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YOUTH CRIME IN LATIN AMERICA

Key Determinants and Effective Public Policy Responses

Ignacio Munyo I November 2013

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EXECUTIVE SUMMARY

Juvenile delinquency is increasing in almost every country in Latin America—a region where citizen security is the main concern. Youth crime is at the forefront of regional social challenges: Scholars, activists and legislators are all debating both causes and potential solutions to this problem.

This report tackles the causes of why an increasing number of youths in the region are engaging in criminal activities, by presenting evidence that this phenomenon could be driven by a change in the incentives to commit crime, rather than created as a result of a generation of youths who differ inherently from its predecessors. In order to do so, this report develops a new dynamic framework with which to analyze juvenile crime as a rational choice in which forward-looking youths decide between legal and criminal activities, and their skills are shaped by their past and present choices. In order to quantify the consequences of each decision, this analysis recognizes the effects of on-the-job training, on-the-crime training, the school of crime in correctional facilities and the social stigmatization of conviction.

The report extracts lessons from the case of Uruguay, where substantial changes in juvenile crime incentives come hand in hand with an exponential growth in juvenile offending rates that have tripled over the last 15 years.

According to the framework presented in this report, four factors can explain most of the spike in juvenile crime in Uruguay. First, an anemic recovery of wages relative to total income after the severe 2002 economic crisis—which lowered the return to legal activities relative to the financial rewards from crime—accounts for 35 percent of the observed variation. Second, the more lenient juvenile crime law passed in 2004—which substantially reduced the expected punishment of youth offenders—explains another 30 percent of the increase. Third, the dramatic increase in the escape rate from juvenile correctional facilities—which further lowers expected punishment—accounts for 10 percent of the increase in juvenile crime. Finally, the outbreak of a paste cocaine epidemic—which reduces a youth's capacity to project the future—accounts for another 10 percent of the observed increase in juvenile crime between 1997 and 2010.[1] In other words, a rational framework of behavior is able to explain the threefold increase in juvenile crime in Uruguay as the costs associated with criminal activity substantially decreased, and the gains from crime outgrew the rewards from legal activities.

The report provides a model-based tool—complementary to the randomized control trial approach prominent in the literature—to quantify the potential effects of alternative measures that address juvenile crime, which account for relevant issues of inter-temporal choice. In fact, dynamic effects are crucial in disentangling the final result that policies such as lowering the age of criminal responsibility or increasing the level of punishment within the juvenile system could have on the incentives for criminal involvement.

According to the results presented in this report, the most effective way of reducing juvenile delinquency is to significantly improve the quality of education, especially in very unfavorable socio-economic contexts. Better education increases the return to legal activities and enhances labor market inclusion, pushing youths to choose work or further education over crime. However, a massive improvement in the quality of education is a long-term investment and effort.

Increasing the severity of juvenile sentences, increasing the probability of effective apprehension and prosecution, or reducing the probability of escape from correctional facilities are all also effective mea-

sures in dealing with the increasing juvenile offending rates in Latin America.

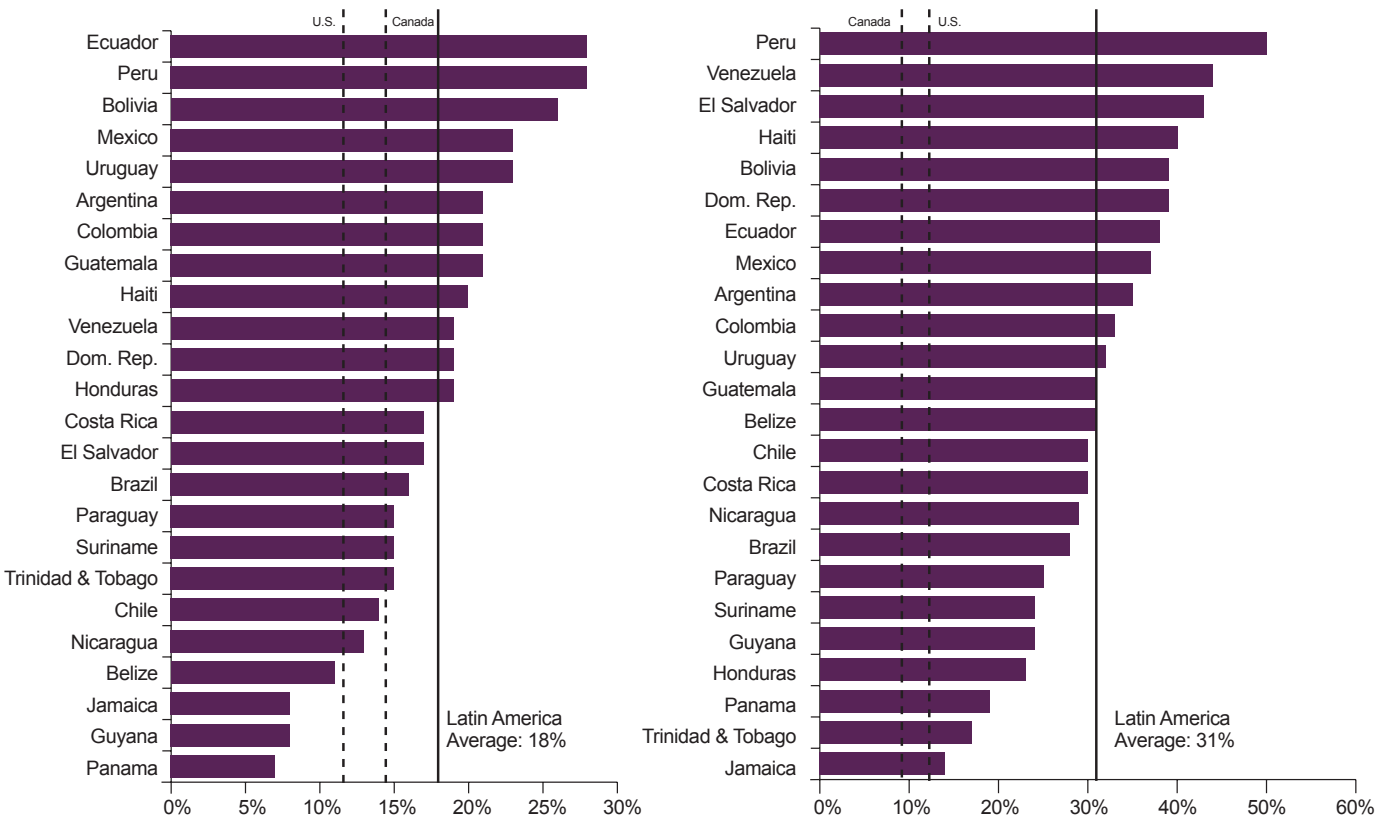
Along these lines, several countries are considering imposing the heavy hand of the adult criminal justice system on violent juvenile offenders by reducing the age of criminal responsibility. The results presented in this report suggest that reducing the age of criminal responsibility is not an efficient way—in terms of a cost-benefit analysis—to deal with youth delinquency. The same predicted reduction in juvenile crime could be obtained after a much smaller increase in the sentence length within the juvenile system (relative to the one implicit in the reduction of the age of criminal responsibility) that avoids the school-of-crime effect (when inmates learn criminal skills in adult detention centers). Moreover, the acceleration in the transmission of crime-related skills and the interruption in the accumulation of work-related skills observed in adult correctional facilities generate incentives for future criminal involvement and therefore increase the likelihood of recidivism.

I. INTRODUCTION

Citizen security is the main concern in Latin America.[2] With an average of 22 homicides per 100,000 inhabitants, Latin America has a higher murder rate than sub-Saharan Africa and is far above all the other regions in the world. Even though it is home to less than 10 percent of the global population, Latin America witnesses more than 30 percent of all the homicides committed worldwide.[3]

Latin America's victimization rates—the percentage of people who are victims of crime, which are systematically measured by the Latin American Public Opinion Project (LAPOP) for the Americas—are significantly above the rates observed in the U.S. and Canada (see Figure 1, panel a). As a result, the perception of insecurity in Latin America is more than double the one observed in North America: The fraction of people that feel unsafe in their own neighborhood in every country in the region—without exception—is significantly higher than the level observed in the U.S. and Canada (see Figure 1, panel b).[4]

Figure 1. Perception of Insecurity and Victimization Rate in Latin America



Source: Latin American Public Opinion Project (LAPOP, 2012)

In this context, juvenile delinquency is at the forefront of social challenges in Latin America.[5] Even though there is no systematic cross-country analysis of juvenile crime in the region—both because of data availability and comparability problems—country-by-country figures suggest that juvenile crime is increasing almost everywhere in Latin America.[6] Social scientists, activists and legislators are all debating both the causes and potential solutions to this problem.

