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Inequality of Opportunity and Juvenile Crime

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Inequality of Opportunity and Juvenile Crime*

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Abstract

To what extent should young people be normatively held responsible for committing a crime? To contribute to this debate, we study the role of inequality of opportunity in juvenile crime behavior. Drawing on Roemer's theoretical framework and using administrative data from Chile, we empirically evaluate how much of the responsibility for the crime was determined by structural factors (i.e., circumstances) and how much was determined by decisions taken by the perpetrator (i.e., agency). Overall, we find evidence of substantial inequality of opportunity in this context. Specifically, we find that the contribution of circumstances varies between 46.44% and 32.10%, when explaining crime among males. As a benchmark analysis, we find that the role of circumstances in high school completion is less relevant than in criminal behavior, with levels between 34.80% and 18.54%. Finally, our study contradicts previous literature—suggesting that a different conception of equality of opportunity does change the conclusion regarding the relative contribution of agency versus circumstances.

Keywords: Equal opportunities, Crime.

JEL Classification: D63, I24, K14.

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1 Introduction

Investigating to what extent young people should be normatively held responsible for committing a crime is empirically challenging and it fundamentally depends on how much of the responsibility for the crime was determined by structural factors, which we call circumstances, and how much was determined by decisions taken by the perpetrator, which we label individual agency. A satisfactory resolution to this research question would be an important input when defining the punishment severity for a person convicted of a crime, a process that should consider to what extent the criminal act was due to an individual's decisions (i.e., agency), as opposed to circumstances beyond their control.[1]

To contribute to this debate, and based on the seminal work by Roemer (1998), our paper empirically evaluates which part of delinquency can be explained by circumstances and which part by individual agency. The advantage of applying this empirical approach is that it allows us to quantify inequality of opportunity in the context of criminal justice. According to Roemer, equality of opportunity is achieved when people, independent of circumstances beyond their control, have the same probability of achieving advantage given their individual agency. One simple approach that captures this idea, and is employed in Roemer (1998), is to partition the population under study into a set of types according to their vector of circumstances. For instance, a group of students could be separated into two types according to their mother's education level (completion of secondary education and noncompletion of secondary education). Equality of opportunity is achieved when the distribution of academic achievement across student types is equalized. In our setting, it would mean that the probability of being prosecuted for a crime, conditional on mother's education level, should be the same for everyone.

The validity of Roemer's conception of equality of opportunity is up for debate. The set of circumstances that may impact an individual's outcome must be defined, for example, so too the set of variables of agency for which they can be held responsible. Furthermore, an individual's decisions are unlikely to be independent of circumstances. For instance, high school students from advantaged backgrounds may be more likely to study for more hours outside the classroom setting (a variable that could be characterized as individual agency) because their parents press them to

[1] In related literature what we call individual agency has been labeled as effort, as the related outcomes are normally positive. Our focus is on negative outcomes and we have therefore chosen to use the word agency.

do so. Thus, the different potential ways of treating the correlation between circumstances and agency have given rise to three different conceptions of equality of opportunity. One by Roemer, as outlined above, one by Barry (Barry, 2005) and one by Swift (Swift, 2005)

These three conceptions of equality of opportunity can be empirically evaluated with a similar econometric structure. In all cases, a particular outcome, which in our setting would be a measure of criminal behavior, is regressed on several measures of circumstances and individual agency. Inequality of opportunity is captured by decomposing the variance –explained by the model– of the outcome in two sources: circumstances and agency. To illustrate the difference between the three conceptions, we will look at each one in turn and summarize the consequences for analysis in our criminal justice setting.

The difference between the conceptions of Roemer, Barry and Swift rests on how to measure the two sets of variables that constitute circumstances and agency. Roemer argues that only relative individual behavior should be considered as individual agency. To replicate this argument using econometric analysis, we estimate auxiliary regressions of agency variables on circumstances, then we obtain the residual of that regression, which represents the individual agency purged from any circumstance. Then, we regress the crime outcomes on circumstances and the residuals behavior. According to Barry, agency should be rewarded no matter what the correlation between circumstances and individual agency might be. Empirically speaking, to reflect Barry's paradigm, we regress criminal outcomes on circumstances and agency variables. Finally, for Swift – who considers that both differences in outcome caused by agency and differences in outcome caused by parental agency must be taken into account– we estimate auxiliary regressions of circumstances on agency variables, whose residuals are the circumstances cleaned of any correlation with agency.[2] Then, we regress outcomes on residual circumstances and agency variables.

In order to test inequality of opportunity in criminal behavior according to these three normative conceptions, we use Chilean administrative data from the Ministry of Education that provides data on all Chilean students who were attending the 1st grade for the first time in 2003. We merge this dataset with administrative data from the Public Defender's Office (PDO) which permits us to identify the individuals in the sample that were prosecuted for any crime up to 2018. We focus our attention on male students because they are three times more likely to be prosecuted for committing

[2]Swift believes that parental agency must take precedence whatever the consequences for the next generation, including inequality. Because we do not have data available on parental agency, we use children's' circumstances as a proxy.

a crime than female students.

We find that for males the relative contribution of circumstances when the outcome is being prosecuted for committing a crime before the age of 22 [3] is 46.44% using Roemer's conception of equality of opportunity, 39.58% using Barry's conception, and 32.10% using Swift's conception. The percentages for *juvenile crime* (understood as being prosecuted as a juvenile under the age of 18) are 48.27% using Roemer, 40.62% using Barry, and 32.62% using Swift. And from this we conclude that the relative contribution of circumstances and agency to the outcome depends on the normative view. As a benchmark analysis, and using the same set of variables for circumstances and agency, we analyze outcomes related to educational achievement. We find that the relative contribution of circumstances for males when the outcome is *nongraduation* is 34.80% using Roemer, 26.01% using Barry, and 18.54% using Swift (and we find similar percentages when the outcome is *dropout*). Therefore, we posit that inequality of opportunity is more pronounced for crime outcomes relative to education outcomes. All our results are robust to changes in both circumstances and agency variables. We also conclude that socioeconomic characteristics at the school level are three times as relevant as socioeconomic characteristics at the family level to explain crime outcomes.

Our article belongs to the broad literature that stems from the seminal work of Roemer (1998) and measures inequality of opportunity in different contexts, such as income and wealth, education, and health.[4] Although the empirical strategies in these studies vary, in general they examine how the distribution of a relevant outcome varies across different individual backgrounds. We contribute to the literature by being, to the best of our knowledge, the first paper to measure inequality of opportunity in the context of criminal justice. This context is highly relevant because normative support for punishment is based on the idea that people receive the punishment *they deserve* and,

[3] We consider two criminal outcome variables: *all crime* and *juvenile crime*. Most students in our sample were born in 1996 and our database of criminal prosecutions includes information up to 2018. Thus, when we refer to *all crime* we are referring to those individuals prosecuted up to approximately 22 years old. *Juvenile crime* indicates that the prosecution occurred when the individual was under 18 years old, which for most students means before 2014.

[4] **Income and wealth**: theoretical models, have been developed by Bourguignon et al. (2007b), Peragine (2004), and Ramos and Van de Gaer (2016), among others; empirical research has mainly focused on developed countries, as in Roemer (2013), Lefranc et al. (2008), Aaberge et al. (2011), Bourguignon et al. (2007b) , Pistolesi (2007), Almås et al. (2008), and Checchi and Peragine (2010); for research on developing countries, see Cogneau and Mesplé-Somps (2008), Ferreira and Gignoux (2011), Bourguignon et al. (2007a), and Adamczyk and Fochezatto (2020). For studies looking at Chile, see Contreras et al. (2014) and Núñez and Tartakowsky (2011). **Education**: in developed countries empirical research has been carried out by Betts and Roemer (2005), Checchi and Peragine (2010), Peragine and Serlenga (2007), Martins and Veiga (2010), and Oppedisano and Turati (2015); see Gamboa and Waltenberg (2012) for a study on six Latin American countries; and Contreras and Puentes (2017) look at inequality of opportunity in an education context in Chile. **Health**: see Fleurbaey and Schokkaert (2009), Trannoy et al. (2010), Jusot et al. (2013), Dias (2010), and Balia and Jones (2011). Carranza and Hojman (2015) find that health inequality is higher in Chile than in European countries.

ultimately, convictions are based on that principle. In comparison, the implications of inequality of opportunity in other contexts, such as education, wages, and health are less dramatic as they only impact an individual's chances when competing for resources.

In a closely related paper, Jusot et al. (2013) study inequality of opportunity and consider the three different normative conceptions previously outlined (Roemer, Barry, and Swift) in the context of health. We follow the empirical strategy they employ to implement the three conceptions. In contrast to the results in Jusot et al. (2013), we find that the normative principle does in fact make a difference to the relative contribution of circumstances and agency to outcomes. This suggests that the context under investigation contributes substantially to whether or not the normative principle applied produces different results.

The second body of literature related to this paper is on youth crime, particularly studies on the relationship between socioeconomic and schooling circumstances and crime. Freeman (1996) analyses the surge in imprisonment rates in the US, particularly affecting Black people, between the mid-1970s and mid-1990s, and finds that high school dropouts have a disproportionate chance of being imprisoned. Lochner and Moretti (2004) find that schooling significantly reduces the probability of incarceration and arrest. Jacob and Lefgren (2003) report that property crime carried out by juveniles decreases on days when school is in session but that violent crime increases.[5] We contribute to this literature by looking at the relationship between socioeconomic background and school characteristics and crime from a different perspective, using different conceptions of inequality of opportunity.

Section 2 describes the three normative approaches used in this study, drawing on Roemer, Barry and Swift. Section 3 describes the judiciary and educational scenario in Chile. Section 4 describes the data. Section 5 presents our results and Section 6 provides some robustness checks. Section 7 concludes.

[5]Several studies explore the extensions of mandatory schooling age or birth date cutoffs for enrollment in order to study the effect of education on crime, including Machin et al. (2011), Clay et al. (2012), Anderson (2014), Hjalmarsson (2008), and Cook and Kang (2016), among others. Lochner (2004) develops a model of crime in which human capital increases the opportunity cost of crime and in a later paper (Lochner, 2010) argues that school programs emphasizing social and emotional development are effective in reducing crime. Fu et al. (2020) construct a dynamic model to estimate teenage choices between schooling and crime using Chilean data to calibrate the model.

2 Three Normative Visions of Equality of Opportunity and Empirical Strategy

The preceding observation in Aristotle's *Politics* reflects the general idea that certain characteristics of individuals merit that they are not treated equally and certain characteristics of individuals do not merit that they be treated differently. Roemer (1998) goes one step further and argues that outcomes for any individual are determined by circumstances beyond the person's control, such as family characteristics, neighborhood, school, as well as by agency, which is under control of the individual. According to Roemer, individuals should be only held responsible for the latter. Describing an educational setting, Roemer (1998) explains that

we must distinguish between the circumstances beyond a child's control which influence their ability to process educational resources and their acts of autonomous volition and agency. Equalizing opportunity for the good life, insofar as education is an input—or, more precisely, equalizing opportunity for educational achievement—requires distributing educational resources in such a way that the differential abilities of children to turn resources into educational achievement are compensated for, where those abilities are determined by circumstances beyond the control of the individual. Differential achievements due to the application of autonomous volition, however, should not be "leveled" or compensated for by an equal-opportunity policy. (p.6)

Implementing equality of opportunity in educational achievement (for instance, a similar probability of tertiary education access across socioeconomic classes), would not only mean that total primary and secondary educational investment per child (both public and private) should be the same, the common conception of equality of opportunity. It would also mean that students from disadvantaged backgrounds should receive a higher investment than students with a more advantaged milieu in order to compensate for the inequality of family conditions between the two groups. [6]

Even if we accept that equality of opportunity should be an objective, it is not a trivial undertaking to disentangle circumstances from agency because behavior can be affected by circumstances. Therefore, the way to treat the possible correlations between circumstances and agency variables is relevant when assessing the relative importance of each factor. This is exemplified in Roemer

[6]For more discussion on how educational finance reform may equalize opportunity across racial and socioeconomic groups, we recommend Betts and Roemer (2005).

(1998) where, using Barry's position as a foil, he elaborates on problems related to delineating the set of circumstances by referring to the educational outcomes of Asian children. It is posited that Asian students typically work hard at school and therefore do well but, because this is usually due to familial pressure, including "Asian" as an element in the set of circumstances would decrease the contribution of agency in the educational outcome of the Asian students in an imagined sample. Roemer argues that 'if the Asian child does not view himself or herself as having a choice in regard to whether or not to exert effort, because it is simply expected by their family that they will, then he or she is not as morally deserving, under the equal-opportunity view, as someone who exerts effort even though they felt no obligation to do so (Roemer (1998),p.22).' Thus, Roemer would probably include Asian as an element in the set of circumstances and also argue that efforts, or what we call individual agency, resulting from the child being Asian should not be rewarded with greater educational achievement.

Roemer gives Barry response: 'granted, the Asian students have worked hard because of familial pressure, an aspect of the environment beyond their control but, nevertheless, if reward is due to effort then they should receive more reward than the academic children, for they really tried harder. (Roemer (1998), p.22)' So, Barry would probably not include "Asian" as an element in the set of circumstances because doing so may contribute to differences in outcome being perceived as unfair when in fact they were due to hard work.

Finally, Swift (2005) believes family has lexical priority over fair equality of opportunity because intimate familial interactions (captured in our framework by the part of circumstances that is correlated with individual agency) are to be protected even if they reproduce inequality across generations. According to Swift, only circumstances that affect the outcome, but that are independent of agency, are a source of illegitimate inequality . He would therefore probably include "Asian" as an element in the set of circumstances and also consider that outcomes determined by the fact that the student is Asian should not be labeled as illegitimate.

This debate can easily be transposed to the field of justice. For instance, is it legitimate that a juvenile from a dysfunctional family, living in a low-income neighborhood (and thus indicative of low quality circumstances) should be considered as less responsible for joining a gang, becoming a substance abuser or dropping out of school (actions that may all be conducive to future criminal behavior and could be characterized as dependent on agency)? And if the juvenile does commit a crime, we can posit that Roemer would consider the juvenile's circumstances as a mitigating factor,

Barry would not consider any elements of the juvenile's circumstances as mitigating factors, and Swift would go further and argue that those circumstances would be aggravating factors, effectively blaming the juvenile for the circumstances over which they had no control.

An important aspect of the contribution made by Roemer and the related literature is the effort that has been made to empirically test the theoretical ideas set forth. We follow the methodology introduced by Jusot et al. (2013) and our objective is to quantify the extent to which circumstances or agency affect delinquency and educational achievement, according to the three normative views that have been delineated. It is a two-step methodology. In the first step, a reduced model is estimated to measure the association between outcomes and circumstances and agency. In the second step, the predictions from the model are used as inputs to obtain the respective contributions of each component, and hence the measure of inequality of opportunity .

