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The Relationship Between Crime Indicators and Spending on Public Safety in Brazilian States

Indicadores de Criminalidade Relacionados ao Gasto com Segurança Pública nos Estados Brasileiros
Indicadores de Criminalidad relacionados con el Gasto en Seguridad Pública en los Estados Brasileños

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Abstract

Research objective: This paper aims to investigate the relationship between crime indicators and spending on public safety in Brazilian states during the period from 2010 to 2018.
Theoretical framework: This research is theoretically based on the Theory of Public Spending, the Theory of Crime, and Public Spending versus Criminality.
Methodology: The sample consists of the population of all Brazilian states during the analyzed period, totaling 211 observations. They were analyzed using a regression with panel data.
Results: The results reveal that crime indicators are positively and significantly related to public safety expenditures and also reveal that the effect of dummy region variables on public security expenditure was statistically neutral, because they were not statistically significant in determining spending.
Originality: This study extends our knowledge by testing this model with crime variables (such as homicides, fatal assaults, rapes, vehicle thefts, firearm seizures, and drug trafficking). It also proposes investigating whether their incidence in these regions is statistically significant in decreasing or increasing crime.
Theoretical and practical contributions: The analyzed data suggests that the allocation of public safety spending is inefficient in combatting crime and public policies are needed to combat crime to avoid the effects illustrated by the Broken Window Theory. Furthermore, it contributes by conducting an empirical investigation, providing statistical evidence regarding dummy region variables which are neutral and not significant in determining public safety expenditures.
Keywords: Crime Indicators, Public Safety Expenditures, Theory of Crime.

Resumo

Objetivo da pesquisa: O trabalho propõe investigar os indicadores de criminalidade relacionados ao gasto com segurança pública nos estados brasileiros durante o período de 2010 a 2018.
Enquadramento teórico: A pesquisa utiliza como base teórica estudos sobre a teoria do gasto, teoria do crime, criminalidade e gastos em segurança pública.
Metodologia: A amostra é composta pela própria população, isto é, os dados dispostos no período analisado de todos os estados brasileiros, contendo assim 211 observações, que foram analisados através da técnica de regressão com dados em painel.
Resultados: Os resultados revelaram que os indicadores de criminalidade estão positivamente relacionados de forma significativa com a despesa com segurança pública, bem como revelam que o efeito das variáveis

dummy (regiões) é estatisticamente igual no tocante ao gasto com segurança pública, visto que elas não são estatisticamente significantes para determinar o gasto, ou seja, as regiões não influenciam no gasto em segurança pública a partir das variáveis utilizadas.
Originalidade: O estudo estende o conhecimento, ao testar o modelo com as variáveis da criminalidade (homicídio dolosos, latrocínios, estupros, roubo de veículos, armas apreendidas e tráfico de entorpecentes), bem como propor a investigação se a incidência nas regiões é ou não estatisticamente significante para diminuição ou aumento da criminalidade.
Contribuições teóricas e práticas: Os dados analisados levam a crer que a função alocativa de gasto em segurança pública é ineficiente no combate ao crime, sendo necessárias políticas públicas que venham a combater a criminalidade para casos como o ilustrado pela Teoria das Janelas Quebradas sejam evitados. Ademais, contribui por meio da investigação empírica analítica, ao trazer evidências estatísticas no tocante às variáveis *dummy*, representadas pelas regiões, que se comportam estatisticamente iguais e não são significantes para determinar os gastos com segurança pública.
Palavras-chave: Indicadores de Criminalidade, Gasto com Segurança Pública, Teoria do Crime.

Resumen

Objetivo de la investigación: Propone investigar indicadores de criminalidad relacionados con el gasto en seguridad pública en los estados brasileños durante el período de 2010 a 2018.
Marco teórico: La investigación utiliza como base teórica estudios sobre teoría del gasto, teoría económica del crimen, criminalidad y gasto en seguridad pública.
Metodología: La muestra de investigación está compuesta por la propia población, o sea, los datos ordenados en el período analizado de todos los estados brasileños, totalizando así 211 observaciones, que fueron analizadas utilizando la técnica de regresión con datos de panel.
Resultados: Los resultados revelaron que los indicadores de criminalidad se relacionan positiva y significativamente con el gasto en seguridad pública, así como también revelaron que el efecto de las variables *dummy* (regiones) es estadísticamente igual con respecto al gasto en seguridad pública, ya que no son estadísticamente significativas para determinar el gasto, esto es, las regiones no influyen en el gasto en seguridad pública.
Originalidad: El estudio amplía el conocimiento probando el modelo con variables de criminalidad (homicidio doloso, robo, violación, hurto de vehículos, armas incautadas y narcotráfico), así como proponer si la incidencia en las regiones es estadísticamente significativa o no para la disminución o aumento de la delincuencia.
Aportes teóricos y prácticos: Los datos analizados sugieren que la función de asignación de gastos en seguridad pública es ineficiente en la lucha contra el crimen, siendo necesarias políticas públicas que aborden la criminalidad para evitar casos como los ilustrados por la Teoría de las Ventanas Rotas. Además, contribuye a través de la investigación empírica analítica, al propocionar evidencias estadísticas en relación con las variables dummy, representadas por las regiones, que se comportan estadísticamente de manera similar y no son significativas para determinar los gastos en seguridad pública.
Palabras clave: Indicadores de Criminalidad, Gasto en Seguridad Pública, Teoría Económica del Crimen.

1 INTRODUCTION

According to the Brazilian Forum on Public Safety (2019), 91 billion reais were spend on public safety in 2018, and even though the rate of intentional violent deaths was roughly 10% less than the previous year, more than 57 thousand deaths occurred due to criminal acts, compared to an average of 60 thousand intentional violent deaths recorded annually from 2014 to 2017 (Fórum Brasileiro de Segurança Pública, 2018).

Various Brazilian authors have portrayed the preoccupying way in which urban violence and criminality have been growing over the past few decades and have also investigated the efficiency of the allocation of scarce public funds in public safety (Cerqueira & Lobão, 2004; Costa & Grossi, 2007; Schull, Feitósa & Hein, 2014; Galdino, Guimarães & Carmo Filho, 2015; Silva & Scherer, 2023).

Within this context, the emerging concern with public safety in Brazil is that gains have not been observed in crime indicators despite the increasing amount of money that has been invested in this area during the past decade as demonstrated by Morais Filho *et al*. (2011).

From 2012 to 2016, according to the Brazilian Forum on Public Safety (2016), there were 262,020 cases of murder, in which one agent seeks to take the life of another. This number, as well as being large in itself, is greater than the total number of victims in Colombia's civil war from 1948 to 1953, which according to Guizado (1991) claimed around 200,000 victims. Nonetheless, these numbers have diminished, given that according to the Brazilian Annual Report on Public Safety - ABSP (2019), in 2017 and 2018 105,039 murders occurred or 52,520 per year, which represents a reduction from the 2012-2016 annual average of 65,505.

The scientific discussion of the econometric model of public spending versus criminality began with Becker's seminal study (1968), as pointed out by Eide, Rubin e Shepherd (2006). However, even though the aspects of health (Hitiris & Posnett, 1992; Queiroz *et al*., 2013; Baltagi *et al*., 2017; Figueiredo *et al*., 2018) and education (Castro, 2007; Silva & Almeida, 2012; Mercan & Sezer, 2014) spending have been widely discussed, there is no consensus on state spending on public safety.

