

Juvenile Curfew and Crime Reduction: Evidence from Brazil

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Resumo: A cidade de Fernandópolis, localizada no interior de São Paulo, adotou, em 2005, o toque de recolher para crianças e adolescentes. Esta decisão não partiu da esfera municipal ou estadual, mas sim de uma decisão judicial. Posteriormente outros municípios do estado de São Paulo também decidiram adotar o toque de recolher juvenil. Com a intenção de verificar o efeito da portaria na redução da criminalidade, o presente artigo utiliza a estimação diferenças em diferenças para calcular o impacto da adoção da portaria em relação aos municípios que não a adotaram. Desta forma, a portaria causou redução de 17,5% nos furtos por mil habitantes nos municípios que a adotaram.

PALAVRAS-CHAVE: Diferenças em Diferenças, Toque de Recolher para Crianças e Adolescente e Criminalidade.

Abstract: The city of Fernandópolis, located in São Paulo, took up, in 2005, the juvenile curfew. This decision did not come from the municipal or state level, but a courtroom decision. Subsequently, some municipalities in the state of São Paulo also decided to take up the juvenile curfew. In order to verify the effect of the ordinance in reducing crime, this article uses the difference in difference estimation to calculate the impact of the implementation of the ordinance in relation to municipalities that not adopted. Thus, the ordinance caused a decrease of 17.5% in thefts per thousand inhabitants in municipalities that adopted the ordinance.

KEY-WORDS: Difference in difference, Juvenile Curfew and Crime.

Código JEL: P48, K42, C21

Área temática: 08) Questões urbanas e metrópoles

1. Introduction

A survey conducted by the Brazilian Ministry of Justice in 2011 demonstrated that property crimes such as theft and robbery (43.7% of total) and involvement with drug trafficking (26.6%) were the most frequent of committed crimes by minors in State Care Institutions fulfilling social-educational measure (Costa, 2014). About a tenth of them were involved in crimes against life, 8.4% of homicides and 1.9% of armed robberies resulted in human deaths.

In August 2005, reflecting concerns about crimes committed by minors, the County of Fernandópolis adopted the curfew for children and adolescents. The city of

Fernandópolis is sited in the northwest of São Paulo, Brazil and it is 554 km away from São Paulo city. It has a high literacy rate of around 94% (IBGE, 2010) and the Municipal Human Development Index (M-HDI) is 0.832, which is considered very high (IPEADATA, 2010). The ordinance follows the ensuing determination: the Police (civil and military) and the Guardianship Council must gather children and adolescents, unaccompanied by a parent or responsible adult, in some risk situations (e.g., minors with contact with alcohol, drugs or prostitution), guiding them to the parents immediately, as a measure of protection by warning. In case of repeated negligence, other measures should be employed such as fines to parents and the treatment of young drug addicts (Pelarin, 2009). The juvenile curfew is the name that was attributed to a decision of the Court of the Children and Youth of Fernandópolis County. The County of Fernandópolis is composed of the cities of Meridian, Macedonia and Pedranópolis, all are in the state of São Paulo, Brazil. Thus, this decision did not come from the Municipal or Federal level, but it was a court decision (Pelarin, 2009).

Moreover, since the start of the curfew, it was issued a public recommendation that parents do not leave their youngsters alone in the streets or in other potentially dangerous places after 11 pm. In July 2005, after several meetings organized by the Magistrates, the Judiciary ordered the formation of a task force, along with the public Security Forces (Civil and Military Police) and Guardianship Council (Pelarin, 2009). Also it was invited the Brazilian Bar Association (OAB) for the carrying out and the enforcement of the resolution reached by the by the Fernandópolis Court. The objective was to draw from the streets minors at risk situation.

In this way, other municipalities followed the same path of Fernandópolis. It is estimated that in 2011, according to data from the Brazilian National Council of Justice (CNJ), 41 municipalities in 16 states have reached this practice as a strategy to prevent and protect the children and adolescents of the several risks that surround them (CNJ, 2011). As the violence in Brazil continues to increase (Anuário Brasileiro de Segurança Pública, 2014), several other cities in Brazil look for ways to control crime and the juvenile curfew is an option with a relatively easy application. There are even projects in the House of Representatives aimed at implementing the curfew in Minas Gerais, another Brazilian State, and also nationwide (Ferreira, 2011 and Noble, 2013).

In the State of São Paulo, Figure 1, besides the municipalities of Fernandópolis County, the cities of Ilha Solteira, Itaperuna and Mirassol followed the same path of Fernandópolis and adopted in 2009 the juvenile curfew following the same modus operandi. In 2010, the Cajuru municipality also implemented the juvenile curfew, and in the following year, it was the city of Barretos that followed the same path.

FIGURE 1: Municipalities That Have Implemented the Juvenile Curfew in the State of São Paulo



Note: Own Elaboration

However, in 2012, the Superior Court of Justice (STJ) of São Paulo declared illegal the decree which determined juvenile curfew in the city of Fernandópolis (CANCIAN, 2012). The Court considered that the government should draw up measures to protect children and adolescents without affecting rights under the Brazilian laws and international treaties.

According to Adams (2003), the law enforcement community, composed by the Prosecutor's Office and the Magistrates, generally favors curfew laws in part because they provide police with additional authority and opportunity to stop and question suspicious youngsters. In this process, the police may detect criminal behavior that might otherwise go unnoticed. Even the possibility of being stopped and questioned may have a deterrent effect on juveniles who are contemplating wrongdoing. These crime control benefits can accrue in addition to any crime reduction effects that compliance with the curfew restrictions may have.

