

# ECONOMIC THEORY OF CRIME: TOWARDS A SCIENTIFICALLY ORIENTED CRIMINAL POLICY

TEORIA ECONÔMICA DO CRIME: POR UMA  
POLÍTICA CRIMINAL CIENTIFICAMENTE ORIENTADA

ALLAN VERSIANI DE PAULA<sup>1</sup>

JULIO CESAR DE AGUIAR<sup>2</sup>

NEFI CORDEIRO<sup>3</sup>

## ABSTRACT

The paper aims to answer the question concerning how the scientific method adopted by the economic theory of crime might be useful to the improvement of criminal policy in Brazil. Initially, the paper reviews the literature on economic theory of crime. Then, it uses the hypothetical-deductive method to analyze how the economic theory of crime can be applied to three questions inserted in the Brazilian legal-criminal scenario. The result of the analysis shows the potential of the

**Keywords:** Criminal law. Economic theory of crime. Criminal Policy.

## 1. INTRODUCTION

The economic theory of crime emerged in the second half of the 20th century, in the context of American common law, with the publication of the article *Crime and Punishment: An Economic Approach*, by economist Gary Becker (1968).<sup>4</sup> This study is considered one of the

1 Master's Degree student in Law at the Catholic University of Brasília (2019-2020). Post-graduate degree in "Control, Detection and Repression of Embezzlement of Public Resources" from the Federal University of Lavras/MG (2016). Graduated in Law from the Federal University of Minas Gerais (2000). Prosecutor of the Federal Public Prosecutor's Office since 2005. Former Federal Prosecutor of the Office of the Attorney General of the Union (2002-2005). ORCID iD: <https://orcid.org/0000-0002-1451-5414>. E-mail: [allanversiani@gmail.com](mailto:allanversiani@gmail.com).

2 PhD in Law from the Federal University of Santa Catarina. PhD in Law from the University of Aberdeen, UK. Professor at the School of Public Policy and Government at the Getúlio Vargas Foundation. Full Researcher-Collaborator at the Institute of Psychology of the University of Brasília. Master in Philosophy from the Federal University of Goiás. ORCID iD: <https://orcid.org/0000-0002-8252-2894>. E-mail: [juliocesar.deaguiar@gmail.com](mailto:juliocesar.deaguiar@gmail.com).

3 PhD in Law from the Federal University of Paraná (2000). Master of Laws from the Federal University of Paraná (1995). He holds a Law degree from Curitiba Law School (1988), Engineering degree from Pontifícia Universidade Católica do Paraná (1998), Military Officer degree from Guatupê Military Police Academy (1983). Minister of the Superior Court of Justice (STJ), currently in the 6th Panel (criminal matters). Professor of the Master of Laws of the Catholic University of Brasília. ORCID iD: <https://orcid.org/0000-0002-1490-3118>. E-mail: [nefi.cordeiro@msn.com](mailto:nefi.cordeiro@msn.com).

4 According to Aguiar (2002, p. 12), Becker's study "revives and perfects the teachings of the utilitarian criminological theory, enunciated by Cesare Beccaria and developed by Jeremy Bentham, still in the 18th century", but its importance goes beyond the criminal field, "because it successfully exemplifies the possibility of extending, outside the traditional mercantile limits, the fundamental assumption of economic theory, that is, the rationality of agents in the use of appropriate means to achieve their objectives". Specifically on the influence of Jeremy Bentham's ideas on Becker's work, see Posner (2002).

### How to cite this article/Como citar esse artigo:

PAULA, Allan Versiani de; AGUIAR, Julio Cesar de; CORDEIRO, Nefi. Teoria econômica do crime: por uma política criminal cientificamente orientada. *Revista Meritum*, Belo Horizonte, vol. 15, n. 4, p. 297-312, 2020. DOI: <https://doi.org/10.46560/meritum.v15i4.8228>.

foundational works of the economic analysis of law<sup>5</sup>, an approach that examines legal phenomena based on theories and analytical tools of microeconomics.

The debate about the economic theory of crime is still recent in Brazil, but has intensified in recent times, as evidenced by a growing national academic production on the subject, which, based on the extensive foreign literature developed since Becker's seminal work, is dedicated to discussing the potential and limitations of the theory, besides seeking to apply it empirically<sup>6</sup> in researches that seek to better understand crime in our country.

This article aims to answer the question of how Brazilian criminal policy can benefit from the economic theory of crime by analyzing concrete situations in the Brazilian legal-criminal scenario. Specifically, we intend to evaluate how the scientific method inherent to this theory contributes to the making of more informed decisions on how the state strategy to fight crime should be structured.

The paper is organized as follows. Initially, the central aspects of the economic theory of crime are discussed, without claiming to be exhaustive, which, based on the theoretical-behavioral premise of the rational criminal, intends to guide criminal policy toward optimal dissuasion. Then, the hypothetical-deductive method is used to analyze three concrete situations from which it is possible to identify how the economic theory of crime can be useful for the construction of a more efficient criminal policy in Brazil.

## 2. ECONOMICS OF CRIME: THE PREMISE OF THE RATIONAL CRIMINAL AND ITS NORMATIVE IMPLICATIONS

The economic theory of crime presented by Becker (1968) is a theory of deterrence: criminal law exists to discourage the commission of socially undesirable acts that would not otherwise be adequately prevented. This implies that, from an economic perspective, the purpose of criminal law is not to ration crime by setting prices that allow it to be committed, but to eliminate crime by imposing sanctions to prevent its occurrence<sup>7</sup>. Were it not for the high cost

5 Next to the articles by Ronald Coase (*The problem of social cost*, 1960) and Guido Calabresi (*Some thoughts on risk distribution and the Law of Torts*, 1961).

6 A compilation of empirical studies conducted in Brazil based on the economic theory of crime is found in Olsson and Timm (2012, p. 123-128). In this field, it is worth highlighting the work conducted in correctional facilities by economist Pery Francisco Assis Shikida and his team, whose results were synthesized in Shikida (2010).

7 Cooter (1984) argues that prices should be set when the activity is allowed, while sanctions are aimed at prohibited activities. Prices aim to internalize the costs of the activity so that individuals can decide whether or not to perform it, while sanctions aim to dissuade people from deviant behavior. The latter should be sized taking into account the agent's mental state, which indicates the level of resistance to deterrence (intentional or unintentional act, first act committed or recidivism, etc.). Prices, on the other hand, should be measured based on the extent of the damage caused to a third party, regardless of the agent's mental state. The differences between price and sanction serve to explain why recidivism is punished more severely, as well as why attempts that do not cause damage are punished. If the penalties were prices, recidivism should not influence the severity of the punishment, since it does not increase the damage caused by the second crime. Attempts, on the other hand, would not cause harm to be internalized. The justification is that the objective, in both cases, is deterrence, which is obtained by means of sanctions that must be dosed according to the mental state of the criminal. The recidivist shows more resistance to deterrence, which imposes a more severe sanction. The attempt raises the expected cost of the offense without increasing punishment, having a dissuasive effect similar to the maintenance of a police force, but at a lower cost

of applying criminal sanctions, the optimal level of criminal activity would be zero or close to zero (POSNER, 1985).