According to the Brazilian Annual Report on Public Safety (2019), it has been pointed out that Brazil does not have the habit of documenting, monitoring, and evaluating public spending in the public safety sector. Thus, a gap has been identified in terms of empirical studies applied to public safety spending.

Fajnzylber, Lederman, and Loayza (2000) provide a good portrait of criminality by showing that public safety is the second greatest concern of Brazilians, surpassed only by unemployment. In this sense, this increase in criminality in Brazil in recent years is leading academia to focus more on studies regarding this subject (Fajnzylber *et al*., 2000; Cerqueira & Lobão, 2004; Grossi, 2007; Santos & Kassouf, 2008; Schull, Feitósa & Hein, 2014; Duenhas, Gonçalves & Gelinski Júnior, 2014; Araújo *et al.*, 2020, Silva & Scherer, 2023).

This increase in crime can be noted through the number of murders, which from 2015 to 2018 surpassed 240,000 (Fórum Brasileiro de Segurança Pública, 2019). In terms of Brazilian states, the North of Brazil stands out with the four highest rates of intentional violent deaths per 100 thousand inhabitants (which encompasses murders and fatal assaults). Within this context, three states from the North stand out: Roraima with 66.6 (1st place), Amapá with 57.9 (2nd place), and Pará with 54.6 (4th place). The Midwest, South, and the Southeast present lower crime rates per 100 thousand inhabitants (Fórum Brasileiro de Segurança Pública, 2019).

In a complementary manner, Pinto and Coronel (2015) point out that the intensity of crime causes restrictions in the locations where it occurs, meaning that it is also related to the economic situation of a given location, because according to Becker and Kassouf (2017), crime is a social issue that has a negative influence on the public's quality of life.

In terms of measuring crime, according to Santos and Kassouf (2008), most empirical studies that verify the relationship between crime and other variables use the murder rate as a proxy for

measuring it. This is because of the difficulty in obtaining data related to this subject as has been reported by Santos and Kassouf (2008) and Bohn, Dalberto, Ervilha, and Gomes (2015).

Thus, in terms of the crime indicators adopted in this study, they have been extracted from the data available in the Brazilian Annual Report on Public Safety (ABSP), selecting the following indicators: murders, fatal assaults, rapes, vehicle thefts, drug trafficking, and firearm seizures.

Given this, the following research problem can be enunciated: what is the influence of crime indicators on public safety spending in Brazilian states?

The relevance and justification of this study is due to the context which Brazil has been experiencing, characterized by an increase in intentional violent deaths from 53,646 to 63,895 from 2013 to 2017, with an increase each year (Fórum Brasileiro de Segurança Pública, 2018).

This is a subject that has received attention not only within a scientific context, but also due to the violence that is registered every day by information on the radio, in the newspapers, and on television. Moreover, this study is unique in using Brazilian public data extracted from the ABSP, together with data from the Brazilian Institute of Geography and Statistics (IBGE), to expand the studied period as well as include the drug trafficking variable which is still usually ignored in public safety studies, as indicated by Entorf and Winker (2008).

Considering that crime has been a central issue in the context of country development, given its influence on various layers of society (Pinto, & Coronel, 2015), this study seeks to contribute to the literature by providing an empirical investigation that offers statistical evidence which will fill the gap in understanding regarding the relationship between crime indicators and public safety spending in the states of Brazil.

In dealing specifically with spending on public safety, Brazilian studies in the national literature such as Schull, Feitósa, and Hein (2014), Bohn *et al.* (2015), Araújo *et al.* (2020), and Silva and Scherer (2023), among others, have used the non-parametric Data Envelopment Analysis methodology to determine spending efficiency, but there are few studies that present factors that are related to, or are determinants of, spending on public safety. This study seeks to innovate by studying these crime aspects in terms of public safety as well as their regional context.

Thus, this article seeks to deepen our understanding of this subject, given that the relationship of crime indicators with Brazilian spending on public safety has not been thoroughly explored academically. Moreover, this study's results offer significant contributions to governance in terms of the management and formulation of public safety policies that directly affect society.

2 THEORETICAL REFERENCES

2.1 **Spending on Public Safety and the Theory of Public Spending**

Crime is not only a social problem; it is also an economic problem that should be treated as a priority, because a lack of security hurts the economy in a general manner causing stagnation in areas that are essential to improving the social well-being of a community (Nascimento & Teixeira, 2016). Thus, countries with high indices of crime and social inequality tend to have fewer resources, and as a result, have little to invest in public safety as noted by Yin *et al*. (2017), in addition to the issue of the quality of allocating the money that is raised.

Based on this context, Galdino, Guimarães and Carmo Filho (2015) inform us that despite the efforts of Brazilian states, the allocation of spending on public safety is not efficient. Inefficiency in the allocation of spending makes it difficult to solve crime problems like the murder rate.

These budgetary allocations are classified in the Manual of Public Sector Accounting in a functional manner by functions and subfunctions which define the governmental area where the spending will be realized. By virtue of this, the public safety function is subdivided into four functions: policing,

civil defense, information and intelligence, and other subfunctions (Brasil, 2018). The distribution of this spending over the past five years is displayed in Table 1:

Table 1: Percentage Distribution of Spending on Public Safety by Subfunction

	2014	2015	2016	2017	2018
Policing	30.47%	34.20%	30.02%	30.17%	33.84%
Civil defense	3.32%	4.32%	3.88%	4.41%	4.19%
Information and intelligence	1.77%	1.14%	1.64%	0.74%	0.74%
Other subfunctions	64.45%	60.34%	64.45%	64.69%	61.23%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Prepared by the author based on the Brazilian Annual Reports on Public Safety (2015, 2016, 2017, 2018, 2019)

Thus, from Table 1 we can perceive that spending on public safety from 2014 to 2018 remained constant in percentage terms. The year of 2018 stands out given that the Brazilian Forum on Public Safety (2019) states that roughly 91 billion reais was spent on public safety in Brazil, which was equivalent to 1.34% of Brazil's GDP in 2018. In addition, there is worrisome data in the form of just 0.74% of public safety spending being devoted to information and intelligence. This is one of the points which could explain the current elevated level of crime, because according to Mingardi (2007) and Gomes (2009) the intelligence subfunction is one of the main factors in combatting crime.

To Cerqueira and Lobão (2004), the data up through the 20th century show the great limitation in the efficiency of resources devoted to public safety in the sense of diminishing crime indices such as homicide. Therefore, these studies make us perceive the importance of accounting given that, according to Schull, Feitósa, and Hein (2014), it forms the basis for decision making in terms of where and how much is invested in given sectors of public administration.

In this way, spending on public safety is a financial alternative to maintain the stability of society, and it can significantly inhibit the growth of crime if it is accompanied by investments in education (Yin *et al*., 2017). In any event, in Brazil it may be perceived that rising spending on public safety in recent years (Souza & Minayo, 2017; Fórum Brasileiro de Segurança Pública, 2019) does not mean that it is being well spent. It may be noted, for example that the value went from 71.4 billion reais in 2014 to 84.7 billion reais in 2017 (Fórum Brasileiro de Segurança Pública, 2018).

