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Política Pública de apoio ao desenvolvimento de APLs uma análise do impacto em Minas Gerais, Brasil

Public policy to support the development of LPA's:
an impact analysis in Minas Gerais, Brazil

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Abstract

The understanding that local productive arrangements (LPAs) are development-friendly justifies the intensification of the government's actions to support them, which can occur through specific public policies, for example. Although there are different ways to analyze public policies related to LPA's and numerous studies on this matter, few of them have focused on their influence on development. In this context, this study analyzes public policies that support the development of LPAs in Minas Gerais, Brazil, considering their impacts on development. The article clarifies the understandings of public policies, public policy analysis, and public policies to promote the development of LPAs, and used data on the performance of municipalities from 2005 to 2015. In order to identify the impact of the public policies related to LPAs through the average effect of treatment-on-the-treated (TOT) estimate, the research applied the propensity score matching (PSM) and the difference-in-differences (DID) techniques. The use of PSM suggested that the polices had a significant and positive impact on GDP (0.788) (a proxy for economic development) and IFDM (0.103) (a proxy for socio-economic development). As for the DID, the results indicate no significant impact on GDP and an IFDM of -0.0278. Several factors may explain these results, such as the variables used, most related to economic development, and the period analyzed. The study contributes to the literature due to the adoption of procedures that enabled the systematized identification of the impacts of public policies supporting the development of LPAs in Minas Gerais, Brazil.

Keywords: Public administration. Local productive arrangement. Development. Impact analysis. Public policy.

Política Pública de apoio ao desenvolvimento de APLs uma análise do impacto em Minas Gerais, Brasil

Resumo

O entendimento de que os arranjos produtivos locais (APLs) são contextos favoráveis ao desenvolvimento, justifica a intensificação das ações dos representantes do poder público para apoiar seu desenvolvimento, a exemplo das políticas públicas desenvolvidas. Diferentes formas de análise dessas políticas foram implementadas. Entretanto, apesar do considerável número de estudos desenvolvidos, poucos trabalhos se dedicaram a observar sua influência no desenvolvimento. Neste contexto, objetivou-se analisar a política pública de apoio ao desenvolvimento dos APLs de Minas Gerais considerando seus impactos no desenvolvimento. Para tanto foram observados entendimentos sobre Políticas Públicas, Análise de Políticas Públicas, Políticas Públicas para promoção do desenvolvimento dos APLs. Foram utilizados dados sobre o desempenho dos municípios referentes ao período de 2005 a 2015. Para identificar o impacto da política pública, por meio da estimação do efeito médio de tratamento sobre o tratado, optou-se pelas técnicas *Propensity Score Matching* e Diferença em Diferença. Contatou-se um impacto significativo e positivo para o PIB (0,788) (*proxy* para desenvolvimento econômico) quanto para o IFDM (0,103) (*proxy* para desenvolvimento socioeconômico) com o *Propensity Score Matching*. Entretanto, com a Diferença em Diferença, o impacto observado no PIB não foi significativo e no IFDM-0,0278. Diversos fatores podem influenciar os resultados, a exemplo das variáveis utilizadas, mais relacionadas ao desenvolvimento econômico, o período analisado dentre outros. Como contribuição do estudo destaca-se a adoção de procedimentos que possibilitaram identificar de forma sistematizada os impactos da política pública de apoio ao desenvolvimento dos APLs de Minas Gerais.

Palavras-chave: Administração Pública. Arranjo Produtivo Local. Desenvolvimento. Análise de Impacto. Política Pública.

Política Pública de Apoyo al Desarrollo de APL: un análisis del impacto en Minas Gerais

Resumen

La comprensión de que los arreglos productivos locales (APL) son contextos favorables al desarrollo, justifica la intensificación de las acciones de los representantes del poder público para apoyar su desarrollo, a ejemplo de las políticas públicas desarrolladas. Se han implementado diferentes formas de análisis de estas políticas. Sin embargo, a pesar del considerable número de estudios desarrollados, pocos trabajos se dedicaron a observar su influencia en el desarrollo. En este contexto, el objetivo fue analizar la Política Pública de Apoyo al Desarrollo de los APL de Minas Gerais considerando sus impactos en el desarrollo. Para ello, se observaron concepciones sobre políticas públicas, análisis de políticas públicas y políticas públicas para la promoción del desarrollo de los APL. Se utilizaron datos sobre el desempeño de los municipios correspondientes al período de 2005 a 2015. Para identificar el impacto de la política pública, a través de la estimación del efecto promedio del tratamiento sobre el tratado, se optó por las técnicas Propensity Score Matching y Diferencia en Diferencia. Se registró un impacto significativo y positivo para el PIB (0,788) (proxy para desarrollo económico) y para el IFDM (0,103) (proxy para desarrollo socioeconómico) con el Propensity Score Matching. Sin embargo, con la Diferencia en Diferencia, el impacto observado en el PIB no fue significativo y en el IFDM fue de -0,0278. Diversos factores pueden influenciar los resultados, a ejemplo de las variables utilizadas, más relacionadas con el desarrollo económico y el período analizado, entre otros. Como contribución del estudio se destaca la adopción de procedimientos que posibilitaron identificar de forma sistematizada los impactos de la Política Pública de Apoyo al Desarrollo de los APL de Minas Gerais.