Another attractive aspect of curfew laws is that they are a seemingly inexpensive way of addressing juvenile crime problems. While the actual costs of curfew enforcement depend on operational details, such as whether the violator is issued a citation or taken into custody, there seems to be a general notion that curfew enforcement can simply be added to the list of an officer's law enforcement duties without need for any significant increase in police resources. However, the curfew enforcement, which involves a relatively minor offense, detracts from the time that an officer can devote to dealing with serious crime.

Thus, as Adams (2003) highlights, the curfews are attractive to a broad audience that encompasses a wide variety of philosophical and political persuasions. As an instrument of social policy, curfews can be used to reinforce parental responsibility and strengthen family ties. The Curfew laws emphasize parental responsibility and they view parents as the first line of this enforcement. Many curfew laws sanction both parents and children for violations, and some exclusively target parents. As a related matter, family ties may be strengthened as children spend more time at home, and there may be benefits in other domains, such as school performance. As a crime control instrument, curfew laws promise to reduce both juvenile offending and

victimization. They also provide law enforcement with an additional tool to investigate and detect juvenile crime more aggressively.

Perceived effectiveness of curfews as a crime prevention measure appears to lead to strong support for these laws. For example, in a New Orleans, USA survey, 81% of parents and 76% of teenagers agreed or strongly agreed that a juvenile curfew helped reduce juvenile delinquency in their city (Reynolds, Thayer, and Reufle 1996). Perceived efficacy also is a major consideration of public officials in deciding to enact curfew laws and of judges in determining their constitutionality. For example, 88% of mayors in the US cities with curfew laws believe that enforcement of these laws make the streets safer (Cochran, 1997).

In fact, there is a small but growing literature on the effects of the curfew on juvenile delinquency. Juvenile curfew statutes are used in hundreds of cities across the United States to prevent juvenile offending and victimization. In spite of their seeming popularity, there is disagreement in the existing literature as to whether juvenile curfews are truly effective in reduction of juvenile criminality (Wallace, 2016).

McDowall, Loftin and Wiersema (2000) used a panel data from a sample of US cities and states to examine the effects of the curfew in juvenile crime rates. The analysis estimates the impact of the new laws in the juvenile homicides and arrests of teenagers for a variety of offenses. The results showed, for the municipal level, that there was a statistically significant decrease in the robbery, thievery, assault and prisons after the adoption of the curfew. The homicide rates were not affected by application of the curfew; both in the cities or states, and, according to the authors, any preventive effects of the curfew appeared to be small. Donohue and Levitt (2001) investigate the role played by the legalization of abortion to explain the reversal trends in crime in the US in the 1990s, and this is due to the fact that with the legalization of abortion, there was a reduction in the supply of people – mostly youngsters – that were more prone to crime and a consequent drop in the number of offenses.

On the other hand, Adams (2003) established an empirical review of research on the juvenile curfew and concluded there was no evidence of the reduction of the crime and the victimization. The juvenile delinquency and victimization are more likely to stay unchanged after the implementation of the curfew laws. It is assumed that adolescents will not change their delinquent activities in ways that accommodate a curfew, but the delinquents may shift their activities to hours when the curfew is not in effect. They might also relocate their delinquent activities to nearby towns or areas that do not have a curfew. Temporal or geographic displacement of delinquent behavior could mean that the net effect of curfews on total crime is negligible.

More recently, Kline (2012) studied the impact of juvenile curfews on juvenile and non-juvenile arrest rates in cities across the United States. The author evaluates the effectiveness of curfew ordinances by comparing the arrest behavior of various age groups within a city before and after curfew enactment. He found that curfews decreased arrest rates for those directly affected by the law. The evidence indicates that arrest rates for older individuals decline, suggesting that juvenile curfews have

spillover effects. The interpretation of these results is complicated by the nature of arrest rates: they were a function of both of criminal behavior and police behavior, and curfew laws likely affect both. Curfews might give police more opportunity to stop and search young-looking individuals, potentially increasing detection of crime. Alternatively, for marginal offenses, police might substitute from making formal arrests to detaining youth for curfew violations. The advantage of looking at arrest rates is that the age of the offender is known; however, the impact on crime rates is the primary outcome of interest when evaluating the cost-effectiveness of this policy. The impact on arrest rates can provide only suggestive evidence on that front.

Carr and Doleac (2014) use a new source of US data on gunfire incidents, and tests the incapacitation effects of two interventions in Washington, DC: juvenile curfews, and rain. Both work primarily by keeping presumed offenders indoors. The first is a common, but controversial, policy used in cities across the United States, and its impact is likely highly sensitive to how it is enforced. The latter is an intervention over which we have no control, but it can be thought of as a perfectly-enforced incapacitation policy: anyone who stays outside during a rainstorm gets wet. They used exogenous variation in the hours affected by each intervention to estimate its causal impact on gun violence and reported crime. The authors found minimal evidence that juvenile curfews are effective, but rainstorms result in large, statistically-significant reductions in gun violence and others crime.

Wallace (2016) studied the effectiveness of a change in the juvenile curfew statutes in Baltimore, USA. Data consist of police arrest records for the months preceding and following the curfew change. The OLS regression analyses address both change in totals arrest and change in the ratio of youth to adult arrests and the ratio of arrests within curfew hours to outside of curfew hours. Results indicate an increase in the ratio of youth to adult arrests during curfew hours. However, totals arrest was decreasing at the time of the curfew change.