Why is juvenile crime increasing in Latin America? What drives an increasing number of youths to engage in criminal activities? Inadequate socialization among the current generation of adolescents has been offered as one of the explanations. Yet, there are other potential causes. The spike in juvenile delinquency may also be the natural outcome of a change in the incentives that affect the choice of engaging in crime, rather than the result of a generation of youths who differ inherently from its predecessors. In this vein, some youths will engage in criminal behavior as long as the expected gains are large enough to offset the expected costs.

Along the lines of Becker (1968), this report analyzes juvenile crime as a rational choice and presents a new dynamic framework in which youths face legal and criminal opportunities and consistently choose between working and committing crimes. In order to quantify the consequences of each decision, the analysis recognizes the effects of on-the-job training, on-the-crime training, the school of crime in correctional facilities and the social stigmatization of conviction.

Applying this framework to a concrete reality depends heavily on micro data from the police, the judicial system and the prison system. This report extracts lessons from the case of Uruguay where juvenile crime tripled between 1997 and 2010. This exponential growth in juvenile delinquency rates comes hand in hand with substantial changes in the incentives to engage in criminal activities. In fact, the anemic recovery of wages relative to total income after the severe 2002 economic crisis led to financial rewards from criminal activities outgrowing the rewards obtainable from legal activities. Additionally, the introduction of a more lenient juvenile crime law and the increase in the escape rate from juvenile correctional facilities substantially lowered the expected costs of crime.

This report not only identifies and quantifies the causes behind the growth in youth crime, but also analyzes the most effective policies to reduce youth crime rates. Very recent work systematically reviewed the empirical evidence on youth violence prevention programs in Latin America.[7] Not only do the majority of studies included in that review stem from a small number of countries (Brazil, Chile and Colombia), but also the limited number of high-quality impact evaluations of youth violence interventions in Latin America suggests that there is still weak empirical evidence for determining what works and what does not. The approach presented in this report provides a model-based tool—complementary to the randomized controlled trial approach prominent in the literature—to evaluate alternative measures to deal with juvenile crime in the region. The analysis accounts for the issues of inter-temporal choice—which are crucial for disentangling the ambiguous effects of policies (such as lowering the age of criminal responsibility and increasing the level of punishment within the juvenile system)—and what these issues could have on the incentives for criminal involvement.

The remainder of the report is organized as follows. Section II presents the analytical framework. Section III tries to explain the recent juvenile crime spike in Uruguay within this framework. Section IV discusses alternative policies to deal with juvenile crime. Section V concludes.

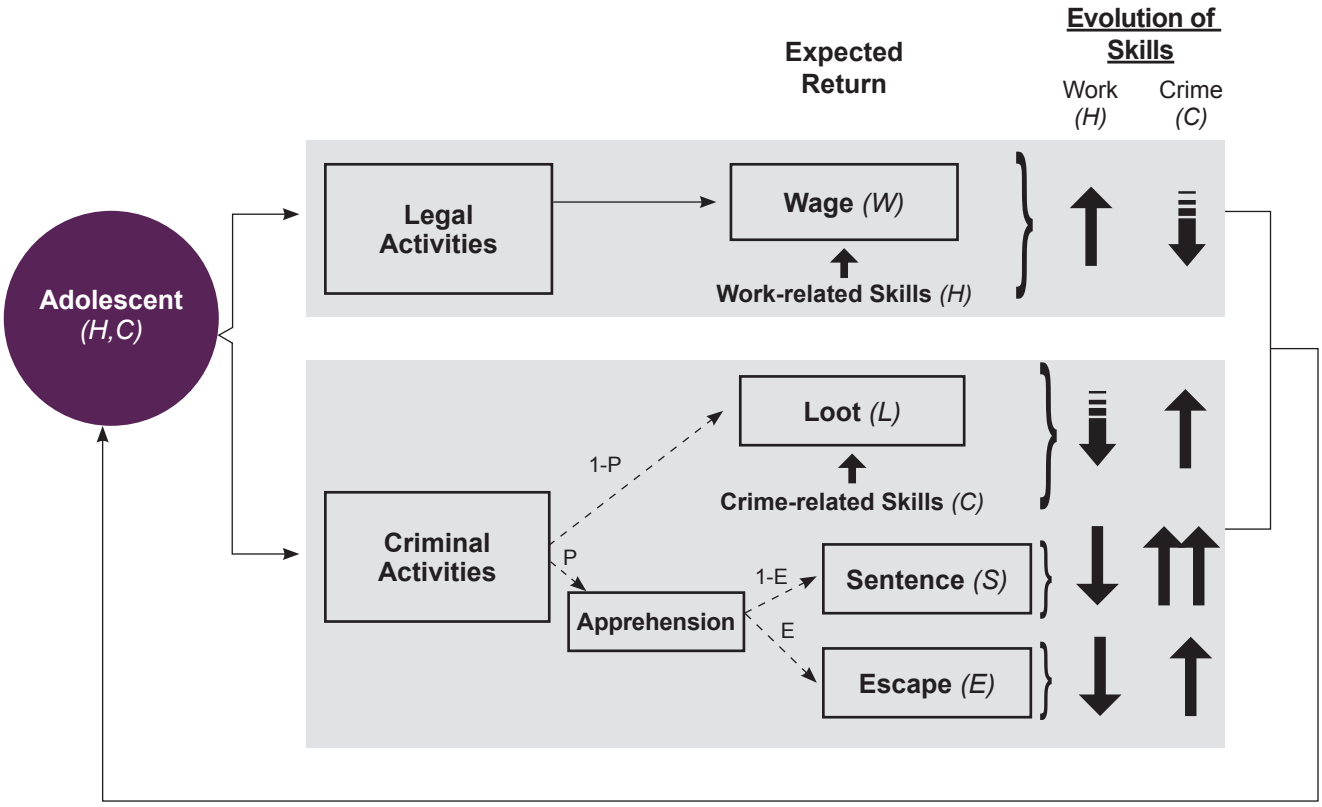
II. ANALYTICAL FRAMEWORK

This section presents a basic model of behavior specifically designed to analyze juvenile crime in an inter-temporal decision setting.[8]

In this analytical framework, forward-looking adolescents are endowed with two different types of human capital, work-related skills (H) and crime-related skills (C), both of which evolve depending on both their current and past choices. Every period, adolescents face legal and criminal opportunities and consistently choose between working and committing crimes (see Figure 2).

If the adolescent decides to engage in legal activities, he will earn a wage (W) of a magnitude that depends on his level of work-related skills (H). Since work-related skills depend on the individual's educational attainment, they indirectly include the underlying social factors that condition his schooling possibilities (such as economic inequality and marginalization).

Figure 2. Adolescent Model of Behavior



If the adolescent engages in crime but evades police apprehension with probability (1-P), he will get to keep the monetary gains from the crime committed (loot L), whose value will depend on the individual's crime-related skills (C). For example, whereas a high-skilled offender is able to steal a car, a low-skilled offender is able to steal a bicycle.

If the adolescent decides to engage in criminal activities, he runs the risk of being apprehended with probability (P). In this case, he will have to serve a sentence (S) in a correctional facility—unless he manages to escape from the detention center. Therefore, the escape probability (E) is also a relevant variable to consider. Naturally, detained individuals are unable to realize the gains from crime.

The dynamic features of this framework are critical (see again Figure 2). Youths' current decisions influence their future choices by affecting their work-related skills (H) and their crime-related skills (C) and, therefore, their expected returns to legal and criminal activities. If the adolescent chooses to engage in legal activities, his work-related skills will increase as he accumulates work experience (on-the-job training), while his level of crime-related skills will remain unchanged. On the other hand, if the youth decides to engage in criminal activities and gets away with the loot (L) without being apprehended, his crime-related skills will increase as he garners valuable criminal experience (on-the-crime training), while his work-related skills will remain constant. Alternatively, if the adolescent decides to commit a crime, is apprehended and serves the full sentence imposed by the judge, his work-related skills depreciate due to the stigmatization effect of conviction, and his crime-related skills increase due to both accumulation of criminal experience prior to apprehension and the school-of-crime effect—according to which inmates learn criminal skills in jail—fostered by correctional facilities. In fact, empirical evidence suggests that crime-related skills are transmitted and magnified in the social environment of juvenile detention centers.[9] Finally, if the adolescent commits a crime and is apprehended but manages to escape from the correctional facilities before serving the sentence, he faces, again, depreciation in his work-related skills due to the stigmatization effect of criminal involvement and an increase in crime-related skills through on-the-crime-training.