Reality shows, however, that crimes do happen, and apparently more frequently than could be considered optimal<sup>8</sup>. This can be explained by the fact that the sanction defined by law for each crime does not correspond to the sanction expected by the criminal who commits it, inasmuch as the two values would only be equivalent if the incidence of the legally imposed sanction were certain. As this does not occur, since not all crimes are discovered and punished<sup>9</sup>, the expected cost of the crime<sup>10</sup> is not equal to the sanction abstractly imposed for the offense, but to the amount of the penalty set by law discounted by the probability that the perpetrator will be identified and convicted. According to the premise of the rational<sup>11</sup> criminal, adopted by the economic theory of crime, this is the calculation that the offender makes when evaluating ex ante the benefits and costs of crime, in order to decide to commit the crime if the benefits exceed the expected costs, that is, if the expected value or net benefit of the offense is positive<sup>12</sup>.

But to maximize the expected utility from crime, the rational criminal will seek the greatest benefit he can extract from his conduct. Assuming that more serious crimes are usually punished with greater severity, and that the greater seriousness of the offense corresponds to a greater return of utility to the offender, it is possible to conclude that the criminal will increase the seriousness of the offense whenever the benefits of this escalation outweigh the costs inherent to the increase of the expected sanction. In other words, the offender will weigh the benefit generated by each small increase in the seriousness of the offense and the cost of increasing the expected punishment, increasing the seriousness of the crime as long as the marginal benefit exceeds the marginal cost, up to the point where both are equal<sup>13</sup>. To better develop the idea of marginality, imagine that  $g_1$ ,  $g_2$  and  $g_3$  represent, in increasing order, three different levels of severity of a crime, in all of which the expected value of the crime is positive (i.e., the benefit is greater than the expected costs). Assume that for a certain criminal the benefit at  $g_1$  is \$100, at  $g_2$  is \$150, and at  $g_3$  is \$200, the respective expected costs being \$25,

8 The assertion that there is an ideal level of criminality, if morally questionable from the point of view of traditional doctrine, is not so under the lens of the economic approach to criminal law, as will be seen later on.

9 Shikida and Amaral (2019, p. 320) note that "there is no data to estimate the probability of an individual's arrest in Brazil, but it is assumed to be lower than that seen in the United States, which is only 5%. This would imply that in Brazil the probability of success in the crime sector may be greater than 95%."

10 Here understood strictly as the cost arising from punishment, for the sake of simplicity. There are, however, other costs that the criminal sometimes incurs to commit the offense that are unrelated to punishment. These costs are included in Ehrlich's (1996) expected net benefit formula, which is: expected net return = expected gross return - direct costs incurred in the acquisition of the proceeds of crime - income lost in some legitimate activity - potential penalty discounted by the probability of conviction.

11 "Although this assumption of the 'rational criminal' seems to many absurd or inappropriate, these same skeptics, when asked about the social function of criminal sanctioning, usually point to deterrence as at least one of its justifications (if not the main one). But, of course, this answer supports the economist's point, for without rational calculation on the part of at least some would-be offenders, deterrence is an empty concept" (MICELI, 2017, p. 29, our translation). In more recent work, Miceli (2019, p. 25-26) notes that "the premise [of the rational offender] seems more plausible for crimes involving monetary gain, such as white-collar crimes, drug trafficking, and robbery. It is probably less relevant for violent crimes and almost certainly irrelevant for crimes of passion or for perpetrators with some kind of permanent or temporary mental disability. Eide (2000, p. 363-364), however, after citing studies that found "substantial elements of rationality" in crimes of rape, homicide, and domestic violence, cautions that "although the effect of punishment may differ across crime types, the evidence to date indicates that the rational choice frame is relevant to all crime types, and that analyses that a priori reject the possibility that some specific crimes are deterred are inadequate" (our translation).

12 In simple mathematical notation, the expected cost of crime is identified by the equation  $C_e = pS$  (where  $S$  is the sanction imposed for the offense and  $p$  is the probability that the criminal will be held accountable). Thus, the expected value or net benefit can be represented as follows:  $V_e = B - pS$  (where  $B$  is the benefit to be gained from the crime). A condition for the crime to be committed, therefore, is that  $B - pS > 0$  (PATRÍCIO, 2015).

13 The point at which the marginal benefit equals the marginal cost represents, in the view of economists, the economic optimum for almost all decisions (COOTER and ULEN, 2010).

\$65, and \$125. In this scenario, it will be profitable to the criminal to increase the severity of the crime from  $g_1$  to  $g_2$ , since the marginal benefit (\$50), given by the difference between the benefits at  $g_2$  and  $g_1$ , exceeds the marginal cost (\$40), indicated by the difference between the expected costs at  $g_2$  and  $g_1$ . It will not be advantageous, however, to escalate severity from  $g_2$  to  $g_3$ , since the marginal benefit (\$50) in this case is less than the marginal cost (\$60)<sup>14</sup>.

If the expected costs of crime for the criminal, on the basis of which the measure of deterrence is defined, are the result of the punishment provided by law ( $S$ ) discounted by the probability of its application ( $p$ ), then one can conclude, first, that it is possible to reach the same level of deterrence with different combinations of  $p$  and  $S$ , and, second, that the achievement of a higher level of deterrence involves increasing those variables, individually or jointly. In fact, for the standard model of the economic analysis of crime, based on the risk<sup>15</sup> neutrality of the criminal, a penalty of \$1000 with a probability of 0.1 is equal to a penalty of \$500 with a probability of 0.2 or a penalty of \$200 with a probability of 0.5: for all of them the expected cost of crime is \$100. On the other hand, as  $p$  and  $S$  rise, the expected cost of crime rises and, consequently, its expected value decreases, leading to fewer crimes being committed. This is the application of the law of demand (or, in the penal sphere, “first law of deterrence”), which prescribes that the demand for a given good (crime) reduces when the cost of acquisition (expected punishment) increases. Cooter and Ulen (2010, p. 480) highlight the empirical support for this statement by stating that, “in laboratory experiments, even rats obey the First Law of Deterrence, and even the worst human being is still more rational than a rat<sup>16</sup>”.

But what is, from the point of view of the economic theory of crime, the appropriate combination between probability of punishment and severity of the sanction? And what is the optimal level of deterrence to be sought by criminal law? Such questions are normative in nature, and concern the second part of the economic theory of crime proposed by Becker, in which,

14 It should be noted that benefits do not always express economic terms (even if not purely monetary), such as those linked to crimes of passion. The majority doctrine, however, considers it possible to translate all benefits, including psychic ones, into economic language (ALFARO and URRUTI, 2019). Similarly, the expected costs of the offense are commonly not expressed in monetary terms. This is because these costs are a function of the penalty imposed for the crime, which, as a general rule, takes the form of restriction of freedom (prison being the main example), not of pecuniary punishment. The conversion of criminal penalties into economic values is based on opportunity cost, understood as what is given up when a scarce resource is used in order to prevent it from having an alternative use. According to this notion, the severity of imprisonment can be measured by the opportunity cost that the penalty carries in terms of loss of income that the criminal would get free and loss of utility due to the restrictions on consumption and freedom to which he will be subjected (BECKER, 1968).