Palabras clave: Administración Pública. Arreglo productivo local. Desarrollo. Análisis de impacto. Política pública.

INTRODUCTION

A public policy is of a government response to the demands of a particular group, involving a diversity of actors and interests, the exercise of power, resulting in benefits and effects, as well as implying in the implementation of a decision made after discussions considering different perspectives (SOUZA, 2006; RUA, 1997, 2009).

According to the authors, government representatives who develop public policies seek, in general, to promote development, and aim for the common good.

In the last twenty years, it is possible to say that governments have focused on development from the economic point of view, carrying out activities to promote local economy (BRASIL, 2004; CASTRO and GONÇALVES, 2014; TEIXEIRA, 2008). Examples of this focus include federal and state policies to support the development of local productive arrangements (LPAs) (BRASIL, 2004; MINAS GERAIS, 2006).

LPAs are "territorial agglomerations of economic, political and social actors with a focus on a specific set of economic activities that are incipient" (LASTRES and CASSIOLATO, 2003, p. 3, our translation). They constitute a favorable context for the government to act, as it has the intention to support the development of local economies.

This behavior can be justified by the fact that: i) policies are more effective in agglomerations than when directed to individual companies; ii) LPAs are promising environments to apply benefits such as specialization, market dynamism, knowledge building, interaction, cooperation, and learning; iii) LPAs contribute to increasing employment and income.

Works that address public policies for LPAs explore topics such as elaboration (CARDOSO, SANTOS and POLACINSKI, 2016), influence (ALBINO, LIMA, SOUZA et al., 2010; MASQUIETTO, SACOMANO NETO and GIULIANI, 2010), impact analysis (BARROSO and SOARES, 2009; GARONE, MAFFIOLI, NEGRI et al., 2014), and the relationship between public policies and development (DIAS, 2011; JACOMETTI, CASTRO, GONÇALVES et al., 2016; MACEDO, ARAÚJO and CAMPOS, 2014).

These studies demonstrate that public policies for LPAs improve their results and promote local development (DIAS, 2011; BARROSO and SOARES, 2009). However, it is crucial to appropriately establish the limits of the LPA when implementing a policy, due to the local characteristics that can facilitate or hinder the activities (ALBINO, LIMA, SOUZA et al., 2010; MASQUIETTO, SACOMANO NETO and GIULIANI, 2010).

The analysis of public policies, for the authors above, is a tool to provide better outcomes, adapting the policy to the specificities of its beneficiaries. However, it is also important to understand the extent to which policy outcomes are consistent with the planning undertaken. This study intends to contribute to the field of policy analysis by examining the public policy supporting the promotion of LPAs in the Brazilian state of Minas Gerais, considering its impacts in terms of development.

Aligned with the argument by Garone, Maffioli, Negri et al. (2014), this study recognizes the relevance of Minas Gerais in the area of LPAs due to its participation in the national economy and the high concentration of small and medium enterprises specialized in producing footwear, clothing, furniture, building materials, and electronics.

The study assumes that LPAs benefited by public policies present better results than non-benefited ones. It analyzes the effectiveness of such policies and, based on the findings, provides recommendations to improve public policies designed to promote LPAs development and their impact on society.

Public policies for development

This section presents concepts on public policies, public policies analysis, and public policies for LPAs.

Public policies

Harold Dwight Lasswell's (1958) understanding of public policy is based on three questions: Who wins what? Why? and What difference does it make? The answers to these questions point to the beneficiaries and benefits of public policy, its purpose, and reason for benefiting a group (and implicitly, the reason for developing a specific public policy).

For Lasswell (1958), public policy involves an action to benefit a specific group who, because of particular characteristics, needs attention. In this concept, benefitting this group will result in improving its prior condition.