Within this context, this spending has a political-ideological aspect, as Santos, Gontijo, and Amaral (2015) note, with public safety in Brazil being neglected, due to, among other factors, the postures of both the left-wing and right-wing political parties, and these political ideas have influenced manager decision making in terms of investment allocations, because according to the authors, violence and crime are the results of clashes of interests that directly and indirectly influence economic investments.

To understand the Theory of Public Spending we have Wagner's Law, written in 1880, which indicates a causal relationship between government spending and economic development by showing that the participation of government in the economy will grow with the dynamic of the country's economic growth (Upender & Ramakrishna, 1994, Ukwueze, 2015). The understanding of the reasons for the growth of government spending became clearer with Downs' study (1957). Thus, analyzing public spending is a central issue in the public economy and the public finance literature (Ukwueze, 2015).

Dows (1957) argues that the actions of government managers in allocating resources do not happen in an altruistic manner representing the public interest, but rather occur to further their own interests. In this sense, investment in the area of public safety can be defined according to their individual ideas.

By virtue of this, Bergstrom and Goodman (1973) believe that the costs of supplying these public goods and services are supported by the community. Therefore, we can make an allusion to the financial situation, because in terms of public spending, the connection between spending and satisfying the population's basic needs should be understood (Berne & Schramm, 1986).

This connection is mentioned by various studies of public finances, however, according to Tiebout (1956), the Theory of Public Spending comes from the Theory of Public Finance proposed in an article by Musgrave and Samuelson (1954) entitled "The Pure Theory of Public Expenditure". Tiebout's study (1956) focuses on the idea of "local government" as an allocation sector for public goods, based on which public finance studies perform analyses in the municipalities and states.

A few years later, Fisher (1961) performed a preliminary analysis of the determinants of public spending in the United States, and the main findings indicated that demographic density, the degree of urbanization, and per capita income were able to explain most public spending. Corroborating this idea, Berne and Schramm (1986) as well as Lima and Diniz (2016), explain that public spending is stipulated by a group of social, economic, political, geographic, and demographic factors.

Within this context, we can summarize the Theory of Public Spending using Wagner's Law in which the rhythm of the growth of public spending is greater than the level of revenue and economic growth of a given locality, or in other words, public spending has increased over time as noted by Jaelani (2018). In view of this, the Theory of Public Spending assumes that when per capita income increases, government spending will also increase. Thus, the general growth of public spending in industrialized societies in recent years has become a fact (Facchini, 2019).

2.2 **The Economic Theory of Crime and Criminality**

Gary Becker, in his article "Crime and Punishment: an Economic Approach", was the first author to investigate criminality based on economics (Eide *et al*., 2006), bringing the relationship of this subject to the behavioral area with what he called the microeconomic rationality of criminality. Becker (1968) stated that the fact of committing a crime or not is the result of comparing the success and failure of a possible activity, that is, its "cost/benefit" which leads to the conclusion that this problem is naturally multidimensional and should be studied as such.

A study by Phillips and Voltey (1972) showed that crime grew in California because spending on public safety did not accompany its growth. One of the explanations for this finding materializes in a study by Freeman (1999) which points out that crime comes to be a market scenario in which one criminal substitutes another, or in other words, there is an elevated elasticity in the supply of crime.

In analyzing the aspects of the Theory of Crime, Block and Heineke (1975) perceived that some criminals envision crime as a second job. A similar situation was noted by Cameron (1988) who argued that people who commit crime have an "income target" in his analysis of the crime economy.

In a complementary manner, Chamlin (1990) in verifying the determinants of police spending in Chicago perceived that idiosyncratic historical processes can affect the relationships between environmental factors and criminality. This finding is in line with Becker's affirmation (1968) that more enlightened societies that are aware of the cost/benefits associated with public policies in the fight against crime require governments to guarantee an ideal level of policing.

The importance of policing can also be observed in Wilson and Kelling (1982), who pointed out that after the beginning of the Safe and Clean Neighborhoods Program, which included police foot patrols, the indices of criminality were not reduced, but residents felt more secure than residents in other neighborhoods and believed that crime had diminished.

Giving continuity to this idea, Wilson and Kelling (1982) discuss the Broken Windows Theory, explaining that criminality is tied in an inextricable manner to communities which have an elevated level of disorder. Metaphorically, if a window in a building remains broken it will probably lead to all of the other windows being broken. This underlines how important maintaining public order is to combatting crime.

This is true of all types of crime, because as argued by Welsh, Braga, and Bruinsma (2015), minor problems, such as begging and graffiti, serve as an invitation for more serious infractions or crimes in these neglected areas.

In turn, a German study by Entorf and Winker (2008) contradicts Becker's idea and presents the "drug" variable which is added to the econometric model, given that the economic theory of crime seems to ignore the presence of "crime due to drugs", while the criminological literature indicates that the use of illicit drugs is one of the main reasons for criminal activity.

Given this, it becomes necessary to identify and typify the crime indicators analyzed in this study, such as: homicides, fatal assaults, rapes, vehicle thefts, firearm seizures, and drug trafficking.

The Brazilian penal code (Law nº 11,343, 1940) describes the crime of homicide as killing someone intentionally, while fatal assault occurs in a practical manner as robbery followed by death.

Rape is defined by Article 213 of the Brazilian penal code as forcing someone through violence or the threat of violence to practice any libidinous act (Decree-Law n. 2848, 1940).

Robbery is a crime that is typified by Article 157 of the Brazilian penal code as taking a movable object through violence or the threat of violence after diminishing the individual's chances of resistance (Decree-Law n. 2848, 1940). In this study, the vehicle thefts indicator has been selected due to its greater availability from the Brazilian Forum on Public Safety as compared to other types of robbery statistics.

Finally, the firearm seizures variable represents the number of arms apprehended by states due to their illegal use or drug trafficking which is defined in Article 33 of Law nº 11,343, known as the Drug Law (Law n. 11,343, 2006).

Thus, the selected crimes are divided into three groups:

- Intentional fatal violent crimes (IFVCs): homicides, fatal assaults;
- Sexual crimes: rapes;
- Other forms of crime: vehicle thefts, firearm seizures, drug trafficking.

2.3 **Research Hypotheses**

Based on the seminal work of Becker (1968) which gave birth to the economic model of crime where variables represent the deterrence effect, there is a positive correlation between spending on public safety and crime rates. We can add to it studies realized by Silva (2015) and Ferreira & Ferreira (2018), as well the data available through the Annual Reports of Public Safety (ABSP), which show that intentional fatal violent crimes, all crimes that result in death, have increased in Brazil in recent years. Thus, the following hypothesis is proposed:

H1: There is a positive relationship between intentional fatal violent crimes and spending on public safety.

In addition, the data available from ABSP also demonstrates that violent sexual crimes have also increased in Brazil in recent years, reaching a total of 180 cases per day in 2018, which was the highest number since 2013 (until this year) (Fórum Brasileiro de Segurança Pública, 2019). Thus, since rape is a form of crime against sexual freedom and one of the cruelest acts of violence, this study seeks a deeper understanding of the relationship between this crime indicator and spending on public safety through the following hypothesis:

H2: There is a positive relationship between crimes against sexual freedom and spending on public safety.