2.1 First Step: Estimation

Our aim is to capture the statistical relationships between the outcome, circumstances, and agency. The vectors of each of these factors are composed of a rich set of variables, which are explained in Subsections 4.1, 4.2, and 4.3.

Let's assume that an individual outcome O is a function of a vector of circumstances C, a vector of agency variables A (called effort in the literature), and a residual term μ. Thus,

$$O = f(C, A, \mu). \tag{1}$$

In this framework, differences in outcomes attributable to circumstances are labeled as illegitimate (although biological factors, such as sex, are arguably an unavoidable difference for which we should not attempt to compensate), whereas differences due to agency variables are labeled as legitimate. The error term is a mix of the effects on outcome of circumstances and individual agency, which we are either not controlling for or are pure luck.

As posited by Barry, agency should be rewarded no matter what the correlation between circumstances and agency might be. This results in non correcting any possible correlation between circumstances and agency. From now on, the methodology will be presented assuming linear relationships. Barry's approach for individual i results in

$$O_i^B = \alpha^B + \beta^B C_i + \gamma^B A_i + \mu_i. \tag{2}$$

Testing for equality of opportunity in Barry's framework therefore amounts to testing the linear hypothesis $H_0 : \beta^B = 0$.

Unfortunately, it is conceivable that the variables that constitute circumstances and agency are not independent. In fact, Larrañaga and Telias (2009) suggest this is indeed the case by showing that SIMCE test scores (battery of tests used in Chile to measure certain subjects of school curricula) are determined by some of the circumstances we consider in our study. Furthermore, Roemer considers that only relative agency should be rewarded. One way to implement this notion is to consider the residual agencies (i.e., the residuals obtained after regressing each agency variable on circumstances) instead of the agency variables:

$$A_i = \delta_0 + \delta_1 C_i + a_i. \tag{3}$$

Once we have identified the estimated relative agency, $\hat{a}_i$, we can substitute it in the main equation for the noncorrected agency:

$$O_i^R = \alpha^R + \beta^R C_i + \gamma^R \hat{a}_i + \mu_i. \tag{4}$$

Testing for Roemer's conception of equality of opportunity amounts to testing the hypothesis $H_0 : \beta^R = 0$. We note that if we are using linear specifications then the Frisch-Waugh-Lovell theorem tells us that $\hat{\gamma}^B$ in Equation 2 and $\hat{\gamma}^R$ in Equation 4 are exactly the same. On the other hand, $\hat{\beta}^B$ and $\hat{\beta}^R$ are not the same. If circumstances and agency variables both improve the outcome, and circumstances are positively related with agency, then the coefficient of circumstances would be magnified using Roemer's approach, as compared to under Barry's.

Finally, Swift considers that the agency of the parents, which has an impact on their children's behavior, must be respected over the child's agency . Because we do not have information on the

agency of the parents, however, we will use the children's circumstances as a proxy. From his point of view, only the part of circumstances which is unrelated to agency is characterized as illegitimate.

Hence, we estimate the following auxiliary regression:

$$C_i = \theta_0 + \theta_1 A_i + c_i. \tag{5}$$

We then substitute the estimated relative circumstance, $\hat{c}_i$, in the outcome equation:

$$O_i^S = \alpha^S + \beta^S \hat{c}_i + \gamma^S A_i + \mu_i. \tag{6}$$

We test equality of opportunity under Swift perspective by testing the hypothesis $H_0 : \beta^S = 0$. And, invoking the Frisch-Waugh-Lovell theorem, we conclude that β^B in Equation 2 and β^S in Equation 6 are exactly the same (and in fact testing $H_0 : \beta^S = 0$ turns out to be the same as testing $H_0 : \beta^B = 0$).

We also find, however, that $\hat{\gamma}^B$ and $\hat{\gamma}^S$ are different. If both circumstances and agency improve the outcome, and circumstances are positively related with agency then the coefficient of agency variables would be magnified using Swift's approach, as compared to under Barry's.

To summarize, we estimate Equation 2, which is just a regression of outcome on circumstances and agency (i.e., the Barry approach). We then proceed to calibrate Equation 3 (i.e., an auxiliary of the Roemer approach) for each agency variable. We plug the residuals from Equation 3 into Equation 4 (a regression of outcome on circumstances and residual agency which captures Roemer's conception of equality of opportunity). Then, we estimate the auxiliary Swift regressions as in Equation 5. And, finally, we insert the residuals from Equation 5 into Equation 6, where we regress outcome on residual circumstances and agency variables and, thus, capture Swift's conception. This procedure is repeated for each outcome variable.

2.2 Second Step: Inequality Assessment

We must now compute the relative contribution of circumstances and agency to the outcome. To do this, we can use the predicted variables in Subsection 2.1 to decompose the estimated value of outcome according to the following three normative foundations:

$$Roemer : \hat{O}_i^R = \hat{\beta}^R C_i + \hat{\gamma}^R \hat{a}_i = \hat{O}_{i,C}^R + \hat{O}_{i,A}^R. \tag{7}$$

$$Barry : \hat{O}_i^B = \hat{\beta}^B C_i + \hat{\gamma}^B A_i = \hat{O}_{i,C}^B + \hat{O}_{i,A}^B. \tag{8}$$

$$Swift : \hat{O}_i^S = \hat{\beta}^S \hat{c}_i + \hat{\gamma}^S A_i = \hat{O}_{i,C}^S + \hat{O}_{i,A}^S. \tag{9}$$

As can be seen in Equations 7, 8, and 9 the expected inequality is decomposed in two sources: circumstances and agency. The natural decomposition of the variance of predicted outcome is given by:

$$\sigma^2(\hat{O}^j) = cov(\hat{O}_C^j, \hat{O}^j) + cov(\hat{O}_A^j, \hat{O}^j) \qquad j = R, B, S. \tag{10}$$

Dividing both sides by $\sigma^2(\hat{O}^j)$ we obtain

$$1 = \frac{cov(\hat{O}_C^j, \hat{O}^j)}{\sigma^2(\hat{O}^j)} + \frac{cov(\hat{O}_A^j, \hat{O}^j)}{\sigma^2(\hat{O}^j)} = RC_C + RC_A \quad j = R, B, S, \tag{11}$$

where RC_k is equal to the relative contribution of k, and k is equal to circumstances and agency.

Equation 11 provides us with an intuitive way to understand the relative weight of circumstances

and agency on the desired outcome. It should be noted that as it stands, the equation produces the sum of the relative contribution of circumstances and agency is equal to 1, regardless of the accuracy of independent variables in explaining the dependent variable. The relative contribution of circumstances to the outcome, which captures inequality of opportunity, is therefore bounded between 0 and 1 by construction.

Moreover, it must be emphasized that the normative conception of inequality of opportunity implemented will have an impact on the relative contribution of each factor. Although not a guarantee, it is to be expected that the relative contribution of circumstances under Roemer would be bigger than under Barry which would be bigger than under Swift. Broadly speaking, this will happen if both high circumstances and high agency have a positive effect on the outcome and if high circumstances are positively correlated with high agency.

In order to test the accuracy of our variance decompositions, we use the bootstrapping percentile method. We generate 100 samples with replacement of the same size of the original sample . Then, we estimate the relative contribution of circumstances and agency for each sample, reporting the 2.5% and 97.5% percentile.

3 Criminal and educational system in Chile

3.1 The Criminal Justice System in Chile

In developing countries, like Chile, crime rates are usually higher compared to developed countries. According to World Prison Brief data, in May 2020 the prison population rate per 100,000 of national population was 376 in the Americas (233 in Chile, 186 in Argentina, 324 in Brazil, 240 in Colombia, 164 in Mexico, 270 in Peru, 321 in Uruguay, 655 in USA, and 178 in Venezuela); in Europe this figure was 187.[7] In terms of gender division, among 45,733 individuals in Chile's prisons in April 2021, 42,504 (92.9%) were male and 3,229 (7.1%) were female.

The prison population rate, however, is not always a good indicator of the prevalence of crime in a country because it requires active prosecution . This explains why ostensibly violent countries such as Venezuela, Mexico, Brazil or Colombia do not have particularly high prison population

[7]World Prison Population List, twelfth edition, Institute for Criminal Policy Research, World Prison Brief 82 (https://www.prisonstudies.org/sites/default/files/resources/downloads/wppl$_1$2.pdf)

rates: the active prosecution rate in the country is low . Homicide rates, in contrast, are seen as a preferred measure of crime because they are difficult to conceal, statistically speaking. In terms of the homicide rate, Chile has lower rate than its continental neighbors with 4.4 per 100,000 in 2018; This is compared to Argentina with 5.3, Brazil with 27.4, Colombia with 25.3, Mexico with 29.1, Peru with 7.9, Uruguay with 12.1, USA with 5, and Venezuela with 36.7. The average rate for South America was 21.0 per 100,000.[8]. For other types of crime, such as offences against the person, sexual assaults, and property crime, Chile is regarded as a relatively safe country in South America, although it is hard to make comparisons because the reporting of offences may differ among countries.

3.2 The Juvenile Criminal Justice System in Chile

A law reforming the juvenile criminal justice system in Chile was enacted in 2005 (Act N^o 20084) and came into effect in 2007. The new law aimed to incorporate international human right standards, such as the United Nations Convention on the Rights of the Child, into the Chilean legislative framework. This included the principles of an exceptional and moderate application of criminal law and the use confinement only as ultima ratio (Langer and Lillo (2014)). The new legislation made three major changes to the previous structure: It reduced the age of criminal liability from 16 to 14. It ended the uncertainty of the previous system whereby adolescents could be treated as adults or juveniles, depending on the judge's considerations. And, for convicted juvenile defendants, the new law reduced the punishment by one grade relative to the corresponding adult sentence (Couso and Duce (2013).

The new juvenile criminal justice system was introduced in the context of a radical criminal justice reform, which started in 2000 and was completed in 2005. This broad reform replaced the inquisitorial model, a written framework that had been in effect for more than a century, with an oral, public, and adversarial procedure. As part of the reform, a number of new institutions were established, including the PDO; the Public Prosecutor's Office; the Guarantee Court, which, among other things, safeguards the rights of all parties during the investigation process ; and the Oral Criminal Trial Courts. The PDO provides nearly all people accused of committing a crime with free legal representation and gathers information about all defendants accessing their services, including

[8]This information is from the United Nations Office on Drugs and Crime (https://dataunodc.un.org/content/data/homicide/homicide-rate)

minors and adults. This data includes detailed information on the particular crime in question.

Under the new juvenile system, the juvenile criminal procedure passes through different stages: In the first stage the juvenile is arrested, either because they are caught by the police in (or close to) the commission of the crime or as the result of an investigation conducted by the public prosecutor that culminates in an accusation. This stage concludes in an arraignment hearing, which takes place in the Guarantee Court and lasts approximately 15 minutes. During this hearing, the arraignment judge must choose between three possible outcomes: to begin criminal proceedings; an alternative ending (which may include compensation agreements and the conditional suspension of proceedings); or to dismiss the proceedings. Most of the cases are resolved in the Guarantee Court, either by a decision for an alternative ending or by a dismissal of the proceedings. Generally speaking, a criminal procedure is reserved for severe crimes.

3.3 The Chilean Education System

In Chile, primary education, for children aged between 6 and 14 years, is made up of eight sequential grades, and secondary education, for teenagers aged between 15 and 18 years consists of four sequential grades. Chilean Law N^o 19.876 mandates primary and secondary school for all children, although not all students complete secondary education. Progression from one grade to the next is not guaranteed and the Ministry of Education provides guidelines for grade retention, which state that a student should be retained if their GPA or attendance falls below certain cutoffs. These rules are not always respected and schools have a degree of flexibility in their implementation (Díaz et al., 2021).

During our sample period between 2003 and 2018, school admissions were decentralized and came under the remit of the schools themselves. Some schools began selecting students not only on the basis of primary school GPAs but also on family background. The selective admission procedure, together with differential fees, contributed to further segregation of students with different socioeconomic status (SES) across schools. These factors, among others, contribute to the segregation of low-SES and high-SES students in Chile, which is very pronounced (Valenzuela et al., 2014).

In 1988, a system of national standardized tests (known by its acronym in Spanish, SIMCE) was introduced as a way to measure the learning process and academic performance of all students

in Chile attending particular grades . We use the language and math SIMCE tests that all Chilean students take in the 4th grade (primary education). The government uses SIMCE results to allocate resources and inform the public about the quality of schools by publicizing school-level results. Given what is at stake, education institutions have incentives to advise their worst students not to take the test, which may exert upward bias on the results of the test.

4 Data

Our data set is constructed by merging administrative data from the Ministry of Education and the PDO. The information collected from the Ministry of Education is an administrative dataset that covers the period between 2003 and 2018. For every year, and for every student in either primary or secondary education in the country, the dataset contains the school attended, the grade level, the educational achievement for that year (including whether the student passed the grade and their average score for that particular year), the student's attendance rate, and basic demographic information, such as birth date and sex. We merge this panel with information on their performance on the SIMCE test. The parents of students that take the test are required to fill in a survey, the results of which provides a rich characterization of the socioeconomic background of the children. Finally, we connect our sample with PDO records of criminal cases prosecuted between 2003 and 2018. Because we do not have information about the verdict in all cases, we define "crime" as being charged with a crime, regardless of the judicial outcome.

Our starting point is a sample of 239,534 students (122,102 males and 117,432 females) who started 1st grade for the first time in 2003 (In our original sample, 58.89% of the students were born in 1996 and 39.62% in 1997). In our robustness checks we work with different samples according to the availability of variables.[9] We will follow the school 2003 cohort in time and study two criminal outcomes (as a benchmark we also analyze two educational outcomes). Our final goal is to understand which share of each outcome can be attributed to circumstances and which share to individual agency. In the following subsections we present the outcomes, circumstances and agency variables considered. A more precise definition for each variable is available in the Appendix A.

[9]We are forced to drop a large number of observations when considering standardized test scores and variables obtained from the associated parents survey due to lack of availability.

4.1 Outcomes

There are two variables of interest in this paper. We construct the variable *all crime*: an indicator function that adopts the value of 1 if the student was arrested between 2003 and 2018 (for most individuals in the sample covers up to the age of 22) and 0 if not. The other variable is *juvenile crime*, which takes the value of 1 if the student was charged with a crime before the age of 17 and 0 if not. As a benchmark, we also define *nongraduation*, which is defined as 1 if the student graduated from high school and 0 if not, and *dropout*, which is defined as 1 if the student was not registered on any course for at least two consecutive years between 2010 and 2014 or if they did not graduate and 0 otherwise.