The contributions by Lasswell (1958) clarify some important points regarding public policies, which can be explored based on the concepts presented below.

Bergue (2013) emphasized that public policies are coherent sets of decisions, options, and actions of the public administration, intended to meet the aspirations of a collective, and guided by the public interest.

Public policy is effective when there is a public interest to be addressed. Therefore, identifying this interest and how to achieve the related goals are challenges inherent in the process of elaboration and implementation of public policies.

According to Rua (1997) and Secchi (2016), the question "why?" is central to the concept of public policy. For Rua (1997), public policy is a set of formal and informal procedures that express power relations and are intended for the peaceful resolution to conflicts over public goods or the set of decisions and actions related to the imperative allocation of values. For Secchi (2016), public policy is a guideline designed to address a public problem.

Other authors such as Souza (2006), Dias and Matos (2012), Fonseca (2013) and Howlett, Ramesh and Prel (2013), adopt a concept that aims to explain public policy emphasizing the question "what difference does it make?" For them, the focus is on the changes a policy intends to make.

For Souza (2006), public policy is the government in action. It is important to evaluate its performance and make changes to improve the services provided. Fonseca (2013) is aligned with this understanding, adding that public policy is a process of political decisions that materialize in goals and expected outcomes, usually linked to the transformation of a given reality.

Dias and Matos (2012), recognize the participation of other actors in the policy-making process. They argue, in addition, that public policy is a measure employed to establish fair conditions so that everyone can achieve an improvement in the quality of life compatible with human dignity.

Howlett, Ramesh and Prel (2013) propose a concept that encompasses all the others above. For them, public policy is an intentional action by governments that contains either one (or several) coordinated goals – however poorly identified, justified, and formulated – or means to be implemented – regardless of how well the means are interconnected with the goals.

The authors, echoing the pioneer concepts by Dye (1984), Peters (1986), Lynn (1980) and Mead (1995), also point out that public policy represents the government in action, and that this action is performed in a context of conflicts of interest and multiple demands.

Public policy analysis

Debates on public policy analysis have intensified since the 1960s (IMAS and RIST, 2009). This advance is explained by the increasing complexity of the problems that policymakers face and the growing need to build and apply knowledge to solve problems in the public sector. Public policy analysis is used to evaluate the performance of a political program, considering its processes and outcomes, and it may be understood as a phase of the policy cycle (FISCHER, MILLER and SIDNEY, 2007).

The analysis of public policy consists of comparing the expected and the obtained outcome, carrying out a systematic and objective process that determines how significant and compensatory a policy is (RIST, BOLOY and MARTIN, 2011). A consistent analysis observes some elements that are worth highlighting. Rua (1997), Cohen and Franco (2000, 2007), and Imas and Rist (2009) emphasize the importance of the analysis' goals, which can range from achieving social improvement to promoting accountability and transparency.

Kusek and Rist (2004), and Fischer, Miller and Sidney (2007) emphasize the focus on the expected outcomes, as they influence the tools used and skills required. Imas and Rist (2009), the purpose of the analysis – ethical, managerial, decision-making, educational, motivational – must be stressed, as it defines the direction of the public policy.

Rua (1997) and Fischer, Miller and Sidney (2007) present other elements to be observed in the evaluation, which can be summarized in the following questions: i) are the stakeholders known? ii) are the goals and proposed actions in line? iii) are the indicators relevant for assessing the outcomes? and iv) are the analysis criteria consistent with processes and outcomes?

Rua (1997) contributes to the debate by discussing the criteria for policy analysis: i) efficacy - producing the expected outcomes, regardless of the cost or the means; ii) efficiency - producing the expected outcomes at the lowest cost, using the best means; iii) effectiveness - the production of permanent direct or indirect outcomes, designated as impacts, producing positive externalities; and iv) equity - makes it possible to contribute to reduce inequalities and exclusion, and promote sustainability, which enables social changes.

Public policies for the development of local productive arrangements

As for the public policies for the development of LPAs, this section discusses existing public policies, using the questions proposed by Lasswell (1958) 'Who wins what?' 'Why?' and 'What difference does it make?'

Among government initiatives to support LPAs, federal and state policies stand out. In Brazil, these policies were designed and implemented top-down, and state policies result from actions developed to meet federal government determinations.

