capita" for the fourth quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 21524.787 + 0.006X$$

This shows that since the angular coefficient value of the regression straight line is positive (0.006), the straight line tends to be positively tilted, indicating that the higher the average value of the contracts, the higher will be the annual average of the GDP per capita. From the value of "sig" (0.226) the confidence level of the model is calculated. In this case, we have that the significance level is 22.6%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

From the results, it was observed that the correlation coefficient  $R=0.121$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.015 was also observed. This value indicates that only 0.15% of the variation of the "Annual average of GDP per capita" is explained by the variable "Annual average value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.005, it is concluded that the regression line has a low degree of adjustment.

Based on the results above, it was verified that only in the fourth quartile the value of the linear correlation coefficient was positive, showing that for the other quartiles the GDP per capita value has no direct relation with the volume of PRONAF contracts. This result is contrasted with the research of Marioni et al. (2016) that verified the influence of PRONAF on the total GDP and the sectorial GDPs and concluded that it shows positive effects on them. On the other hand, it corroborates Coelho's research (2015), when he states that in the Territory of Cantuquiriguaçu-PR there was no significant evolution of the GDP per capita from the PRONAF.

The expected economic result, according to Silva and Alves Filho (2009), would be that PRONAF generates positive impacts on macroeconomic variables (including GDP per capita), which indicates the program contribution to the development of local economies.

In summary, based on the results described, it can be observed that PRONAF resources are not being directed to the municipalities that show the lowest GDP per capita values, thus counterpointing the H2 hypothesis that PRONAF would have positive effects on GDP per capita.

### **Average annual value of PRONAF contracts versus Bolsa Família**

Based on the model summary values and the regression coefficients generated in the SPSS® software for the independent variable "Average annual value of PRONAF contracts" versus the dependent variable "Average annual benefits of the Bolsa Família" for the first quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 17901.573 - 0.166X$$

This shows that since the angular coefficient value of the regression straight line is negative (-0.166), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower the number of benefits of the Bolsa Família. From the value of "sig" (0.718), the confidence level of the model was calculated. In this case, we have that the significance level is 71.8%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

According to the data, it was observed that the correlation coefficient  $R=0.037$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.001 was also observed. This value indicates that only 0.1% of the variation in the "Average annual benefits of the Bolsa Família" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.009, it is concluded that the regression line has a low degree of adjustment.

From the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Average annual benefits of the Bolsa Família" for the second quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 25941.690 - 0.313X$$

This shows that since the angular coefficient value of the regression straight line is negative (-0.313), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower the number of benefits of the Bolsa Família. From the value of "sig" (0.523), the confidence level of the model was calculated. In this case, we have that the significance level is 52.3%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

Thus, it was observed that the correlation coefficient  $R=0.020$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.000 was also observed. This value indicates that the variation in "Average annual benefits of the Bolsa Família" is not explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.010, it is concluded that the regression line has a low degree of adjustment.

Based on the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Average annual benefits of the Bolsa Família" for the third quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 5026.965 + 0.248X$$

This shows that since the angular coefficient value of the regression straight line is positive (0.248), the straight line tends to be positively tilted, indicating that the higher the average value of the contracts, the higher the number of benefits of the Bolsa Família. From the value of "sig" (0.493) the confidence level of the model was calculated. In this case, we have that the significance level is 49.3%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

Therefore, it was observed that the correlation coefficient  $R=0.07$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.005 was also observed. This value indicates that only 0.5% of the variation in the "Average annual benefits of the Bolsa Família" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.005, it is concluded that the regression line has a low degree of adjustment.

Supported by the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Average annual benefits of the Bolsa Família" for the fourth quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = -2528.231 + 0.168X$$

This shows that since the angular coefficient value of the regression straight line is positive (0.168), the straight line tends to be positively tilted, indicating that the higher the average value of the contracts, the higher the number of benefits of the Bolsa Família. From the value of "sig" (0.000), the confidence level of the model is calculated. In this case, we have that the significance level is 0%, being  $P < 0.01$ , which denotes very little evidence against the null hypothesis, that is, one cannot deny the null hypothesis, with a confidence level of 99%.