In terms of another aspect, Entorf and Winker (2008) show the relationship between drugs with crime. The vehicle theft variable also grew in absolute terms between 2015 and 2017 and then began to fall. The number of firearm seizures, meanwhile, remained relatively constant from 2013 to 2018 (Fórum Brasileiro de Segurança Pública, 2019) and crime studies have not verified a relationship between these variables and spending on public safety. Given this, this study's third research hypothesis is:

H3: There is a positive relationship between other types of crime and spending on public safety.

The following crime indicators are used in this study: homicides, fatal assaults, rapes, vehicle thefts, drug trafficking, and firearm seizures, with homicides and fatal assaults being classified as IFVCs, rapes as crimes against sexual freedom, and the last three are classified as other types of crimes.

3 MATERIALS AND METHODS

In accordance with Sampieri et al. (2013), this study is primarily quantitative in nature and features an empirical-analytical approach. In terms of objectives, according to Sampieri et al. (2013), studies can be classified as exploratory, descriptive, correlational, or explanatory. Using these terms, this study is classified as correlational given that it verifies the relationship between two or more variables, and exploratory because it analyzes a little studied area and seeks to broaden previous investigations.

To achieve this, this study has collected data from three distinct databases. Accounting data regarding spending on public safety and crime indicators was extracted from the Annual Reports of the Brazilian Forum on Public Safety - ABSP. The demographic population density information came from the Brazilian Institute of Geography and Statistics (IBGE), while state income was obtained from the web portal of the National Treasury Secretariat (STN) through Summary Budgetary Reports (RREOs) for each Brazilian state for the period under examination.

The study's data sample included population figures for all of the Brazilian states from 2010 to 2018. This time period was selected because some of the variables featured in the Annual Reports of the Forum on Public Safety were available just for this period.

In terms of the data for the dependent variable, it was obtained from the ABSP, together with the crime indicators (explanatory variables) which represent homicides, fatal assaults, rapes, vehicle thefts, firearm seizures, and drug trafficking, and all of them are displayed in Text Table 1.

Text Table 1: Summary of Independent and Dependent Variables in the Final Model

Variables	Abbrev.	Formula/Description	Data Source	Previous Studies	Expected Sign
Spending on Public Safety Per Capita	spend	$\frac{Spending\ on\ public\ safety}{Number\ of\ inhabitants}$	ABSP	Tiebout (1956), Fisher (1961), Araújo *et al.* (2020).	Dependent variable
Homicides	homic	$\left(\frac{Numbeer\ of\ homicides}{Number\ of\ inhabitants}\right) * 100.000$	ABSP	Duenhas, Gonçalves, Gelinski Júnior (2014); Araújo *et al.* (2020).	+

Fatal Assaults	assaults	$\left(\frac{Number\ of\ fatal\ assaults}{Number\ of\ inhabitants}\right) * 100.000$	ABSP	Araújo *et al.* (2020).	+
Rapes	rapes	$\left(\frac{Number\ of\ rapes}{Number\ of\ inhabitants}\right) * 100.000$	ABSP	Araújo *et al.* (2020).	+
Vehicle Thefts	vehthefts	$\left(\frac{Numbere\ of\ vehicle\ thefts}{Number\ of\ inhabitants}\right) * 100.000$	ABSP	Not verified in other studies	+
Firearms seized	arms	$\frac{Number\ of\ firearms\ seized}{Number\ of\ inhabitants} * 100.000$	ABSP	Not verified in other studies	+
Drug Trafficking	drugs	$\frac{Number\ of\ drug\ traffickin}{Number\ of\ inhabitan} * 100.000$	ABSP	Entorf and Winker (2008)	+
Northern Region	north	Dummy variable which represents states in the North	-	Not verified in other studies	+
Northeastern Region	northeast	Dummy variable which represents states in the Northeast	-	Not verified in other studies	+
Southern Region	south	Dummy variable which represents states in the South	-	Not verified in other studies	-
Southeastern Region	southeast	Dummy variable which represents states in the Southeast	-	Not verified in other studies	-
Midwestern Region	midwest	Dummy variable which represents states in the Midwest	-	Not verified in other studies	Reference Region

Source: Prepared by the author (2022).

In turn, control variables that have presented a significant influence on public safety spending were included: population density and per capita income as displayed in Text Table 2.

Text Table 2: Summary of the Control Variables

Variables	Abbrev.	Formula / Description	Data Source	Previous Studies	Expected Sign
Per Capita Income	income	$\frac{Revenues}{Number\ of\ Inhabitants}$	State Data on STN Web Portal	Fisher (1961), Ukwueze (2015)	+
Population Density	density	$\frac{Population}{Area}$	IBGE	Fisher (1961), Shelton (2007)	-

Source: Prepared by the author (2022).

In order to verify whether crime indices exert an influence on public safety spending, two models were estimated, the first without the dummy variables, and the second with the dummy variables, in accordance with the following equations:

$$Spend_{i,t} = \beta 0 + \beta 1 homicassaults_{i,t} + \beta 2 rapes_{i,t} + \beta 3 vehthefts_{i,t} + \beta 4 drugs_{i,t} + \beta 5 arms_{i,t} + \beta 6 income_{i,t} + \beta 7 density_{i,t} + \varepsilon (1)$$

$$Spend_{i,t} = \beta 0 + \beta 1 homicassaults_{i,t} + \beta 2 rapes_{i,t} + \beta 3 vehthefts_{i,t} + \beta 4 drugs_{i,t} + \beta 5 arms_{i,t} + \beta 6 income_{i,t} + \beta 7 density_{i,t} + \beta 8 north_{i,t} + \beta 9 northeast_{i,t} + \beta 10 south_{i,t} + \beta 11 southeast_{i,t} + \beta 12 midwest_{i,t} + \varepsilon (2)$$

in which Spend = the annual value spent on public safety per capita from 2010 to 2018 in each Brazilian state, homicassaults = the number of homicides and fatal assaults per one hundred thousand inhabitants of state *i* during period *t,* rapes = the number of rapes per one hundred thousand inhabitants of state *i* during period *t*, vehthefts = the number of vehicle thefts per one hundred thousand inhabitants of state *i* during period *t*, arms = the number of firearms seized per one hundred thousand inhabitants in state *i* during period *t*, drugs = the number of cases of drug trafficking per one hundred thousand inhabitants in state *i* during period *t*, north = a dummy variable which represents the states in the northern region, northeast = a dummy variable which represents the states in the northeastern region, south = a dummy variable which represents the states in the southern region, southeast = a dummy variable which represents the states in the southeastern region, midwest = a dummy variable which represents the states in the midwestern region (which is the regional reference), income = the per capita income (or revenues) of state *i* during period *t*, density = the population density of state *i* during period *t*, and ε = the regression's error term.

Thus, a regression with panel data was selected for this study, because the sample is made up of sectional (Brazilian states) and temporal (years) data, and it was treated and analyzed using the *Stata* software package.