Although the stakeholders such as the beneficiaries are usually not engaged in the elaboration of these policies, the initiatives are characterized as applying coordinated actions, since the expected outcomes are convergent, focusing on supporting the development of LPAs and, consequently promoting the development of the area where they are located. Examples of these aspects are the Brazilian federal policy (Inter-ministerial Ordinance 200/2004), and the policy of the state of Minas Gerais (Law 16296/2006).

The federal policy elaborated and proposed general guidelines for the coordinated action to support the development of LPAs throughout the country. The policy of the state of Minas Gerais aimed to support the development of LPAs by: i) strengthening regional productive activity by stimulating the complementarity of local productive chains; ii) consolidating activities of local small and medium-sized enterprises through mutual cooperation and with public research institutions; iii) stimulating the development of innovation capacity and collective efficiency at the regional level; iv) publicizing opportunities for taking advantage of external occurrences favorable to the activity, at the regional level; v) favoring the growth of the state's economy, improving wealth distribution through the production chains and the productive reinvestment; vi) facilitating the increase and equitable distribution of income and job opportunities, as well as the improvement of work quality.

The beneficiaries were identified through a study conducted in 2009, in partnership with the Brazilian Development Bank (BNDES), the Federal University of Santa Catarina (UFSC), LPA Research Network (REDESIST), and the Foundation of Socioeconomic Research (FEPESE) (BOTELHO, 2009). Thirty-four LPAs were identified, based on criteria of relevance of the businesses involved (number of companies and employees), LPA's participation in the region's economy, level of cooperation and collaboration between the companies in the arrangement, perspectives for the sector and companies in the region, prospects for job creation and quality jobs (MINAS GERAIS, 2015).

The identified LPAs were in 174 cities of the state of Minas Gerais and their activities were concentrated in the craft drink sector (alembic "cachaça"), biotechnology, footwear, footwear and bags, clothing, electronics, floriculture, fireworks, fruit farming, foundry, gems and precious stones, gems and jewelry, furniture, soapstone, quartzite (BOTELHO, 2009). Seven LPAs in Minas Gerais benefited from the federal government Growth Acceleration Program (PAC APL MG): LPA in Jaíba (fruit farming); LPA in Cláudio (foundry); LPA in the metropolitan region of Belo Horizonte (RMBH) (biotechnology); LPA in RMBH (footwear and bags), LPA in Santa Rita do Sapucaí (consumer electronics); LPA in Ubá (furniture); and LPA in Nova Serrana (footwear) (MINAS GERAIS, 2015).

The program's activity aimed to increase companies' productivity and competitiveness. The policy, developed in line with the state's development plan, was effective in fostering the development of the LPAs and, consequently, in the development of the state of Minas Gerais.

Studies on public policies for local productive arrangements

The studies that address public policies for LPAs include themes related to elaboration (CARDOSO, SANTOS and POLACINSKI, 2016), influence (ALBINO, LIMA, SOUZA et al., 2010), impact analysis (BARROSO and SOARES, 2009; GARONE, MAFFIOLI, NEGRI et al., 2014), and relationship with development (DIAS, 2011; JACOMETTI, CASTRO, GONÇALVES et al., 2016; MACEDO, ARAÚJO and CAMPOS, 2014).

The study by Cardoso, Santos and Polacinski (2016) sought to establish a theoretical reflection on strategy, development, and LPA, and to present a practical case on defining strategies during the construction of the LPA development plan for family agribusiness of the region of Missões, in the Brazilian state of Rio Grande do Sul (RS).

The study identified specific demands for the development of the LPA, showing the government the potential to promote the development of the region by investing in the LPA. The results show the importance of the definition of strategies to guide the implementation and execution of the LPA development plan, as well as for the development of the region of Missões. This is an example of building a development plan with the participation of different actors. The characteristics of the LPA were considered in order to enhance the development process.

To analyze the evolution, the discussions about the role of entrepreneurial actions, and the influence of public policies on the furniture industry of Ubá, Minas Gerais, Albino, Lima, Souza et al. (2010) addressed the development of an LPA in the context of globalization.

The authors found that i) public policies had minimal participation in the emergence and development of the LPA; ii) it is necessary to investigate the diversity of the companies in the LPA to propose adequate tailor-made policies; iii) entrepreneurial action played a decisive role in the development of the LPA.

The study by Albino, Lima, Souza et al. (2010) addresses the influence of public policy on the development of LPAs and offers insights on potentialities and limitations to policymakers.

Barroso and Soares (2009) analyzed a set of policies implemented in an LPA in the area of sheep farming, based on the understanding of LPAs as a strategy for local development.