4.2 Circumstances

Circumstances are facts that are relevant to the outcome and that are not under the student's control. When students take the SIMCE test a survey is administered to their parents. From these surveys, we obtain information about the socioeconomic status of the student; however, not all students take the SIMCE and not all parents answer the survey. Moreover, it is likely that not taking the exam or not filling the survey, or both, are related to outcomes. In order not to loose students in our sample which did not take the exam or filled the survey, we choose to consider socioeconomic variables on the baseline, taking the average at the school level, which should be a good proxy of the family socioeconomic background because Chile has a high degree of educational segregation (Valenzuela et al., 2014). Accordingly, we group students by school attended in 2006 (which for most students means the school they attended in 4th grade). Then, we take the socioeconomic variables contained in the surveys completed by the parents of the students who took the SIMCE (either in 2006 or later) and average them. (Clearly, the averages are only taken when the data is available.) Finally, the only variable which is individual-dependent is sex. In Section 6, we perform robustness checks by adding variables at the individual level. Socioeconomic status is measured by the percentage of students that use the public health system, the average monthly household income, the monthly school fee paid, and the average years of mother's schooling. As in Haveman and Wolfe (1995) and in line with conventional wisdom that suggests maternal, as opposed to paternal, years of schooling has a bigger effect on children's' schooling, we choose mother's years of schooling because it has more predictive power. In order to control for differences in ethnicity between students, we include

the percentage of students who have at least one indigenous parent. We add variables aimed at characterizing high performance schools, such as whether or not the school attended is private, whether or not the school attended is rural, and the student's average score for the SIMCE language test and the SIMCE math test. Additionally, we construct three variables, *all crime – old generation*, *juvenile crime – old generation*, and *nongraduation – old generation*. These variables contain the fraction of students, among all 4rth graders who attended a particular school in 2003, who committed a crime, who committed a crime when they were juveniles, or who did not graduate. Then we connect those variables, which are at the school level, with our 2003 school cohort, using as a link the school attended in 2003. In summary, these variables study the outcomes of interest for the cohort that is three years older than the one under study. They have the potential to capture important aspects at the school level, such as academic capacity of faculty, student development (extra-curricular activities, for example), school culture and organizational environment (such as parent involvement, security, and organization of the campus) better than variables such as if the school is private or how much does it cost per month. Appendix A contains a detailed description of all circumstances incorporated into this study.

4.3 Agency

We consider individual agency to be those variables that are under the control of the individual. In our baseline model we consider three variables: *percentile grades*, the grade percentile the student is in with respect to their classmates; *ever repeated*, which takes the value 1 if the student ever repeated a primary school grade; and *percentage attendance*, the average attendance to school between 2003 and 2010 (school years) where the student is enrolled . In Section 6, we investigate alternative measures of agency, such as the two individual SIMCE grades (language and math). For a detailed definition of each variable, see Appendix A.

4.4 Descriptive Statistics

With respect to outcomes, in our sample, females have better outcomes in terms of crime and education than males. In terms of crime outcomes: males are almost three times as likely to be charged with a crime, 14.7% versus 5.1%. Those differences are even more marked for *juvenile crime*: only 2.3% of females commit crime as a juvenile compared to 7.5% of males. Males

underperform females in education: 16.7% of males did not graduate compared to 11.5% of females, and the probability of dropout is 18.4% for boys and 13.3% for girls. Because males are substantially more likely to commit crime, we focus on male criminal and educational behavior.

Table 1 contains descriptive statistics for the sets of variables in circumstances and agency and outcomes for male students. It reveals that 78.7% of students in the sample are in the public health system. The mean monthly household income of the students whose parents answered the SIMCE in 2006 was 352,748 Chilean pesos (CLP) (the mean exchange rate in 2006 was 530 CLP to the dollar, so this equates to USD 666). The data show that most of the schools attended by students in the sample were tuition free or had low fees, and a minority of students attended rural schools (12.7%) and private schools (6.5%).In terms of ethnic background, 10.7% of the students had at least one indigenous parent (the Mapuche account for approximately 85% of the indigenous people in Chile). On average, the mother's of the students had 11.1 years of schooling. Finally, regarding SIMCE test scores, male students scored 251.1 on average in the language test and females scored 258.8; for the math test, males scored 251.4 and females 247.0, again on average.

Table 1: Descriptive statistics for male students

Classification	Variable	Obs	Mean	Std. Dev.	Min	Max
Circumstances	Public Health	96,436	0.787	0.409	0	1
Circumstances	Public Health - School	122,102	0.797	0.255	0	1
Circumstances	Household Income	94,275	352,748	406,196	50,000	1,800,000
Circumstances	Household Income - School	122,102	339,955	335,369	50,000	1,800,000
Circumstances	School Payment	94,432	14,082	25,941	0	100,000
Circumstances	School Payment - School	122,102	13,215	24,356	0	100,000
Circumstances	One Parent Indigenous	93,827	0.107	0.309	0	1
Circumstances	One Parent Indigenous - School	122,102	0.113	0.144	0	1
Circumstances	Standardized Test Score in Language - School	122,102	255.535	25.001	119.870	355.685
Circumstances	Standardized Test Score in Math - School	122,102	250.877	28.626	98.610	347.580
Circumstances	Years Education Mother	102,125	11.142	3.395	0	20.000
Circumstances	Years Education Mother - School	122,102	11.044	2.215	0	17.200
Circumstances	Rural School	122,102	0.127	0.333	0	1
Circumstances	Private School	122,102	0.065	0.246	0	1
Circumstances	All Crime – Old Generation	122,102	0.124	0.071	0	1
Circumstances	Juvenile Crime – Old Generation	122,102	0.040	0.039	0	1
Circumstances	Nongraduation – Old Generation	122,102	0.174	0.138	0	1
Agency	Percentile Grades	122,102	46.081	28.598	0.101	99.821
Agency	Ever Repeated	122,102	0.267	0.443	0	1
Agency	Percentage Attendance	122,102	93.646	4.359	0	100
Agency	Standardized Test Score in Language	110,482	251.116	54.772	102.730	381.820
Agency	Standardized Test Score in Math	110,433	251.453	56.303	81.130	377.540
Outcomes	All Crime	122,102	0.147	0.355	0	1
Outcomes	Juvenile Crime	122,102	0.075	0.264	0	1
Outcomes	Nongraduation	122,102	0.167	0.373	0	1
Outcomes	Dropout	122,102	0.184	0.388	0	1

Note: This table reports descriptive statistics on circumstances, agency and outcomes variables. The sample is made up of male students who were in 1st grade for the first time in 2003. See Appendix A for the definitions of variables.

Table 2 explores the statistical relationships between categories for male students. Students affiliated to private health insurance providers perform significantly better (6.6% of young people with private health insurance commit crime (up to the age of 22) compared to 15.0% who use the public health system), as do those who live in homes with higher monthly household income (8.1% commit crime versus 15.0%), and those with mothers that have more years of education (8.5% commit crime versus 16.8%). Students with indigenous parents slightly underperform those without indigenous parents. Young people that attend public school are three times more likely to have an interaction with the justice system compared to those that attend private schools (15.4% versus 4.7%). This difference is even more acute for *juvenile crime*. There is also persistence in the quality of schools : this is revealed by the fact that students who attend schools where the old generation commit less crime also commit less crime themselves. Finally, it is worth noting that those who perform better across both SIMCE tests have better odds of finishing school and of not interacting with the judicial system. Those students who did not take the SIMCE test have the lowest performance in all four outcomes.

Appendix B contains the pairwise correlations between all the variables used in our study for male students. Table 9, 10, and 11 show that correlations between circumstances are high. For instance, the variable *household income* illustrates that high-income parents have had more years of schooling and can afford more expensive, private schools where their children interact with other children from high-income households. Because of peer effects and their socioeconomic background these students will likely perform significantly better in the SIMCE tests, dropout of school less frequently, and have fewer interactions with the judiciary system. From the correlation tables we can also extract one meaningful conclusion : *all crime* and *juvenile crime* are positively correlated with *nongraduation* and *dropout*, which supports the well-established research finding in the economics of crime literature that higher levels of education are associated with lower criminality (Lochner and Moretti, 2004).

5 Results

In this section, we present our findings on the impact of circumstances and agency on *all crime* and *juvenile crime*. In order to compare results, we also include *nongraduation* and *dropout*. In our baseline specification, we consider individual circumstances as mean circumstances at the school

Table 2: Means per Category for Male Students

Classification	Observations	All Crime	Juvenile Crime	Nongraduation	Dropout
Private Health	20,516	0.066	0.024	0.045	0.053
Public Health	75,920	0.150	0.075	0.155	0.172
Chi-Square Test		999 (0.000)	687 (0.000)	1.7e+03 (0.000)	1.8e+03 (0.000)
High Household Income	31,138	0.081	0.034	0.055	0.065
Low Household Income	63,137	0.150	0.075	0.152	0.170
Chi-Square Test		905 (0.000)	605 (0.000)	1.9e+03 (0.000)	2.0e+03 (0.000)
High School Payment	42,022	0.098	0.044	0.076	0.087
Low School Payment	52,410	0.150	0.075	0.154	0.172
Chi-Square Test		579 (0.000)	379 (0.000)	1.4e+03 (0.000)	1.4e+03 (0.000)
No Parent Indigenous	83,764	0.130	0.064	0.137	0.151
One Parent Indigenous	10,063	0.168	0.082	0.178	0.198
Chi-Square Test		110 (0.000)	51 (0.000)	127 (0.000)	146 (0.000)
High Years Education Mother	39,599	0.085	0.037	0.062	0.073
Low Years Education Mother	62,526	0.168	0.086	0.195	0.213
Chi-Square Test		1.4e+03 (0.000)	926 (0.000)	3.5e+03 (0.000)	3.6e+03 (0.000)
Non Rural School	106,632	0.149	0.078	0.157	0.174
Rural School	15,470	0.139	0.059	0.240	0.255
Chi-Square Test		11 (0.001)	65 (0.000)	679 (0.000)	594 (0.000)
Private School	7,898	0.047	0.015	0.036	0.045
Public School	114,204	0.154	0.080	0.176	0.194
Chi-Square Test		671 (0.000)	446 (0.000)	1.0e+03 (0.000)	1.1e+03 (0.000)
High All Crime – Old Generation	58,971	0.188	0.103	0.214	0.235
Low All Crime – Old Generation	63,131	0.110	0.049	0.124	0.136
Chi-Square Test		1.5e+03 (0.000)	1.3e+03 (0.000)	1.8e+03 (0.000)	2.0e+03 (0.000)
High Juvenile Crime – Old Generation	63,526	0.180	0.098	0.202	0.223
Low Juvenile Crime – Old Generation	58,576	0.112	0.051	0.129	0.142
Chi-Square Test		1.1e+03 (0.000)	958 (0.000)	1.2e+03 (0.000)	1.3e+03 (0.000)
High Nongraduation – Old Generation	61,440	0.191	0.103	0.246	0.268
Low Nongraduation – Old Generation	60,662	0.103	0.047	0.087	0.099
Chi-Square Test		1.9e+03 (0.000)	1.4e+03 (0.000)	5.6e+03 (0.000)	5.8e+03 (0.000)
High Standardized Test Score in Language	52,225	0.088	0.039	0.067	0.078
Low Standardized Test Score in Language	58,257	0.190	0.099	0.222	0.243
Non Standardized Test Score in Language	11,620	0.203	0.118	0.343	0.368
Chi-Square Test		2.6e+03 (0.000)	1.8e+03 (0.000)	7.6e+03 (0.000)	7.8e+03 (0.000)
High Standardized Test Score in Math	57,347	0.094	0.042	0.066	0.077
Low Standardized Test Score in Math	53,086	0.193	0.102	0.237	0.259
No Standardized Test Score in Math	11,669	0.203	0.119	0.346	0.371
Chi-Square Test		2.5e+03 (0.000)	1.8e+03 (0.000)	8.8e+03 (0.000)	9.1e+03 (0.000)

Note: This table reports the mean of different categories in criminal and educational outcomes. It also includes the Pearson Chi-square test to assess if there is a statistically significant difference between frequencies in each category (the p-value is reported in parentheses). The sample is made up of male students who were in 1st grade for the first time in 2003. See Appendix A for the definitions of variables.

level obtained in the SIMCE tests and surveys as *public health – School*, *household income – school*, *school payment – school*, *one parent indigenous – school*, *standardized test score in language – school*, *standardized test score in math – school*, and *mother's education years – school*. We also use school characteristics such as *private school* and *rural school*, and the variables related to the cohort three years before our sample cohort: *all crime – old generation*, *juvenile crime – old generation*, and *nongraduation – old generation*. The agency variables include *percentile grades*, *ever repeated*, and *percentage attendance*. All variables listed are precisely defined in Appendix A. The result of the main regressions can be found in Appendix D and the results of auxiliary regressions in Appendix E. In Section 6, we conduct a robustness analysis where other variables are considered.

5.1 Goodness of Fit

In Table 3, we show the goodness of fit for our four predicted outcomes for male students. The R-squared of the model is 7.38% for *all crime* and 5.81% for *juvenile crime*, which indicates there is room for improvement in our model. The R-squared percentages are higher for the educational variables: 24.16% for *nongraduation* and 24.96% for *dropout*. We also assess how good our model is at correctly classifying outcomes by running our regressions to obtain the predicted probability of outcomes for each student. Then, we draw random numbers from a uniform distribution between 0 and 1. If the random number is smaller than our predicted outcome, then we consider the simulated outcome to be 1, and 0 if the number is larger. We consider an individual to be correctly classified if the simulated outcome is equal to the outcome. For *all crime* we correctly classify 76.55% of individuals and for *juvenile crime* 86.73% are correctly classified. In general, the model tends to perform better when the outcome is 0 and when the simulated outcome is 0. This is the case because, for most individuals, the predicted probability of committing crime is closer to 0 than to 1. In order to perform the out-of-sample cross-validation exercise, we randomly select 90% of the estimation sample and estimate the probability model. For the remaining 10%, we draw a uniformly distributed random number between 0 and 1, and assign a simulated outcome of 1 if the predicted probability (using the model) is larger than the number drawn, or 0 if it is smaller. Then, we compute the correctly classified cases. We repeat this exercise 100 times and report the averages. Since the out-of-sample goodness of fit for all four outcomes is very similar to the original sample, we conclude that the original model was not over fitted and has validity out of sample.

Table 3: Goodness of Fit

Goodness of Fit	All Crime		Juvenile Crime		Nongraduation		Dropout	
	Original	Cross Validation	Original	Cross Validation	Original	Cross Validation	Original	Cross Validation
R-squared	7.38%		5.81%		24.16%		24.96%	
Correctly Classified	76.55%	76.63%	86.73%	86.67%	78.09%	77.96%	76.71%	76.59%
Correctly Classified (Simulated Outcome=1)	20.84%	20.85%	12.48%	12.62%	35.24%	34.96%	37.32%	37.08%
Correctly Classified (Simulated Outcome=0)	86.33%	86.34%	92.87%	92.88%	87.22%	87.17%	86.08%	86.03%
Correctly Classified (Outcome=1)	21.10%	21.01%	12.65%	12.94%	36.99%	36.82%	38.93%	38.80%
Correctly Classified (Outcome=0)	86.14%	86.23%	92.77%	92.68%	86.35%	86.23%	85.24%	85.13%

Note: This table reports the goodness of fit of our baseline estimations. The original sample used consists of 122,102 male individuals which represent our baseline sample. The cross validation methodology is explained in Subsection 5.1. The first row reports the R-squared, the second row the % of individuals who were correctly classified, the third row includes the % of individuals correctly classified when the simulated outcome is equal to 1, the fourth row presents the % when the simulated outcome is 0, the fifth row the % of correct classified students when the outcome is in fact 1, and sixth row when the outcome is 0.