Therefore, each decision made by youths increases the return to making that same choice in the future. This intrinsic dynamic explains the existence of career criminals and why adolescents who work and study are less prone to commit crimes when facing the same loot and same potential jail sentence than juveniles who neither work nor study. By the same token, the framework explains why, if confinement in correctional facilities improves adolescents' crime-related skills and lowers their expected returns from future legal activities, longer sentences could end up making the decision to re-engage in crime even more attractive instead of having the desired deterrent effect.

Finally, this dynamic analysis accounts for the fact that key factors affecting individual decisions, such as the probability of conviction, the severity of punishment and the correctional facilities escape rate, are significantly more lenient for youths than for adults.

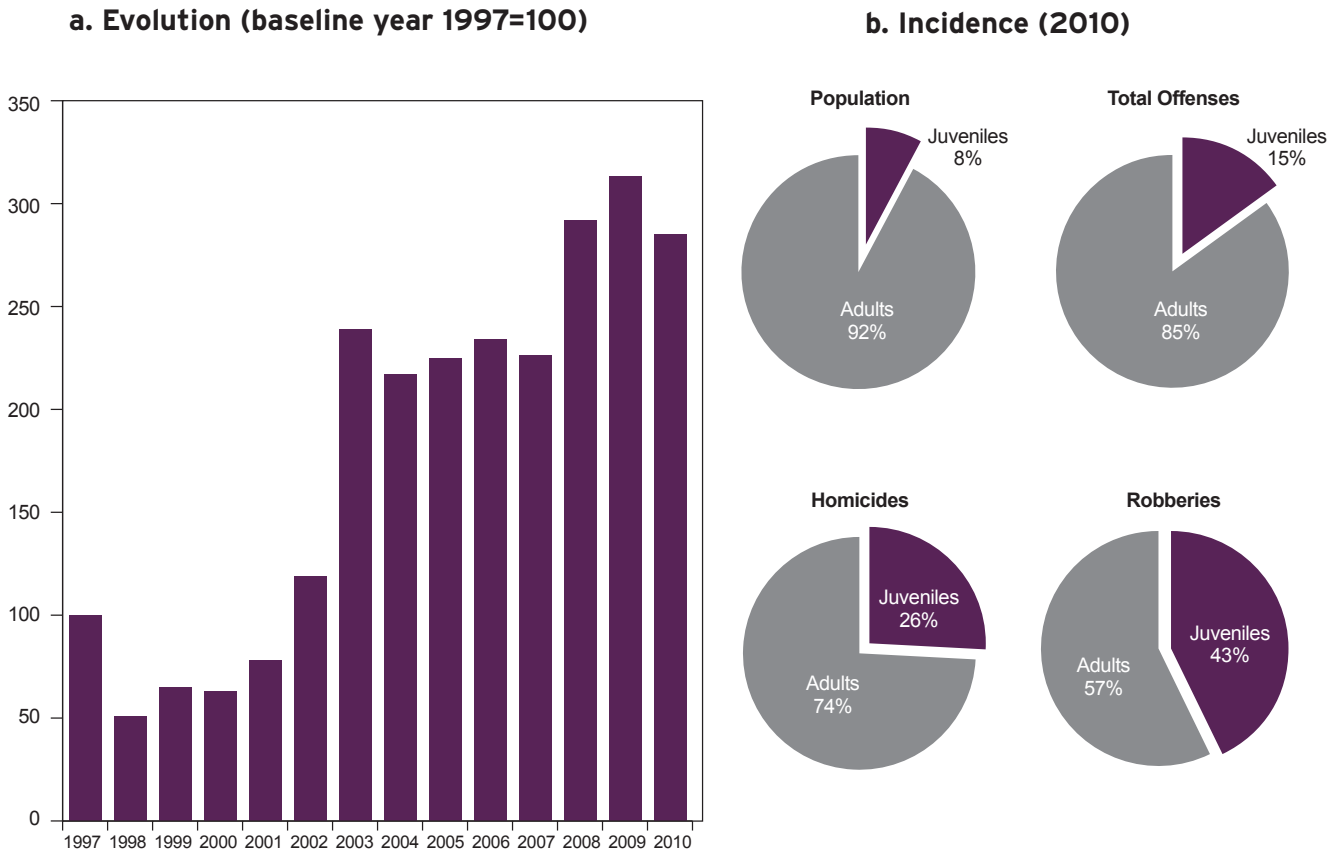
III. THE DETERMINANTS OF THE INCREASE IN JUVENILE CRIME: THE CASE OF URUGUAY

Criminal court records in Uruguay indicate that youth crime increased 180 percent between 1997 and 2010 (see Figure 3, panel a).[10] In 2010, minors aged 13-17 comprised roughly 8 percent of the total population, but accounted for 15 percent of total offenses, 26 percent of the homicides and more than 40 percent of all robberies in the country (see Figure 3, panel b).[11]

This massive spike in youth delinquency has triggered a strong debate over how to deal with young offenders. In fact, in 2014 Uruguayans will vote on whether to reform their constitution in order to reduce the age of criminal responsibility from 18 to 16.

To understand why youth crime increased so sharply in Uruguay, it is necessary to set the framework presented in Section II to match the juvenile crime rate observed in 1997. In 1997, according to government statistics, the probability of apprehension and prosecution (P) was 10 percent for both adults and

Figure 3. Juvenile Crime in Uruguay



Source: Justice Statistics, National Statistics, Ministry of the Interior

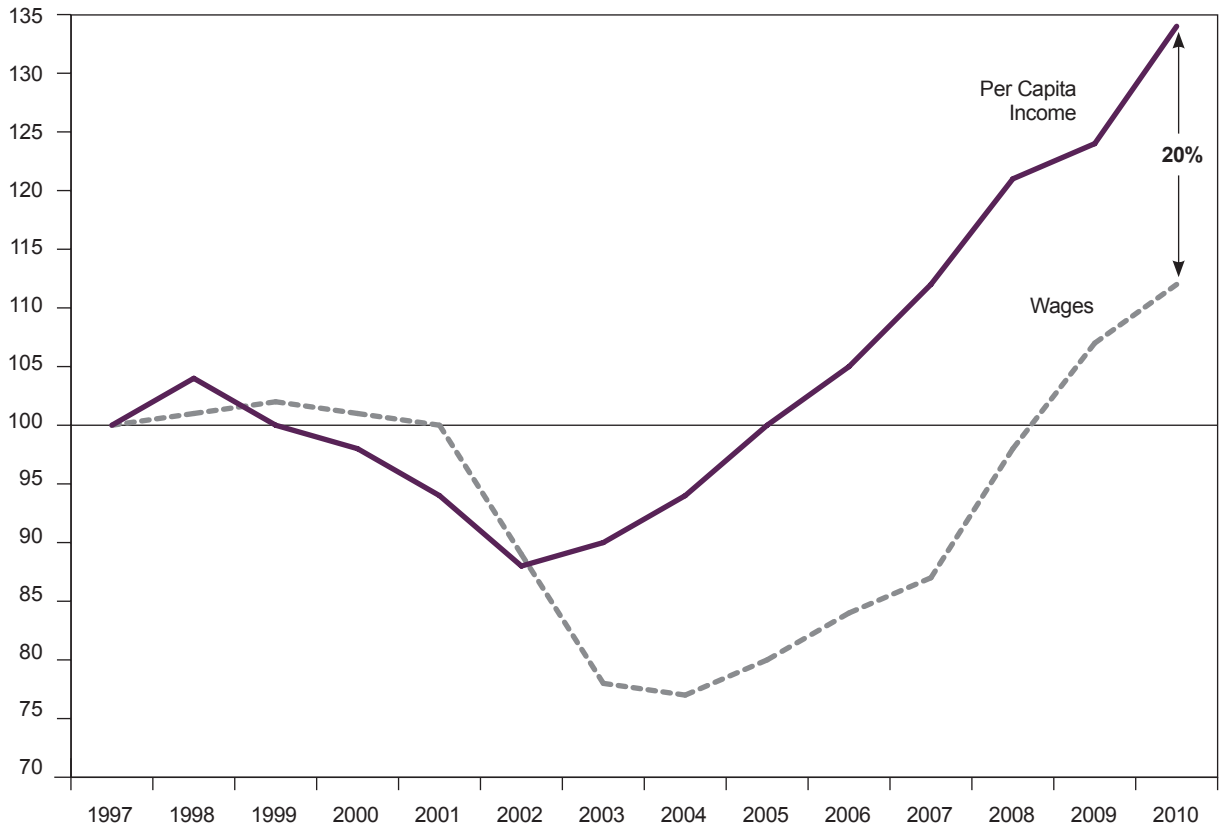
minors.[12] The probability of escape (E), which differs substantially between juveniles and adults, was 11 percent in juvenile correctional facilities and virtually zero in adult detention centers. The average sentences (S) served by adults and minors were also different. On average, for all crimes, while a minor faced a sentence of only 6 months, an adult faced a prison sentence of 15 months.[13]