In the case of the Brazilian juvenile curfew, the Guardianship Council reported that the juvenile curfew was responsible for an 80% reduction of illegal acts and 82% of the complaints in the Council, in the municipality of Fernandópolis (Siqueira, 2009). And, the city's Juvenile Court Judge highlights that the number of the offenses has been falling year by year (Siqueira, 2009). In 2005, there were 378 incidents, compared to 74 in 2008. The largest reduction was in the incidence of thefts, which diminished 91% in four years. The occurrence numbers fell sharply also in the possession of narcotics, personal injury, minors carrying firearms, and in the final year of the survey, this value reached zero. In the Guardianship Council, there was also a reduction of offenses against troubled minors and the severity of the complaints about youngsters also had decreased.

Thus, according to the Guardianship Council information, the resolution issued by the Juvenile Court Judge of Fernandópolis had the desired effect; it would have diminished the violence and it had the support of the population (Pelarin, 2009). Also, Pelarin (2009) shows the ordinance was legal, from a constitutional point of view, and it was based on a joint action enters the Judiciary and other Public Officials (Pelarin, 2009). Nevertheless, it is necessary to check to what extent the reduction in crime is

due to ordinance or is a felicitous coincidence, for example, a basic education policy that can also affect crime rates.

The evidence available about the conditions of the urban violence in Brazil tends to highlight the role of the share of youngsters in the population (De Mello and Schneider, 2007; Menezes et al. 2013; Chioda, De Mello and Soares, 2015). For example, De Mello and Schneider (2007) displayed the role that the proportion of the youngster influences the violence; hence, they showed a 1% increment in the male population aged 15 to 24 increased by 4.5% the homicide rate.

Despite the experience described above, the juvenile curfew policy is barely studied in Brazil. The discussion of the juvenile curfew issue in Brazil regards the legality of the ordinance and if it is breaking the Statute of Children and Adolescents and the Brazilian Constitution, because it impose limits to the freedom of individuals to come and go. Several national and international authors raised hypotheses agree or dissent on the legality of the ordinance (Hemmens and Bennett, 1999; Tavares, 2010; Saliba and Brega Filho, 2012; and Lepore and Rossato, 2012). Even considering the relevance of their legal status, it also seems essential to understand the effectiveness of this policy regarding the reduction of urban violence in Brazil and this is the proposal of this article.

Specifically, using a Difference-in-Difference identification strategy, we use a data panel database to investigate a causal relationship between the implementation of the juvenile curfew – the adoption of the curfew in nine cities– and crime (thief and robbery). In our survey, we found that there was a reduction of 17.5% in the theft rate for the treated municipalities that adopted the juvenile curfew. On the other hand, we found no impact on the robbery rate, as well as, other variables related to crime, such as, homicide rates, vehicle theft, vehicle robbery and armed robberies resulting in human deaths. The results are robust to the consideration of different control groups and forms of the model misspecification.

The paper is organized as follow: in the section 2, we present the empirical strategy and descriptive statistics; in the section 3, we present and discussed the result, and in the section 4 we carry out the Robustness Checks and Falsification Tests. Finally, in the section 5, we present the discussion and final considerations.

2. Empirical Strategy and Descriptive Statistics

In order to investigate the existence of a possible causal relationship between the juvenile curfew and the decreasing in the crime rate – in the absence of social experiment associated with such public policy – our strategy is based on a model of differences-in-differences (DiD). This approach estimates the effect of a treatment – in our case, the juvenile curfew, that is, a response variable or dependent variable, in this case, crime – comparing the average change over time in the result variable for the treatment group (cities that adopted the juvenile curfew) and the mean variation over time in the control group (cities that not adopted the juvenile curfew) (Angrist and Pischke, 2008).

Such strategy may be subject to certain problems (as selection bias, for example), although it is intended to wipe out some of these bias effects. As there are different periods of adoption of the juvenile curfew in the state of São Paulo, it permits us to compare cities that implemented first the curfew with cities that implement it later, which eliminates in part the problem of heteroscedasticity (Biderman, De Mello and Schneider, 2007). We identified nine cities that adopted the ordinance curfew in different moments in time: in 2005 it was the county of Fernandópolis, composed by the cities of Fernandópolis, Macedonia, Meridiano, and Pedranópolis. In 2009 it was the time of the cities of Ilha Solteira, Itapura and Mirassol, in 2010, Cajuru city and, finally in 2011 the city of Barretos adopted the juvenile curfew. The other cities in the state of São Paulo are the control group used to obtain the counterfactual.

More formally, we will estimate parameters of several versions of the following model:

$$Crime_{it} = \beta_0 + \beta_1 CF_{it} + Year_t + M_i + \Phi X_{it} + \theta(OAB_i * T_t) + \varepsilon_{it} \quad (1)$$

Where i refer to the cities in the state of São Paulo and t is the year. CF is a dummy that takes the value 1 if the curfew was implemented in the city i at time t , and zero otherwise. Thus, for the cities that have not adopted the ordinance and cities that have implemented curfews before the adoption of the same, the variable assumes zero value. $Year$ is a series of dummies for the period from 2002 to 2011. And M_i is a complete set of dummy variables for i municipalities and it measures the fixed effect of city. The term OAB_i indicates the average rate of the total of crime in the municipality i in the base year, 2002. Multiplying OAB_i by T_t , a linear time trend, we obtain a specific linear trend for each municipality. This trend captures crime convergence between municipalities with different initial conditions. If the juvenile curfew was originally installed in cities with high criminality, and these municipalities tend to advance on crime indicators more quickly than others for others reasons than due to the juvenile curfew, our coefficient of interest would be overestimated. Thus, this control helps us to isolate the influence of long-term factors associated with the advancing of criminality and simultaneously with the introduction of policies directed to public safety.