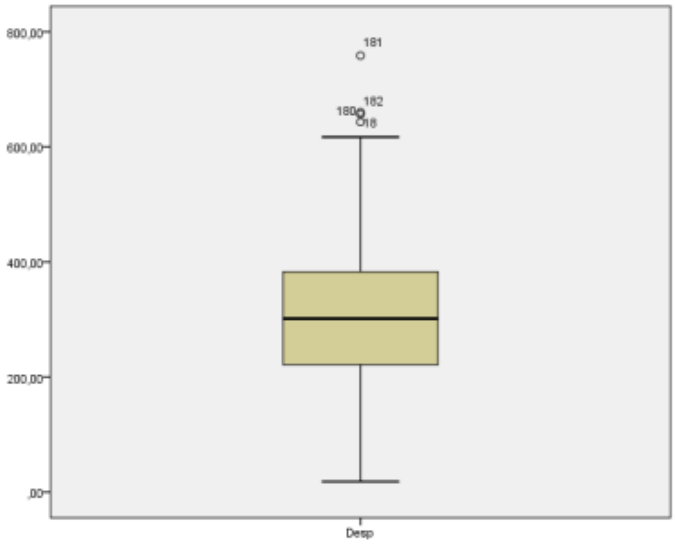
4 RESULTS AND DISCUSSION

4.1 **Descriptive statistics**

The initial research sample consisted of 214 observations from 26 states during the period from 2010 to 2018, however the distribution was not normal as was determined by employing the

Kolmogorov-Smirnov and Shapiro-Wilk tests for the dependent variable. Thus, the outliers were treated (as illustrated in Figure 1) with the exclusion of the three most extreme values which yielded normality that had a significance greater than 0.05.

Figure 1: Boxplot of the Spending on Public Safety Variable



Source: Elaborated with research data (2022).

The values removed from the sample were from the State of Roraima for the years 2015, 2017 and 2018 which presented the respective values of per capita Spending on public safety of R$643.30, R$758.75, and R$656.80.

Thus, after excluding the outliers this study consisted of data for 26 states for the period from 2010 to 2018 with 211 observations per variable. The descriptive statistics for this data are displayed in Table 2.

Table 2: Descriptive Statistics for the Explanatory Variables (Crime Indicators)

Variables	N	Average	Standard Deviation	Minimum	Maximum
Homicides	211	28.87	0.90	5.50	72.88
Fatal Assaults	211	1.25	0.05	0.03	5.41
Homicides and Fatal Assaults	211	30.12	0.92	6.09	74.00
Rapes	211	29.11	1.00	4.29	70.38
Vehicle Thefts	211	88.21	4.44	5.47	318.83
Drug Trafficking	211	58.72	2.60	0.70	244.60
Firearm Seizures	211	36.98	1.63	2.40	144.50

Source: Prepared with research data (2022).

In terms of the descriptive analysis, Table 2 displays a sample made up of 211 observations with great variations between the maximum and minimum values for several indicators, taking into account the way the data was stored or provided. Nonetheless, it is understood that this data comes from official government or state sources as listed in the Annual Reports of the Brazilian Forum on Public Safety.

Through descriptive statistics we can see that the analyzed crimes with the greatest averages are Vehicle Thefts, followed by Drug Trafficking and Firearm Seizures. Thus, we note that these crimes occur with greater frequency in terms of every 100,000 inhabitants.

Table 3: Descriptive Statistics for the Dependent Variable and the Control Variables

Variables	N	Average	Standard Deviation	Minimum	Maximum
Spending on Public Safety	211	304.63	8.80	18.48	660.35
Per Capita Income	211	3462.08	96.21	1236.66	9085.98
Population Density	211	75.75	8.16	2.01	515.94

Source: Prepared with research data (2022).

In turn, Table 3 presents descriptive statistics for the dependent variable Spending on Public Safety which displays an elevated variation between the minimum and maximum values, as do the control variables Per Capita Income and Population Density. It should be noted that the Per Capita Income variable presented the largest standard deviations, because this Per Capita Income comes from taxes, and the larger the population, the greater the revenues will tend to be. In a complementary manner, Yan (2011) and Bartoluzzio *et al*. (2020) state that revenues or income depend on the economic activities performed in a given region.

Next, in order to verify the correlations among the study variables, the Pearson correlation was calculated for the independent and control variables as displayed in Table 4. We can observe the predominance of correlations that were significant at 1% and several which were significant at 5%. There is only one high correlation (above 0.5) between Vehicle Thefts and Population Density. However, the obtained coefficients indicate that the independent variables do not have high correlations among themselves, which indicates the absence of multicollinearity.

Table 4: Bivariate Correlations of the Indicators

	HomicAssaults	Rapes	VehThefts	Drugs	Arms	Income	Density
HomicAssaults	1.000	1.000					
Rapes	-0.243***	-0.114**					
VehThefts	0.234***	0.109	1.000	1.000			
Drugs	0.072	0.335***	-0.037	-0.045	1.000		
Arms	0.073	0.483***	0.297***	0.357***	0.295***	1.000	1.000
Income	-0.237***	-0.086	0.125**	0.118**	0.096	0.341***	
Density	-0.030		0.512***				

Note. *** Statistically significant at 1%; ** Statistically significant at 5%. Source: Elaborated with research data (2022).

Given this, to verify whether there was multicollinearity we employed the VIF (Variance Inflation Factor) as is displayed in Table 5.

Table 5: VIF Results

Variable	VIF	1/VIF
HomicAssaults	1.42	0.705
Rapes	1.67	0.600
VehThefts	1.65	0.606
Drugs	1.70	0.588
Arms	1.60	0.623
Income	1.68	0.596
Density	1.65	0.606
Average VIF	**1.62**	

Source: Prepared with research data (2022).

Thus, in the final model obtained with the application of the VIF test it is possible to infer that there are no high correlations between the explanatory variables in this study, or in other words, there is no multicollinearity given that the average VIF is 1.62.

That being so, after performing these tests it was possible to analyze the econometric models which will be presented in Section 4.2 below.

4.2 **Econometric Analysis**

As stated in the methodological procedures, to analyze the relationships between the crime indicators and spending on public safety we verified Equations 1 and 2 to estimate the regression models.

Thus, we estimated both models, with the first omitting the presence of the regional dummy variables and the second including them. The South and Southeast variables represent the South and Southeast of Brazil, while the North and Northeast variables represent the North and Northeast of Brazil, and the Midwest variable represents the Midwest of Brazil, which is the reference region.

Tests were conducted on both models. First of all, the Breusch-Pagan test was employed as the null hypothesis of unobserved effects in which H0 was rejected. Thus, panel data rather than pooled data needed to be used. Then the Hausman test was used to identify whether the model's effects should be random or fixed. Since the p-value was greater than 0.05, random effects were used.

To decide between Equation 1 or 2, the second model including the dummy variables was run and this confirmed that the model should have panel data with random effects, as can be seen in Table 6. In this manner, no further tests were deemed necessary, given that the model had panel data with random effects, as indicated by Gujarati & Porter (2011) and Fávero & Belfiore (2017).

The tests indicated the use of a model with random effects, which according to Fávero (2013) assumes that $\beta 0$ is purely random and not related to the regressors. That being so, the estimate was performed based on GLS (Generalized Least Square) estimators, which have the main advantage that this model estimates all of the coefficients and marginal effects. In addition, according to Corman and Mocan (2000), the utilization of models with panel data for crime data and other variables is advantageous, because they can verify the temporal and spatial dimensions of the data.