15 The indifference between different combinations of  $p$  and  $S$  presupposes risk neutrality. For a risk-averse person, the one with a higher penalty with a lower probability is the more dissuasive between two combinations of punishment and probability. Conversely, when the criminal has a preference for risk, a higher probability of punishment deters more. Risk aversion, in this case, indicates that the person prefers a more certain outcome (higher probability) in which he will lose less (lower penalty) than a more uncertain outcome (lower probability) of losing more (higher penalty), even though the expected cost is equal. Risk preference is the symmetrical opposite.

16 There is considerable empirical literature supporting the theoretical proposition that increasing the probability of punishment or the severity of the penalty increases deterrence, and a summary of this scientific production is presented, for example, in Ehrlich (1996) and Eide (2000). Martinez (2016) highlights the studies by Levitt (1998) and Kessler and Levitt (1999), stating that they would have overcome the methodological limitation of previous studies that, when analyzing crime rates, did not distinguish between the effects of deterrence, caused by changes in the probability of punishment or the severity of the sanction, and the effects of incapacitation caused by imprisonment (if there are more prisons, there are fewer criminals on the streets). The study by Kessler and Levitt (1998) is a natural experiment propitiated by the approval and application in California of the three strikes and you're out policy, which can be explained as the imposition of a significant increase in the severity of the sanction after the third conviction. In the words of Cooter and Ulen (2010, p. 513), “this was one of the most drastic and careful studies to find a deterrent effect caused by criminal sanctions that can be differentiated from the incapacitating effects of imprisonment. See also, on this topic, the work of Mendes and McDonald (2001), who, based on the research of 33 studies conducted between 1971 and 1995, whose findings were consistent as to the deterrent effect of increasing the probability of punishment, but not so conclusive regarding the deterrent effect linked to the severity of the penalty, argues that it is impossible to analyze the deterrent effect of each variable in isolation, debiting to this “separation of the package” the fact that some studies have failed to identify important deterrent effects related to the severity of the sanction.

based on the implications of the premise of the rational criminal, propositions are deduced about how the public policy to face criminality should be structured, aiming at the optimal dissuasion. To answer them, it will be necessary to shift the focus of the analysis, hitherto focused on the offender and the costs and benefits related to him, to society and the costs it bears due to crime. These are the social costs of crime, which can be broken down into direct costs and indirect costs.

The direct costs relate to the harm that criminal activity causes to the victims of crime. Economists generally consider these costs to be the difference between the harm caused to the victim and the benefit received by the criminal<sup>17</sup>. Thus, if a thief, in order to steal a stereo that is worth \$75 and is installed in a vehicle, breaks the window of the vehicle, which costs \$100, and takes the equipment, the benefit to the criminal is \$75 and the victim's loss is \$175, and the direct damage caused by the crime is therefore \$100<sup>18</sup> (COOTER and ULEN, 2010).

Indirect costs, in turn, refer to public and private costs that society incurs due to crime prevention and punishment activities.

In the private sphere, this definition includes expenses incurred by potential crime victims to protect themselves from the actions of offenders, such as placing offending vehicles (electrified fences, shards of glass, etc.) on house walls, installing bars, alarms and security cameras, hiring private security and insurance policies, and creating corporate structures to combat fraud within companies. Given the state monopoly on the right to punish, private costs are related to crime prevention and, when they impact the probability of holding the criminal<sup>19</sup> accountable, they raise the expected cost of crime.

Public indirect costs correspond to the expenses incurred by the State in the services of prevention, investigation and prosecution of crimes, as well as in the activities of enforcement of sentences imposed in the criminal process. In the first group, they involve expenditures with the maintenance of an ostensive police force with a preventive focus and with the operation of state agencies charged with the functions of elucidating crimes that have occurred and putting the perpetrators on trial in order to convict them. The activities of the second group, related to the enforcement of sentences imposed, imply expenses with the operation of the prison system, in addition to expenses for the supervision of compliance with sentences other than imprisonment.

Considering the formula of the expected cost of crime ( $C_e = pS$ ), one notices that the costs of prevention, investigation and trial impact the probability that the crime will be discovered and its perpetrator held accountable. Increasing this probability requires more public spending, since, says Friedman (2000, p. 225), "it takes more police officers to arrest fifty murderers out of a hundred than to arrest twenty-five, and more time for prosecutors and courts to con-

17 This is the object of controversy among scholars, since some argue that the criminal's benefits should not be considered. Cooter and Ulen (2010) point out that this conclusion may vary depending on the situation under analysis: if someone, lost in the woods, finds an uninhabited cabin, breaks into it, and steals food so as not to starve to death, many would agree that the benefit should be counted as social gain; however, if the crime is rape, most people would find it repugnant to consider the rapist's pleasure as gain.

18 This is a simplification. As a rule, the value that the criminal assigns to the good obtained through crime is lower than the value that the victim assigns to the same good. This value, for Posner (1985), is measured by the willingness to pay, and the coercive transfer that characterizes crime, by evidencing a low willingness of the offender to acquire the good in the market, almost never transfers resources to a more valuable use.

19 Private indirect costs do not always impact the likelihood that the criminal will be punished. Some private deterrents redistribute crime, which will be committed elsewhere or under other circumstances.

vict them” (our translation). The costs of enforcing the penalties imposed by the judiciary, on the other hand, are dependent on the severity of the penalty. The cost of imposing sanctions is greater the more severe the punishment, because harsher punishments, such as imprisonment, require large investments in construction, maintenance and operation of prisons, which does not occur with lighter punishments such as fines, which have low enforcement costs and generate revenue for the state (POSNER, 2007). The same occurs when the duration of penalties of the same nature is increased: long prison sentences demand more public resources than short prison sentences and, given the solvency constraints, larger fines tend to imply higher collection costs than smaller fines, since the collection of the former is more difficult than of the latter (POSNER, 2007). As a consequence, raising the expected cost of crime by increasing the probability that the criminal will be convicted or by increasing the severity of the penalties imposed results in a greater commitment of public money.

It is now possible to return to the questions previously formulated about the optimal combination of probability of punishment and severity of punishment, as well as about the level of deterrence to be pursued by criminal law, which propose to identify, respectively, the efficiency of the means of deterrence (regardless of the level of deterrence involved) and the optimal level of deterrence.

On the first question, Friedman (2000) says that an efficient system will seek, among different combinations of probability of punishment and severity of the sanction that cause the same expected cost to the criminal - and therefore have the same deterrent effect - the combination in which the sum of the indirect costs of crime reaches the lowest possible<sup>20</sup> value. From the state perspective, that is, disregarding the private indirect costs of crime<sup>21</sup>, the efficient combination will be that in which, for the same level of deterrence, the sum of public expenditures on crime prevention, investigation and trial, on the one hand, and on the enforcement of sanctions imposed by the judiciary, on the other, results in the lowest consumption of public revenue. Thus, for different combinations of probability and severity of punishment that produce the same expected cost of crime, it will be up to the State to evaluate the cost of obtaining each percentage of probability of punishment and the cost of applying each level of severity of punishment to find the least costly and therefore most efficient combination. An example may be useful: suppose, for an offense with an expected cost of \$1,000, that for each 1% probability of punishment obtained the state needs to spend \$5, and that the cost of enforcing the penalty imposed rises by \$5 for each \$50 level of severity of punishment. Disregarding other possible combinations, the combination of 40% probability of punishment (which would cost the state \$200) with a penalty of \$2,500 (cost the state \$250) is more efficient than the alternative arrangements of 20% probability (\$100) with a penalty of \$5,000 (\$500) or of 80% probability (\$400) and a penalty of \$1,250 (\$125).