5.2 Contribution of Circumstances and Agency on *All Crime*, *Juvenile Crime*, *Nongraduation*, and *Dropout*

The main results of interest of this paper are related to the magnitudes of inequality in the explained outcome, which informs us about the accuracy of the model, and the respective contribution of circumstances and agency to these magnitudes, which provides us information about inequality of opportunity. In Table 4 and Table 5 we present the contribution of circumstances and agency to the magnitudes of inequality for male students. And although our is focus on male students (because they are three times more likely to commit crime than their female counterparts), we also present the contributions for female students in Table 6 and Table 7. The methodology employed is outlined in Section 2. Tables of auxiliary and outcome regressions are provided in Appendix D and Appendix E.

Circumstances make the most substantial contribution to criminal outcomes. In terms of the three normative conceptions of equality of opportunity, for *all crime* the contribution of circumstances, for male students, is 46.44% using Roemer's conception, 39.58% using Barry's, and 32.10% using Swift's. In the case of *juvenile crime* it is slightly higher: 48.27% with the Roemer approach, 40.62% with Barry, and 32.62% with Swift. These results suggest that circumstances, regardless of the accepted normative view, play a determinant role in the probability of an individual of interacting with the judiciary system. And, more concerning, low-quality circumstances continue to dog students into their early adulthood. With respect to the female results, the relative contribution of agency under the three normative views and for all four outcomes is slightly higher than the analog contribution in male students.

Regarding educational outcomes for male students, the relative contribution of circumstances to *nongraduation* varies. It is 34.80% using Roemer's conception, 26.01% using Barry's, and 18.54%

using Swift's. For *dropout*, the contribution is similar, ranging from between 34.84% (Roemer) and 18.50% (Swift), the contribution using the Barry approach is roughly in the middle at 26.02%. The relative contribution of circumstances is higher for criminal outcomes compared to educational outcomes, controlling for normative view. We are therefore able to reach the conclusion that the impact of circumstances is more determinant for criminal outcomes than educational outcomes.

Using the bootstrapping percentile method, as explained in Subsection 2.2, we construct the confidence intervals for the relative contribution of circumstances and agency under the Roemer, Barry and Swift approaches. Notably, in all four outcomes the confidence intervals do not intersect between each other. This has a major implication—that being, the normative view adopted is relevant when assessing the importance of circumstances and agency. Our results are therefore contrary to the conclusion reached in Jusot et al. (2013) that the normative view adopted makes little difference to the relative contribution, although their research focuses on health inequality and not criminal justice.

The relative contribution of circumstances, particularly when considering education outcomes, is lower than intuitively expected. This result is also found in related literature. Hufe et al. (2017) point out that the effect of circumstances on income acquisition in advanced economies is reported as in the order of 20% in several studies. Two arguments are often advanced to explain this empirical finding. The first one is that the behaviors and accomplishments of children (shown in variables such as *percentile grades* and *ever repeated*) are considered as efforts when they should be considered as consequences of circumstances (Hufe et al., 2017) because individuals should not be deemed responsible for their choices before the age of consent. In our framework, this would mean asserting that the relative contribution of circumstances is 100%. The second argument is that IQ—which some may consider as a circumstance—is often not included as a variable for a number of reasons (in fact, we do not count it as variable), including that it is difficult to observe and it can be manipulated downwards. Thus, not including IQ as a circumstance variable may result in upward bias in the relative weight of agency (as what appears as agency may be partially determined by IQ).

5.3 Specific Contribution of Variables

To examine whether specific variables are driving our results, we use our baseline sample of 122,102 male students to perform all calculations but this time dropping one variable at a time. The results

Table 4: Relative Contribution of Circumstances and Agency for Male Students (Criminal Outcomes)

		All Crime		Juvenile Crime	
		Circumstances	Agency	Circumstances	Agency
Roemer	Point Estimate	46.44%	53.56%	48.27%	51.73%
	C.I.	[44.39% ; 49.37%]	[50.63% ; 55.61%]	[45.69% ; 51.03%]	[48.97% ; 54.31%]
Barry	Point Estimate	39.58%	60.42%	40.62%	59.38%
	C.I.	[37.41% ; 42.54%]	[57.46% ; 62.59%]	[38.08% ; 43.21%]	[56.79% ; 61.92%]
Swift	Point Estimate	32.10%	67.90%	32.62%	67.38%
	C.I.	[29.87% ; 34.80%]	[65.20% ; 70.13%]	[30.43% ; 35.05%]	[64.95% ; 69.57%]

Note: This table reports the relative contribution of circumstances and agency, as expressed in Equation 11, for *all crime* and *juvenile crime*. In brackets We report the confidence intervals in parentheses, which were constructed using a 95% percentile bootstrap confidence interval. The sample is made up of male students who in 2003 were doing in 1st grade for the first time in 2003, and we used the baseline specification.

Table 5: Relative Contribution of Circumstances and Agency for Male Students (Educational Outcomes)

		Nongraduation		Dropout	
		Circumstances	Agency	Circumstances	Agency
Roemer	Point Estimate	34.80%	65.20%	34.84%	65.16%
	C.I.	[33.76% ; 35.98%]	[64.02% ; 66.24%]	[33.80% ; 36.13%]	[63.87% ; 66.20%]
Barry	Point Estimate	26.01%	73.99%	26.02%	73.98%
	C.I.	[25.09% ; 27.04%]	[72.96% ; 74.91%]	[25.09% ; 27.13%]	[72.87% ; 74.91%]
Swift	Point Estimate	18.54%	81.46%	18.50%	81.50%
	C.I.	[17.74% ; 19.41%]	[80.59% ; 82.26%]	[17.72% ; 19.43%]	[80.57% ; 82.28%]

Note: This table reports the relative contribution of circumstances and agency, as expressed in Equation 11, for *nongraduation* and *dropout*. We report the confidence intervals in parentheses, which were constructed using a 95% percentile bootstrap confidence interval. The sample is made up of male students who were in the 1st grade for the first time in 2003, and we used the baseline specification.

Table 6: Relative Contribution of Circumstances and Agency for Female Students (Criminal Outcomes)

		All Crime		Juvenile Crime	
		Circumstances	Agency	Circumstances	Agency
Roemer	Point Estimate	44.05%	55.95%	42.65%	57.35%
	C.I.	[40.95% ; 48.06%]	[51.94% ; 59.05%]	[38.04% ; 47.26%]	[52.74% ; 61.96%]
Barry	Point Estimate	37.74%	62.26%	35.76%	64.24%
	C.I.	[34.70% ; 41.80%]	[58.20% ; 65.30%]	[31.22% ; 40.32%]	[59.68% ; 68.78%]
Swift	Point Estimate	31.19%	68.81%	28.88%	71.12%
	C.I.	[28.43% ; 35.07%]	[64.93% ; 71.57%]	[24.79% ; 33.11%]	[66.89% ; 75.21%]

Note: This table reports the relative contribution of circumstances and agency, as expressed in Equation 11, for *all crime* and *juvenile crime*. We report the confidence intervals in parentheses, which were constructed using a 95% percentile bootstrap confidence interval. The sample is made up of female students who were in 1st grade for the first time in 2013, and we use the baseline specification.

Table 7: Relative Contribution of Circumstances and Agency for Female Students (Educational Outcomes)

		Nongraduation		Dropout	
		Circumstances	Agency	Circumstances	Agency
Roemer	Point Estimate	32.64%	67.36%	33.21%	66.79%
	C.I.	[31.39% ; 33.87%]	[66.13% ; 68.61%]	[31.89% ; 34.45%]	[65.55% ; 68.11%]
Barry	Point Estimate	25.56%	74.44%	26.06%	73.94%
	C.I.	[24.42% ; 26.72%]	[73.28% ; 75.58%]	[24.74% ; 27.18%]	[72.82% ; 75.26%]
Swift	Point Estimate	19.44%	80.56%	19.80%	80.20%
	C.I.	[18.52% ; 20.37%]	[79.63% ; 81.48%]	[18.68% ; 20.79%]	[79.21% ; 81.32%]

Note: This table reports the relative contribution of circumstance and agency, as expressed in Equation 11, for *nongraduation* and *dropout*. We report the confidence intervals in parentheses, which were constructed using a 95% percentile bootstrap confidence interval. The sample is made up of female students were in 1st grade for the first time in 2003, and we use the baseline specification.

are displayed in Appendices F, G, H, and I.

From Figures 1, 3, 5, 7, 9, and 11, we can conclude that dropping one circumstance variable and performing all regressions again does not generally have a significant impact on the measurement of inequality of opportunity in criminal outcomes using Roemer, Barry or Swift. This holds for *all crime* and *juvenile crime*. The most relevant circumstance variable appears to be if the student attended a rural school or not. In this sense, rural school have students who commit less crime than students from urban areas (see Table 2), in spite of the fact that *rural school* is negatively correlated with important variables such as *household income* or *years education mother*, as shown in Appendix B. An assessment of the educational outcomes (Figures 13, 15, 17, 19, 21, and 23) leads to the conclusion that dropping a specific variable is not very relevant to the relative contribution of circumstances, with the exception of *nongraduation – old generation*, which confirms our suspicions of school quality persistence.

The results are (mostly) robust to dropping one circumstance variable, which suggests that the relative contribution to inequality is relatively independent of the specification. And this finding has a further interpretation: reducing inequality of opportunity will require a multidimensional approach because there is not a unique circumstance that causes the variance in the outcome.

The effects of dropping one agency variable on criminal outcomes are shown in Figures 2, 4, 6, 8, 10, and 12. All agency variables (*percentile grades*, *ever repeated*, and *percentage attendance*) are relevant, but *percentile grades* appears to be the most important variable when the analysis uses Roemer's normative conception (it is possible that the residual for *percentile grades* produced when

using Roemer is similar to the variable itself because socioeconomic characteristics at the school level cannot explain how a student's performance compares to other students in their class). With Barry or Swift, *ever repeated* is the most unique variable to explain the relative contribution of agency of *all crime* and *juvenile crime*.

With respect to educational outcomes (as shown in Figures 14, 16, 18, 20, 22, and 24), *ever repeated* is the most important variable for all three normative conceptions. Some authors, such as Lochner and Moretti (2004), argue that passing a grade and moving to the next should increase the returns to legitimate work, increasing the opportunity costs of illicit behaviors. Other authors, such as Jacob (2005), view grade retention as an opportunity that may help the student become more competitive in the classroom. These competing and slightly ambiguous positions, which are theoretical but are also backed by empirical data, have been termed the grade retention controversy and are explained in Díaz et al. (2021).

Finally, in Figures 12, 18, and 24 (or 1, 3, 7, 9, 15, 19, and 21) the relative contribution of agency (or circumstances) is greater in some cases when dropping one agency (or circumstance) variable with respect to the baseline. In Appendix J we show that this counterintuitive result is theoretically possible.

5.4 P90 — P10

Following Gamboa and Waltenberg (2012) and Carranza and Hojman (2015), we propose an alternative measure of inequality, which also enables us to better understand the importance of each particular variable. First, we estimate the predicted outcome probability for all individuals with our baseline model and then report the differences in estimated probability between the 90th and 10th percentile (P90 – P10). The purpose of this exercise is to assess the magnitude of the differences in predicted outcomes between the individuals with high quality circumstances who exercise high levels of individual agency (90th percentile) and those individuals with low quality circumstances who exert low levels of individual agency (10th percentile).

In Table 8, we report the differences in the percentiles of the distribution for *all crime* and *juvenile crime*, which are independent of the normative view (as a benchmark we include our two educational outcomes: *nongraduation* and *dropout*). We also detail the counterfactual outcomes obtained by estimating the model with all the data, equalizing one variable at a time to the highest

possible value and estimating the probabilities. For each outcome we report the distance between P90 – P10. The objective being to understand if equalizing one variable at a time, while leaving the other variables fixed, alters the gap between high performers and low performers.

An analysis of the results leads to the following conclusions. First, the differences in predicted outcomes between the students with high quality circumstances who exercise high levels of individual agency and the students with low quality circumstances who exert low levels of individual agency are moderate. The differences in the percentiles of distribution at the baseline for *all crime* and *juvenile crime* are 25.25% and 16.53%. For educational outcomes, the distance between P90 – P10 for *nongraduation* is 48.50% and for *dropout* is 51.00%. The fact that the distance is greater in the educational outcomes compared to the criminal outcomes is to be expected because the unconditional probabilities in our crime variables are much lower than in our educational variables. Because the expected probability of committing a crime or committing a crime as a juvenile at the 10th percentile is roughly 0%, it means that even the most underperforming individuals (in terms of circumstances and agency) have a relatively low probability of committing crime.

Table 8 also provides an insight into the circumstances and agency variables that are more relevant, in the sense that equalizing one variable at a time among all individuals will have the biggest reduction in P90 - P10. As the circumstances set of variables is richer than the individual agency set of variables, equalizing one circumstance for all individuals does not usually have a big impact on P90 – P10. Regarding agency the most important variable is *percentile grades*: equalizing it at the maximum level implies that the P90 - P10 metric would decrease 5.86 percentage points in *all crime* and 3.05 percentage points in *juvenile crime*. With regards to circumstances, differences in *standardized test score in language - school* have the biggest impact on P90 - P10. Equalizing that variable for all students would imply a reduction of P90 - P10 by 2.73 percentage points in *all crime* and by 1.88 percentage points in *juvenile crime*. Finally, *years education mother – school* appears to reduce inequality of opportunity in education outcomes. Overall, the results are in line with what is presented in Subsection 5.3.