Table 6: Results of the Estimates for the Model with Dummy Variables

Spending	**Coefficients**	**Standard Errors**	**Z**	**p-values**
HomicAssaults	1.374420	0.801515	1.71	0.086*
Rapes	1.621703	0.733202	2.21	0.027**
VehThefts	0.3919927	0.130908	2.99	0.003***
Drugs	0.7273042	0.275519	2.64	0.008***
Arms	0.7853884	0.320415	2.45	0.014**
North	22.502010	58.34112	0.39	0.700
Northeast	-35.71190	59.13830	-0.60	0.546
South	-80.99413	68.25152	-1.19	0.235
Southeast	-12.49217	88.52830	-0.14	0.888
Income	0.0225491	0.008985	2.51	0.012**
Density	-0.201815	0.235223	-0.86	0.391
Constant	64.84543	61.84045	1.05	0.294

Note. *** Statistically significant at 1%; ** Statistically significant at 5%; * Statistically significant at 10%.
Source: Elaborated with research data (2022).

Thus, after all of the tests were performed, Model 2 was used to determine spending on public safety, presenting an R^2 of 0.46, while Model 1's R^2 was 0.40. In this manner, the results of the regression with panel data and random effects demonstrated that the final model conforms with Equation 2, with an R^2 of 0.46.

$$Spending_{i,t} = 64.84 + 0.80homicassaults_{i,t} + 0.73rapes_{i,t} + 0.13vehthefts_{i,t} + 0.27drugs_{i,t} + 0.32arms_{i,t} + 0.008income_{i,t} - 0{,}20density_{i,t} + 22.50north - 35.71northeast - 80.99south - 12.49southeast + \varepsilon \quad (2)$$

Given this, here is the analysis of the results presented in Table 6. With the findings obtained in the final model, Hypothesis H1 is rejected at 5% despite its positive association, due to the fact that the HomicAssaults variable (odds = 0.80, p = 0.086), the sum of the homicide and fatal assault indicators per 100 thousand inhabitants of the states, is statistically significant at 10%. Therefore, even though H1 cannot be rejected at 10%, this study employs a confidence level of 95%.

Within this context, from the econometric results it is possible to infer that intentional fatal violent crimes are not related with per capita spending on public safety in Brazilian states, which indicates the need to improve public policies as pointed out by Silva (2015) and Ferreira & Ferreira (2018), who mention the importance of estimating the performance of public policies in fighting crime and the elevated rates of IFVCs in Brazilian states.

Hypothesis H2, meanwhile, cannot be rejected because Rapes (odds = 0.73, p = 0.027) is positive and statistically significant. This confirms that crimes against sexual freedom are related to spending on public safety, and this is where the role of the state enters in ensuring the safety of individuals. Since it is necessary to improve public policies related to rapes to diminish these crimes and leave "rape culture" behind, it should be remembered, as Campos *et al*. (2017) point out, that rape culture is linked to Brazil's colonial past and slavery.

In Table 6, it may also be observed that VehThefts (odds = 0.13, p = 0.003), Drugs (odds = 0.27, p = 0.008), and Arms (odds = 0.32, p = 0.014) are related in a positive and significant manner to per capita Spending with a confidence level of 95%. Thus, Hypothesis H3 cannot be rejected, even though we can see from the ABSP data that there was a growth in these crimes in several states. In this manner, the data obtained was significant in demonstrating that vehicle thefts, drug trafficking, and firearm seizures have an effect on public safety spending in Brazilian states.

These results are in line with the view of the Broken Windows Theory that social disorder in public spaces affects the behavior of individuals in certain locations (Sampson & Raudenbush, 1999, Welsh, Braga & Bruinsma, 2015). Therefore, there is a relationship between these crime indicators and public safety spending to control the growth of these crimes.

In terms of the control variables, Density has a negative coefficient, which indicates that the lower it is, the greater public safety spending will be, which is in line with the findings of Shelton (2007) who affirms that variables that represent population and urbanization are related to spending on public safety. Thus, this is a possible explanation of the fact that states with lower population density have less public safety and need to invest more in public safety spending. However, Density was not statistically significant for this model.

Income, meanwhile, has a positive and significant relationship with public safety spending which is in line with the Theory of Public Spending, which affirms that as a given location grows and develops economically, public safety spending will be elevated, which is in line with Ukwueze's findings (2015) that indicate that income is one of the determinants of public safety spending.

Moreover, governmental decisions are linked to public policies in that the way in which a government makes its decisions depends on the nature of the relationship between the government and society (Downs, 1957). Thus, according to Downs (1957), governmental decisions are not perfectly altruistic in maximizing social well-being, but are designed to achieve revenue targets, power, and the prestige which accompanies their positions. Based on this, it may be deduced that government managers will make more or less investments in public safety according to their own ideas and their government's plans.

In terms of the dummy variables, it is possible to infer that the effect of the regions is statistically neutral in terms of spending on public safety, given that they are not statistically significant in determining per capita spending on public safety, or in other words, the regions do not influence spending on public safety.

In sum, this model uses panel data with random effects with dummy variables (Equation 2) due to the tests performed, as well as the fact that the R^2 of Model 2 has a greater value than Model 1, and

well as the fact that this enables us to determine whether regions are statistically significant in representing spending on public safety.

5 FINAL CONSIDERATIONS

In the face of the advance of crime in recent years, as well as the incipient nature of research on the relationship between crime indicators and spending on public safety, this article has sought to contribute to the literature by testing hypotheses regarding this relationship.

Thus, this article investigates crime indicators in relation to public safety spending in 26 Brazilian states to test hypotheses that crime indicators positively affect spending on public safety. A database was constructed based on information from the ABSP, STN and IBGE for the years 2010 to 2018. The data analysis included statistical tests that indicated the use of a regression with panel data and random effects, with one model featuring dummy variables for Brazilian regions, and another without these variables.

The results of Model 2 indicate that among the investigated crime variables, that represent homicides, fatal assaults, rapes, vehicle thefts, firearm seizures, and drug trafficking, all are influenced and justified in a positive and statistically significant manner, by spending on public safety in Brazilian states, except the HomicAssaults variable, indicating that the confidence interval of 95% for H1 cannot be accepted, even though it shows a positive association. That being said, the expected signs of the coefficients of the theoretical model were verified by the econometric model, which indicates the consistency of the analyses and the review of the literature. Regions, in turn, behaved in a statistically neutral manner and were not significant in determining spending on public safety.

Thus, this study's purpose has been fulfilled, given that all of the predetermined steps of the methodology were performed, namely the data collection and analysis, the elaboration and estimation of the models, and the processing of the data and its analysis. Moreover, the three states with the highest relative spending on public safety were Roraima, Acre, and Rio de Janeiro.

The relevance of this study in terms of its contribution to the understanding of how the analysis of crime indicators in relation to spending on public safety should also be emphasized, and it can lead to improvements in Brazilian public policies in terms of public safety in its states, which are of more importance than ever given the growing demand to control this problem as noted by Becker & Kassouf (2017) and Silva & Scherer (2023).