20 Friedman's (2000) approach is broader than this one, as it adds to the indirect costs related to the execution of punishment the opportunity cost incurred by the criminal. The author presents the concept of "cost of punishment", defined as the difference between the cost that punishment imposes on the criminal and the benefit (which may be negative and, therefore, cost) that the same punishment provides to third parties. Therefore, the imposition of a fine would entail a cost of punishment equal or close to zero, since the collection of the fine generates a transfer of the amount from the offender to the State. A prison sentence, conversely, would tend to generate negative benefits, since the public indirect costs inherent in the prison system would be added to the opportunity cost of the convict.

21 In addition to the difficulties of knowing with reasonable precision the costs that citizens assume to prevent crime, private indirect costs are not necessarily aligned with social benefits, but with equally private benefits, as seen in note n. 16 above.

Considering that the economic optimum corresponds to the point where the marginal cost and the marginal benefit are equivalent, efficiency will be maximum when, at the same level of deterrence, there is a balance between the public indirect costs that impact the probability of punishment (prevention, investigation, and trial) and the public indirect costs related to the execution of sentences imposed by the judiciary. At this point, any variation in the combination of probability of punishment and severity of punishment, however minimal, results in an increase in total spending on the public indirect costs of crime.

Of course, the theoretical formulation faces practical challenges. Different sentences have not only different costs, but different deterrent effects. Long prison sentences, for example, are achieved by adding incarceration time to their end. A 4-year prison sentence is longer than a 2-year one because at the end of these, there is the addition of another 2 years. If the offender's discount rate is positive, the additional years will not cause a loss of utility identical to that experienced by the offender in the first few years of imprisonment<sup>22</sup>. Although the reference to the discount rate causes strangeness, since the prison sentence, despite the opportunity cost embedded in it, is a non-monetary sanction, the incidence of the discount stems from the circumstance that people prefer immediate consumption to deferred consumption, therefore assigning less value to future consumption than to current consumption, which consequently requires that they be rewarded for the postponement<sup>23</sup> (POSNER, 1985).

On the other hand, fines in significant amounts usually exceed offenders' ability to pay, which weakens their deterrent<sup>24</sup> effect and makes it necessary, for deterrence to remain at the desired level, to resort either to smaller fines with a higher probability of enforcement or to other forms of punishment, such as imprisonment, which in both cases would raise the indirect costs of crime. Were it not for the limited deterrent potential of the fine, at any level of deterrence the most efficient deterrent, which would result in the smallest sum of public indirect costs, would be the combination of a fine close to infinity, whose enforcement costs would be low, with a probability of punishment close to zero, which would require minimal spending on offense prevention, investigation, and trials (POSNER, 1985). But even in cases where the practical implementation of the theory is feasible, that is, in situations where the wealth of criminals allows the payment of fines at very high levels, there are difficulties in adopting the fine penalty more broadly. Some of these difficulties, as pointed out by Levitt (1997), are the private information that criminals have about their wealth levels (which prevents the state from properly assessing the ability to pay the fines), the possibility of concealment of assets by criminals, and the costs of confiscating them, which can be prohibitive in some cases. Another difficulty is that punishing a crime through a fine, when committed by the rich criminal who can pay it, and through imprisonment, when the criminal is poor, is perceived as unfair

22 Posner (1985) exemplifies that if the criminal has a discount rate of 10%, a 10-year prison term implies disutility only 6.1 times greater than the disutility caused by a 1-year prison sentence, and a 20-year prison term implies disutility 8.5 times greater than a 1-year prison sentence. Decreasing the discount rate to 5%, the figures would be 7.7 times for a 10-year prison sentence and 12.5 times for a 20-year sentence, respectively.

23 There is now a prevailing understanding that future discounting is best described as hyperbolic discounting, rather than constant discounting. This means that future discount rates vary over time, being very high for the near future and relatively low for the far future (MURAMATSU and FONSECA, 2008).

24 The reduction in the deterrent effect of the fine that exceeds the offender's ability to pay arises from the fact that  $S$ , in the formula of the expected cost of the offense ( $C_e = pS$ ), in this situation is not the amount of the fine fixed for the offense, but a smaller amount equivalent to the offender's assets. Thus, it is this asset that will define and limit the deterrence, so that the fine, to the extent that it exceeds the criminal's asset, will have no deterrent effect.

(and even unconstitutional) punishment by society, indicating that it considers other values, besides deterrence, important in determining the criminal sanction (MICELI, 2017).

If efficient deterrence, at any level of deterrence, means an internal balance between the indirect costs of crime, the optimal level of deterrence refers to the balance between such indirect costs and the direct costs of crime, the sum of which reveals the social costs of crime. In other words, the optimal level of deterrence will be reached when the sum of the indirect costs and the direct costs of crime lead to the minimization of the social costs of crime, being this minimization, according to Cooter and Ulen (2010), the goal of the economic analysis of criminal law.

As noted earlier, the first law of deterrence prescribes that increasing the expected cost of crime reduces the number of crimes. The fewer crimes committed, the lower the direct costs caused by delinquency. It has also been seen that increasing the expected cost of crime requires raising the probability of punishing the criminal or the severity of the sanction, which calls for increasing the indirect costs of crime. A synthesis of these statements can be outlined as follows: society pays the indirect public and private costs of crime to reduce the damage that crime causes to the victims of crime (direct costs). This reduction, according to Alfaro and Urruti (2019), is the social benefit sought by reducing crime.

According to Kaldor-Hicks<sup>25</sup>, a system in which the indirect costs incurred in fighting crime are greater than the social benefits derived from this fight would not be efficient. Consequently, since the cost of preventing an additional crime exceeds the damage that the crime to be prevented would cause, it is not efficient to deter it. This argument can be presented in another way: as long as the decrease in the direct cost of crime (marginal benefit) exceeds the indirect costs incurred in providing it (marginal cost), these indirect costs (and hence the expected cost of crime) must be increased, up to the point where the optimal level of deterrence is reached, where the marginal social benefit of reducing one more crime is equal to the marginal social cost of doing so<sup>26</sup>. For the economic theory of crime, therefore, it is not efficient to eliminate crime, since the costs of doing so would be greater than the social benefits of eradicating crime altogether.

It is necessary to pay attention, however, to the complexity of establishing the optimal level of deterrence in practice. The greatest risk is that increases in the expected cost of isolated offenses, notably by increasing the severity of the sanction, succeed in reducing the direct costs caused by that specific offense but, due to the existence of substitute crime of greater severity, end up increasing the quantity of the latter, ultimately raising the total social cost of crime (ALFARO and URRUTI, 2019).