Consequently, it was observed that the correlation coefficient  $R=0.613$  is between 0 and 1, being closer to 1, which shows the existence of a strong positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.375 is also observed. This value indicates that 37.5% of the variation of the "Average annual benefits of the Bolsa Família" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0,369, it is concluded that the regression line has a high degree of adjustment.

Based on the results above, it can be observed that in the third and fourth quartiles the value of the linear correlation coefficient was positive, showing that for the other quartiles the Bolsa Família has no direct relation with the volume of PRONAF contracts.

Therefore, the municipalities that receive the most resources from PRONAF are also those that have the most beneficiaries of the Bolsa Família, ratifying the researches of Mocelin and Fialho (2010), Rios et al., (2011), and Damasceno, Khan and Lima (2011), which refutes the hypothesis **H3**, that PRONAF would reduce the number of benefits of PBF. This can be explained by the fact that

the Bolsa Familia Program is aimed not only at people in social vulnerability living in rural areas, but also at those living in urban areas.

### **Average annual value of PRONAF contracts versus Food Purchase Program (PAA)**

From the correlation values between "Annual average value of PRONAF contracts" and the "Annual average of the Food Purchase Program" for the first quartile of municipalities, the value of the correlation between the annual average value of contracts and the annual average of the PAA is equal to 0.065 was observed, that is, it is a weak positive correlation. This indicates that in this case, as the average value of the contracts increases, the value of the PAA increases.

Based on the correlation values between the "Annual average value of PRONAF contracts" and the "Annual average of the Food Purchase Program" for the second quartile of municipalities, the correlation value between the annual average value of the contracts and the annual average of the PAA is equal to -0.015 was found, i.e. it is a weak negative correlation. This indicates that in this case, as the average value of the contracts increases, the value of the PAA decreases.

According to the correlation values between "Annual average value of PRONAF contracts" and "Annual average of the Food Purchase Program" for the third quartile of municipalities, the value of the correlation between the annual average value of the contracts and the annual average of the PAA is equal to 0.087 was found, i.e., it is a weak positive correlation. This indicates that in this case, as the average value of the contracts increases, the value of the PAA increases.

As for the correlation values between "Annual average value of PRONAF contracts" and "Annual average of the Food Purchase Program" for the fourth quartile of municipalities, the correlation value between the annual average values of the contracts and the annual average of the PAA is equal to 0.056 is inferred, i.e., it is a weak positive correlation. This indicates that in this case, as the average value of the contracts increases, the value of the PAA increases.

In view of this, it is concluded that in general, the correlation between the average annual value of the contracts and the annual average of the PAA is positive, but weak, and what is expected would be a strong positive correlation, because according to Grisa, Wesz and Buchweitz (2014) the creation of the Food Acquisition Program (PAA) in 2003, in the set of basic actions of the Zero Hunger Program, this is the intersection between elements of agricultural policy and elements of food and nutrition security policy, as the federal government purchases food from family farmers and distributes it to socially vulnerable people, to social welfare institutions, public schools, public food and nutrition facilities, or intended for stock formation.

Thus, what is perceived is that while PRONAF was created as a policy of rural credit, the PAA emerged as an opportunity for family farmers in order to market their products, marked by a scenario of debates on hunger and food and nutritional security. However, the results showed that in Paraná state, in the period analyzed (2012 to 2017), the purchase of family farmers' products took place in a limited way, i.e., in this case there is a failure in the correct intersection of public agricultural and food security policies.

In this path, what was expected, in the line of Oliveira and Baccarin (2016), is that the southern region stands out as the one that receives the most benefits from the actions of the PAA, and this Program has brought several advantages to the farmers' families, although the Program needs to adjust to the disparities of Brazilian regionalism.

In short, it is concluded that there is a small relationship between the PAA and the average value of the contracts, i.e., this relationship is not significant to the extent that it can be said that the average value of the contracts influences the volume of the PAA, thus refuting hypothesis H4.