Table 8: P90 - P10

	All Crime p90-p10	Juvenile Crime p90-p10	Nongraduation p90-p10	Dropout p90-p10
Actual Circumstances and Agency	25.25%	16.53%	48.46%	51.00%
Public Health – School	23.58%	15.83%	47.62%	50.06%
Household Income – School	27.75%	17.64%	51.97%	54.50%
School Payment - School	24.70%	16.38%	48.47%	51.01%
One Parent Indigenous - School	25.08%	16.53%	48.76%	51.33%
Standardized Test Score in Language – School	22.52%	14.65%	46.05%	48.38%
Standardized Test Score in Math - School	25.91%	17.12%	48.19%	50.66%
Years Education Mother – School	23.07%	15.17%	42.80%	45.24%
Rural School	25.61%	16.63%	48.65%	51.28%
Private School	25.27%	16.55%	48.50%	51.11%
All Crime – Old Generation	24.20%	15.82%	48.27%	50.70%
Juvenile Crime - Old Generation	24.74%	15.90%	48.17%	50.67%
Nongraduation - Old Generation	23.47%	15.23%	44.16%	46.48%
Percentile Grades	19.40%	13.47%	40.32%	42.40%
Ever Repeated	21.08%	13.48%	30.97%	33.17%
Percentage Attendance	23.04%	14.68%	43.93%	45.85%

Note: This table reports the differences in estimated probability between the 90th and 10th percentiles of the distribution of estimated probabilities for *all crime*, *juvenile crime*, *nongraduation* and *dropout*, under the three normative conceptions of inequality of opportunity. We include the baseline results and the counterfactual outcomes, which are obtained by estimating the model using the original data, equalizing one variable at a time to the highest possible value, and predicting the outcomes. The sample is made up of male students who were in the 1st grade for the first time in 2003.

6 Robustness Analysis

We present a set of alternative specifications as a robustness check, all the results of which are displayed in Appendix C. In Table 12 we display the relative contribution of circumstances and agency for crime outcomes and in Table 14 for education outcomes. In Table 13 and 15 we include the differences between our scenarios and the baseline scenarios. All the variables used under each specification are identified in Table 16.

In our baseline model we did not include circumstances at the individual level, mainly obtained from the SIMCE parent surveys, because not all students take the SIMCE and not all parents whose children take the test decide to complete the survey (and it is likely that not taking the exam or not filling the survey, or both, are related to outcomes). In our first specification, we include all variables at the school level and all circumstances at the individual level. Overall, the relative contribution of circumstances slightly increases: 2.54% in *all crime* and 3.32% in *juvenile crime* (with slightly higher increases for the educational outcomes) using Barry's conception of equality of opportunity. This indicates that either an individual's circumstances are not that relevant in determining crime outcomes or that an individual's circumstances are homogeneous within schools (and therefore school characteristics already capture individual circumstances).

Our second specification incorporates individual test scores (i.e., the results from the SIMCE math and SIMCE language tests). The relative contribution of agency increases 1.79% in *all crime* and 0.66% in *juvenile crime* using Barry (and 2.07% in *nongraduation* and 1.66% in *dropout*). This suggests that *percentile grades*, *ever repeated*, and *percentage attendance* capture almost all the information contained in test results.

In the third specification, we replace circumstances at the school level by circumstances at the individual level. The relative contribution of circumstances experiences a decreases with respecto to our baseline scenario. The relative contribution of circumstances under Barry in *all crime* is 28.28% (11.30 percentage points less than in our baseline scenario). In *juvenile crime*, the relative contribution of circumstances is 25.41%, 15.21 percentage points less than in our main specification. This suggests that, particularly for children, individual circumstances do not fully capture school and peer characteristics that may contribute to criminal behavior.

Finally, the fourth specification includes both individual circumstances and individual test results.

As Table 13 and Table 15 show, the differences between Roemer and Swift widen with respect to our baseline scenario. For example, in *all crime* the gap between Roemer and Swift is 22.67 percentage points compared to 14.34 percentage points in the baseline scenario.

In summary, although the relative contribution is for the most part similar under these alternative scenarios, alternative specifications may result in slightly different assessments of equality of opportunity. This suggests that in order to perform international comparisons it would be advisable to use the same selection of variables for all countries.

6.1 School Effects or Family Influence?

As discussed, adding individual circumstances (as in specification 1) does not dramatically change the relative contribution of circumstances, but only considering individual circumstances (as in specification 3) results in a lower relative contribution of circumstances. This suggests that school circumstances are probably more important than individual circumstances, although there is probably some overlap, given that there is little heterogeneity within the school. In order to answer what is the exact contribution of school circumstances and individual circumstances, we consider the relative contribution of variables in specification 3 using Barry. We do so by extending Equation 10 and Equation 11 to consider multiple factors. Table 17 and Table 18 show the relative contribution of each factor under Barry.

For *all crime*, the relative contribution of school circumstances is 31.57%, the contribution of individual circumstances is just 10.55%, and individual agency accounts for 57.88%. School circumstances explain 34.24% of the variance in *juvenile crime*, 9.70% of the variance is due to individual circumstances, and 56.06% to individual agency. In comparison, the relative contribution between school circumstances and individual circumstances in education outcomes is not as acute. For instance, when the outcome is *nongraduation*, school circumstances explain 20.26% of the variance, individual circumstances explain 9.48%, and individual agency accounts for 70.26%. These results suggest that equalizing school quality and diminishing segregation at the school level should have a profound effect in the reduction of inequality of opportunity in the contexts of criminal justice and, to a lesser extent, education.

7 Conclusion

To the best of our knowledge, this is the first paper that studies juvenile criminal behavior using the conception of equality of opportunity developed by John Roemer. In this approach, the studied outcome (i.e., criminal behavior) is explained by circumstances and individual agency, and the empirical challenge is to quantify the relevance of each of these two determinants. Because circumstances and individual agency are correlated, the way to treat that correlation has a significant impact on the estimated contribution of each factor and has given rise to three different normative views—that of Roemer, that of Swift, and that of Barry. Roemer's view is that correlation should be treated as a circumstance, for Swift correlation is treated as agency, and for Barry correlation is split between circumstances and agency, according to the usual rules of regression.

Using very rich Chilean administrative data, we find that circumstances explain 46.44% of the inequality in the probability of being prosecuted up to 22 years old using Roemer's conception, 39.58% using Barry's, and 32.10% using Swift's conception. When the outcome is being prosecuted as a juvenile, those percentages are 48.27% for Roemer, 40.62% for Barry, and 32.62% for Swift. As a benchmark, we replicate this empirical evaluation of inequality of opportunity but this time considering education outcomes, and find a less relevant contribution of circumstances.

In sum, this paper shows that circumstances (beyond an individual's control) have a substantial role in determining the criminal behavior of young people. Although expected, these results should be considered when defining the punishment severity for young people who are found guilty of a crime. Furthermore, these results have been determined by considering some variables as part of the set of agency variables that many would also consider to be part of set of circumstances variables, such as grade retention in the early primary school grades.

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Appendix

A Variables' definition

Circumstances:

Female = 1 if student is a female; 0 otherwise

Public Health = 1 if student was attended in Fonasa the first year he took the Simce; 0 otherwise.

Public Health - School = fraction of students who are attended by Fonasa grouped by school in 2006.

Household Income = household income the first year the student took the Simce, expressed in 2006 CLP. It is considered *High* if it is greater or equal to 300.000 CLP (566 USD) per month and *Low* otherwise.

Household Income - School = mean of household income for students who took the SIMCE in 2006 grouped by school.

School payment = amount of money the student pays monthly to the school. Obtained from 2006's SIMCE surveys. It is considered *High* if it is greater or equal to 5.000 CLP (9.43 USD) per month and *Low* otherwise.

School Payment - School = average monthly school payment grouped by school in 2006.

One Parent Indigenous=1 if at least one parent is indigenous; 0 otherwise.

One Parent Indigenous - School = fraction of students who had at least one indigenous parent grouped by school in 2006.

Standardized Test Score in Language - School = average grade in the lecture exam on the national standardized test (*Sistema de Medición de Calidad de la Educación*, SIMCE) grouped by school in 2006.

Standardized Test Score in Math - School = average grade in the math exam on the national standardized test (*Sistema de Medición de Calidad de la Educación*, SIMCE) grouped by school in 2006.

Years Education Mother = years of schooling the mother has. It is considered *High* if it is greater

or equal to 13 years, *Low* otherwise.

Years Education Mother - School = average number of years of education the mothers of students have, grouped by school in 2006.

Rural School = 1 if school is classified as rural; 0 otherwise.

Private School = 1 if student attended a private school in 2006; 0 otherwise.

All Crime - Old Generation = fraction of 4rth graders (among those who on 2003 were attending the same school as our student was attending in 2003 as a 1st grader) who were criminally prosecuted up to 2018.

Juvenile Crime - Old Generation = fraction of 4rth graders (among those who on 2003 were attending the same school as our student was attending in 2003 as a 1st grader) who were criminally prosecuted as a juvenile (for most students up to 2011 or 2012).

Nongraduation - Old Generation = fraction of 4rth graders (among those who on 2003 were attending the same school as our student was attending in 2003 as a 1st grader) who did not graduate secondary school up to 2018.

Agency:

Percentile Grades = Percentile that the student occupies with respect to grades between 2003 and 2010 and relative to all the classmates with whom each student shared school in 2003. This percentile ranges from 0 to 100%.

Ever Repeated = 0 if student was successful in finishing the 8 grades of primary school in 8 academic years; 1 otherwise.

Percentage Attendance = Average attendance to school during the 8 scholar years from 2003 to 2010. The average is taken only over the enrolled years.

Standardized Test Score in Language = grade in the language exam on the national standardized test (*Sistema de Medición de Calidad de la Educación*, SIMCE) taken by all students in the 4th grade. We register only the first time the student did the test. It is considered *High* if it is greater than or equal to 258.18, *Low* otherwise.

Standardized Test Score in Math = grade in the math exam on the national standardized test (*Sistema de Medición de Calidad de la Educación*, SIMCE) taken by all students in the 4th grade.

We register only the first time the student did the test. It is considered *High* if it is greater than or equal to 251.92, *Low* otherwise.

Outcomes:

All Crime = 1 if student was criminally charged up to 22 years old.

Juvenile Crime = 1 if student was criminally charged up to 18 years old.

Nongraduation = 1 if student graduated from high school between 2003 and 2018; 0 otherwise

Dropout = 1 if student was at least two consecutive years between 2010 and 2014 out of school between 2010 and 2014 or did not graduate; 0 otherwise

B Correlation Matrix

Table 9: Pairwise correlations for male students (part 1)

Variables	Public Health	Public Health - School	Household Income	Household Income - School	School Payment	School Payment - School	One Parent Indigenous	One Parent Indigenous - School
Public Health	1							
Public Health - School	0.6249*	1						
Household Income	-0.6162*	-0.7707*	1					
Household Income - School	-0.5793*	-0.9265*	0.8310*	1				
School Payment	-0.5445*	-0.8566*	0.7788*	0.9171*	1			
School Payment - School	-0.5542*	-0.8889*	0.7899*	0.9523*	0.9628*	1		
One Parent Indigenous	0.1076*	0.1354*	-0.1253*	-0.1292*	-0.1130*	-0.1195*	1	
One Parent Indigenous - School	0.1921*	0.3065*	-0.2467*	-0.2908*	-0.2687*	-0.2686*	0.4467*	1
Standardized Test Score in Language - School	-0.4151*	-0.6552*	0.5273*	0.6236*	0.5827*	0.5928*	-0.1214*	-0.2708*
Standardized Test Score in Math - School	-0.4216*	-0.6682*	0.5298*	0.6309*	0.5834*	0.5970*	-0.1456*	-0.3293*
Years Education Mother	-0.4076*	-0.5299*	0.4965*	0.4899*	0.4326*	0.4520*	-0.1729*	-0.2690*
Years Education Mother - School	-0.5230*	-0.8281*	0.6415*	0.7663*	0.6914*	0.7096*	-0.1889*	-0.4256*
Rural School	0.1447*	0.2251*	-0.1602*	-0.1923*	-0.1435*	-0.1517*	0.1089*	0.2225*
Private School	-0.4348*	-0.7041*	0.7050*	0.8500*	0.8504*	0.8830*	-0.0823*	-0.1850*
All Crime - Old Generation	0.2333*	0.3422*	-0.2829*	-0.3176*	-0.3165*	-0.3179*	0.0763*	0.1506*
Juvenile Crime - Old Generation	0.2005*	0.2926*	-0.2445*	-0.2718*	-0.2683*	-0.2681*	0.0569*	0.1154*
Nongraduation - Old Generation	0.3331*	0.4961*	-0.3757*	-0.4311*	-0.3903*	-0.3993*	0.1259*	0.2624*
Percentile Grades	-0.0530*	-0.0293*	0.0218*	0.0202*	-0.0384*	0.0163*	-0.0160*	-0.0094*
Ever Repeated	0.1011*	0.1495*	-0.0883*	-0.1367*	-0.0583*	-0.1234*	0.0315*	0.0723*
Percentage Attendance	-0.0445*	-0.0744*	0.0448*	0.0746*	0.0356*	0.0726*	-0.0129*	-0.0461*
Standardized Test Score in Language	-0.2314*	-0.3225*	0.2798*	0.3051*	0.2613*	0.2902*	-0.0585*	-0.1313*
Standardized Test Score in Math	-0.2504*	-0.3579*	0.3029*	0.3356*	0.2841*	0.3166*	-0.0797*	-0.1703*
All Crime	0.1018*	0.1300*	-0.1002*	-0.1140*	-0.0914*	-0.1100*	0.0342*	0.0617*
Juvenile Crime	0.0844*	0.1066*	-0.0814*	-0.0940*	-0.0733*	-0.0903*	0.0234*	0.0440*
Nongraduation	0.1339*	0.1936*	-0.1297*	-0.1653*	-0.1132*	-0.1522*	0.0367*	0.0953*
Drop Out	0.1377*	0.1969*	-0.1325*	-0.1683*	-0.1161*	-0.1551*	0.0394*	0.0954*

Table 10: Pairwise correlations for male students (part 2)