The authors reviewed the public policies for development and strengthening the LPA, and identified the activities developed and implemented by the local actors to increase productivity, bring technology and management innovation, credit facility and quality of the herd.

With the study, the authors found that public policies had a significant impact on the region's breeders, who experienced improvements in herd management processes and production, which represents a significant gain for LPA participants.

The work by Garone, Maffioli, Negri et al. (2014) is another example of public policy analysis. The authors aimed to study the impact of federal public policy supporting LPAs on the performance of small and medium enterprises (SMEs).

Their study differs from that of Barroso and Soares (2009), as the LPAs of the states of São Paulo and Minas Gerais were analyzed based on data related to employment growth, the total value of exports, and the probability of exporting, through the model of fixed effects with weighted methods. Based on their understanding of the LPA development policy, SME performance, and spillovers, the authors concluded that the LPA policy had a direct positive impact on employment and exports.

Specifically, the authors evidenced short-term negative effects on employment in the first year after the implementation of the policy, and positive spillovers on medium and long-term export outcomes. The research findings highlight that, when evaluating a public policy, it is necessary to consider that there are periods where the effects over the performance are still not visible.

The relationship of public policy with development was the scope of studies by Dias (2011), Jacometti, Castro, Gonçalves et al. (2016), and Macedo, Araújo and Campos (2014), which aimed to i) analyze the importance of territorial agglomerations, with emphasis on LPA, for the development of Brazilian regions; ii) identify how public policies explain the marked economic development of LPA; and iii) analyze the implementation of LPAs, respectively.

These studies were different regarding their objectives, location, and type of LPA examined. Dias (2011) analyzed the government Secretaries of Regional Programs; Jacometti, Castro, Gonçalves et al. (2016) studied the LPA in the city of Arapongas (RS), operating in the area of furniture; and Macedo, Araújo and Campos (2014) studied LPAs in the area of plastic and tools, in the region of ABC, in the state of São Paulo (SP). Regarding the data collection technique, Dias (2011) and Jacometti, Castro, Gonçalves et al. (2016) used interviews and Macedo, Araújo and Campos (2014), adopted documentary research.

Dias (2011) found that the implementation of the policy resulted in better performance for the LAPs, which revealed to be instruments for local development in the region they operate. Jacometti, Castro, Goncalves et al. (2016) found that the conditions of the institutional environment changed the technical environment and supported the pattern of development observed. However, the conditions of the institutional environment did not meet the expectations regarding the firms' improvement of competitiveness and expected economic benefits due to fragile social relations, unable to provide trust among local actors or reduce isolation in small groups and individual competition. Macedo, Araújo and Campos (2014) identified the critical role of the government in the tool LPA and the volume of investments made by the plastic LPA in the region.

The results obtained in these studies contribute to the discussions on public policy, LPAs and development: i) LPAs are recognized as favorable environments for the implementation of public policies for local development, given their responsiveness to stimuli received (DIAS, 2011); ii) in the LPAs it is necessary to pay attention to the relationships of the actors, as limitations related to social relations may result in the ineffectiveness of a policy (JACOMETTI, CASTRO, GONÇALVES et al., 2016), and iii) the creation of public policies and partnerships with developing educational and research institutions, essential to building LPAs (MACEDO, ARAÚJO and CAMPOS, 2014).

METHODOLOGY

Adopting the instructions designed by Cooper and Shindler (2016), this study is a qualitative and quantitative descriptive research, based on the concepts of public policies and public policies analysis, obtained through bibliographic research.

The study examined 853 municipalities of the Brazilian state of Minas Gerais (MG), using secondary data about the LPAs performance indicators (BOTELHO, 2009) collected through documentary research – as described by Gil, (2002) –, the study analyzed the period from 2005 to 2015 (Box 1). The available data allowed to analyze the LPAs, and the research conducted intensive comparisons to meet the goals established.