Finally, X_{it} is a vector of time-varying controls and ε_{it} is the error term that will be organized by cluster at the city level in all the estimates to take into account the heteroscedasticity and serial correlation of the characteristics observed between the attributes belonging to the same city (Bertrand et al., 2004). Crime is our variables of interest and it is measured by the rates of theft¹ and robbery. The literature of crimes uses as dependent variables the rate per one hundred thousand inhabitants (De Mello & Schneider, 2007) and so we will follow this pattern along this exercise. Thus,

¹ We will use theft as a synonym for crimes which there were no kind of violence involved, such as car or house thefts which there was no violence, only the appropriation of someone property. We also use robbery as a synonym for crimes which there was violence involved, as, for example, the use of physical violence, melee weapons or firearms to commit a crime.

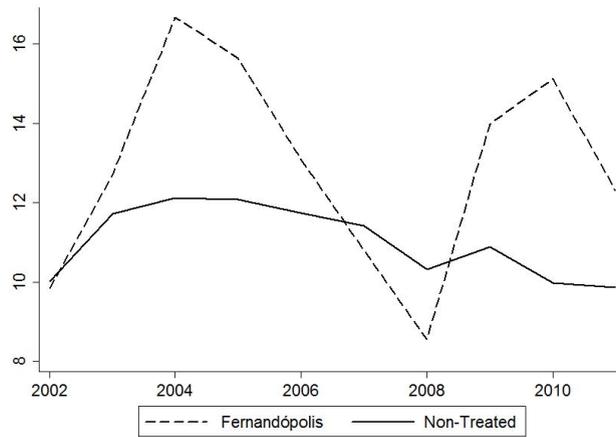
the estimative of causal impact of the juvenile curfew should be the value of β_1 , that is, the average effect on the treated municipalities (ATT).

The two initial controls in X_{it} are the most straightforward ways to take into consideration the heterogeneity over the time. Thus, the controls include the logarithm of GDP per capita, because it measures the local level of development and the share of young people between 15 and 24 years, thus in this age period that happens the greatest number of deaths and cases of violence (De Mello & Schneider, 2007). These variables are observed on a yearly basis, and, for the dependent variable, the observations were weighted by the average population. This is because crime does not always occur frequently or are not reported clearly in small towns. Thus, there is much less variance in small towns compared to large urban centers; the weighting corrects part of this problem. In addition, weighting the observations by population serves two purposes. First, it emulates a regression at the individual level, i.e., weighting observations provides estimates closer to a random sample in the state of São Paulo. Second, the crimes rates are not a common occurrence and observations from small cities are much noisier than those from larger cities (its variance decreases with population). Thus variation from smaller cities should be discounted. In order to avoid giving more weight to observations in the later part of the sample, the weight is the city population in 2002.

In addition to the controls for the per capita income and the share of young people, we also use as controls the expense of each municipality in culture, health, education, social security and social assistance and public safety. According to Cerqueira, Mello and Soares (2014), this last variable serves as a proxy to the police budget. The city-level enforcement variables are particularly important in two ways. First, these expanses show the municipality concern about the youngsters, because most of these variables are linked to the power of the city to care about its minor's population and it reinforces the role of the city in ensuring culture, health, education and social care for their inhabitants. Second, the city is the main law enforcer by constitutional mandate and the empirical literature has established the link from the city enforcement to crime (Marvell and Moody, 1996; Corman and Mocan, 2000; Di Telia and Schargrotsky, 2004; Levitt, 2002).

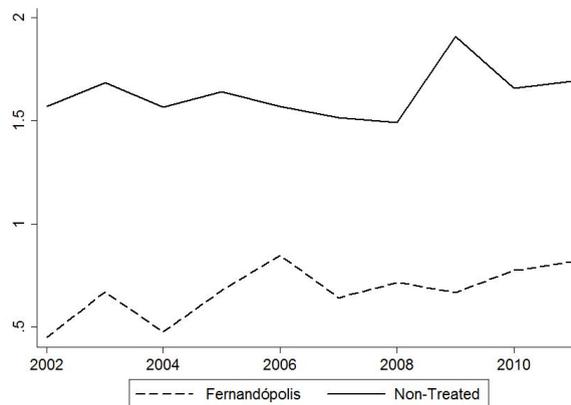
To illustrate the evolution of the crime rates, the Figures 2 and 3 show the dynamics of theft and robbery rates in the Fernandópolis city, respectively. As the Figure 2 evidence, the theft rates show a clear decline after the acceptance of the ordinance and the mean of the theft rate of the non-treated cities have hardly changed over the time. On the other hand, for the robbery rates, Figure 3, the Fernandópolis city does not have a downward trend after the implementation of the curfew, both datasets are barely constant over time and there is not a decrease in this crime modality, as evident in the previous figure.

FIGURE 2: The Theft Rate (per one thousand inhabitants) – Fernandópolis and the Non-Treated cities – 2002 a 2011



Note: The data is from the SEADE Think Tank

FIGURE 3: The Robbery Rate (per one thousand inhabitants) – Fernandópolis and the Non-Treated cities – 2002 a 2011



Note: The data is from the SEADE Think Tank

The data used in the study were primarily obtained from two sources. The first one is the SEADE², a foundation linked to the Department of Planning and Management of the State of São Paulo. In this database there are information about theft and robbery and it has annual frequency. This database also contained information such as the municipal GDP per capita, data on demographics, such as the share of young people between 15 and 24 years, and the population in each municipality over the period of analysis. In addition, data such as expense in education, culture, health, social assistance, social security and public safety are found in that database and follows the same annual frequency of the data on crime.