### **Average annual value of PRONAF contracts versus Gross Production Value (GPV)**

From the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Gross Production Value (GPV)" for the first quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 47303890.402 + 8667.802X$$

This shows that since the angular coefficient value of the regression straight line is positive (8667.802), the straight line tends to be positively tilted, indicating that the higher the average value of the contracts, the higher will be the gross production value. From the "sig" value (0.0756), the confidence level of the model is calculated. In this case, we have that the significance level is about

7.6%, being between  $0.05 < P < 0.10$ , which denotes suggestive evidence against the null hypothesis.

It was observed, according to the data, that the correlation coefficient  $R=0.179$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relation between the variables in the study. The determination coefficient (R-squared) is equal to 0.032 is also observed. This value indicates that 3.2% of the variation in the "Gross Production Value" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.022, it is concluded that the regression line has a low degree of adjustment.

Based on the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Gross Production Value (GPV)" for the second quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 500670837.450 - 9126.996X$$

This shows that since the angular coefficient value of the regression straight line is negative (-9126.996), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower the gross production value. From the value of "sig" (0.566), the confidence level of the model was calculated. In this case, we have that the significance level is about 56%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

It was noticed that the correlation coefficient  $R=0.058$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.003 was also observed. This value indicates that only 0.3% of the variation in the "Gross Production Value" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was -0.007, it is concluded that the regression line has a low degree of adjustment.

Based on the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Gross Production Value (GPV)" for the third quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 232758754.549 - 2137.737X$$

This shows that since the angular coefficient value of the regression straight line is negative (-2137.737), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower the gross production value. From the value of "sig" (0.199), the confidence level of the model was calculated. In this case, the significance level is about 20%, being  $P > 0.10$ , what denotes little or no real evidence against the null hypothesis.

Supported by the data achieved, it can be noticed that the correlation coefficient  $R=0.130$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.017 was also observed. This value indicates that only 1.7% of the variation of the "Gross Production Value" is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.007, it is concluded that the regression line has a low degree of adjustment.

Based on the model summary values and the regression coefficients "Average annual value of PRONAF contracts" versus the dependent variable "Gross Production Value (GPV)" for the fourth quartile of municipalities, the straight line of Simple Linear Regression was obtained:

$$Y = 115374364.956 - 80.075X$$

This shows that since the angular coefficient value of the regression straight line is negative (-80.075), the straight line tends to be negatively tilted, indicating that the higher the average value of the contracts, the lower the gross production value. From the value of "sig" (0.065), the confidence level of the model was calculated. In this case, we have that the significance level is 6.5%, being  $0.05 < P < 0.10$ , which denotes suggestive evidence against the null hypothesis.

According to the data obtained, it was observed that the correlation coefficient  $R=0.184$  is between 0 and 1, being closer to 0, which shows the existence of a weak positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.034 was also observed. This value indicates that only 0.34% of the variation of the "Gross Production Value"

is explained by the variable "Average annual value of PRONAF contracts" through the simple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.024, it is concluded that the regression line has a low degree of adjustment.

In accordance with the results above, it was verified that only in the first quartile the value of the linear correlation coefficient was positive, showing that for the other quartiles the Gross Production Value has no direct relation with the volume of PRONAF contracts. This result corroborates with the Guanziroli, Buainain and Di Sabbato (2012) research. On the other hand, it contrasts the expected economic result according to Kageyama's (2003) research, stating that PRONAF has a strong correlation with technological variables and agricultural productivity.

In summary, it can be concluded that, in general, there is no direct relationship between the GPV and the average volume of contracts in the period analyzed, thus counterposing the H5 hypothesis that the average value of PRONAF financing in Paraná positively impacts the Gross Production Value.

### Multiple Linear Regression

Finally, the Multiple Linear Regression between the dependent variable Y "Gross Production Value" and the independent variables X: "Average value of contracts", "Annual average of contracts", "HDI-M", "GDP per capita" and "quartile" was performed. The summary of the regression model is in Table 3.