If the expected cost of the offense of theft, for example, is equal to that of the crime of robbery, offenders will be incentivized to commit the more serious crime, given the premise that the more serious the offense, the greater the benefits provided to criminals. When this

25 According to this criterion, a public policy is considered efficient when the benefits that result from it outweigh the costs derived from its implementation. This criterion was developed as a way to solve the difficulties of the Pareto criterion, which considers an efficient situation, from the point of view of resource allocation, when it improves the condition of at least one person without worsening that of any other.

26 On the point, Cooter and Ulen (2010) warn that the marginal social costs of reducing crime rise as higher levels of crime reduction are achieved. Thus, further reducing crime by 1% costs less when the rate of crime reduction is 5% than when it has already reached 95%. Conversely, the marginal social benefit decreases as the level of crime deterrence increases. Thus, reducing crime from 5% to 7% has more social benefit than reducing crime from 95% to 97%.



occurs, marginal dissuasion is weakened, understood as the incentive for more serious crimes to be replaced by less serious ones<sup>27</sup> (POSNER, 1985). On this issue, Cooter and Ulen (2010, p. 491) warn that “penalties do not exist in isolation: they are part of an integrated scale that influences their optimal values. Using strong deterrents with less serious crimes generally prevents them from being used for more serious crimes.”.

### **3. APPLIED ECONOMIC THEORY OF CRIME: THE SCIENTIFIC METHOD AT THE SERVICE OF CRIMINAL POLICY**

In the criminal-political field, the economic theory of crime and the methodology inherent to it allow us to estimate the effects that may be caused by different strategies to face criminality, contributing to the elaboration of criminal policy based on scientific knowledge, and not on intuition or common sense. The consequence tends to be the adoption of more efficient strategies that achieve better results and optimize scarce public resources.

For example, the economic theory of crime could show that a criminal policy based predominantly on increasing the severity of penalties, which is common in Brazil, might not result in important gains in deterrence due to the high rates at which criminals discount the future<sup>28</sup>, and would make the indirect costs linked to the increase in spending on enforcement outweigh the social benefits expected from the adoption of this policy. A model that looked at this issue might conclude that greater social benefits would be achieved by increasing deterrence not by increasing the penalty, but by increasing the probability of punishment, and that this increase would generate even greater social benefits if it were achieved by investing in technologies that facilitate finding the authors of crimes, rather than by hiring police officers. Still as an example, the economic analysis of the use of pardon as a penitentiary policy instrument to mitigate the problem of prison overpopulation could in theory conclude that this policy, due to its negative effect on dissuasion (the reduction of the penalty reduces the expected cost of the offense), in a certain time horizon could lead to an increase in crime and, consequently, more incarceration. This would not only increase the direct and indirect social costs of the offense but also aggravate the problem that was intended to be solved, evidencing the need for the pardon to be associated with measures to recompose the level of deterrence or, perhaps, the need to adopt another policy to solve the serious Brazilian prison problem.

These are just a few examples of how the economic theory of crime can help criminal policy, and many issues that influence the level of criminality have already been addressed by foreign literature<sup>29</sup>. In any case, the specificities of the Brazilian criminal law system and

27 The idea of marginal deterrence goes back to Beccaria (On Crime and Punishment, 2004, p. 69): “[...] if two crimes that affect society unequally receive identical punishment, the man inclined to crime, not having to fear a greater penalty for the more heinous crime, will more easily resolve himself to the crime that will bring him more advantages [...]”.

28 Polinsky and Riskind (2017) cite empirical studies that concluded that offenders have high discount rates that appreciably reduce the perceived difference between short and long periods of incarceration.

29 The foreign literature registers studies on various criminal policy issues, having already addressed, to cite a few examples, the influence of abortion decriminalization on future crime rates (LEVITT, 2004), the optimal combination of prison sentences and fines (POLINSKY and SHAVELL, 1984), and the optimal combination of prison, parole, and restrictive sentences (POLINSKY

reality provide ample research field for the application of the economic method to the various problems related to criminality in our country.

To illustrate how the economic theory of crime can be used in the construction of Brazilian criminal policy, three situations inserted in the national legal-criminal scenario are analyzed below. The situations were selected due to their simplicity and capacity to demonstrate the predictive, empirical and normative potential of the economic theory of crime. The analysis will be made in three stages: first, it will be exposed how the economic method works from the premise of the rational criminal to derive predictions about the behavior of the criminal; next, it will be shown how the predictions can be submitted to empirical validation or rejection tests; finally, it will be shown how the scientific conclusions provided by the economic method can support, in view of the social<sup>30</sup> goal to be achieved, normative proposals about which criminal<sup>31</sup> policy measure should be adopted in a given situation.

### 3.1 PREDICTION: LAW 13.654/2018 AND ROBBERY WITH A KNIFE

This example reflects what happened when Law 13654/2018 was enacted. The law repealed subsection I of § 2 of art. 157 of the Criminal Code, which provided for the use of a weapon (without distinguishing between a melee weapon and a firearm) as a cause of increasing robbery by one-third to one-half. The same law added § 2º-A to art. 157 of the Penal Code, in which the cause of the increase, in a more serious level (2/3), was only for the use of a firearm, with no mention of a melee weapon. This situation lasted until Law 13,964/19, which, among several modifications, restored the increase for the use of a knife to its original level (from 1/3 to half).

It is beyond the scope of this analysis to address the impact of the change on past facts. What matters for the economic theory of crime is to understand how the legal change affected the incentive structure that the criminal considers when deciding, *ex ante*, whether to commit the crime or not.

A predictive model based on the premise of the rational criminal would offer, as its first and most obvious implication, the conclusion that the removal of the cause of the increase of armed robbery reduced the expected cost of this offense (there was a reduction of variable  $S$  in the formula  $Ce = pS$ ), which would probably be followed by an increase in the demand for its commission.

The model would also conclude that by equalizing the penalties for simple robbery and robbery with a knife, which function as substitute crimes, the legislative innovation eliminated the marginal deterrence that existed between the two, which encouraged the substitution of the more serious offense (robbery with a knife) for the less serious offense (simple robbery).

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and RISKIND, 2017). Brazilian authors have dedicated themselves to studying this empirical literature in search of solutions compatible with the Brazilian criminal justice system, such as Boson (2015), who analyzed the policy of three strikes and you're out adopted in US states, and Odon (2018), who suggested interesting criminal policy measures that could be adopted in Brazil, which, according to him, would have a high impact on Brazilian crime rates.

30 A social goal is understood as "the state of affairs politically defined as socially desirable" (AGUIAR, 2017, p. 140).

31 This paper adopts the vision of criminal policy proposed by Roxin (2000, p. 22 and 82), who, overcoming the incommunicability between criminal law and criminal policy sustained by Liszt in the late nineteenth century, affirms that there is a "systematic unity" between both, so that criminal law would be "much more the form through which the political and criminal purposes can be transferred to the mode of legal validity.