² The SEADE, Fundação Sistema Estadual de Análise de Dados, a think tank linked to the Department of Planning and Management of the State of São Paulo. For further information, see www.seade.gov.br.

The crime variables are from the DATASUS³, the database from the Ministry of Health. The analysis period begins in 2002 and ends in 2011. The Table 1 presents the information about the treated and not treated municipalities before and after treatment, the juvenile curfew.

TABLE 1: Summary Statistics

Variable	Pretreatment Period (2002-2005)			PostTreatment Period (2006-2011)		
	Non-tre ated	Treated	Mean Differen ce	Non-tre ated	Treated	Mean Differ ence
Theft Rate	10.92 (7.202)	14.77 -9552	-3.85*	11.12 (6.511)	11.13 (6.793)	-0.01
Robbery Rate	1.632 (2.432)	0.617 (0.505)	1.015**	1.625 (2.279)	0.653 (0.659)	0.972* **
Logarithm of GDP Per Capita	9.011 (0.529)	9.109 (0.439)	-0,098	9.481 (0.574)	9.564 (0.456)	-0.083
Proportion of Young People	0.0944 (0.0071 7)	0.0909 (0.0044 0)	0.0035* **	0.0901 (0.0105)	0.0808 (0.0065 2)	0.009 3***
Population	61,781 (443,93 1)	31,703 (34,873)	30.078	61,662 (442,51)	22,793 (27,945)	38,86 9
Logarithm of Expense in Culture	9.633 (5.063)	8.513 (6.678)	1.12	10.83 (4.644)	7.741 (6.513)	3.089* **
Logarithm of Expense in Education	15.77 (1.303)	15.77 (1.355)	0	16.09 (1.399)	15.72 (1.210)	0.37
Logarithm of Expense in Health	15.47 (1.363)	15.70 (1.170)	-0.23	15.85 (1.430)	15.63 (1.068)	0.22
Logarithm of Expense in Public Safety	4.247 (6.274)	5.330 (6.573)	-1.083	5.075 (6.660)	4.572 (6.572)	0.503
Logarithm of Expense in Social Assistance	13.82 (1.356)	14.02 (1.109)	-0.2	14.12 (1.326)	13.94 (1.050)	0.18
Logarithm of Expense in Social Security	8.874	13.30	-4.426** *	8.185	11.24	-3.055 ***

³ The DATASUS, Departamento de Informática do Sistema Único de Saúde. For further information, see www.datasus.gov.br.

	(6.635)	(3.433)	(7.014)	(5.147)
Observations	2,544	36	2,544	36

Note: Data from SEADE and DATASUS. SD is in parentheses. *** p<0.01, ** p <0.05, * p <0.1 *** p<0.01, ** p<0.05, * p<0,10. The crime variables are the rate per one hundred thousand inhabitants.

Table 1 shows the average and the differences between the set of variables before and after the treatment, the implementation of juvenile curfew. From the total of 645 municipalities of the state of São Paulo, nine (1.4%) adopted the juvenile curfew at different points in time. For the pretreatment period, the treated municipalities have a higher theft rate and a lower robbery rate. They have quite the same per capita income and percentage of young people, but a smaller population compared to the non-treated municipalities. As all municipalities that are treated are small to medium size cities, we observed significant differences in the rates of municipal expense, such as culture, social assistance, education. After the treatment, the theft rate declined for the treated group and had rates similar to the control group. The robbery rate hardly changed for both groups. Again the per capita incomes are similar, but the percentage of young people decreased more in the treated group.

3. Results

Aiming to analyze the effect of the juvenile curfew on the crime rates for the State of São Paulo, we will build a panel containing the period before the intervention, 2002 to 2005, and the post-intervention period, after the adoption of the curfew, after 2005 to 2011. We procedure with the strategy of DiD to estimate the causal effect of the ordinance. We use data from 645 cities, from which nine were treated, because they implement the juvenile curfew.

Table 2 presents the results of estimates of equation (1). The first three (columns (1) through (3)) show the impact on theft for all cities that have adopted the curfew compared to those not implemented in the theft rate. The first column, with no control and no fixed effects, indicates a negative but not statistically significant impact of the juvenile curfew in the theft rate. The second column, when we add the controls, has the same pattern, a negative effect but not statistically significant. But, when we add the fixed effects of time and city and the trend, it was found that there was an impact of -2.589 in the theft rate per one hundred thousand inhabitants and it was statistically significant at 10%. And it represents a considerably reduction in this modality of offense of 17.5%.