Once the initial setting is calibrated to match the observed crime rate in 1997, this framework can be used to shed light on why juvenile crime increased threefold in Uruguay. Potentially relevant factors to analyze are the anemic evolution of wages relative to the monetary gains from crime after a severe economic crisis (1998-2002), the introduction of a more lax juvenile crime law (2004), the rise in the escape rate from correctional facilities (since 2007) and the outbreak of a paste cocaine epidemic (since 2004).

THE RETURN TO LEGAL AND CRIMINAL ACTIVITIES

Both wages and total per capita income fell dramatically during the 1998-2002 economic crises in Uruguay, when GDP fell by 15 percent and wages by 20 percent. Economic activity displayed a strong recovery after 2003. However, while in 2010 real per capita income was 34 percent above its 1997 level, real wages were only 12 percent above pre-crisis levels. Thus, the level of real wages lagged 20 percent behind the level of total income (see Figure 4).

Figure 4. Evolution of Wages and Income (in real terms, baseline year 1997=100)



Source: National Statistics

This observed gap between wages and per capita income affects the return to crime insofar as loot increases hand in hand with per capita income. The assumption that loot from criminal activities grows proportionally with income is frequently found in the literature.[14] Total income rose from $24 billion to $40 billion between 1997 and 2010. As income increases, so does the value of what can potentially be stolen. In other words, the financial rewards from criminal activities increased 20 percentage points above the financial rewards from legal activities.

Legal activities have become less profitable for an increasing fraction of the young population. Once we consider the divergent growth paths of the expected returns to criminal activities (L) and legal activities (W) in the framework presented in Section II, the predicted increase in juvenile crime accounts for 35 percent of the observed variation from 1997 to 2010.[15]

JUVENILE CRIME REGULATION

The second key factor that explains the recent spike in juvenile delinquency in Uruguay is the approval of a lenient juvenile criminal law in 2004 introduced to align legislation with international treaties and agreements. Beyond several procedural changes, the new regulation decriminalized attempted theft and established that judges should not consider aggravating circumstances in offenses committed by adolescents. According to judicial statistics, this new law implied a reduction of 50 percent of the average sentence length.[16]

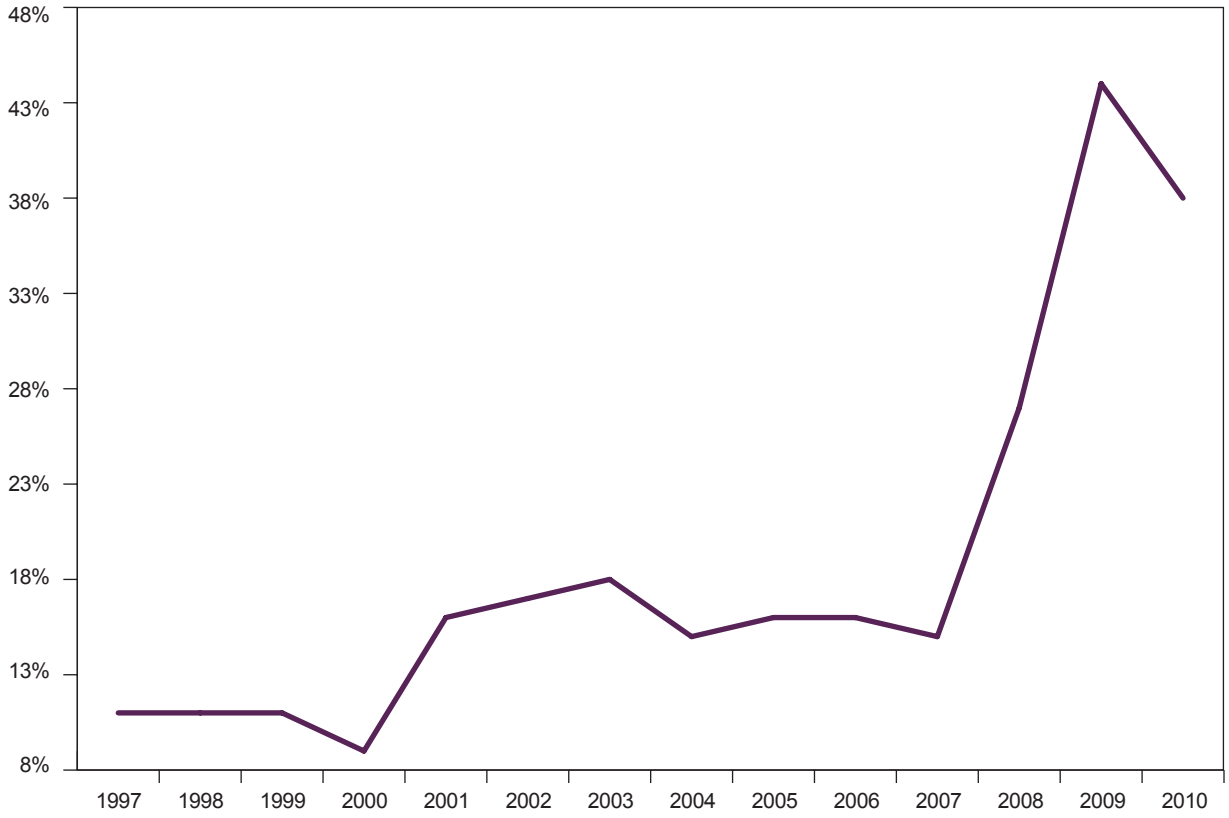
Additionally, the new juvenile criminal system allowed judges to arbitrarily decide whether to even initiate a judicial procedure once they are notified by the police of an adolescent's arrest. In fact, in 2004 judges decided to immediately release approximately 40 percent of arrested youths, reducing juveniles' effective probability of conviction from 10 to 6 percent.[17]

This move towards a more lenient juvenile crime regulation that reduces the effective probability of apprehension and prosecution (P) and the average sentence length (S) accounts for 38 percent of the increase in juvenile crime since 1997.[18] Moreover, by considering both the effect of this revision of the juvenile criminal law and the differential evolution of the returns to legal and criminal activities, the framework presented in Section II can explain two-thirds of the observed variation in juvenile offending between 1997 and 2010.

ESCAPES FROM CORRECTIONAL FACILITIES

The third relevant factor in explaining the evolution of juvenile delinquency in Uruguay is the increase in escapes from juvenile correctional facilities. According to official statistics, the probability of escape from juvenile detention centers rose from 10 percent in 1997 to 38 percent in 2010 (see Figure 5).