Variables	Standardized Test Score in Language - School	Standardized Test Score in Math - School	Years Education Mother	Years Education Mother - School	Rural School	Private School	All Crime - Old Generation	Juvenile Crime - Old Generation	Nongraduation - Old Generation
Public Health									
Public Health - School									
Household Income									
Household Income - School									
School Payment									
School Payment - School									
One Parent Indigenous									
One Parent Indigenous - School									
Standardized Test Score in Language - School	1								
Standardized Test Score in Math - School	0.9193*	1							
Years Education Mother	0.4435*	0.4656*	1						
Years Education Mother - School	0.6882*	0.7245*	0.6405*	1					
Rural School	-0.1303*	-0.2078*	-0.2772*	-0.3930*	1				
Private School	0.4391*	0.4374*	0.3175*	0.5037*	-0.0834*	1			
All Crime - Old Generation	-0.3710*	-0.3373*	-0.2111*	-0.3036*	-0.1309*	-0.2375*	1		
Juvenile Crime - Old Generation	-0.3277*	-0.2968*	-0.1906*	-0.2671*	-0.1318*	-0.1951*	0.6956*	1	
Nongraduation - Old Generation	-0.5160*	-0.5316*	-0.4414*	-0.6264*	0.2882*	-0.2514*	0.3838*	0.3667*	1
Percentile Grades	0.0567*	0.0600*	0.1555*	0.0429*	-0.0123*	0.0066*	0.0137*	0.0104*	0.0067*
Ever Repeated	-0.1764*	-0.1826*	-0.1982*	-0.1791*	0.0473*	-0.0877*	0.0883*	0.0858*	0.1648*
Percentage Attendance	0.1516*	0.1393*	0.0951*	0.1022*	0.0293*	0.0491*	-0.0911*	-0.0904*	-0.1254*
Standardized Test Score in Language	0.4629*	0.4329*	0.3117*	0.3428*	-0.0804*	0.2143*	-0.1868*	-0.1695*	-0.2712*
Standardized Test Score in Math	0.4716*	0.5084*	0.3497*	0.3910*	-0.1305*	0.2321*	-0.1886*	-0.1700*	-0.3035*
All Crime	-0.1556*	-0.1476*	-0.1328*	-0.1421*	-0.0094*	-0.0741*	0.1172*	0.1072*	0.1351*
Juvenile Crime	-0.1350*	-0.1255*	-0.1071*	-0.1172*	-0.0231*	-0.0604*	0.1101*	0.1058*	0.1207*
Nongraduation	-0.2354*	-0.2363*	-0.2431*	-0.2500*	0.0746*	-0.0925*	0.1275*	0.1233*	0.2461*
Dropout	-0.2411*	-0.2412*	-0.2435*	-0.2524*	0.0697*	-0.0942*	0.1340*	0.1289*	0.2496*

Table 11: Pairwise correlations for male students (part 3)

Variables	Percentile Grades	Ever Repeated	Percentage Attendance	Standardized Test Score in Language	Standardized Test Score in Math	All Crime	Juvenile Crime	Nongraduation	Dropout
Public Health									
Public Health - School									
Household Income									
Household Income - School									
School Payment									
School Payment - School									
One Parent Indigenous									
One Parent Indigenous - School									
Standardized Test Score in Language - School									
Standardized Test Score in Math - School									
Years Education Mother									
Years Education Mother - School									
Rural School									
Private School									
All Crime - Old Generation									
Juvenile Crime - Old Generation									
Nongraduation - Old Generation									
Percentile Grades	1								
Ever Repeated	-0.5233*	1							
Percentage Attendance	0.2969*	-0.3099*	1						
Standardized Test Score in Language	0.5125*	-0.3508*	0.1407*	1					
Standardized Test Score in Math	0.5422*	-0.3910*	0.1660*	0.7651*	1				
All Crime	-0.1831*	0.1838*	-0.1452*	-0.1715*	-0.1722*	1			
Juvenile Crime	-0.1505*	0.1642*	-0.1382*	-0.1407*	-0.1381*	0.6865*	1		
Nongraduation	-0.3193*	0.4020*	-0.2737*	-0.2636*	-0.2955*	0.3193*	0.2918*	1	
Dropout	-0.3242*	0.4049*	-0.2857*	-0.2665*	-0.2985*	0.3263*	0.3010*	0.9431*	1

Note: This table displays the pairwise correlations between circumstances, agency and outcome variables. The sample used consists of 122,102 male individuals which represent our baseline sample. * indicates correlation is significant at the 0.01 level

C Scenario Analysis

Table 12: Scenario Analysis (criminal outcomes)

Specification	Observations	Norm	All Crime		Juvenile Crime	
			Circumstances	Agency	Circumstances	Agency
0. Baseline	122,102	Roemer	46.44%	53.56%	48.27%	51.73%
		Barry	39.58%	60.42%	40.62%	59.38%
		Swift	32.10%	67.90%	32.62%	67.38%
1. Baseline + Individual circumstances	86,091	Roemer	49.14%	50.86%	51.52%	48.48%
		Barry	42.12%	57.88%	43.94%	56.06%
		Swift	37.41%	62.59%	39.30%	60.70%
2. Baseline + Individual Test Scores	109,356	Roemer	45.04%	54.96%	47.24%	52.76%
		Barry	37.79%	62.21%	39.96%	60.04%
		Swift	23.32%	76.68%	25.75%	74.25%
3. Baseline - School circumstances + Individual circumstances	86,091	Roemer	36.03%	63.97%	33.14%	66.86%
		Barry	28.28%	71.72%	25.41%	74.59%
		Swift	21.86%	78.14%	19.17%	80.83%
4. Baseline + Individual circumstances + Individual Test Scores	84,679	Roemer	48.83%	51.17%	51.17%	48.83%
		Barry	41.07%	58.93%	43.21%	56.79%
		Swift	26.16%	73.84%	28.42%	71.58%

Note: This table recapitulates the share of outcome inequalities explained by circumstances and agency in the three normative frameworks under four robustness scenarios using as sample male students who in 2003 were doing 1st grade for the first time . The first column contains the specification. On Table 16 we can relate every specification to specific variables. The second column informs the number of observations. The last columns recapitulate the relative contribution of circumstances and agency in the three frameworks for each of the outcomes.

Table 13: Differences with baseline scenario (criminal outcomes)

Specification	Observations	Norm	All Crime		Juvenile Crime	
			Circumstances	Agency	Circumstances	Agency
1. Baseline		Roemer	2.70%	-2.70%	3.25%	-3.25%
+ Individual circumstances	86,091	Barry	2.54%	-2.54%	3.32%	-3.32%
		Swift	5.31%	-5.31%	6.68%	-6.68%
2. Baseline		Roemer	-1.40%	1.40%	-1.03%	1.03%
+ Individual SIMCES	109,356	Barry	-1.79%	1.79%	-0.66%	0.66%
		Swift	-8.78%	8.78%	-6.87%	6.87%
3. Baseline		Roemer	-10.41%	10.41%	-15.13%	15.13%
- School circumstances	86,091	Barry	-11.30%	11.30%	-15.21%	15.21%
+ Individual circumstances		Swift	-10.24%	10.24%	-13.45%	13.45%
4. Baseline		Roemer	2.39%	-2.39%	2.90%	-2.90%
+ Individual circumstances	84,679	Barry	1.49%	-1.49%	2.59%	-2.59%
+ Individual SIMCES		Swift	-5.94%	5.94%	-4.20%	4.20%

Note: This table recapitulates the differences in share of outcome inequalities explained by circumstances and agency in the three normative frameworks under four robustness scenarios with respect to the baseline scenario. The population are male students who in 2003 were doing 1st grade for the first time . The first column contains the specification. On Table 16 we can relate every specification to specific variables. The second column informs the number of observations. The last columns recapitulate the relative contribution of circumstances and agency in the three frameworks for each of the outcomes.

Table 14: Scenario Analysis (educational outcomes)

Specification	Observations	Norm	Non Graduation		Drop Out	
			Circumstances	Agency	Circumstances	Agency
0. Baseline	122,102	Roemer	34.80%	65.20%	34.84%	65.16%
		Barry	26.01%	73.99%	26.02%	73.98%
		Swift	18.54%	81.46%	18.50%	81.50%
1. Baseline + Individual circumstances	86,091	Roemer	38.55%	61.45%	38.30%	61.70%
		Barry	29.74%	70.26%	29.51%	70.49%
		Swift	24.76%	75.24%	24.62%	75.38%
2. Baseline + Individual Test Scores	109,356	Roemer	33.36%	66.64%	33.60%	66.40%
		Barry	23.94%	76.06%	24.36%	75.64%
		Swift	12.98%	87.02%	13.21%	86.79%
3. Baseline - School circumstances + Individual circumstances	86,091	Roemer	29.79%	70.21%	28.92%	71.08%
		Barry	21.43%	78.57%	20.71%	79.29%
		Swift	14.92%	85.08%	14.35%	85.65%
4. Baseline + Individual circumstances + Individual Test Scores	84,679	Roemer	38.07%	61.93%	37.87%	62.13%
		Barry	27.34%	72.66%	27.40%	72.60%
		Swift	15.33%	84.67%	15.32%	84.68%

Note: This table recapitulates the share of outcome inequalities explained by circumstances and agency in the three normative frameworks under four robustness scenarios using as population male students who in 2003 were doing 1st grade for the first time . The first column contains the specification. On Table 16 we can relate every specification to specific variables. The second column informs the number of observations. The last columns recapitulate the relative contribution of circumstances and agency in the three frameworks for each of the outcomes.

Table 15: Differences with baseline scenario (educational outcomes)

Specification	Observations	Norm	Non Graduation		Drop Out	
			Circumstances	Agency	Circumstances	Agency
1. Baseline		Roemer	3.75%	-3.75%	3.46%	-3.46%
+ Individual circumstances	86,091	Barry	3.73%	-3.73%	3.49%	-3.49%
		Swift	6.22%	-6.22%	6.12%	-6.12%
2. Baseline		Roemer	-1.44%	1.44%	-1.24%	1.24%
+ Individual Test Scores	109,356	Barry	-2.07%	2.07%	-1.66%	1.66%
		Swift	-5.56%	5.56%	-5.29%	5.29%
3. Baseline		Roemer	-5.01%	5.01%	-5.92%	5.92%
- School circumstances	86,091	Barry	-4.58%	4.58%	-5.31%	5.31%
+ Individual circumstances		Swift	-3.62%	3.62%	-4.15%	4.15%
4. Baseline		Roemer	3.27%	-3.27%	3.03%	-3.03%
+ Individual circumstances	84,679	Barry	1.33%	-1.33%	1.38%	-1.38%
+ Individual Test Scores		Swift	-3.21%	3.21%	-3.18%	3.18%

Note: This table recapitulates the differences in share of outcome inequalities explained by circumstances and agency in the three normative frameworks under four robustness scenarios with respect to the baseline scenario. The population are male students who in 2003 were doing 1st grade for the first time. The first column contains the specification. On Table 16 we can relate every specification to specific variables. The second column informs the number of observations. The last columns recapitulate the relative contribution of circumstances and agency in the three frameworks for each of the outcomes.

Table 16: Variables used on each scenario

Specification	Variables
0. Baseline	**Circumstances:** Public Health - School, Household Income - School, School Payment - School, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Nongraduation - Old Generation **Agency:** Percentile Grades, Ever Repeated, Percentage Attendance
1. Baseline + Individual circumstances	**Circumstances:** Public Health, Public Health - School, Household Income, Household Income - School, School Payment - School, One Parent Indigenous, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Nongraduation - Old Generation **Agency:** Percentile Grades, Ever Repeated, Percentage Attendance
2. Baseline + Individual Test Scores	**Circumstances:** Public Health - School, Household Income - School, School Payment - School, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Nongraduation - Old Generation **Agency:** Percentile Grades, Ever Repeated, Percentage Attendance, Standardized Test Score in Language, Standardized Test Score in Math
3. Baseline - School circumstances + Individual circumstances	**Circumstances:** Public Health, Household Income, One Parent Indigenous, Years Education Mother **Agency:** Percentile Grades, Ever Repeated, Percentage Attendance
4. Baseline + Individual circumstances + Individual Test Scores	**Circumstances:** Public Health, Public Health - School, Household Income, Household Income - School, School Payment - School, One Parent Indigenous, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Non Graduation - Old Generation **Agency:** Percentile Grades, Ever Repeated, Percentage Attendance, Standardized Test Score in Language, Standardized Test Score in Math

Note: This table describes the variables used under each scenario

Table 17: Relative contribution of factors under Barry (Specification 1 - criminal outcomes)

Factor	Variables	All Crime	Juvenile Crime
Circumstances - School	Public Health - School, Household Income - School, School Payment - School, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Nongraduation - Old Generation	31.57% [28.00% ; 34.94%]	34.24% [30.62% ; 38.00%]
Individual Circumstances	Public Health, Household Income, One Parent Indigenous, Years Education Mother	10.55% [8.35% ; 13.01%]	9.70% [7.61% ; 12.40%]
Agency	Percentile Grades, Ever Repeated, Percentage Attendance	57.88% [55.55% ; 60.32%]	56.06% [52.99% ; 59.08%]

Note: This table recapitulates the relative contribution of each factor for *All Crime* and *Juvenile Crime* under Barry. The population are male students who in 2003 were doing 1st grade for the first time. The first column contains the factor, the second column specifies the variables and the last columns summarize the relative contribution of each factor. In brackets we report the 95% bootstrap confidence interval.

Table 18: Relative contribution of factors under Barry (Specification 1 - educational outcomes)

Factor	Variables	Non Graduation	Drop Out
Circumstances - School	Public Health - School, Household Income - School, School Payment - School, One Parent Indigenous - School, Standardized Test Score in Language - School, Standardized Test Score in Math - School, Years Education Mother - School, Rural School, Private School, All Crime - Old Generation, Juvenile Crime - Old Generation, Nongraduation - Old Generation	20.26%	20.81%
		[18.91% ; 22.37%]	[19.35% ; 22.81%]
Individual Circumstances	Public Health, Household Income, One Parent Indigenous, Years Education Mother	9.48%	8.70%
		[8.03% ; 10.98%]	[7.44% ; 9.88%]
Agency	Percentile Grades, Ever Repeated, Percentage Attendance	70.26%	70.49%
		[68.93% ; 71.73%]	[68.84% ; 71.93%]

Note: This table recapitulates the relative contribution of each factor for *Nongraduation* and *Dropout* under Barry. The population are male students who in 2003 were doing 1st grade for the first time. The first column contains the factor, the second column specifies the variables and the last columns summarize the relative contribution of each factor. In brackets we report the 95% bootstrap confidence interval.

D Main regressions (male students)

Table 19: *All Crime* main regressions (male students)

All Crime			
	Roemer	Barry	Swift
	(1)	(2)	(3)
Public Health - School	0.0547***	0.0593***	
	(0.000)	(0.000)	
Household Income - School	6.50e-08***	5.98e-08***	
	(0.000)	(0.000)	
School Payment - School	-0.000000127	-0.000000234	
	(0.417)	(0.134)	
One Parent Indigenous - School	0.0162*	0.0201**	
	(0.033)	(0.008)	
Standardized Test School in Language - School	-0.00106***	-0.000875***	
	(0.000)	(0.000)	
Standardized Test School in Math - School	-0.0000148	0.000154	
	(0.873)	(0.097)	
Years Education Mother - School	-0.0112***	-0.00832***	
	(0.000)	(0.000)	
Rural School	-0.0588***	-0.0520***	
	(0.000)	(0.000)	
Private School	-0.00338	0.00104	
	(0.740)	(0.919)	
All Crime - Old Generation	0.150***	0.164***	
	(0.000)	(0.000)	
Juvenile Crime - Old Generation	0.167***	0.154***	
	(0.000)	(0.000)	
Nongraduation - Old Generation	0.131***	0.126***	
	(0.000)	(0.000)	
Percentile Grades (Roemer residual)	-0.00154***		
	(0.000)		
Ever Repeated (Roemer residual)	0.0567***		
	(0.000)		
Percentage Attendance (Roemer residual)	-0.00495***		
	(0.000)		
Percentile Grades		-0.00154***	-0.00130***
		(0.000)	(0.000)
Ever Repeated		0.0567***	0.0831***
		(0.000)	(0.000)
Percentage Attendance		-0.00495***	-0.00667***
		(0.000)	(0.000)
Public Health - School (Swift residual)			0.0593***
			(0.000)
Household Income - School (Swift residual)			5.98e-08***
			(0.000)
School Payment - School (Swift residual)			-0.000000234
			(0.134)
One Parent Indigenous - School (Swift residual)			0.0201**
			(0.008)
Standardized Test School in Language - School (Swift residual)			-0.000875***
			(0.000)
Standardized Test School in Math - School (Swift residual)			0.000154
			(0.097)
Years Education Mother - School (Swift residual)			-0.00832***
			(0.000)
Rural School (Swift residual)			-0.0520***
			(0.000)
Private School (Swift residual)			0.00104
			(0.919)
All Crime - Old Generation (Swift residual)			0.164***
			(0.000)
Juvenile Crime - Old Generation (Swift residual)			0.154***
			(0.000)
Nongraduation - Old Generation (Swift residual)			0.126***
			(0.000)
Constant	0.439***	0.835***	0.809***
	(0.000)	(0.000)	(0.000)
Observations	122,102	122,102	122,102
R-squared	0.074	0.074	0.074
F	648.4	648.4	648.4

Note: This table reports coefficients and standard errors (in parentheses) of the main regressions in Roemer, Barry and Swift specifications when the outcome is *all crime* and we are using the baseline scenario. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively.