TABLE 2: The Impact of the Juvenile Curfew on the Crime Rates

	Theft Rate			Robbery Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
				0.207*		
Juvenile Curfew	-0.439 (1.056)	-0.040 (1.117)	-2.589* (-1.361)	* (0.094)	0.116 (0.103)	-0.127 (0.152)

		-1.146**				
Logarithm of GDP		*	0.333		0.019	-0.055
		(0.205)	(0.626)		(0.072)	(0.367)
						-26.863
Share of Young People		23.871*	-176.765**		2.595	*
		(14.445	-75.281		(2.212)	-13.787
)				
Logarithm of Expense in Culture		0.015	-0.039		0.000	-0.005
		(0.018)	(0.042)		(0.003)	(0.010)
Logarithm of Expense in Education		0.416**	0.054		0.170**	0.032
		(0.168)	(0.077)		(0.077)	(0.037)
Logarithm of Expense in Health		0.068	0.078		0.034	-0.004
		(0.096)	(0.066)		(0.026)	(0.019)
Logarithm of Expense in Social Assistance		-0.035	-0.003		0.015	-0.008
		(0.063)	(0.060)		(0.016)	(0.038)
Logarithm of Expense in Social Security		0.007	0.028		-0.001	0.028
		(0.016)	(0.029)		(0.004)	(0.018)
Logarithm of Expense in Public Safety		-0.007	-0.042		0.016**	0.012
		(0.021)	(0.033)		*	(0.011)
Municipal Controls	No	Yes	Yes	No	Yes	Yes
Fixed Effect of City	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect of Time	Yes	Yes	Yes	Yes	Yes	Yes
Trend	No	No	Yes	No	No	Yes
Observations	5,775	5,775	5,775	5,775	5,775	5,775
Adjusted R ²	0.0000	0.0537	0.328	0.0011	0.4974	0.514

Note: Clustered standard errors are presented in parentheses, * indicates a significance of 10%, ** indicates a significance of 5%, *** indicates a significance of 1%; all specifications include a constant not reported.

On the other hand, the impact of the curfew on the robbery rates, column (4) through (6), had an initial unforeseen effect. In column (4), with no fixed effects or controls the impact of the curfew on the robbery rate was positive and statistically significant, but when we add the controls, the effect was not statistically significant, although it still positive. In the last column, when we add the fixed effects of time and city, the impact was negative and it was not statistically significant, despite being a negative signal, according to expected.

Of course, the estimates found in the previous estimation provided the average effect on the treated municipalities (ATT) of the ordinance in the crime over the period of the post-treatment. These estimates, however, can be non-uniform in relation to the effect of the curfew in specific years after its enacting, because it takes time to the curfew really work and, indeed, reduce the crime rate. Thus, it is possible that the ATT varies over time depending on the evolution of crime rates in the cities that adopted the ordinance.

With the aim to capture this effect, we estimate the model of equation (2):

$$Crime_{it} = \beta_0 + \sum_{2003}^{2004} \beta_{-\tau} CF_{it} + \sum_{2005}^{2008} \beta_{+\tau} CF_{it} + Year_t + M_i + \Phi X_{it} + \theta(OAB_i * T_t) \varepsilon_{it} \quad (2)$$

And this equation is noteworthy, because the non-linear effects allow the ordinance in crime rates of the treated cities. The CF coefficient is equal to 1 for cities that had reached the juvenile curfew and zero, otherwise. Crime is still robbery and theft rates. The coefficients β_{2003} and β_{2004} allows two leads or anticipatory effect. The β_{2005} is the effect of the curfew in the year it was launched and the coefficients β_{2006} , β_{2007} and β_{2008} allow three lags or post-treatment effects. As emphasized above, this model will report the effect of treatment before the ordinance was applied, the anticipatory effects, and these should be statistically equal to zero to reinforce the causal interpretation of the impact (Angrist and Pischke, 2008). The results are shown in table 3 and to facilitate the interpretation of the parameters, only the ATT is displayed.

Table 3 shows the lead and lags estimation. In column (1), we estimate the leads and lags estimation for the theft rates. Note that the impact on this kind of offense for the first two years before and the year of treatment are not statistically significant. This strengthens our argument that the treatment and municipal controls have similar dynamics in the behavior of the theft rate (Angrist and Pischke, 2008). The outcomes also suggest that the negative impact of the juvenile curfews on theft rate has increased over the time. Specifically, after the adoption of the ordinance, the effect increased, reaching the double in the third year after the kickoff of the curfew. The robbery rate, column (2), has similar behavior for the theft rate, but in the last year has a positive impact, however, as will be seen in the next section, this estimation for the robbery rate is not robust, indicating that we cannot infer any effect of the ordinance on this variable. Thus, we can assume that both variables satisfied the common trend hypothesis.

TABLE 3: The Common Trend Assumption and the Lead and Lags Estimation

	Theft Rate	Robbery Rate
	(1)	(2)
Curfew Two Years Before	1.062 (1154)	0.344 (0.288)
Curfew One Year Before	-0.689 (2.852)	0.091 (0.139)
Curfew in the Year Zero	-2.206	0.218

	(2.395)	(0.134)
Curfew One Year After	-2.487	0.093
	(1.564)	(0.193)
Curfew Two Years After	-2.541*	-0.085
	(1.493)	(0.220)
Curfew Three Years After	-5.016***	0.169*
	(0.952)	(0.090)
Municipal Controls	Yes	Yes
Fixed Effect of City	Yes	Yes
Fixed Effect of Time	Yes	Yes
Trend	Yes	Yes
Adjusted R ²	0.002	0.180
Observations	5,775	5,775

Note: Clustered standard errors are presented in parentheses, *indicates a significance of 10%, ** indicates a significance of 5%, *** indicates a significance of 1%; all specifications include a constant not reported.

One possible explanation for the increasing in the effect on theft rate through the time is that a public policy can take some time to be effective, thus when it is launched, people are not sure if the juvenile curfew is for real. Hence, as time passes and the ordinance is still functioning, the tendency is the effect increases over the time and, in addition, to the greater coercion for the families to keep their youngsters at home because of the possibility of fines imposed by the ordinance.