Figure 5. Probability of Escape from Juvenile Correctional Facilities



Source: Government Statistics

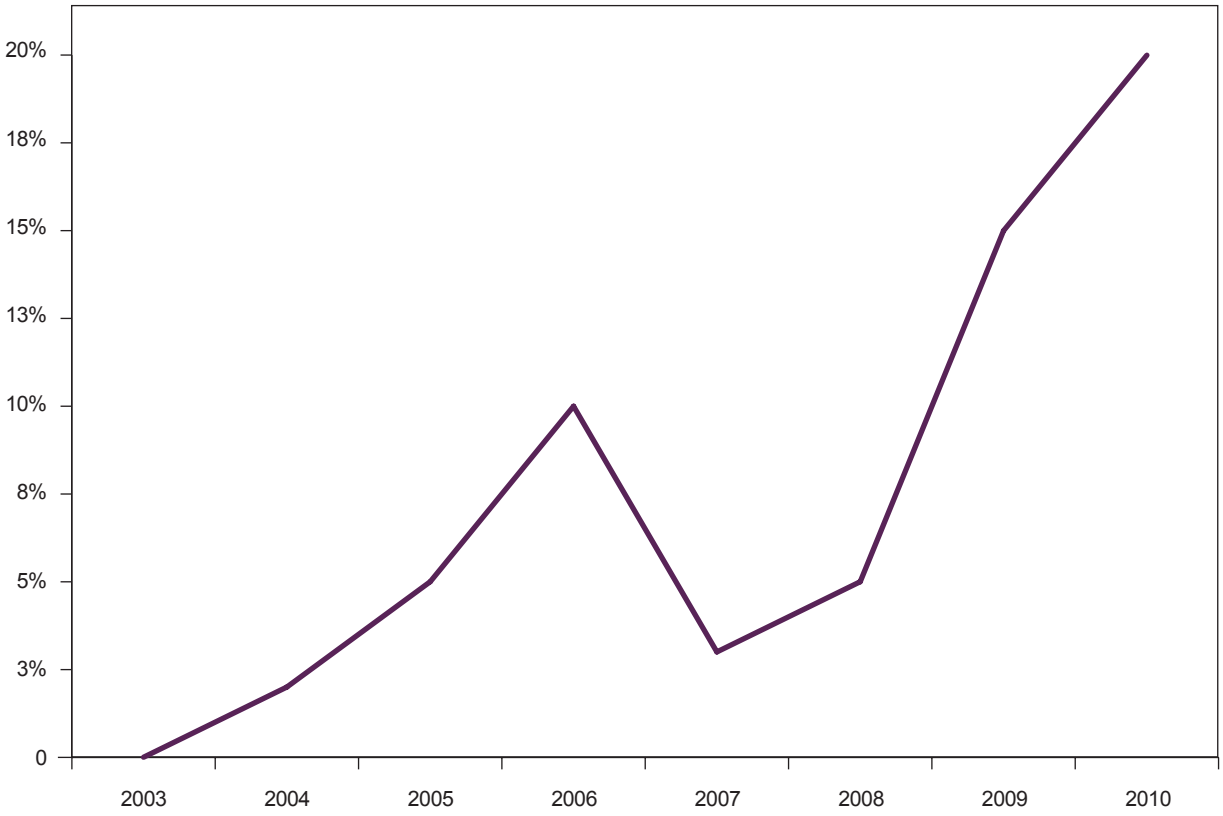
In November 2007, after a strong political debate, the government approved the release of 10 percent of the total prison population to deal with prison overpopulation. At the same time, there was an explosive increase in the escape rate of juvenile correctional facilities, reaching a peak of 43 percent in 2009.

This relaxation of surveillance of juvenile correctional facilities that produced a significant increase in the probability of escape (E) explains 10 percent of the increase in juvenile offending.[19] Once we consider the three factors together—the evolution of the return to legal activities below that of the monetary gains from crime, the decline in the probability of effective apprehension and the reduction in sentences, and the rise in the escape rate from correctional facilities, the framework presented in Section II explains 75 percent of the observed variation in juvenile delinquency in Uruguay since 1997.

THE PASTE COCAINE EPIDEMIC[20]

This assessment would not be complete if it ignored the effect of the increase in hard drug consumption in Uruguay. The incidence of paste cocaine among youths has risen exponentially since 2003. Official statistics show that while total drug seizures multiplied by 1.5 between 2003 and 2010, seizures of paste cocaine multiplied by almost 7 (see Figure 6). According to official statistics, 10 percent of the juvenile population from socially vulnerable backgrounds frequently consumes paste cocaine, and paste cocaine incidence

Figure 6. Paste Cocaine Seizures (% of total drugs seizures)



Source: National Drug Board

among inmates in juvenile correctional facilities exceeds 50 percent.

The literature suggests that decision making processes under the influence of drugs are still consistent with a rational-choice framework.[21] Experimental studies systematically show that drug consumption reduces the time horizon of decision makers by reducing their ability to think about consequences in the future.[22] More specifically, this literature presents evidence that the consumption of hard drugs reduces the time horizon of decisions by almost 20 years. Once we consider such a reduction in the time horizon of Uruguayan youths—who naturally have a shorter time horizon than adults since the ability to plan into the future increases with age[23]—the outbreak of the paste cocaine epidemic accounts for an additional 10 percent of the observed variation in juvenile crime between 1997 and 2010.[24]

When all four factors—the differential evolution of the returns to legal and criminal activities, the more lenient juvenile crime regulation, the increase in the probability of escape from correctional facilities and the paste cocaine epidemic—are considered together, the framework presented in Section II is able to explain 86 percent of the observed increase in juvenile crime in Uruguay since 1997.

In sum, crimes committed by adolescents have tripled in Uruguay not only because the gains from crime increased relative to the rewards from legal activities but also because the costs associated with

criminal activity substantially decreased. Only 6 out of 100 adolescents who commit severe crimes are actually convicted due to police efficiency and the 2004 juvenile crime law. Of those six who are convicted, less than four serve their full sentences due to the escape rate from correctional facilities. In addition, the sentences of the 4 out of 100 who are arrested, convicted, and do not manage to escape from the detention centers were halved to an average of three months by the 2004 juvenile crime law. In the words of a prosecuted youth, committing crimes "is a piece of cake, in the neighborhood everyone does it and if they catch you, nothing happens." [25]

To make matters worse, this very low expected punishment disappears in the minds of youths under the influence of hard drugs.

In this context, it should come as no surprise that records on judicial interviews reveal that more than 50 percent of youths involved in crime in Uruguay testify that delinquency is their way of earning a living. The changes in economic and institutional factors discussed above are conducive to an environment where an increasing fraction of the young population in unfavorable socio-economic contexts finds it more profitable to commit crime than to engage in legal activity.

IV. DEALING WITH JUVENILE CRIME

Juvenile crime is usually treated quite differently than adult crime. Offenses committed by minors are considered delinquent acts within a separate justice system. This system is designed to recognize the special needs and immature status of adolescents by emphasizing rehabilitation over punishment. Juvenile criminal records are sealed from adult courts and public record, arrested youths are judged by juvenile courts, and convicted minors are strictly segregated from adults in custody. Psychological research supports this differential treatment based on the developmental immaturity of adolescents.[26]

However, in the fight against juvenile crime, several countries—including Uruguay—are considering trying violent juvenile offenders as adults in court. Beyond psychological concerns, invoking the heavy hand of the adult criminal justice system also raises relevant issues of inter-temporal choice and might have ambiguous effects on the incentives for criminal involvement. The negative signal generated by court records—which ruins future wages in the labor market—and the acquisition of crime-related skills in detention centers could offset the potential reduction in juvenile crime achieved through deterrence from harsher punishments.

How, then, should we deal with young offenders who commit severe crimes? In order to answer this critical question, this section quantifies the effectiveness of alternative policies to deal with juvenile crime by considering the previous framework—which we found to have a strong explanatory power—to perform counterfactual exercises.[27]