Box 1
Variables used in the study

	Variable	Source	Theoretical support	Effect observed
Dependents	FIRJAN index of municipal development (IFDM)	FIRJAN	Leite Filho and Fialho (2015); Moreira, Lyra, Macedo et al. (2013).	Proxy adequate to measure socio-economic development.
Dependents	Gross Domestic Product (GDP)	SIDRA-IBGE	Andrade, Teixeira and Fortunato (2014); Degenhart, Vogt and Zonatto (2016).	Proxy adequate to measure economic development.
Independents	Total municipal revenues (Munrev)	SEF-MG	Avellaneda and Gomes (2017); Vieira, Abrantes and Ferreira (2017).	Proxy adequate to measure economic development.
Independents	Active companies (Active)	CAGED/RAIS	Ford and Souza (2009); Tisott, Schmidt and Waquil (2017).	Proxy adequate to measure economic development.
Independents	Value Added Tax (VAT)	SEF-MG	Gonçalves, Nascimento and Wilbert (2016); Silva, Santos and Cavalcante (2017).	Positive relation to development.
Independents	Active Links (ActLink)	CAGED/RAIS	Borges, Porto and Dias (2017); Tisott, Schmidt and Waquil (2017).	Positive relation to development.
Dummies	Investment in LPAs (Invest)	MDIC	Dias (2011); Jacometti, Castro, Gonçalves et al. (2016); Macedo, Araújo and Campos (2014).	Positive relation to development.
Dummies	D_Year		Assume value 1 for the years 2006 to 2015, period after the policy implementation, and 0 for 2005, period before the policy implementation	
Dummies	Treated		Assume value 1 for municipalities present in the LPAs benefitted by the policy and 0 for those not benefitted.	
Dummies	D_Yeartreated		Represents the interaction between the dummies year and treated.	

Source: Elaborated by the authors.

To identify the impact of the policy on the development of the LPAs, the study used the techniques Propensity Score Matching and difference-in-differences, with the support of the Stata® software, estimating the average treatment effect.

The study used the following procedures to carry out the Propensity Score Matching technique: forming the control group to allow unbiased estimation; identification of matching model and metric; means and bias tests before and after matching; calculation of treatment on treated effect (TOT).

The impact of public policy was observed by comparing the performance of municipalities, according to the variables presented in Table 1, considering whether or not the policy was implemented. This impact involves speculation about the performance of municipalities if they were not part of an LPA benefited by a public policy. As it was not possible to observe this performance (presence and absence of the policy) in the same municipality for the same period, a control group was created.

Just as the public policy to support the development of LPAs, the beneficiaries are chosen based on criteria consider the performance of the LPAs. In the identification of the treated and control groups, the matching technique (ROSENBAUM and RUBIN, 1983) was chosen, using the matching metric to the nearest neighbor. Thus, the following probit model was estimated, expressed by:

psmatch2 Treated ActLink Munrev Active Vat if year == 0, neighbor (5) common ties (1)

The matching resulted in the selection of 1,190 municipalities, 440 treated (LPAs in areas of biotechnology, footwear, red ceramics, clothing, electronics, fireworks, fruit farming, foundry, gems and jewels, and furniture) and 750 municipalities in the control group. To ensure that the control and treatment groups are balanced and within the common support region, mean difference testing was performed before and after matching to verify that the set of variables are balanced. Also, bias testing was conducted to examine whether the bias was reduced after matching.

The Kolmogorov-Smirnov Normality Test indicated no normality in the dataset. In this case, the most suitable means test was the Kruskal–Wallis test. At a significance level of 95%, the null hypothesis was rejected, because before matching the samples did not have the same mean. After matching, with the Kruskal–Wallis test, it was found, at a significance level of 95%, that the null hypothesis should not be rejected.

After identifying the treatment and control groups, it was possible to calculate the TOT:

$$\text{IFDM: } attnd\ IFDM\ Treated\ [pweight = \_weight],\ pscore\ (score2)\ comsup \qquad (2)$$

$$\text{PIB: } attnd\ GDP\ Treated\ [pweight = \_weight],\ pscore\ (score2)\ comsup \qquad (3)$$

Using the difference-in-differences technique as suggested by Heckman, Ichimura and Todd (1997), the following hypotheses were met: i) common trend (both control and treatment groups should follow the same trend); ii) no difference between groups prior to program implementation; and iii) existence of a region where there is common support.

The difference-in-differences technique makes it possible to observe changes in the performance of treatment and control groups, considering the results observed before and after the implementation of the public policy.

The matching procedures used in Propensity Score Matching were repeated. Two fixed-effects models were used to observe variations, calculated based on the observed average results for treatment and control groups that occurred before (2005) and after (2015) policy implementation, described as follows:

$$xtreg\ IFDM\ Year\ Treated\ Invest\ YearxTreated,\ fe\ i\ (Municipality) \qquad (4)$$

$$xtreg\ GDP\ Year\ Treated\ Invest\ YearxTreated,\ fe\ i\ (Municipality) \qquad (5)$$

The difference-in-differences technique was conducted testing the average difference before and after matching, to confirm that the treatment and control groups meet the specifications. For all these tests, suitable conditions were identified to employ the technique.