Consequently, the increase in demand for robbery with a knife would be counterbalanced by a reduction in demand for simple robbery. In fact, since the expected value of the offense is equal to the benefit to be gained from committing the crime minus the expected cost of the crime ( $Ve = B - pS$ ), the expected value of armed robbery would exceed that of simple robbery for two reasons. First, if we consider that the greater seriousness of the crime corresponds to greater benefits (the use of a knife makes it easier to steal), variable  $B$  will be greater in robbery with a knife. Second, if we consider that the use of a sharp weapon reduces the victim's resistance and makes it easier for the criminal to flee, reducing the chances of apprehension, the variable  $p$  in the formula for the expected cost of the robbery with a sharp weapon will be smaller than in that of simple robbery, which decreases the expected cost of the former and, consequently, increases its expected value.

Another implication would be that Law 13,654/2018, by raising the cause of increase for robbery with a firearm to 2/3 and eliminating the increase for robbery with a knife, has created marginal deterrence between these crimes, which did not exist previously because, until then, the penalty for both was equal. Since the two crimes also function as substitutes, the model would indicate that marginal<sup>32</sup> deterrence would encourage some offenders to switch from gunpoint robbery (whose  $Ve$  decreased due to the increase of  $S$ ) to robbery with a knife (whose  $Ve$  increased due to the decrease of  $S$ ).

### 3.2 EXPERIMENTATION: PARALYZATION OF THE MILITARY POLICE OF CEARÁ

In February of 2020, military police officers in the state of Ceará paralyzed their activities for 13 days, between February 18 and March 1, in an attempt to pressure for the fulfillment of their claims. According to data released in the press, the number of violent crimes increased in the period. Compared to February 2019, homicides were up 178%. There were 164 homicides in February 2019 compared to 456 in the same month of 2020. Of these 456 homicides, 312 occurred during the shutdown, an average of 26 per day, compared to an average of 8 per day in the period before the shutdown. Robbery records also increased in the comparison period: they went from 477 in February 2019 to 1280 in February 2020, an increase of 168%.<sup>33</sup>

Just as the implementation of the three strikes policy in California was considered a natural experiment that provided empirical study considered fruitful in confirming deterrence theory, demonstrating the deterrent effect of increases in sanction severity in a manner independent of incapacitation effects, the strike of the military police of Ceará apparently has the aptitude to be a quasi-experiment to evaluate, *ex post facto*, the theoretical proposition that decreasing the probability of punishment negatively impacts deterrence, which would contribute to the expansion of the existing empirical literature on the subject.

The hypothesis that there is, besides the correlation between the variables "reduced ostensive policing" and "increased violent crime", a causal relationship along the lines proposed by the economic theory of crime is sufficiently strong, and empirical work could validate or refute

32 This marginal deterrence persists, but to a lesser extent, even after Law 13,964/2019, which, as we have seen, restored the cause of increase for robbery with a knife to the original level of 1/3 to half.

33 The data were extracted from the following article: <<https://g1.globo.com/ce/ceara/noticia/2020/03/06/312-pessoas-foram-assassinadas-no-ceara-durante-motim-da-pm-diz-secretaria-da-seguranca.ghtml>>, accessed on 12.04.2020.

the hypothesis in the situation under examination. What is intended to emphasize, however, is not so much whether the proposition is true or not, but that due to the scientific character of the economic theory of crime, the proposition, based on the premise of the rational criminal, can be submitted to empirical testing that accepts or rejects it, which does not occur in traditional<sup>34</sup> dogmatics.

The significant increase in violent crimes during the period of the strike suggests that the rapid response of the state to such incidents, usually by the military police, plays a relevant role in elucidating the authorship of the crimes and, therefore, in dissuading the perpetrators. In this area, empirical studies could cover, for example, the evaluation of proactive policing initiatives directed to specific regions, the so-called "focused policing", which covers hot spots policing (more police in areas with higher crime rates) and problem-oriented policing, or POP, a strategy in which the police get closer to the community to prevent criminal behavior (ODON, 2018<sup>35</sup>).

### 3.3 NORMATIVE PROPOSAL: EMBEZZLEMENT COMMITTED BY MAYORS

The cause of increase of art. 327, §2 of the Penal Code<sup>36</sup>, applicable, among others, to the crime of embezzlement<sup>37</sup>, was introduced by Law 6,799/1980. The justification of the respective bill, on this point, stated that "the conduct is more reprehensible in criminal terms the more power is in the hands of the official, because he has a greater duty to defend it and to be loyal to it<sup>38</sup>", which would require an increase in the penalty for embezzlement. which would require an increase in the penalty when the public official committing the offense holds a commission or a management or advisory position.

Although the judgment of "reprehensibility" expresses a evaluative criterion that cannot be empirically compared, there seems to be an economic explanation for the more severe penalty for functional crimes committed by persons holding a commission or a management or advisory position. The explanation is based on the premise that, since the expected cost of the offense is equivalent to the sanction imposed discounted by the probability of punishment ( $C_e = pS$ ), any reduction in  $p$  must be accompanied by an increase in  $S$  for the expected cost of the offense to remain the same (SHAVELL, 2016). The positions and functions specified in the cause of increase are assigned greater portions of power than those assigned to positions at lower levels of the state hierarchy. And the more power the agent holds, the less likely he or

34 "Although it seeks the logical systematization of positive law by means of doctrinal texts, dogmatics does not propose hypotheses, nor is it susceptible to empirical testing. While the language of science is assertive and bipolar (true/false), the language of dogmatics fails to achieve this veritative function. How to prove or disprove a dogmatic 'thesis' if there is no possibility of testing it, but only of accepting or not its rhetorical arguments, either by the doctrine that follows it, or by the courts? The criterion becomes pragmatic (in the philosophical sense of the term), that is, dogmatics may be useful or useless for persuasive purposes and technological aid, but it does not reach truth or even falsity. By the Popperian criterion, therefore, dogmatics is not science" (CARVALHO, 2014, p. 129-130).

35 Also according to Odon (2018), an example of a POP-based program is Fica Vivo (Stay Alive), implemented in the Morro das Pedras region in Belo Horizonte/MG, which in the first six months reduced the homicide rate by 69%.

36 Art. 327, § 2 of the Penal Code: "The penalty will be increased by one-third when the perpetrators of the crimes provided for in this Chapter are occupants of commissioned positions or positions of direction or advisory functions of a direct administration body, mixed economy society, public company or foundation established by the public power."

37 Art. 312. A public official appropriating money, valuables or any other movable good, public or private, of which he has possession by reason of his office, or embezzling them for his own benefit or for the benefit of others: Penalty: confinement, from two to twelve years, and a fine.

38 Bill 1.066/1975, of the House of Representatives.

she is to be punished for functional crimes, since that power is generally associated with conditions that are more conducive to concealing the crime and making it more difficult to fully investigate it. In the most extreme cases, the criminal may not only be responsible for appointing, dismissing or removing employees of the internal control bodies, but also for controlling the budget destined to the activities of prevention and detection of deviations that this body carries out. In order that, in these situations, the expected cost of the offense is not higher for the common employee, the lower probability of punishment for crimes committed by the occupants of commissioned, management and advisory positions is compensated by increasing the penalty applicable to them.