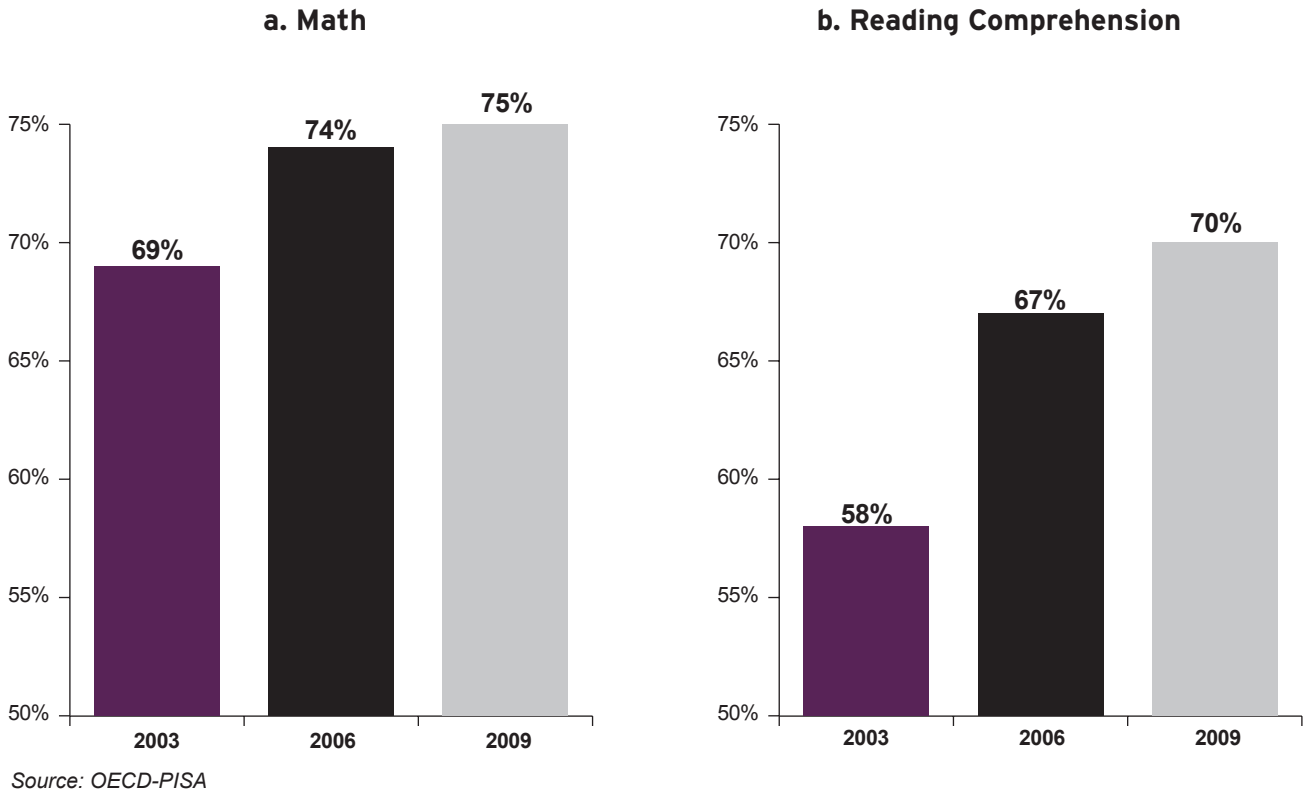
IMPROVING THE QUALITY OF EDUCATION

A consensus way to fight juvenile crime is to increase the opportunity cost of crime by improving youths' work-related skills through better education, especially in very unfavorable socio-economic contexts. Doing so would increase the expected return from legal activities and, hence, make these activities more attractive than crime. Several empirical studies in the literature confirm the negative relationship between education and crime.[28] Specifically in Latin America, there is also strong evidence that school-based and education projects systematically reduce juvenile crime rates.[29]

Results obtained by Uruguayan students in international standardized tests are unsatisfactory, to say the least. A significant decline of Uruguay's educational quality, especially in the public schooling system, which enrolls 80 percent of the population, has not only lowered the average skill level of the workforce, but has also left a significant part of the youth population without the minimum qualifications to join the labor market. According to the OECD's Program for International Student Assessment (PISA) tests, educational failure in very unfavorable socio-economic contexts in both math and verbal skills has increased steadily since 2003, reaching 75 and 70 percent, respectively, in 2009 (see Figure 7, panels a and b).[30] Moreover, recent empirical research concluded that secondary schooling for students living in very unfavorable socio-economic contexts is not a profitable investment in Uruguay as it fails to translate into higher future income.[31]

In this context, the impact of a substantial improvement in the quality of education on juvenile crime can be quantified following the logic of the framework presented in Section II. More specifically, if education in adverse socio-economic settings converged to the level found in very favorable settings, the return to legal activities would increase, reducing the incentive to engage in criminal activities. If Uruguay were able to close the educational gap between very favorable and very unfavorable contexts—which implies a reduction in failure rates from more than 70

Figure 7. Educational Failure in Very Unfavorable Socio-economic Context (% of students below the minimum requirements in PISA tests)



Source: OECD-PISA

to 12 percent of the students from very unfavorable socio-economic contexts, the improvement of work-related skills makes legal activities more attractive to many adolescents. Juvenile crime would fall by approximately 40 percent.

Along these lines, alternative measures that increase the opportunity cost of crime could also be considered. For instance, the introduction of government welfare transfer payments would also contribute to crime reduction as it could affect the decision between working and committing crime. However, in the framework presented in Section II, only transfers conditional on legal activities could reduce the incentives for crime. As long as the conditions are not strictly controlled, transfer payments would have no effect on an individual's decisions.

INCREASING THE SEVERITY OF EXPECTED PUNISHMENT

The empirical evidence on the effects of harsher punishment to juvenile crime is inconclusive in the literature. On the one hand, several criminological studies in the U.S. find no evidence of deterrent effects.[32] On the other hand, a more recent literature in the U.S. and Europe finds that harsher punishments deter potential juvenile offenders.[33] In Latin America, evidence from Colombia shows that after an exogenous decrease of the costs of crime faced by Colombian youths—through the enactment in 2006 of

Table 1. Alternative Measures to Deal with Juvenile Crime

	2010	Policy	Variation in Juvenile Crime
Average Sentence Length (S)	3 months	6 months	-4%
	3 months	15 months	-30%
Effective Probability of Apprehension and Prosecution (P)	6%	10%	-4%
	6%	26%	-30%
Probability of Escape (E)	38%	0%	-7%

a new juvenile crime regulation to align Colombian legislation with international treaties to implement a restorative justice system—juvenile crime rates significantly increased.[34]

In general terms, an increase in the severity of the expected punishment could be implemented by increasing the level of the punishment, by increasing the certainty of the punishment or by reducing the escape rate from correctional facilities. All these measures can be analyzed under the framework presented in this report (see Table 1).

According to the framework presented in Section II, if the average sentence length (S) were doubled from three to six months—just to go back to the pre-2004 law average sentence length—juvenile crime would decline by 4 percent. If it were multiplied by 5 from three to 15 months—to converge to the adult's average sentence length—juvenile crime would decline by 30 percent: Naturally, the stronger the increase in the level of punishment, the higher the projected reduction in juvenile crime.[35] Similar results could be obtained by increasing the effective probability of effective apprehension and prosecution (P). Whereas to reduce juvenile crime by 4 percent, the effective probability of effective apprehension and prosecution would need to increase from 6 percent to 10 percent, to reduce juvenile crime by 30 percent, this probability would need to increase from 6 percent to 26 percent. Alternatively, the expected reduction in juvenile crime with the elimination of escapes from youth correctional facilities was 7 percent.

A more complex policy that combines all the previous measures would be the reduction of the age of criminal responsibility, currently under consideration in Uruguay. In this case, offenders aged 16 and 17 would be judged in adult courts by adult standards of legal responsibility. Therefore, for this subset of youths, (i) the average sentence length (S) would increase from three to 15 months, (ii) the probability of effective apprehension and prosecution (P) would climb from 6 to 10 percent, and (iii) the escape probability (E) would fall from 38 percent to zero. Under this scenario, the expected reduction in juvenile crime is 35 percent. It should be noted that a longer exposure to the school-of-crime effect in adult detention centers partially offsets the deterrence effect of a harsher punishment (including the stigmatization effect of adult courts that reduces future wages). This is the reason why a significantly stronger increase in the expected punishment (which, in addition to increasing the sentence length, also includes an increase in the probability of apprehension, prosecution and the elimination of escapes

from correctional facilities) translates into a similar reduction in juvenile crime compared to the case where only the average sentence length is increased but youth offenders are confined to juvenile correctional facilities where the school-of-crime effect is smaller.

The revision of the juvenile crime system by introducing harsher sentences is an alternative to avoid the school-of-crime effect associated with the confinement of juveniles in adult detention centers. In this case, when relevant changes in regulation and enforcement are introduced in juvenile crime law, such as (i) an increase in the sentences so that the average sentence length (S) is doubled from three to six months, (ii) an increase in the probability of effective apprehension and prosecution (P) from 6 to 10 percent by eliminating judges' ability to arbitrarily decide whether or not to start judicial proceedings and by re-criminalizing attempted theft, and (iii) a reduction of the escape probability (E) from 38 percent to zero thanks to tighter security measures, the framework presented in Section II predicts that juvenile crime would decline by 36 percent. In other words, a much smaller increase in the sentence length within the juvenile system—relative to the one implicit in the reduction of the age of criminal responsibility—replicates the same predicted reduction in juvenile crime due to the lower school-of-crime effect in juvenile correctional facilities.