The results of the estimates made using the techniques Propensity Score Matching and difference-in-differences are presented in the next section.

RESULTS AND DISCUSSION

To identify the impact of public policy for the development of LPAs, the study used information related to the performance of municipalities of Minas Gerais and economic and social developments as indicators (see Box 1), whose proxies are GDP and IFDM, respectively. Table 1 describes the results of the Propensity Score Matching.

Table 1
Treatment effect on IFDM and GDP 2005 -2015

Treated		Treated	Control	TOT	Std. Err.	t
IFDM	2005 to 2013	368	424	**0.069**	0.006	10.678
IFDM	2005 to 2014	396	450	**0.077**	0.006	12.226
IFDM	2005 to 2015	440	750	**0.103**	0.005	20.117
GDP	2005 to 2013	368	424	**0.601**	0.049	12.275
GDP	2005 to 2014	396	450	**0.642**	0.045	14.274
GDP	2005 to 2015	440	750	**0.788**	0.038	20.932

Source: Elaborated by the authors based on research data.

For the period from 2005 to 2015, the municipalities in the benefited LPAs (treatment group), presented 10.3% increase in socio-economic development (5% significance level) (t = 20.117) and an increase of 78.8% in economic development (5% significance level) (t = 20.932) which denotes a significant impact, corroborating the results observed in 2013 and 2014.

In addition to Propensity Score Matching, policy impact can be identified using the difference-in-differences technique.

According to the results of the estimates shown in Table 2 below, considering the period from 2005 to 2015, participation in the policy had no significant impact on economic development, considering a 5% significance level (t = 2.21). While for socioeconomic development a negative impact of -2.78% was identified, considering a 5% significance level (t = - 2.43). In this case, unlike that observed with the Propensity Score Matching, only in the period 2005-2013 was a positive and significant impact on GDP identified.

Table 2
Result of difference-in-differences technique on GDP and IFDM 2005-2015

		Coef	Std. Err	t	P>t
GDP	$D2013_t$	.3762143	.0133046	28.28	0.000
	Politica APLS$_i$	(omitted)			
	$PoliticaAPLS_i \times D2013_t$	.0611667	.0276957	2.21	0.028
	_cons	5.098515	.0082433	618.51	0.000
GDP	$D2014_t$	.2390415	.0519743	4.60	0.000
	Politica APLS$_i$	(omitted)			
	$PoliticaAPLS_i \times D2014_t$	-.0346882	.1059957	-0.33	0.744
	_cons	5.024225	0320299	156.86	0.000
GDO	$D2015_t$	.2565573	.0509331	5.04	0.000
	Politica APLS$_i$	(omitted)			
	$PoliticaAPLS_i \times D2015_t$	-.0268952	.1038721	-0.26	0.796
	_cons	5.024225			
IFDM	$D2013_t$	.1124021	.0048816	23.03	0.000
	Politica APLS$_i$	(omitted)			
	$PoliticaAPLS_i \times D2013_t$	-.0178331	.0101618	-1.75	0.081
	_cons	594439	.0030245	196.54	0.000
IFDM	$D2014_t$	.1279259	.0051285	24.94	0.000
	Politica APLS$_i$	(omitted)			
	$PoliticaAPLS_i \times D2014_t$	-.0231941	.010459	-2.22	0.028
	_cons	.5847503	.0031605	185.02	0.000
IFDM	$D2015_t$	.1059446	.0056083	18.89	0.000
	Politica APLS$_i$	(omitted)	.0313882	160.07	0.000
	$PoliticaAPLS_i \times D2015_t$	-.0278446	.0114374	-2.43	0.016
	cons	.5847503	.0034562	169.19	0.000

Source: Elaborated by the authors based on research data.

As highlighted, it was assumed that the LPAs are environments favorable for development (LASTRES and CASSIOLATO, 2003) and that making investments enhances their capacity and promotes development (DIAS, 2011; JACOMETTI, CASTRO, GONÇALVES et al., 2016; MACEDO, ARAÚJO and CAMPOS, 2014). Despite the different techniques, the results may be used for comparison.

Propensity Score Matching tests show results that point to a positive and significant effect of public policy on the development of LPAs. Such as in the study by Garone, Maffioli, Negri et al. (2014), who considered data on job growth, the total value of exports, and the likelihood of exporting, this study showed a direct positive impact on employment and exports. Although different, the variables used in both studies are related to economic growth.