Table 20: *Juvenile Crime* main regressions (male students)

Juvenile Crime			
	Roemer (1)	Barry (2)	Swift (3)
Public Health - School	0.0186	0.0239*	
	(0.051)	(0.012)	
Household Income - School	3.00e-08**	2.77e-08**	
	(0.002)	(0.004)	
School Payment - School	6.23e-09	-5.98e-08	
	(0.958)	(0.610)	
One Parent Indigenous - School	-0.00406	-0.00198	
	(0.478)	(0.730)	
Standardized Test School in Language - School	-0.000742***	-0.000611***	
	(0.000)	(0.000)	
Standardized Test School in Math - School	0.0000370	0.000146*	
	(0.595)	(0.036)	
Years Education Mother - School	-0.00743***	-0.00549***	
	(0.000)	(0.000)	
Rural School	-0.0481***	-0.0429***	
	(0.000)	(0.000)	
Private School	-0.000927	0.00177	
	(0.903)	(0.816)	
All Crime - Old Generation	0.0935***	0.101***	
	(0.000)	(0.000)	
Juvenile Crime - Old Generation	0.185***	0.174***	
	(0.000)	(0.000)	
Nongraduation - Old Generation	0.102***	0.0934***	
	(0.000)	(0.000)	
Percentile Grades (Roemer residual)	-0.000839***		
	(0.000)		
Ever Repeated (Roemer residual)	0.0426***		
	(0.000)		
Percentage Attendance (Roemer residual)	-0.00399***		
	(0.000)		
Percentile Grades		-0.000839***	-0.000674***
		(0.000)	(0.000)
Ever Repeated		0.0426***	0.0593***
		(0.000)	(0.000)
Percentage Attendance		-0.00399***	-0.00519***
		(0.000)	(0.000)
Public Health - School (Swift residual)			0.0239*
			(0.012)
Household Income - School (Swift residual)			2.77e-08**
			(0.004)
School Payment - School (Swift residual)			-5.98e-08
			(0.610)
One Parent Indigenous - School (Swift residual)			-0.00198
			(0.730)
Standardized Test School in Language - School (Swift residual)			-0.000611***
			(0.000)
Standardized Test School in Math - School (Swift residual)			0.000146*
			(0.036)
Years Education Mother - School (Swift residual)			-0.00549***
			(0.000)
Rural School (Swift residual)			-0.0429***
			(0.000)
Private School (Swift residual)			0.00177
			(0.816)
All Crime - Old Generation (Swift residual)			0.101***
			(0.000)
Juvenile Crime - Old Generation (Swift residual)			0.174***
			(0.000)
Non Graduation - Old Generation (Swift residual)			0.0934***
			(0.000)
Constant	0.283***	0.599***	0.577***
	(0.000)	(0.000)	(0.000)
Observations	122,102	122,102	122,102
R-squared	0.058	0.058	0.058
F	502.3	502.3	502.3

Note: This table reports coefficients and standard errors (in parentheses) of the main regressions in Roemer, Barry and Swift specifications when the outcome is *juvenile crime* and we are using the baseline scenario. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively.

Table 21: *Nongraduation* main regressions (male students)

Nongraduation			
	Roemer	Barry	Swift
	(1)	(2)	(3)
Public Health - School	0.0134	0.0280*	
	(0.268)	(0.021)	
Household Income - School	8.67e-08***	8.46e-08***	
	(0.000)	(0.000)	
School Payment - School	0.000000283	6.15e-09	
	(0.057)	(0.967)	
One Parent Indigenous - School	-0.0359***	-0.0296***	
	(0.000)	(0.000)	
Standardized Test School in Language - School	-0.00114***	-0.000762***	
	(0.000)	(0.000)	
Standardized Test School in Math - School	-0.000455***	-0.0000728	
	(0.000)	(0.410)	
Years Education Mother - School	-0.0284***	-0.0219***	
	(0.000)	(0.000)	
Rural School	-0.0251***	-0.00904**	
	(0.000)	(0.007)	
Private School	-0.00736	0.00301	
	(0.447)	(0.756)	
All Crime - Old Generation	0.0173	0.0365	
	(0.367)	(0.057)	
Juvenile Crime - Old Generation	0.168***	0.124***	
	(0.000)	(0.000)	
Nongraduation - Old Generation	0.324***	0.278***	
	(0.000)	(0.000)	
Percentile Grades (Roemer residual)	-0.00195***		
	(0.000)		
Ever Repeated (Roemer residual)	0.205***		
	(0.000)		
Percentage Attendance (Roemer residual)	-0.0105***		
	(0.000)		
Percentile Grades		-0.00195***	-0.00160***
		(0.000)	(0.000)
Ever Repeated		0.205***	0.246***
		(0.000)	(0.000)
Percentage Attendance		-0.0105***	-0.0125***
		(0.000)	(0.000)
Public Health - School (Swift residual)			0.0280*
			(0.021)
Household Income - School (Swift residual)			8.46e-08***
			(0.000)
School Payment - School (Swift residual)			6.15e-09
			(0.967)
One Parent Indigenous - School (Swift residual)			-0.0296***
			(0.000)
Standardized Test School in Language - School (Swift residual)			-0.000762***
			(0.000)
Standardized Test School in Math - School (Swift residual)			-0.0000728
			(0.410)
Years Education Mother - School (Swift residual)			-0.0219***
			(0.000)
Rural School (Swift residual)			-0.00904**
			(0.007)
Private School (Swift residual)			0.00301
			(0.756)
All Crime - Old Generation (Swift residual)			0.0365
			(0.057)
Juvenile Crime - Old Generation (Swift residual)			0.124***
			(0.000)
Nongraduation - Old Generation (Swift residual)			0.278***
			(0.000)
Constant	0.785***	1.533***	1.350***
	(0.000)	(0.000)	(0.000)
Observations	122,102	122,102	122,102
R-squared	0.242	0.242	0.242
F	2593.2	2593.2	2593.2

Note: This table reports coefficients and standard errors (in parentheses) of the main regressions in Roemer, Barry and Swift specifications when the outcome is *Nongraduation* and we are using the baseline scenario. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively.

Table 22: *Dropout* main regressions (male students)

Drop Out			
	Roemer	Barry	Swift
	(1)	(2)	(3)
Public Health - School	0.0140	0.0312*	
	(0.263)	(0.013)	
Household Income - School	8.73e-08***	8.51e-08***	
	(0.000)	(0.000)	
School Payment - School	0.000000285	4.21e-09	
	(0.063)	(0.978)	
One Parent Indigenous - School	-0.0392***	-0.0327***	
	(0.000)	(0.000)	
Standardized Test School in Language - School	-0.00124***	-0.000833***	
	(0.000)	(0.000)	
Standardized Test School in Math - School	-0.000488***	-0.0000892	
	(0.000)	(0.329)	
Years Education Mother - School	-0.0292***	-0.0223***	
	(0.000)	(0.000)	
Rural School	-0.0318***	-0.0142***	
	(0.000)	(0.000)	
Private School	-0.00308	0.00753	
	(0.758)	(0.451)	
All Crime - Old Generation	0.0364	0.0564**	
	(0.066)	(0.004)	
Juvenile Crime - Old Generation	0.182***	0.135***	
	(0.000)	(0.000)	
Nongraduation - Old Generation	0.341***	0.291***	
	(0.000)	(0.000)	
Percentile Grades (Roemer residual)	-0.00206***		
	(0.000)		
Ever Repeated (Roemer residual)	0.210***		
	(0.000)		
Percentage Attendance (Roemer residual)	-0.0118***		
	(0.000)		
Percentile Grades		-0.00206***	-0.00170***
		(0.000)	(0.000)
Ever Repeated		0.210***	0.254***
		(0.000)	(0.000)
Percentage Attendance		-0.0118***	-0.0141***
		(0.000)	(0.000)
Public Health - School (Swift residual)			0.0312*
			(0.013)
Household Income - School (Swift residual)			8.51e-08***
			(0.000)
School Payment - School (Swift residual)			4.21e-09
			(0.978)
One Parent Indigenous - School (Swift residual)			-0.0327***
			(0.000)
Standardized Test School in Language - School (Swift residual)			-0.000833***
			(0.000)
Standardized Test School in Math - School (Swift residual)			-0.0000892
			(0.329)
Years Education Mother - School (Swift residual)			-0.0223***
			(0.000)
Rural School (Swift residual)			-0.0142***
			(0.000)
Private School (Swift residual)			0.00753
			(0.451)
All Crime - Old Generation (Swift residual)			0.0564**
			(0.004)
Juvenile Crime - Old Generation (Swift residual)			0.135***
			(0.000)
Nongraduation - Old Generation (Swift residual)			0.291***
			(0.000)
Constant	0.840***	1.703***	1.515***
	(0.000)	(0.000)	(0.000)
Observations	122,102	122,102	122,102
R-squared	0.250	0.250	0.250
F	2706.9	2706.9	2706.9

Note: This table reports coefficients and standard errors (in parentheses) of the main regressions in Roemer, Barry and Swift specifications when the outcome is *dropout* and we are using the baseline scenario. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively.

E Auxiliar regressions (male students)

Table 23: Auxiliar Roemer regressions (male students)

All Crime, Juvenile Crime, Nongraduation, Dropout			
	Percentile grades	Ever repeated	Percentage Attendance
	(4)	(5)	(6)
Public Health - School	-3.763***	0.00196	2.137***
	(0.000)	(0.903)	(0.000)
Household Income - School	-0.00000510***	-2.69e-08	0.000000219
	(0.000)	(0.097)	(0.174)
School Payment - School	-0.0000413**	0.00000122***	0.00000519**
	(0.002)	(0.000)	(0.008)
One Parent Indigenous - School	2.464***	-0.0163	-0.170
	(0.000)	(0.093)	(0.076)
Standardized Test School in Language - School	0.0354***	-0.000437***	0.0207***
	(0.000)	(0.001)	(0.000)
Standardized Test School in Math - School	0.0582***	-0.00120***	0.00222
	(0.000)	(0.000)	(0.056)
Years Education Mother - School	0.895***	-0.0179***	0.105***
	(0.000)	(0.000)	(0.000)
Rural School	0.497	-0.0279***	0.899***
	(0.088)	(0.000)	(0.000)
Private School	1.815*	-0.0401**	-0.133
	(0.032)	(0.002)	(0.298)
All Crime - Old Generation	9.299***	-0.0169	-0.229
	(0.000)	(0.509)	(0.366)
Juvenile Crime - Old Generation	2.859	0.139**	-1.943***
	(0.330)	(0.002)	(0.000)
Nongraduation - Old Generation	12.98***	0.226***	-2.479***
	(0.000)	(0.000)	(0.000)
Constant	13.85***	0.835***	85.24***
	(0.000)	(0.000)	(0.000)
Observations	122,102	122,102	122,102
R-squared	0.008	0.042	0.033
F	83.27	449.0	349.6

Note: This table reports coefficients and standard errors (in parentheses) of the auxiliary regressions in Roemer specifications for any of the four outcomes. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively

Table 24: Auxiliar Swift regressions (male students) - Part 1

	All Crime, Juvenile Crime, Nongraduation, Dropout					
	Public Health - School	Household Income - School	School Payment - School	One Parent Indigenous - School	Standardized Test School in Language - School	Standardized Test School in Math - School
	(7)	(8)	(9)	(10)	(11)	(12)
Percentile grades	0.000671***	-932.8***	-64.45***	0.000228***	-0.0620***	-0.0680***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ever repeated	0.101***	-123,996.2***	-8,132.1***	0.0279***	-10.00***	-12.08***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Percentage Attendance	-0.00247***	3,653.8***	275.1***	-0.00109***	0.676***	0.667***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.970***	73,913.7***	-7,400.8***	0.197***	197.8***	194.7***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
N	122,102	122,102	122,102	122,102	122,102	122,102
R-sq	0.027	0.024	0.021	0.007	0.045	0.044
F	1,139.0	1,013.8	855.0	299.3	1,920.9	1,881.3

Note: This table reports coefficients and standard errors (in parentheses) of the auxiliary regressions in Roemer specifications for any of the four outcomes. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively

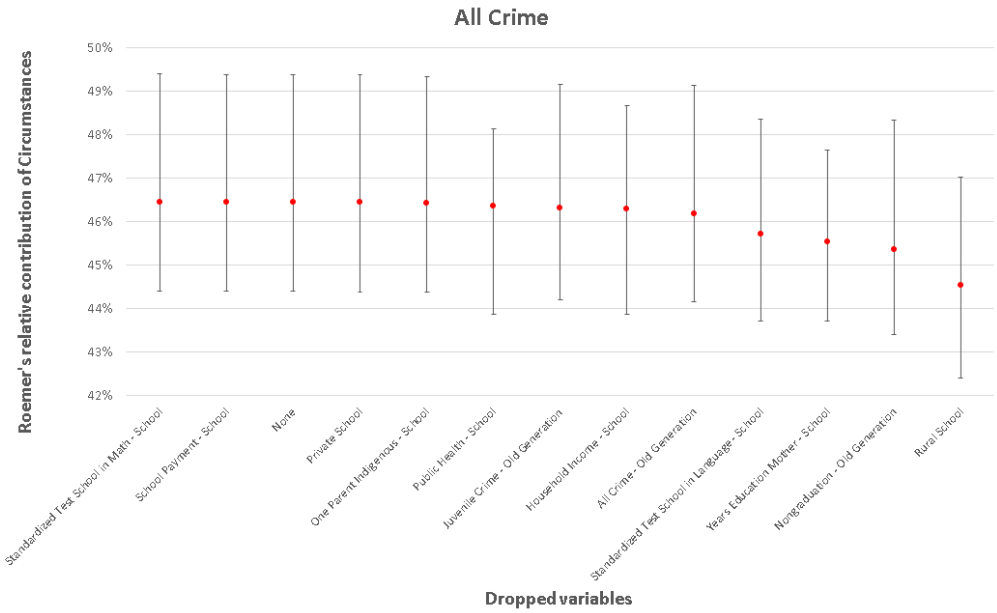
Table 25: Auxiliar Swift regressions (male students) - Part 2