Moreover, even though harsher punishments within the juvenile justice system or a reduction of the age of criminal responsibility would have a similar effect on juvenile crime, trying juveniles as adults would lead to an increase in the likelihood to reoffend after release. According to the framework presented in Section II, whereas the revision of the juvenile crime regulation would reduce future adult crime, lowering the age of criminal responsibility would amplify the incentives for crime later in life, increasing recidivism by 5 percent. The stigma generated by criminal records, coupled with the acceleration in the transmission of crime-related skills in adult correctional facilities, generates incentives for future criminal involvement.

This result is consistent with the empirical evidence that suggests that judging and sentencing juvenile offenders as adults increases the likelihood of recidivism.[36] For example, recent empirical work examines the outcomes of comparable youths in the U.S. who are randomly assigned to judges who differ in their sentencing severity and find that juvenile confinement increases future reconviction rates by 22 percentage points.[37] In the same line, a recent empirical study in Colombia finds that adolescents sent to serve their punishment in correctional facilities have recidivism rates significantly higher than the rate of similar juveniles sentenced to alternative punishments.[38]

V. CONCLUSION

This report presents a new framework to analyze the dynamics of juvenile crime, in which forward-looking youths choose between legal and criminal activities, and their skills are shaped by their past and present choices.

The evidence from the case study presented in this report suggests that the increase in juvenile crime can be interpreted as a rational response to a change in the incentives youths face to engage in criminal and legal activities. In fact, four factors can explain most of the spike in juvenile crime in the past 15 years in Uruguay. First, the anemic recovery of wages relative to total income after the severe 2002 economic crisis—which lowered the return to legal activities relative to the monetary gains from crime—accounts for 35 percent of the observed variation. Second, the more lenient juvenile crime regulation passed in 2004—which reduced youths' likelihood of being prosecuted and convicted as well as the average sentence length they face—explains another 30 percent of the increase. Third, the dramatic increase in escapes from juvenile correctional facilities—which lowered even further the effective average sentence length—accounts for 10 percent of the increase in juvenile crime in Uruguay. Finally, the outbreak of a paste cocaine epidemic—which reduced the time horizon of youths who consume the drug—accounts for another 10 percent of the observed increase in juvenile crime between 1997 and 2010.

Increasing the severity of the sentences, the probability of effective apprehension and prosecution, or reducing the escape probability from correctional facilities are all effective measures to deal with the increasing juvenile offending rates in Latin America.

In this line, several countries are considering placing violent juvenile offenders under the adult criminal justice system by reducing the age of criminal responsibility. The results presented in this report suggest that reducing the age of criminal responsibility is not an efficient way—in terms of a cost-benefit analysis—to deal with youth crime. The same predicted reduction in juvenile crime could be obtained after a much smaller increase in the sentence length within the juvenile system (relative to the one implicit in the reduction of the age of criminal responsibility) that avoids the school-of-crime effect in which inmates learn criminal skills in adult detention centers. Moreover, the acceleration in the transmission of crime-related skills and the interruption in the accumulation of work-related skills observed in adult correctional facilities generate incentives for future criminal involvement and, therefore, increase the likelihood of recidivism after release.

Yet the most effective way of reducing juvenile delinquency would be to significantly improve the quality of education, especially in very unfavorable socio-economic contexts. A better education increases the return to legal activities and enhances labor market inclusion, pushing youths to choose work or further education over crime.

ENDNOTES

1. Paste cocaine is a cheaper alternative to cocaine that is produced in crude intermediate stages of the cocaine's preparation process.
2. See Barómetro Iberoamericano (2011).
3. Casas-Zamora (2013) presents a similar picture of violence in Latin America.
4. See Latin American Public Opinion Project—LAPOP (2012).
5. Juvenile offending covers a multitude of different violations of legal and social norms, ranging from minor offences to serious crimes committed by young people. The focus of this report is exclusively on serious juvenile crime.
6. See Frühling and Martínez (2011).
7. See Moestue et al. (2013).
8. Munyo (2013) presents the mathematical development of this model.
9. See Bayer at al. (2009), Camp and Gaes (2009), and DeLisi et al. (2011).
10. Raw data from criminal court records understate the rise in juvenile crime, as attempted theft (one of the most common types of juvenile offense in Uruguay) was decriminalized in the juvenile crime code passed in 2004. Before the introduction of this new regulation, attempted theft represented 25 percent of the total number of trials initiated by the juvenile justice system (Sayagués-Laso 2004). Therefore, the number of procedures initiated by the juvenile justice system between 2004 and 2010 was adjusted by a factor of 4/3 to provide a consistent time series of juvenile offending that accounts for attempted thefts.
11. Robbery is defined as depriving a person of property with the use of violence or threat of violence.
12. The probability of apprehension is the ratio of total prosecutions to total offenses after adjusting data on police-recorded offenses for an underreporting rate of 55 percent (Aboal et al. 2013). This underreporting rate, which is in line with the rate estimated for the U.S. (Levitt 1996) and for Chile (Nuñez at al. 2003), comes from official victimization surveys.
13. Lopez and Palummo (2013) provide data to compute the average sentence length for juveniles. The average sentence length of adults was computed by using records of flows from and into the Complejo Carcelario Santiago Vazquez (ComCar) correctional facility. According to Prisoner Ombudsman Alvaro Garcé, inmates in ComCar (35 percent of the prison population) are a representative sample of urban Uruguayan offenders.
14. See, for example, Ehrlich (1996).
15. The Matlab codes are available upon request.
16. See Lopez and Palummo (2013).
17. See Sayagués-Laso (2004).
18. The Matlab code that includes this computation is available upon request.
19. Again, the Matlab code is available upon request.
20. Paste cocaine is a cheaper alternative to cocaine that is produced in crude intermediate stages of the cocaine's preparation process.
21. See Becker and Mulligan (1997).
22. See Bretteville-Jensen (1999), Petry (2003), Coffey et al. (2003), Kirby and Petry (2004) and Blondel et al. (2007).
23. See, for example, Nurmi (1991), Green et al. (1994), Green et al. (1996), Green et al. (1999), and Steinberg et al. (2009).
24. Once again, the Matlab code is available upon request.
25. See El País (2010).
26. See Steinberg (2009).

27. The Matlab codes that compute the counterfactual exercises presented in this section are available upon request.

28. See Cullen at al. (2003); Lochner and Moretti (2004); Merlo and Wolpin (2009); Berthelon and Kruger (2011); Hjalmarsson and Lochner (2012); Meghir et al. (2012); and Machin et al. (2012).

29. See Waiselfisz and Maciel (2003); Berthelon and Kruger (2011); and Chaux (2012).

30. The Programme for International Student Assessment (administrated by the OECD in 65 countries around the world) assesses the educational achievements of students—mainly 15-year-olds—finishing compulsory schooling every three years.

31. See Patrón (2011).

32. See Singer and McDowall (1988), Jensen and Metsger (1994) and Steiner et al. (2006).

33. See Levitt (1998), Imai and Krishna (2004), Mocan and Rees (2005), Oka (2009) Hjalmarsson (2009) and Entoff (2011).

34. See Ibañez et al. (2013).

35. It is worth mentioning that the reduction in juvenile crime is more than proportional due to nonlinear effects associated with the endogenous dynamics of skills that affect future decisions.

36. See Podkopacz and Feld (1995), Bishop et al. (1996), Fagan (1996) and Myers (2003).

37. See Aizer and Doyle (2013).

38. See Romero (2012).

REFERENCES

Aboal, D., J. Campanella, and B. Lanzilotta (2013). "Los Costos del Crimen en Uruguay." Inter-American Development Bank WP 408, Washington DC.

Aizer, A. and J. Doyle Jr. (2013). "Juvenile Incarceration, Human Capital and Future Crime: Evidence from Randomly-Assigned Judges." NBER Working Paper 19102.

Bayer, P., R. Hjalmarsson and D. Pozen (2009). "Building Criminal Capital Behind Bars: Peer Effects in Juvenile Corrections." Quarterly Journal of Economics 124(1), 105-147.

Becker, G. (1968). "Crime and Punishment: An Economic Approach." Journal of Political Economy 76(2), 169-217.

Becker, G. and C. Mulligan (1997). "The Endogenous Determination of Time Preference." Quarterly Journal of Economics 112(3), 729-758.

Berthelon, M. and D. Kruger (2011). "Risky Behavior among Youth: Incapacitation Effects of School on Adolescent Motherhood and Crime in Chile." Journal of Public Economics 95(1-2), 41-53.

Bishop, D., C. Frazier, L. Lanza-Kaduce and L. Winner (1996). "The Transfer of Juveniles to Criminal Court: Does It Make a Difference?" Crime and Delinquency 42, 171-191.