The public policy goals and the variables used may justify the differences. The policy focuses on economic development by fostering the most important economies in the state. The variables used both for matching and selecting the LPAs to take part in the policy, are variables related to the economic context.

During the research, other variables seeking to characterize the municipalities from the socio-economic point of view were tested, but it was not possible to balance them. The variables considered were spending on health, education, housing, social services, and infrastructure, among others, and they were removed from the data set.

The discussions conducted by Cardoso, Santos and Polacinski (2016), Albino, Lima, Souza et al. (2010), and Barroso and Soares (2009) also provided insights into the results obtained.

Cardoso, Santos and Polacinski (2016) observed the participation of different actors and the particularities of the LPA that enhance its development. Their study point to the need to examine variables – beyond the ones related to the economic development – that are equally important when elaborating public policies, variables dealing with factors that may influence socioeconomic development and not considered in this research, which may explain the differences found.

Similarly, Albino, Lima, Souza et al. (2010) showed potentials and limitations of a public policy. For the authors, it is necessary to investigate the diversity of the companies that are part of the LPA in order to propose appropriate policies directed to the different types of companies. Demands for LPA development must address development in all its dimensions. The results obtained in this study may have been influenced by the actions taken in the policy-making phase, since the economic dimension of development has a prominent role, with more significant impact on economic development at the expense of socio-economic development.

Finally, Barroso and Soares (2009) demonstrate that public policies developed and implemented by local actors are effective. These authors clarify that, with due specificities, the involvement of actors from different levels of government may help improve public policy.

Regarding the use of the difference-in-differences technique, it is possible to argue that the results may have been influenced by specific issues that occurred in 2005 and 2015. These issues were intensified by the implementation of the policy (or promoted it).

The municipalities with LPAs presented positive average variation in the period from 2005 to 2015. The Munrev grew 28% for Arremu, VAT 42%, active companies increased 64%, ActLink 97%. GDP and IFDM had a positive average variation of 75% and 92%, respectively. For the Propensity Score Matching the variations were 85%, 49%, 97%, 100% respectively for Munrev, VAT, Active, ActLink; with GDP and IFDM behaving similarly (75% and 94% respectively).

However, the majority of municipalities had a significant reduction in Munrev and VAT. Other variables connected to those used in this study may have influenced the results obtained in the difference-in-differences technique, considering that the behavior of the dependent variables (GDP and IFDM) did not change during the years examined.

The studies by Avellaneda and Gomes (2017), Vieira, Abrantes and Ferreira (2017), about municipal revenue; and Gonçalves, Nascimento and Wilbert (2016) and Silva, Santos and Cavalcante (2017), about value-added tax; indicate the existence of a positive relationship between these variables and the development of the municipality. This understanding may justify the results of the estimates made with the difference-in-differences technique since in most municipalities there was a reduction in the value of Munrev and VAT.

FINAL CONSIDERATIONS

Public policy analysis has received particular attention regarding the impact of policies, being the subject of debates exploring different perspectives. These impacts are not always easily perceived since they are not directly associated with the goals of the public policy.

The study analyzed the public policy to support the development of the LPAs in the Brazilian state of Minas Gerais, considering their impacts on development and using the techniques of Propensity Score Matching and difference-in-differences.

Through the Propensity Score Matching technique, the results show that there was a significant and positive impact of public policy supporting LPAs for both GDP (a proxy for economic development) and IFDM (a proxy for socio-economic development). The interpretation of the coefficients shows that the investments made through this policy increased economic development by 78.8% and socioeconomic development by 10.3%.

However, the application of the difference-in-differences technique did not identify the impact on GDP. The results showed that participation in the public policy reduced socioeconomic development by 2.78%, considering a significance level of 5% (t = 2.43).

In general, corroborating Dias (2011), Jacometti, Castro, Gonçalves et al. (2016), and Macedo, Araújo and Campos (2014), this study found that government investment in LPAs generates positive impacts on development when the analysis uses the Propensity Score Matching technique.

It is necessary to state that the variables available and the period considered for the analysis of an ongoing policy such as the one studied here, may be considered as research limitations. However, the results suggest the need for future research in the field, such as analyzes involving public policies to support LPAs in all Brazilian states, adopting a comparative perspective. Also, it is crucial to carry out further research to identify the factors that influence the divergent results obtained when applying different techniques.

Finally, this study managed to identify, in a systematized way and using different techniques, the impacts of public policy to support the development of the LPAs in the state of Minas Gerais, which is an advance in the literature on this issue.

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