In this manner, the presented data suggest that the allocation of spending on public safety is inefficient in the fight against crime. It is thus imperative to avoid situations illustrated by the Broken Windows Theory in terms of lesser as well as more serious crimes.

In terms of contributions, we have the importance of studying this area of great relevance, demonstrating the relationship between spending on public safety and crime, because it still has been the subject of few scientific studies. Given this, this study has contributed to the literature by providing an analytical empirical investigation that provides statistical evidence regarding variables which permit the verification of the relationship between spending on public safety and crime in Brazilian states. This study is also important because it includes population data, which means that the sample consists of the universe of data itself.

In terms of social relevance, this study's results have the potential to provide guidelines for more efficient public policies in the fight against crime, verifying priority areas for investment, at the same time as stimulating debate about the public safety situation in this country.

Finally, it should be noted that the results obtained in this study do not constitute a definitive response in terms of the relationship between crime and spending on public safety, given that this relationship needs to be monitored to verify whether it remains constant over time. In terms of this

study's limitations, there is its scarcity and the difficulty involved in finding crime indicator data, as well as the use of other variables which are not only linked to the context of crime. Therefore, future studies should also use model indicators that can measure other social issues such as education and unemployment.

REFERENCES

Araújo, R. J. R., Freitas Júnior, F. L., Silva, P. E. N. T. B., & Lins, D. C. (2020). Segurança pública estadual brasileira: o que influencia o seu desempenho? *Revista de Administração, Ciências Contábeis e Sustentabilidade*, *10*(1), pp. 89-99.

Baltagi B.H., Lagravinese R., Moscone F., & Tosetti E. (2017). Health Care Expenditure and Income: A Global Perspective. *Health Econ*., *26*(7), pp. 863-874.

Bartoluzzio, A. I. S. S., Rodrigues, S. V. M., & Anjos, L. C. M. (2020). Diversificação e elasticidade das fontes e recursos dos estados brasileiros e suas relações com os déficits de arrecadação. *Administração Pública e Gestão Social*, *12*(3), pp. 1-19.

Becker, G. (1968). Crime and punishment: an economic approach. *Journal of politic economy*, *76*(2), pp. 169-217.

Becker, K. L., & Kassouf, A. L. (2017). Uma análise do efeito dos gastos públicos em educação sobre a criminalidade no Brasil. *Economia e Sociedade*, *26*(1), pp. 215-242.

Bergstrom, T., & Goodman, R. P. (1973). Private Demands for Public Goods. *American Economic Review, 63*(3), pp. 280-296.

Berne, R., & Schramm, R. (1986). *The financial analysis of governments*. New Jersey: Prentice Hall.

Block, M. K., & Heineke, J. M. (1975). A Labor Theoretic Analysis of Criminal Choice. *American Economic Review*, 65(3), pp. 314-325.

Bohn, L., Dalberto, C. R., Ervilha, G. T., & Gomes, A. P. (2015). Efficiency indexes of the spending on the public safety in the cities of the state of Minas Gerais: analysis using the DEA methodology. *Economic Analysis of Law Review*, *6*(1), pp. 34-54.

Brasil. IBGE. (2010). *Censo Demográfico*. Recuperado em 10 abril, 2019, de https://cidades.ibge.gov.br/brasil/panorama.

Brasil. Ministério de Estado do Orçamento e Gestão. (1999*). Portaria nº 42, de 14 de abril de 1999*. Accessed at http://www.orcamentofederal.gov.br/orcamentos-anuais/orcamento-1999/Portaria_Ministerial_42_de_140499.pdf/ on August 28, 2023.

Brasil. Ministério da Fazenda. (2018). *Manual de Contabilidade Aplicada ao Setor Público (MCASP)* (8a ed.). Accessed at http://www.tesouro.fazenda.gov.br/documents/10180/695350/CPU_MCASP+8%C2%AA%20ed+-+publica%C3%A7%C3%A3o_com+capa_3vs_Errata1/6bb7de01-39b4-4e79-b909-6b7a8197afc9 on August 28, 2023.

Cameron, S. (1988). The Economics of Crime Deterrence: A Survey of Theory and Evidence. *Kyklos*, *41*(2), pp. 301-323.

Castro, J. A. (2007). Financiamento e gasto público na educação básica no Brasil: 1995-2005. *Educação & Sociedade*, *28*(100), pp. 857-876.

Cerqueira, D., & Lobão, W. (2004). Criminalidade, ambiente socioeconômico e polícia: desafios para os governos. *Revista de Administração Pública*, *38*(3), pp. 371-399.

Chamlin, M. B. (1990). Determinants of police expenditures in Chicago, 1904-1958. *The Sociological Quarterly*, *31*(3), pp. 485-494.

Corman, H., & Mocanm, H. N. (2000). A time series analysis of crime, deterrence and drug abuse in New York City. *The American Economic Review*, *90*(3), pp. 371-399.

Costa, A., Grossi, B. C. (2007). Relações intergovernamentais e segurança pública: uma análise do fundo nacional de segurança pública. *Revista Brasileira de Segurança Pública*, *1*(1), pp. 6-20.

Decreto-Lei n. 2848, de 6 de dezembro de 1940 (1940). *Código Penal*. Accessed at https://www.planalto.gov.br/ccivil_03/decreto-lei/del2848compilado.htm. on September 1, 2023.

Downs, A. (1957). An economic theory of political action in a democracy. *Journal of Political Economy*, *65*(2), pp. 135-150.

Duenhas, R. A., Gonçalves, F. O., & Gelinski Júnior, E. (2014). Educação, segurança pública e violência nos municípios brasileiros: uma análise de painel dinâmico de dados. *Publicatio UEPG – Ciências Sociais Aplicadas*, *22*(2), pp. 179-191.

Eide, E., Rubin, P. H., & Shepherd. (2006). Economics of Crime. *Foundations and Trends in Microeconomics*, *2*(3), pp. 205-279.

Entorf, H., & Winker, P. (2008). Investigating the drugs-crime channel in economics of crime models: empirical evidence from panel data of the German States. *International Review of Law and Economics*, *28*(1), pp. 8-22.

Facchini, F. (2019). What are the determinants of public spending? An overview of the literature. *Atlantic Economic Journal*, *46*(4), pp. 419-439.

Fajnzylber, P., Lederman, D., & Loayza, N. (2000). Crime and victimization: an economic perspective. *Economía*, *1*(1), pp. 219-278.

Fávero, L. P. L. (2013). Dados em painel em contabilidade e finanças: teoria e aplicação. *Brazilian Business Review*, *10*(1), pp. 131-156.

Fávero, L. P. L., & Belfiore, P. (2017). *Manual de análise de dados*. 1 ed. Rio de Janeiro: Elsevier.

Ferreira, L. H. C., & Ferreira, F. P. M. S. (2018). Crime violento letal intencional em Salvador, Bahia: uma avaliação dos resultados. *Revista do Instituto Brasileiro de Segurança Pública*, *1*(2), pp. 26-47.

Figueiredo, J. O., Prado, N. M. B. L., Medina, M. G., & Paim, J. S. (2018). Public and private health expenditures in Brazil and selected countries. *Saúde em Debate*, *42*(2), pp. 37-47.