Block, M. and V. Gerety (1995). "Some Experimental Evidence on Differences Between Student and Prisoner Reactions to Monetary Penalies and Risk." Journal of Legal Studies 24(1), 123-138.

Blondel, S., Y. Loheac, and S. Rinaudo (2007). "Rationality and Drug Use: An Experimental Approach." Journal of Health Economics 26(3), 643–658.

Bretteville-Jensen, A. (1999). "Addiction and Discounting." Journal of Health Economics 18(4), 393-407.

Casas-Zamora, K. (2013). "The Besieged Polis: Citizen Insecurity in Latin America." The Brookings Institution.

Chaux, E. (2012). "Educación, Convivencia y Agresión Escolar." Ediciones Uniandes, Colombia.

Camp, S., and G. Gaes (2009). "Unintended Consequences: Experimental Evidence for the Criminogenic Effect of Prison Security Level Placement on Post-release Recidivism." Journal of Experimental Criminology 5(12), 139-162.

Coffey, S., G. Gudleski, M. Saladin and K. Brady (2003). "Impulsivity and Rapid Discounting of Delayed Hypothetical Rewards in Cocaine-Dependent Individuals." Experimental and Clinical Psychopharmacology 11(1), 18-25.

Cullen, J., B. Jacob and S. Levitt (2003). "The Effect of School Choice on Student Outcomes: Evidence from Randomized Lotteries." NBER Working Paper 10113.

DeLisi, M., A. Hochstetler, G. Jones- Johnson, J. Caudill and J. Marquart (2011). "The Road to Murder: The Enduring Criminogenic Effects of Juvenile Confinement Among a Sample of Adult Career Criminals." Youth Violence and Juvenile Justice 9(3), 207-221.

Ehrlich, I (1996)."Crime, Punishment, and the Market for Offenses." Journal of Economic Perspectives 10(1), 43-67.

Entorf, H. (2011). "Turning 18: What a Difference Application of Adult Criminal Law Makes." IZA Discussion Papers Series Number 5434.

Fagan, J. (1996). "The Comparative Advantage of Juvenile versus Criminal Court Sanctions on Recidivism among Adolescent Felony Offenders." Law and Policy 18, 77-114.

Frühling, H. and F. Martínez (2011). "Políticas Públicas de Prevención de la Violencia Juvenil en América Latina." Centro de Estudios en Seguridad Ciudadana del Instituto de Asuntos Públicos, Universidad de Chile.

Green, L., A. Fry and J. Myerson (1994). "Discounting of Delayed Rewards: A Lifespan Comparison." Psychological Science 5(1), 33-36.

Green, L., J. Myerson and P. Ostazewski (1999). "Discounting of Delayed Rewards Across the Life Span: Age Differences in Individual Discounting Functions." Behavioural Processes 46(1), 89-96.

Green, L., J. Myerson, D. Lichtman, S. Rosen and A. Fry (1996). "Temporal Discounting in Choice Between Delayed Rewards: the Role of Age and Income." Psychology and Aging 11(1), 79-84.

Hjalmarsson, R. (2009). "Juvenile Jails: A Path to the Straight and Narrow or to Hardened Criminality?" Journal of Law and Economics 52.

Hjalmarsson, R. and L. Lochner (2012). "The Impact of Education on Crime: International Evidence." CESifo DICE Report 10(2), 49-55.

Ibáñez, A., C. Rodríguez and D. Zarruk (2013). "Crime, Punishment, and Schooling Decisions: Evidence from Colombian Adolescents." Inter-American Development Bank WP 413, Washington DC.

Imai, S. and K. Krishna (2004). "Employment, Deterrance, and Crime in a Dynamic Model." International Economic Review 45(3), 845-872.

Jensen, E. and L. Metsger (1994). "A Test of the Deterrent Effect of Legislative Waiver on Violent Juvenile Crime." Crime and Delinquency 40, 96-104.

Kirby, K. and N. Petry (2004). "Heroin and Cocaine Abusers Have Higher Discount Rates for Delayed Rewards than Alcoholics or Non-drug-using Controls." Addiction 99(4), 461-71.

Levitt, S. (1996). "The Effect of Prison Population Size on Crime Rates: Evidence from Overcrowding Litigation." Quarterly Journal of Economics 111(2), 319-351.

Levitt, S. (1998). "Juvenile Crime and Punishment." Journal of Political Economy 106(6), 1156-1185.

Levitt, S. and L. Lochner (2000). "The Determinants of Juvenile Crime." In J. Gruber (Ed.), "Risky Behavior by Youths." University of Chicago Press.

Lochner, L. and E. Moretti (2004). "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports." American Economic Review 94(1), 155-89.

Lopez, A., and J. Palummo (2013). "Delincuencia Juvenil en la Ciudad de Montevideo." Fundación Justicia y Derecho.

Machin, S., O. Marie and S. Vujic (2012). "Youth Crime and Education Expansion." IZA Discussion Paper 6582.

Meghir, C., M. Palme and M. Schnabel (2012). "The Effect of Education Policy on Crime: An Intergenerational Perspective." NBER Working Paper 18145.

Merlo, A. and K. Wolpin (2009). "The Transition from School to Jail: Youth Crime and High School Completion among Black Males." PIER Working Paper 09–002. Philadelphia, United States: Penn Institute for Economic Research, University of Pennsylvania.

Mocan, H. and D. Rees (2005). "Economic Conditions, Deterrence and Juvenile Crime: Evidence from Micro Data." American Law and Economics Review 7(2), 319-349.

Moestue H., L. Moestue and R. Muggah (2013). "Youth Violence Prevention in Latin America and the Caribbean: A Scoping Review of the Evidence." Norwegian Peace-building Resource Centre.

Munyo, I. (2013). "The Juvenile Crime Dilemma." Manuscript, CERES, Uruguay.

Myers, D. (2003). "The Recidivism of Violent Youths in Juvenile and Adult Court: A Consideration of Selection Bias."Youth Violence and Juvenile Justice 1, 79-101.

Nuñez, J., J. Rivera, X. Villavicencio, and O. Molina (2003). "Determinantes Socioeconómicos y Demográficos del Crimen en Chile." Estudios de Economía 30(1), 55-85.

Nurmi J. (1991). "How Do Adolescents See Their Future? A Review of the Development of Future Orientation and Planning." Developmental Review 11(1), 1-59.

Oka, T. (2009). "Juvenile Crime and Punishment: Evidence from Japan." Applied Economics 41(24), 3103-3115.

Patrón R. (2011). "When More Schooling is Not Worth the Effort: Another Look at the Dropout Decisions of Disadvantaged Students in Uruguay." Working Paper Departamento de Economía, Facultad de Ciencias Sociales, Universidad de la República.

Petry, N. (2003). "Discounting of Money, Health, and Freedom in Substance Abusers and Controls." Drug and Alcohol Dependence 71(2), 133-41.

Podkopacz, M. and B. Feld (1995). "End of the Line: An Empirical Study of Judicial Waiver." Journal of Criminal Law and Criminology 86, 449-492.

Romero, G. (2012). "Crimen y Castigo: Efectos de la Privación de la Libertad sobre la Reincidencia." Master's thesis. Bogotá, Colombia: Universidad de los Andes.

Sayagués-Laso, D. (2004). "Primeras Reflexiones ante la Entrada en Vigencia del Código de la Niñez y Adolescencia." Espacio Abierto, AFJU.

Singer, S. and D. McDowall (1988). "Criminalizing Delinquency: The Deterrent Effects of the New York Juvenile Offender Law." Law and Society Review 22, 521-535.

Steinberg, L. (2009). "Adolescent Development and Juvenile Justice." Annual Review of Clinical Psychology 5, 459-485.

Steinberg L., S. Graham S, L. O'Brien, J. Woolard, E. Cauffman and M. Banich (2009). "Age Differences in Future Orientation and Delay Discounting." Child Development 80(1), 28-44.

Steiner, B., C. Hemmens and V. Bell (2006). "Legislative Waiver Reconsidered: General Deterrent Effects of Statutory Exclusion Laws Enacted Post-1979." Justice Quarterly 23, 34-59.

Waiselfisz, J. and J. Maciel (2003). "Revertendo Violencias, Semeando Futuros: Avaliaçao de Impacto do Programa Abrindo Espaços no Río de Janeiro e em Pernambuco." Brasília, Brazil. UNESCO.

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