**Table 3:** Summary of the Multiple Linear Regression Model

Model	R	R-squared	Adjusted R-squared	Estimate standard error	Durbin-Watson
1	.590a	.348	.347	144244955.72348	
2	.621b	.386	.383	140230376.51525	
3	.643c	.414	.409	137203936.52125	
4	.650d	.422	.416	136356905.59116	1.998

a. Predictors: (Constant), AVERAGE\_CONTRACTS

b. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2?

c. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2? HDI-M\_2010

d. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2? HDI-M\_2010, GDP\_PERCAPITA\_AVERAGE

Note. Data from applied research (2018).

According to Table 3, it is observed that the best correlation coefficient is from model 4, with R=0.650, being between 0.4 and 0.7 which shows the existence of a moderate positive linear relationship between the variables under study. The determination coefficient (R-squared) is equal to 0.422 is also observed. This value indicates that 42.2% of the dependent variable variation is explained by the independent variables through the multiple linear regression model. The adjusted R-squared indicates the proportion of the variation of the dependent variable Y explained by the independent variable X. In this case, as the value of the adjusted R-squared was 0.416, it is concluded that the regression straight line has a high degree of adjustment. The value of the Durbin-Watson test was 1.998, that is, it is very close to 2, which suggests that there is strong statistical evidence that the hypothesis of independence of errors is satisfied. Table 4 shows the Variance Analysis of the Multiple Linear Regression.

**Table 4:** Variance Analysis of Multiple Linear Regression

Model		Sum of squares	df	Average Square	Z	Sig.
1	Regression	44073739094531	1	4407373909453125600.000	211.826	.000b
	n	25600.000				
	Residue	82394164716602	396	20806607251667260.000		
	Total	12646790381113	397			
2	Regression	48792897745579	2	2439644887278984700.000	124.063	.000c
	n	69400.000				
	Residue	77675006065553	395	19664558497608588.000		
	Total	12646790381113	397			
3	Regression	52297718235239	3	1743257274507988740.000	92.604	.000d
	n	66000.000				
	Residue	74170185575893	394	18824920196927400.000		
	Total	12646790381113	397			
4	Regression	53396605400713	4	1334915135017833730.000	71.796	.000e
	n	34900.000				
	Residue	73071298410420	393	18593205702397008.000		
	Total	12646790381113	397			

a. Dependent Variable: GPV\_AVERAGE

b. Predictors: (Constant), AVERAGE\_CONTRACTS

c. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2?

d. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2? HDI-M\_2010

e. Predictors: (Constant), AVERAGE\_CONTRACTS, IS IT QUARTILE 2? HDI-M\_2010, GDP\_PERCAPITA\_AVERAGE

Note. Data from applied research (2018).

Based on Table 4, the values referring to the variance analysis of the regression are verified. In this case, the value of "sig" that indicates the global level of significance of the four models is equal to 0.000, which suggests that there is statistical evidence that there is significance among the variables. The coefficients of the Multiple Linear Regression are shown in Table 5.

**Table 5:** Multiple Linear Regression Coefficients

Model	Non-standard coefficients		Standard Coefficients	t	Sig.
	B	Standard Error	Beta		
1 (Constant)	96395585.390	9376422.337		10.281	.000
AVERAGE_CONTRACTS	241979.138	16626.032	.590	14.554	.000
2 (Constant)	81012360.363	9641186.455		8.403	.000
AVERAGE_CONTRACTS	228890.592	16382.635	.558	13.972	.000
IS IT QUARTILE 2?	80737319.005	16481021.848	.196	4.899	.000
3 (Constant)	-462205303.878	126247644.537		-3.661	.000
AVERAGE_CONTRACTS	219417.423	16178.724	.535	13.562	.000
IS IT QUARTILE 2?	77759785.418	16140088.384	.189	4.818	.000
HDI-M_2010	779896277.968	180746763.744	.168	4.315	.000
4 (Constant)	-380833743.222	129856126.786		-2.933	.004
AVERAGE_CONTRACTS	216787.299	16115.200	.529	13.452	.000
IS IT QUARTILE 2?	75460776.539	16068299.438	.183	4.696	.000
HDI-M_2010	617276115.740	191681568.278	.133	3.220	.001
GDP_PERCAPITA_AVERAGE	1481.993	609.602	.100	2.431	.016

a. Dependent Variable: GPV\_AVERAGE

Note. Data from applied research (2018).