Fisher, G. W. (1961). Determinants of state and local government expenditures: a preliminary analysis. *National Tax Journal*, *14*(4), pp. 349-355.

Fórum Brasileiro de Segurança Pública. (2019). *Anuário do Fórum Brasileiro de Segurança Pública*. Ano 13.

_____. (2018). *Anuário do Fórum Brasileiro de Segurança Pública*. Ano 12.

_____. (2016). *Anuário do Fórum Brasileiro de Segurança Pública*. Ano 10.

Freeman, R. B. (1999). The economics of crime. In: Ashenfelter, O. C. & Card, D. (Org.). Handbook of Labor Economics, vol. 3, Part. C (pp. 3529-3571). Elsevier.

Galdino, J. A., Guimarães, M. G. V., & Carmo Filho, M. M. (2015). Análise do desempenho na gestão das despesas orçamentárias com segurança pública no Brasil. *Revista Ambiente Contábil*, *7*(1), pp. 70-88.

Gomes, R. C. (2009). Prevenir o crime organizado: inteligência policial, democracia e difusão do conhecimento. *Revista Segurança Pública & Cidadania*, *2*(2), pp. 107-137.

Guizado, A. C. (1991). El ayer y el hoy de la violencia en Colombia: continuidades y discontinuidades. *Análisis Político*, 12, pp. 23-34.

Gujarati, D. N., & Porter, D. C. (2011). *Econometria Básica*. 5 ed. New York: Mc Graw.

Hitiris, T., & Posnett, J. (1992). The determinants and effects of health expenditure in developed countries. *Journal of Health Economics*, *11*(2), pp. 173-181.

Jaelani, A. (2018). Public expenditure management in Indonesia: Islamic Economic Review on State Budget 2017. SSRN Electronic Journal.

Lei n. 11343, de 23 de agosto de 2006 (2006). *Institui o Sistema Nacional de Políticas Públicas sobre Drogas - Sisnad*. Accessed at https://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/lei/l11343.htm on September 1, 2023.

Lima, S. C., & Diniz, J. (2016). *Contabilidade pública: análise financeira governamental*. São Paulo: Atlas.

Mercan, M., & Sezer, S. (2014). The effect of education expenditure on economic growth: The case of Turkey. *Procedia – Social and Behavior Sciences*, 109, pp. 925-930.

Mingardi, G. (2007). O trabalho da inteligência no controle do crime organizado. *Estudos Avançados*, *21*(61), pp. 51-69.

Morais Filho, O. M., Cario, R. D., & Nogueira, R. A. (2011). Análise dos investimentos em segurança pública no Brasil entre 2000 e 2009. *Revista Brasileira de Segurança Pública*, *5*(8), pp. 38-59.

Nascimento, D. E., & Teixeira, M. A. N. (2016). Segurança pública e desenvolvimento local: experiências do Brasil, Colômbia e Japão. *Revista Brasileira de Planejamento e Desenvolvimento*, *5*(3), pp. 365-385.

Phillips, L., Votey, H. L. (1972). An Economic Analysis of The Deterrent Effect of Law Enforcement on Criminal Activity. *Journal of Criminal Law, Criminology and Police Science*, *63*(3), pp. 330-342.

Pinto, N. G. M., & Coronel, D. A. (2014). A criminalidade no Brasil: uma análise das evidências empíricas. *Revista Brasileira de Administração Científica*, *6*(1), pp. 270-280.

Queiroz, M. F. M., Silva, J. L. M., Figueiredo, J. S., & Vale, F. F. R. (2013). Eficiência do gasto público com saúde: uma análise nos municípios do Rio Grande do Norte. *Revista Econômica do Nordeste*, *44*(3), pp. 761-776.

Sampieri, R. H., Collado, C. H., Lucio, P. B., Morais, D. V., Garcia, A. G. Q., & Silva, D. (2013). *Metodologia de Pesquisa*. 5. Ed. Porto Alegre: Penso.

Sampson, R. J., & Raudenbush, S. W. (1999). Systematic Social Observation of Public Spaces: A New Look at Disorder in Urban Neighborhoods. *American Journal of Sociology*, *105*(3), pp. 603–651

Samuelson, P. A. (1954). The pure theory of public expenditure. *The review of Economic and Statistics*, *36*(4), pp. 387-389.

Santos, I. G., Gontijo, J. G. L., & Amaral, E. F. L. (2015). A política da segurança pública no Brasil: uma análise dos gastos estaduais (1999-2010). *Opinião Pública*, *21*(1), pp. 105-131.

Santos, M. J., & Kassouf, A. L. (2008). Uma investigação econômica da influência do mercado de drogas ilícitas sobre a criminalidade brasileira. *Revista Economia*, *8*(2), pp. 187-210.

Schull, A. N., Feitósa, C. G., & Hein, A. F. (2014). Análise da eficiência dos gastos em segurança pública nos estados brasileiros através da Análise Envoltória de Dados (DEA). *Revista Capital Científico*, *12*(3), pp. 1-15.

Silva, T. P. (2015). Análise espacial e avaliação da vulnerabilidade socioeconômica para crimes violentos letais intencionais (CVLI) no estado de Pernambuco. *Geoingá: Revista do Programa de Pós-Graduação em Geografia*, *7*(2), pp. 60-77.

Silva, J. L. M., & Almeida, J. C. L. (2012). Eficiência no gasto público com educação: uma análise dos municípios do Rio Grande do Norte. *Planejamento e Políticas Públicas*, 39, pp. 219-242.

Silva, P. E. N. T. B., & Scherer, L. M. (2023). Ainda há esperança? Eficiência do gasto com segurança pública no Brasil. *Suma de Negocios*, *14*(31), pp. 144-153.

Shelton, C. A. (2007). The size and composition of government expenditure. *Journal of Public Economics*, 91, pp. 2230-2260.

Souza, E. R., & Minayo, M. C. S. (2017). Public security in a violent country. *Cadernos de Saúde Pública*, *33*(3), pp. 1-4.

Tiebout, C. M. (1956). A pure theory of local expenditures. *The Journal of Political Economy*, *64*(5), pp. 416-424.

Ukwueze, E. R. (2015). Determinantes of the Size of Public Expenditure in Nigeria. *SAGE Open*, *5*(4), pp. 1-8.

Upender, M., & Ramakrishna, G. (1994). Wagner's Law of Public Expenditure: Indian Experience. *Finance India*, *8*(3), pp. 635-647.

Welsh, B. C., Braga, A. A., & Bruinsma, G. J. N. (2015). Reimagining Broken Windows. *Journal of Research in Crime and Delinquency*, *52*(4), pp. 447–463.

Wilson, J. Q., & Kelling, G. L. (1982). Broken Windows. *The Atlantic Online*, 249, pp. 29-38.

Yan, W. (2011). The interactive effect of revenue diversification and economic base on US local government revenue stability. *Public Money & Management*, *31*(6), pp. 419-426.

Yin, Z., Kang, C., Wang, L., Geng, D., & Xiong, Z. (2017). Public security expenditure, education investment, and social stability: an empirical analysis based on provincial panel data from China. *Revista de Cercetare Si Interventie Sociala*, 59, pp. 239-260.