Finally, despite the negative effect of the juvenile curfew on the theft rate, we got above; it is possible that their evidence can reflect a more general trend of some crimes reduction in these municipalities not directly associated with this policy. The SENASP, the National Secretary of Public Security of the State of São Paulo, estimates that minors are responsible for 0.9% of all offenses committed in Brazil. If we consider only murder and attempted murder, the percentage drops to 0.5% (Costa, 2014). Here, we investigate this possibility by considering some other types of offenses not directly related with minors, such as homicide⁴, vehicle robbery, vehicle theft and armed robberies resulting in human death. The data on others kinds of offenses were from the SEADE's database. The table 4 presents the new results.

TABLE 4: The Impact of the Juvenile Curfew on Others Modalities of Crime

	Homicide	Vehicle Robbery	Vehicle Theft	Armed Robberies resulting in Human Death
	(1)	(2)	(3)	(4)

⁴ For the homicide data, we were also considered the numbers of unknown cases. This is because the deaths are not properly classified as homicides, that is, some part of the homicides were added to the numbers of deaths from wounds, but it was ignored that were accidentally or not (Levin, 2000). Therefore, in addition we use data on unintentional injury deaths; we also regard the deaths with unknown intent, given the low variance of homicides in some cities in the state (Levin, 2000).

Juvenile Curfew	0.040 (0.026)	-0.082 (0.055)	0.095 (0.185)	0.000 (0.002)
Municipal Controls	Yes	Yes	Yes	Yes
Fixed Effect of City	Yes	Yes	Yes	Yes
Fixed Effect of Time	Yes	Yes	Yes	Yes
Trend	Yes	Yes	Yes	Yes
Observations	5,775	5,775	5,775	5,775
Adjusted R ²	0.820	0.583	0.467	0.187

Note: Clustered standard errors are presented in parentheses, * indicates a significance of 10%, ** indicates a significance of 5%, *** indicates a significance of 1%; all specifications include a constant not reported.

As the numbers of the Table 4 makes clear, none of these other different types of crimes appear to be affected by juvenile curfew. According to the Anuário Brasileiro de Segurança Pública (2014), these types of offenses are not commonly committed by minors. Thus, we can infer that the juvenile curfew has a heavier impact on crimes more prone to be perpetrated by minors and others public policies with intent to diminish the crime, parallel with the curfew, did not work.

4. Robustness Checks and Falsification Test

In order to check the robustness of the above results, in this section we obtain new results considering different control groups of controls, and implementing a falsification test for them. This way, we will precede three tests to verify the robustness of the estimates found in the former section. The first robustness test is to eliminate neighboring municipalities which implemented the ordinance, because the criminals might relocate their delinquent activities to nearby towns or areas that do not have a curfew and this might generate a positive bias in ours outcome (Adams, 2003; Menezes et al., 2013). The second robustness test uses a Propensity Score Matching approach with DiD strategy to verify if the outcomes are robustness for municipalities with closer characteristics. In the last test we eliminate the trend and we only estimate with the last year before the juvenile curfew, 2004, and the last year of the ordinance, 2011. The point is to verify if, even we remove the other years of the sample, and consequently the trend, the outcomes keep the same.

As Adams (2003) made clear, criminals can migrate to other cities that have not reached the curfew with intent to commit offenses. So, we removed from the sample cities that are neighbor to the treated sites – 38 cities – it may be that the delinquents commit crimes in this region instead of perpetrating crimes in the curfew municipalities. The goal is to verify that, even eliminating the neighbors of the treated cities, which can be impacted negatively, the result remains the same. The columns (1) and (2) of the Table 4 displayed the results. Thus, even when we eliminated the neighbors of cities that implement the juvenile curfew the result still closer to that we had found in the previous Table. The impact of the ordinance in the theft rate was -2.577 and the outcome was statistically significant at 10%. So, it indicates a

reduction of 17.45% in this kind of offense. The effect of the curfew on the robbery rate has a negative signal, as expected, but it still not statistically significant.

TABLE 5: The Robustness Checks – without the Neighbors for All the Cities That Have Implemented the Juvenile Curfews, the Propensity Score Matching and the First and the last Year of the Ordinance

	Without the Neighbors		Propensity Score Matching		First Year before and last Year after of the Ordinance	
	Theft Rate	Robbery Rate	Theft Rate	Robbery Rate	Theft Rate	Robbery Rate
	(1)	(2)	(3)	(4)	(5)	(6)
Juvenile Curfew	-2.577*	-0.133	-3.591***	-0.187	-6.679** *	0.815
	-1.388	(0.154)	-1.241	(0.173)	-2.234	(0.626)
Municipal Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect of City	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effect of Time	Yes	Yes	Yes	Yes	No	No
Trend	Yes	Yes	Yes	Yes	No	No
Observations	5,436	5,436	4,299	4,299	1,091	1,091
Adjusted R ²	0.324	0.515	0.348	0.540	0.233	0.091

Note: Clustered standard errors are presented in parentheses, * indicates a significance of 10%, ** indicates a significance of 5%, *** indicates a significance of 1%; all specifications include a constant not reported.

The following step is to use a strategy based on the Propensity Score Matching for considering a new control group, in order to improve the balance between the treated and untreated units. Specially, we will use a matching strategy for the municipalities before the estimation of equation (1), which is implemented through the Kernel method⁵. Then, we apply the kernel matching strategy, and afterward, we estimate the model of the differences-in-differences considering only the subset selected by the matching process. The columns (3) and (4) of Table 4 displays the result.