From the "sig" values shown in Table 5, the confidence level of the model was calculated. Thus, we have that the significance level (sig) for the independent variable "Average Annual Contracts Value" is below 0.05 for all variables of all models, which indicates that the regression is significant. Therefore, it is concluded that there is statistical evidence that the model can explain and predict the dependent variable Y. Finally, the multiple linear regression generated in Microsoft Excel© is shown in Table 6 in order to obtain the F-Test of the model significance.

**Table 6:** F-Test of significance

	gl	SQ	MQ	F	F of significance
Regression	7	5.47361E+18	7.81945E+17	42.51373862	0.000
Residue	390	7.17318E+18	1.83928E+16		
Total	397	1.26468E+19			

Note. Data from applied research (2018).

It is observed that the value of the F-test for the model is equal to 0.000, that is, there is statistical evidence that the model can explain and predict the dependent variable Y. It is concluded, therefore, that the regression model shown is reliable and that this demonstrates that as the independent variables ("Average value of PRONAF contracts", "Annual average of PRONAF contracts", "HDI-M", "GDP per capita") increase, so does the Gross Production Value.

Thus, the **H6** hypothesis could be confirmed, since the multiple linear regression model has shown that when the variables are entered together in the analysis, there is a positive correlation on the GPV. In order to facilitate the identification of the results of the hypotheses tested in this research, Table 07 was prepared.

**Table 07:** Hypotheses tested in the research and results

Hypothesis	Result
H1. The HDI-M and the Gini Index have positive effects on the allocation of PRONAF resources in Paraná.	Refused
H2. PRONAF funding has positive impacts on GDP per capita.	Refused
H3. Investments in PRONAF generate positive effects by reducing the number of Bolsa Família benefits.	Refused
H4. PRONAF funding has positive impacts on the resources paid by the PAA.	Refused
H5. The average value of PRONAF financing in Paraná has a positive impact on the Gross Production Value.	Refused
H6. PRONAF numbers allied to the HDI and GDP per capita generate positive effects on the Gross Production Value.	Confirmed

As shown in Table 07, it was only possible to prove the impact of PRONAF on GPV in Paraná when multiple linear regression was performed, involving the average value of PRONAF contracts, the annual average of PRONAF contracts, the HDI-M and the GDP per capita, which shows that the social dimension was the one that showed the greatest positive relationship between PRONAF and socioeconomic indicators.

## Conclusions

Regarding the variables analyzed in this research, most of them has shown weak correlations, and in some cases were negative. It was found that PRONAF resources are not being directed to the municipalities with the lowest HDI-M, GDP per capita and Gini Index, and these indicators are the ones that show if the income distribution is occurring in an equitable way among the population, in view of the distributive function of public policies that seeks to make society less unequal in terms of income and wealth, through taxation and financial transfers, subsidies, fiscal incentives, allocation of resources to poorer sections of the population.

In this sense, for the variable Bolsa Família, it was verified that in the third and fourth quartiles the value of the linear correlation coefficient was positive, denoting that for the other quartiles the Bolsa Família has no direct relation with the volume of PRONAF contracts. That is, the municipalities that receive more resources from PRONAF are also those that have more beneficiaries of the Bolsa Família.

This study concludes that PRONAF is an institutionalized public policy, being the first national public policy specifically aimed at the segment of family farmers, however, based on statistical analysis, it was not possible to prove that there are positive effects of PRONAF on the improvement of socioeconomic indicators, which indicates that the resources of the Program are not being allocated correctly in order to promote the expected benefits in regions with low socioeconomic indexes.

As recommendations for future studies, it is suggested that new econometric studies involving PRONAF data, also with other socioeconomic indicators, be conducted in order to validate whether they also influence the results of the program. In addition to *in loco* researches on rural properties in order to assess directly with farmers what significant changes occur on their properties with the use of the Program. In addition, the author's opinion is that the period and/or region of study should be extended, as well as comparing data from the 2006 and 2017 Agricultural Censuses. These suggestions corroborate a greater understanding of the results, scope and fulfillment of the program objectives.

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