The economic rationale presented justifies the cause of increase for those occupying the heads of the Executive Branch (president, governors and mayors).<sup>39</sup> The analysis will then focus on the crime of embezzlement committed by mayors. This crime, contrary to what occurs with regard to other heads of the Executive Branch, is not provided for in art. 312 of the Criminal Code, but in a special law, Decree-Law 201/1967, which in art. 1, I, typifies the mayor's conduct of "appropriating public property or income or embezzling it for his own benefit or for the benefit of others. The penalty for deprivation of liberty is the same as in art. 312 of the Penal Code (imprisonment of two to twelve years), which makes the penalty for embezzlement of mayors abstractly less than that applicable to crimes of embezzlement committed by governors and the president, since the latter are subject to the increase provided for in art. 327, § 2 of the Penal Code. For the same reason, the penalty imposed on mayors is, in the abstract, lower than that applicable to their subordinates in commissioned or directive and advisory positions. These observations, which can be reached by a simple reading of the legal provisions under analysis, could justify, on the basis of normative criteria relating to the "greater reprehensibility" of embezzlement committed by mayors, the correction of what appears to have been a legislative error, which is all the more evident because the increase in the penalty of art. 327, § 2 of the Penal Code is applied to mayors when they are perpetrators of crimes that are subject to such an increase, such as the crime of passive corruption (art. 317 of the Penal Code).

But the economic analysis of the crime of embezzlement of a mayor provides an argument that might not be easily perceived. It indicates that the crime provided for in art. 1, I of DL 201/1967 has a lower expected cost not only than the embezzlement of other heads of the Executive Branch or other officials occupying a commissioned position or a management and advisory function, but also the embezzlement of the simplest public official, since the reduction of  $p$  in the formula of the expected cost of the mayor's embezzlement, inherent to the means that the position confers to make it difficult to discover and solve the crime, is not accompanied by an increase of  $S$ . And, as the condition of mayor is elementary to the embezzlement of art. 1, I of DL 201/1967, it is communicated to the co-authors of the crime, by force of art. 30 of the Penal Code, even if individually they would be liable for the embezzlement of art. 312 of the Penal Code and eventually be subject to the surcharge of art. 327, § 2 of the Penal Code. In other words: the embezzlement of municipal civil servants who hold positions

39 The Federal Supreme Court recognizes that those holding elective office may be covered by the elementary "management function", since any other interpretation would lead to the absurdity of punishing the assistant occupying a commissioned position and a management/advisory function more severely than the person in general charge of the Public Administration (INQ 1769/PA and INQ 2606/MT). It is interesting to note that this understanding evidences a concern with the consequences of possible interpretations. The difference is that traditional hermeneutics evaluates the consequences by resorting to intuition and common sense, and not to a scientific theory that makes it possible to formulate hypotheses about human behavior that, in principle, are empirically falsifiable.

of commission or management and advisory functions (such as municipal secretaries), when committed in competition with the mayor, will also have a lower expected cost than the embezzlement of the simplest civil servant. This scenario suggests that the lower expected cost of the embezzlement of art. 1, I of Decree-Law 201/1967 is capable of increasing the demand for this crime, both by mayors and by those who occupy commissioned posts and management and advisory positions in the municipal Executive Branch (in this case, in competition with the mayor). Therefore, a more efficient deterrence of this offense, whose reprehensibility (evaluative criterion) was previously recognized by law when it was established as a crime, requires a legislative reform that equates the custodial penalty imposed for the crime of art. 1, I of DL 201/1967 to that of art. 312 of the Penal Code plus the increased penalty of art. 327, § 2 of that code. And this could be proposed based on the conclusions obtained from the application of the economic theory of crime.

## 4. CONCLUSIONS

This article applies the economic theory of crime to criminal policy, aiming to demonstrate its usefulness as a scientific foundation for the definition of that policy.

After reviewing the central propositions of the economic theory of crime, three situations inserted in the Brazilian legal-criminal scenario were analyzed in order to exemplify how the theory can be used to subsidize the political decisions that structure the state strategies to fight crime.

We conclude that the economic theory of crime and the scientific method inherent to it generate knowledge that makes it possible to estimate the impacts of different criminal policy configurations, favoring better informed state decisions. This is possible because the premise of the rational criminal allows predictions to be made about criminal behavior that, in principle, can be submitted to empirical validation or refutation tests, thus producing conclusions that, depending on the social goal to be reached, lead to normative propositions about the criminal policy measure that should be adopted in the analyzed situation.

The conclusions revealed by the economic theory of crime qualify the state choices that define how and in what amount expenditures will be made on crime prevention, investigation and trial, which will indicate the probability of punishing criminals, and how penalties will be scaled for each type of offense, which will dimension the expenditure on the execution and supervision of sanctions. The consequence tends to be the adoption of more efficient strategies to fight crime, which obtain better results and optimize public resources.

The economic theory of crime has limitations, which show that it is not the definitive solution to all problems of criminal policy. But no criminological theory is, and the recognition of limitations does not mean that the theory is not useful. The usefulness of the economic theory of crime to guide the construction of criminal policy seems undeniable, as indicated by the vast empirical literature corroborating the premise of the rational criminal. In Brazil, there is a wide field for research that seeks, based on the application of the theory, to better understand the phenomenon of criminality and help our legal and criminal system to face it more efficiently.