The Kernel matching constructs a match for each program participant using a weighted average over multiple cities in the comparison group (Smith, 1997). As discussed by Ho et al. (2006), when done properly, the matching before the estimation can reduce model dependence and variance, lower mean square error, and also generate less potential for bias. Hence, when we compared a subset of more likely municipalities, the impact of the juvenile curfew in the theft rate strengthens, and it had an impact of -3.591 per one hundred thousand inhabitants and statistically significant at 1%. On the other hand, the impact of the curfew in the robbery rate, one more time, was not statistically significant.

⁵ We first estimate a Logit model with the same controls used in the standard model.

So far, in all our estimations, we used in the regression a specific linear trend for each municipality of the crime rate. Thus, we will eliminate this trend of the sample and we will estimate the impact of juvenile curfews only for the first year before treatment, 2004, and the last year before the ordinance be suspended by the STJ-SP in 2011. The table 4, columns (5) and (6), shows the results.

The outcome found in the column (5) of the Table 4 suggests that the impact of the curfew on the theft rate, even when we ignore the trend, is statistically significant at 1% and the impact was -6.679, a stronger effect of the policy. Then, this much higher value reflect the omission of the lag component of crime rate (trend) and it is consistent with the results of the Table 3 (the Leads and Lags estimation), that indicates an increasing impact through the time. That is, even whether we eliminate the trend and the time fixed effects, the impact of the curfew in the theft rate remains. On the other hand, the robbery rate was not statistically significant and we can infer, one more time, that there was no impact of the curfew in the robbery rate.

Briefly, the juvenile curfew was responsible for a strong decrease in the theft rate of approximately 17.5%, column (3) of Table 2. This result respects the common trend hypotheses, Table 3, and it was robust for all tests we performed in this section. However, the impact of the curfew in the robbery rates, while respecting the hypotheses of common trend, was not statistically significant in any specification and we can infer that there is no impact of the curfew in the kind of offense.

Finally, despite the negative effect of the juvenile curfew on the theft rate, we got above; it is possible that their evidence can reflect a more general trend of some crimes reduction in these municipalities not directly associated with this policy. So, we will perform a test to verify this hypothesis. Thus, we estimate the benchmark regression, but as dependent variable, we used suicide and drowning rates, because we hope that none of these variables are impacted by the implementation of the ordinance. These final results are presented in the following Table 6.

TABLE 6: The Falsification Test I – Drowning and Suicide Rates

	Drowning Rate	Suicide Rate
	(1)	(2)
Juvenile Curfew	0.006 (0.005)	0.006 (0.014)
Municipal Controls	Yes	Yes
Fixed Effect of City	Yes	Yes
Fixed Effect of Time	Yes	Yes
Trend	Yes	Yes
Observations	5,775	5,775
R ²	0.137	0.119

Note: Clustered standard errors are presented in parentheses, *indicates a significance of 10%, ** indicates a significance of 5%, *** indicates a significance of 1%; all specifications include a constant not reported.

The results of Table 6 indicate, once more, that the effect of the curfew was not statistically significant, even considering the trend of these two variables, the fixed effects of time and cities and the other covariates in the model. The evidence, thus, strongly suggest that the juvenile curfew did not impact the suicide and the drowning and so there is a very small risk of our results be spurious and the reduction in the rate theft cannot be attributed to other unobservable policies, for example, some basic education police, supporting the causal effect of the curfew in reducing this kind of offence.

5. The Discussion and Final Considerations

The impact of interventions such as juvenile curfews depends crucially on how they are implemented and how police officers, law-abiding citizens, and would-be offenders respond. We show that in the cities of the state of São Paulo, at least, there is compelling evidence that the juvenile curfew policy reduces the theft rate. Thus, the results of this exercise show that there was a decrease in theft rates for the municipalities that adopted the curfew. Specially, the initial estimate showed a reduction in the theft rate around 2.589 per one hundred thousand inhabitants compared to the pretreatment period, what represents a sharp reduction of around 17.5% in this type of offense. As some information on crimes is not officially registered by the authorities, we must believe that this effect could be even greater (Oliveira and Simonassi, 2013). In contrast, the robbery rate was not affected by juvenile curfew.

The reduction in the theft rate associated with the juvenile curfew we have found is in line with the evidence provided by McDowall, Loftin and Wiersema (2000) and Wallace (2016). And it represents an empirical support for this kind of policy for cities and states suffering excessive violence.

The result remained when we performed different kinds of robustness tests, suggesting that the impact of the juvenile curfew, found in the Table 2, is robust to different compositions of the samples. Furthermore, the other rates of crimes, such as robbery and vehicle theft, murder and armed robberies resulting in human death were not affected by the curfew. The falsification test shown that suicide and drowning rates were also not affected by the curfew, indicating that the results found were not a spurious regression, once, we expected that the ordinance did not affect these modes of death and it again reinforces the causal effect of it.

Nevertheless, the general application of this policy has to be viewed cautiously. As Adams (2003) highlights, there is an evidence that keeping minors at school does seem to have a greater effect on crime reducing and, this is, unintentionally, it is far more effective at than curfews are. Second, in the case of Brazilian cities, the application of the juvenile curfew may involve serious violations of the Statute of Children and Adolescents and the Brazilian Constitution since the ordinance limits

the right to come and go (Hemmens and Bennett, 1999; Tavares, 2010; Saliba and Brega Filho, 2012; and Lepore and Rossato, 2012).

A clear extension of this work would be to compare the cost/benefits between the juvenile curfew and those from other policies regarding minors in the reduction of the offenses rate. For example, we can verify the cost/benefits of the investment in basic education or other programs for the youngsters, such as the integral school, which the student stays all day at school, in the reduction of the criminality rates.

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