## REFERENCES

- AGUIAR, J. C. D. Economic approach to law: epistemological aspects. **Lusíada: Revista de Ciência e Cultura**, Coimbra, v. 2, n. 1, p. 169-186, Jan. 2002.
- AGUIAR, J. C. D. **Analytic-behavioral theory of law**: towards a scientific approach to law as a functionally specialized social system. Porto Alegre: Núria Fabris, 2017.
- ALFARO, C. P. R.; URRUTI, L. A. Economic analysis of criminal law. In: ACCIARRI, H. A. **Law, economics and behavioral sciences**. [S.l.]: Ediciones SAIJ, 2019. p. 147-176. Available from: <http://www.bibliotecadigital.gob.ar/items/show/1713>. Accessed 16 December 2019.
- BECCARIA, C. **On Crimes and Penalties**. Translation by Torrieri Guimarães. São Paulo: Martin Claret, 2004.
- BECKER, G. S. Crime and Punishment: An Economic Approach. **The Journal of Political Economy**, v. 76, n. 2, p. 169-217, Mar-Apr 1968. Available from: <https://pdfs.semanticscholar.org/f252/e0a5a33891158be5ee683493ae13280c82ff.pdf>. Accessed on: 6 January 2020.
- BOSON, D. S. Three strikes and you're out: an economic analysis of sentencing. **Brazilian Journal of Criminal Sciences**, São Paulo, v. 23 n. 116, p. 17-37, sep-out 2015.
- CARVALHO, C. Is a "science" of law possible? Situation and perspectives for Brazilian legal dogmatics. In: PORTO, A. M.; SAMPAIO, P. **Law and economics in two worlds**: legal doctrine and empirical research. Rio da Janeiro: FGV Publisher, 2014. Chap. 4, p. 121-143.
- COOTER, R. Price and Sanctions. **Columbia Law Review**, v. 84, p. 1523-1560, 1984. Available at: <https://scholarship.law.berkeley.edu/facpubs/1613/>. Accessed on: 04 Jan 2020.
- COOTER, R.; ULEN, T. **Law & Economics**. Translation by Luis Marcos Sander and Francisco Araujo da Costa. Porto Alegre: Bookman, 2010.
- EHRlich, I. Crime, punishment, and the market for offenses. **Journal of Economic Perspectives**, v. 10 n. 1, p. 43-67, 1996. Available at: <https://www.ufrgs.br/ppge/giacomo/wp-content/uploads/2019/03/Crime-Punishment-and-the-Market-for-Offenses.pdf>. Accessed on: 04 Apr. 2020.
- EIDE, E. Economics of criminal behavior. In: BOUCKAERT, B.; GEEST, G. D. **The Economics of Crime and Litigation (Encyclopedia of Law and Economics)**. Cheltenham: Edward Elgar, v. 5, 2000. p. 345-389.
- FRIEDMAN, D. D. **Law's Order**: What Economics has to do with Law and why it matters. Princeton: Princeton University Press, 2000.
- KESSLER, D.; LEVITT, S. D. Using sentence enhancements to distinguish between deterrence and incapacitation. **Journal of Law and Economics**, v. XLII, p. 343-363, April 1999. Available at: <http://pricetheory.uchicago.edu/levitt/Papers/KesslerLevitt1999.pdf>. Accessed on: 04 Apr. 2020.
- LEVITT, S. D. Incentive Compatibility Constraints as an Explanation for the Use of Prison Sentences Instead of Fines. **International Review of Law and Economics**, New York, v. 17, p. 179-192, 1997. Available at: <https://pricetheory.uchicago.edu/levitt/Papers/LevittIncentiveCompatibilityConstraints1997.pdf>. Accessed July 15, 2020.
- LEVITT, S. D. Why do increased arrest rates appear to reduce crime: deterrence, incapacitation, or measurement error. **Economic Inquiry**, v. 36 n. 3, p. 353-372, jul 1998. Available at: <http://pricetheory.uchicago.edu/levitt/Papers/LevittWhyDoIncreasedArrest1998.pdf>. Accessed on: 04 Apr. 2020.
- LEVITT, S. D. Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that Do Not. **Journal of economic perspectives**, v. 18 n. 1, p. 163-190, 2004.
- MARTINEZ, A. P. Evidence on the deterrent effect of punishment in the case of economic crimes. [www.jota.info](http://www.jota.info), 2016. Available at: <https://www.jota.info/especiais/evidencias-efeito-dissuasorio-da-pena-no-caso-de-crimes-economicos-22092016>. Accessed on: 16 January 2020.
- MENDES, S. M.; MCDONALD, M. D. Putting severity of punishment back in the deterrence package. **Policy Studies Journal**, v. 29 n.4, p. 588-610, november 2001. Available at: <https://repositorium.sdum.uminho.pt/bitstream/1822/2929/1/GlasgowPSJ.pdf>. Accessed on: 04 Apr. 2020.

MICELI, T. J. The use of economics for understanding law: An economist's view of the cathedral. In: ULEN, T. **The Methodology of Law and Economics**. Cheltenham, UK: Edward Elgar, 2017. Chap. 2, p. 18-43.

MICELI, T. J. **The paradox of punishment**: reflections on the economics of criminal justice. Cham: Palgrave Macmillan, 2019.

MURAMATSU, R.; FONSECA, P. Economics and psychology in explaining intertemporal choice. **Revista de Economia Mackenzie**, v. 6 n. 6, p. 87-112, 2008. Available at: <http://editorarevistas.mackenzie.br/index.php/rem/article/view/810>. Accessed on: 08 Apr. 2020.

ODON, T. I. Public security and the economic analysis of crime: designing a crime reduction strategy for Brazil. **Revista de Informação Legislativa**, Brasília, v. 55 n. 218, p. 33-61, Apr-Jun 2018. Available at: [http://www12.senado.leg.br/ril/edicoes/55/218/ril\\_v55\\_n218\\_p33](http://www12.senado.leg.br/ril/edicoes/55/218/ril_v55_n218_p33). Accessed on: 13 Aug 2020.

OLSSON, G. A.; TIMM, L. B. Economic analysis of crime in Brazil. In: BOTTINO, T.; MALAN, D. **Direito penal e economia**. Rio de Janeiro: Elsevier: FGV, 2012. p. 111-131.

PATRÍCIO, M. The Economic Analysis of Crime: A Brief Introduction. **Revista Jurídica Luso-Brasileira**, Lisbon, v. 1, p. 157-175, 2015.

POLINSKY, A. M.; RISKIND, P. N. Deterrence and the optimal use of prison, parole and probation. **Stanford Law and Economics Olin Working Paper no. 507**, May 2017. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2968614](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2968614). Accessed on: 24 Jul 2020.

POLINSKY, A. M.; SHAVELL, S. The optimal use of fines and imprisonment. **Journal of Public Economics**, v. 24, p. 89-99, 1984.

POSNER, R. A. An Economic Theory of the Criminal Law. **Columbia Law Review**, v. 85, p. 1193-1231, october 1985. Available at: <https://pdfs.semanticscholar.org/6448/aee7b1aaa0785667ee8f0ba4fb7e9fe0a3c0.pdf>. Accessed on: 5 January 2020.

POSNER, R. A. The economic analysis of law movement: desde Bentham hasta Becker. **The economic analysis of law movement: desde Bentham hasta Becker**, v. 44, p. 37-54, 2002. Available from: <http://revistas.pucp.edu.pe/index.php/themis/article/view/10057>. Accessed 16 December 2019.

POSNER, R. A. **Economic Analysis Of Law**. Translation by Eduardo L. Suárez. 2nd ed. Ciudad del Mexico: Fondo de Cultura Economica, 2007.

ROXIN, C. **Criminal Policy And Legal-penal System**. Translation by Luis Greco. Rio de Janeiro: Renovar, 2000.

SHAVELL, S. **Fundamentals Of The Economic Analysis Of Law**. Translation by Yanna G. Franco. Madrid: Editorial Universitaria Ramón Areces, 2016.

SHIKIDA, P. F. A. Considerations On The Economics Of Crime In Brazil: a summary of 10 years of research. **Economic Analysis of Law Review**, Brasília, v. 1 n. 2, p. 318-336, jul-dez 2010. Available at: [https://www.researchgate.net/publication/286060021\\_Consideracoes\\_sobre\\_a\\_Economia\\_do\\_Crime\\_no\\_Brasil\\_Um\\_Sumario\\_de\\_10\\_Anos\\_de\\_Pesquisa](https://www.researchgate.net/publication/286060021_Consideracoes_sobre_a_Economia_do_Crime_no_Brasil_Um_Sumario_de_10_Anos_de_Pesquisa). Accessed on: 8 Aug 2020.

SHIKIDA, P. F. A.; AMARAL, T. B. D. Economic Analysis of Crime. In: TIMM, L. B. **Law and Economics in Brazil**: studies on the economic analysis of law. 3rd. ed. Indaiatuba, SP: Foco, 2019. Chap. 13, p. 311-334.

**Received/Recebido:** 31.08.2020.

**Approved/Aprovado:** 26.09.2020.