	All Crime, Juvenile Crime, Nongraduation, Dropout					
	Years Education Mother - School	Rural School	Private School	All Crime - Old Generation	Juvenile Crime - Old Generation	Non Graduation - Old Generation
	(13)	(14)	(15)	(16)	(17)	(18)
Percentile grades	-0.00634***	0.0000962*	-0.000518***	0.000243***	0.000127***	0.000711***
	(0.000)	(0.015)	(0.000)	(0.000)	(0.000)	(0.000)
Ever repeated	-1.012***	0.0498***	-0.0606***	0.0181***	0.00960***	0.0654***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Percentage Attendance	0.0324***	0.00361***	0.00188***	-0.00138***	-0.000763***	-0.00330***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	8.569***	-0.229***	-0.0709***	0.237***	0.103***	0.432***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	122,102	122,102	122,102	122,102	122,102	122,102
R-sq	0.039	0.004	0.011	0.019	0.018	0.049
F	1,660.8	180.5	444.0	792.4	738.6	2,079.0

Note: This table reports coefficients and standard errors (in parentheses) of the auxiliary regressions in Roemer specifications for any of the four outcomes. The last three rows contain the number of observations, R-squared of the model and the F-value. The definition of variables is in Appendix A. ***, ** and * indicate statistical significance at 1%, 5% and 10% respectively

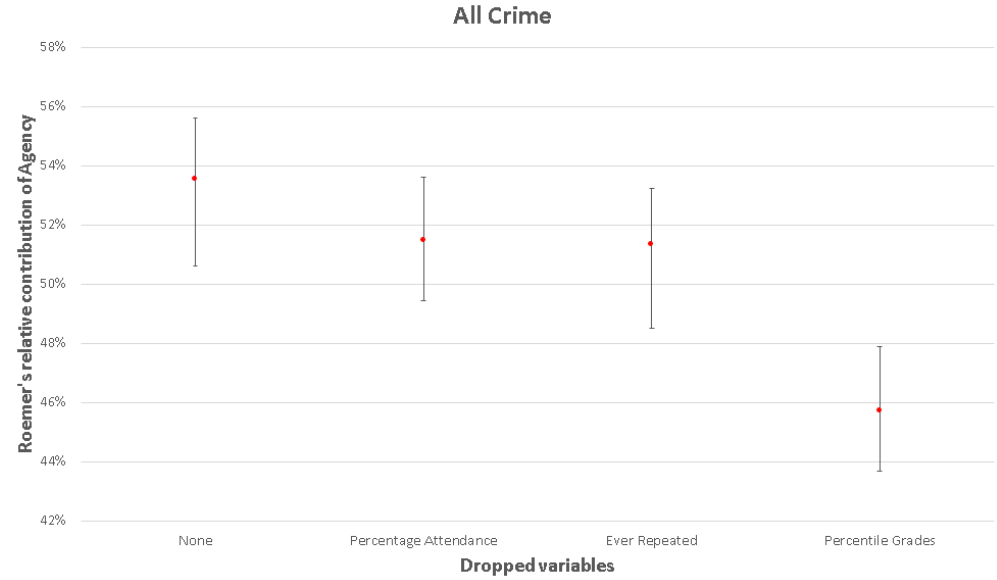
F The impact of variables on *All Crime* (male students)

Figure 1: Effect of dropping one variable on Roemer's relative contribution of circumstances



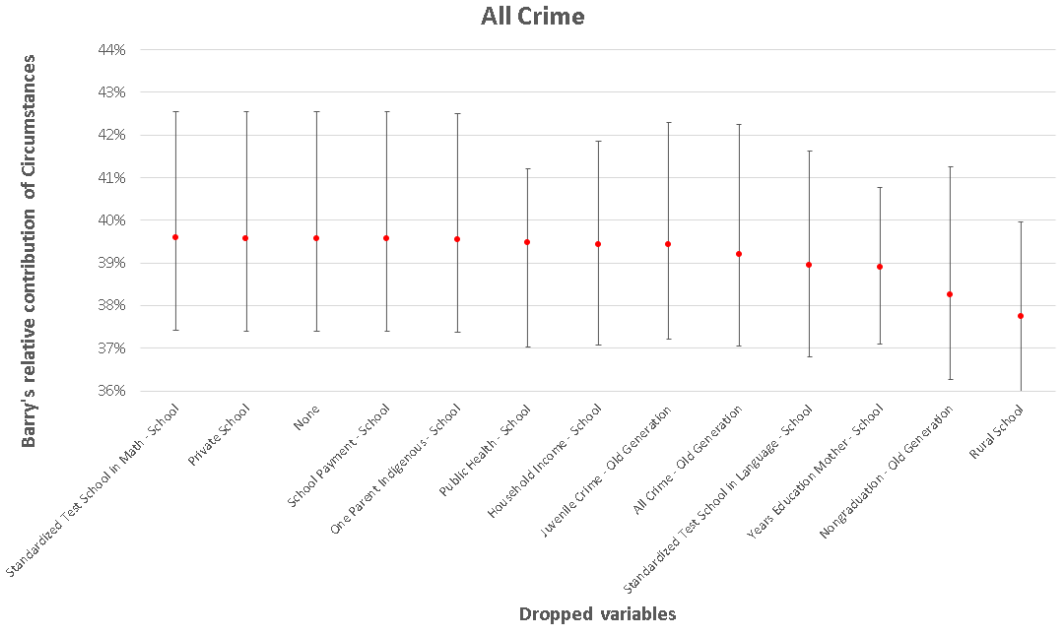
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 2: Effect of dropping one variable on Roemer's relative contribution of agency



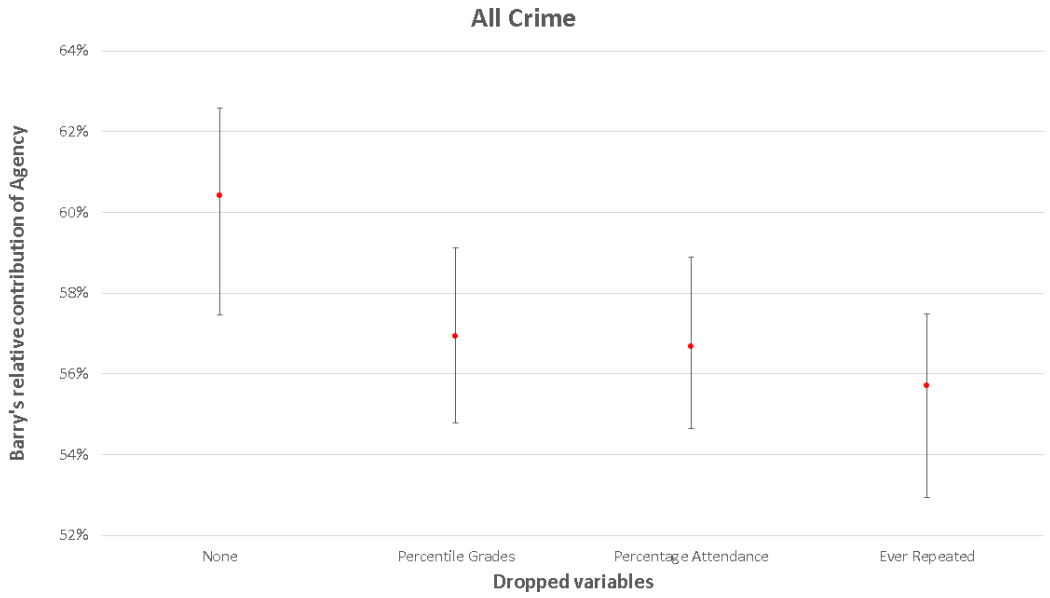
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 3: Effect of dropping one variable on Barry's relative contribution of circumstances



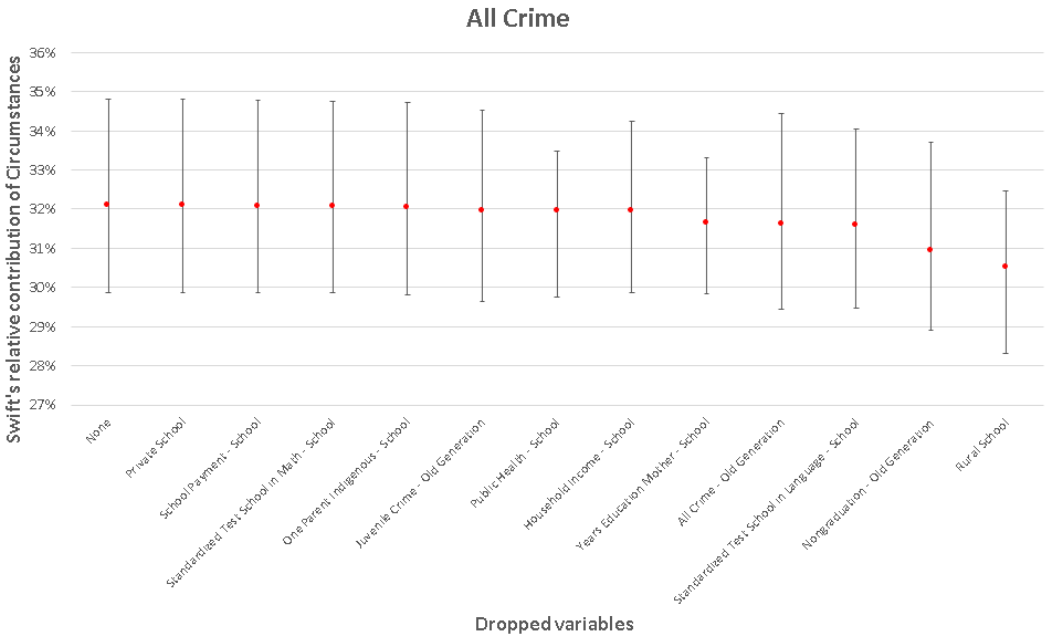
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 4: Effect of dropping one variable on Barry's relative contribution of agency



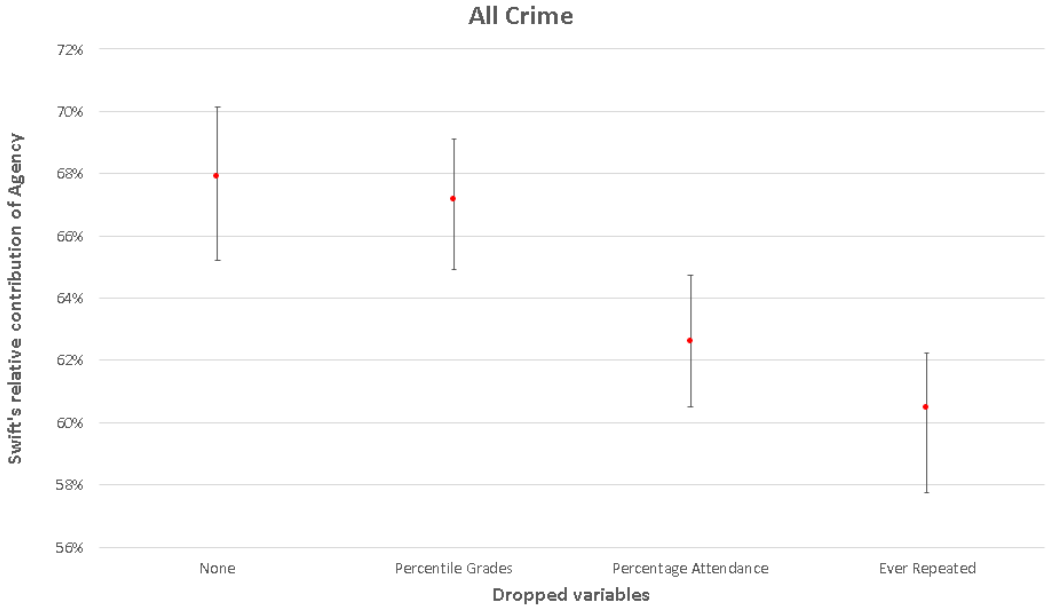
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 5: Effect of dropping one variable on Swift's relative contribution of circumstances



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

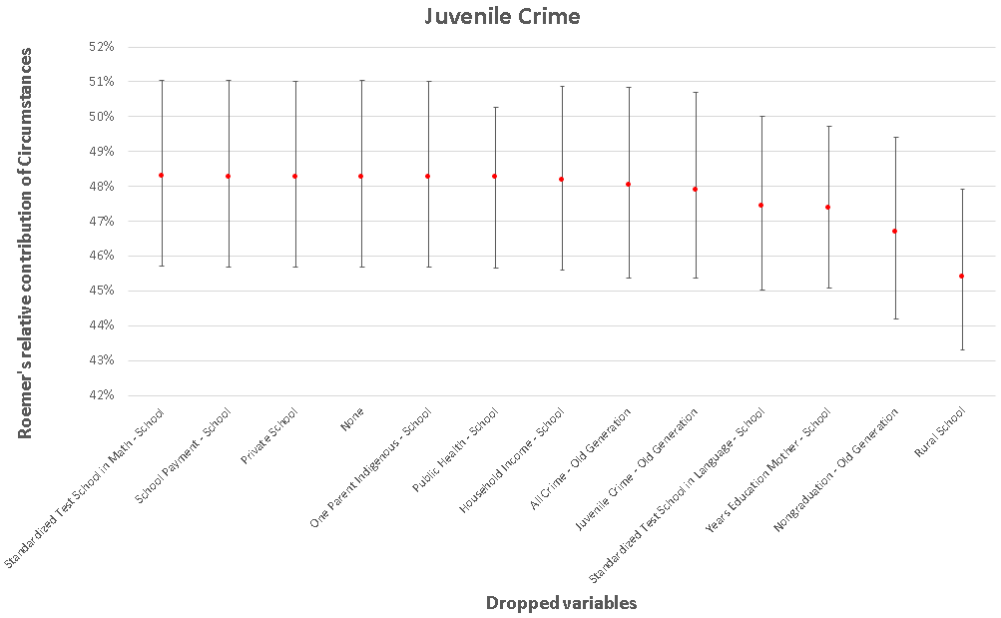
Figure 6: Effect of dropping one variable on Swift's relative contribution of agency



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

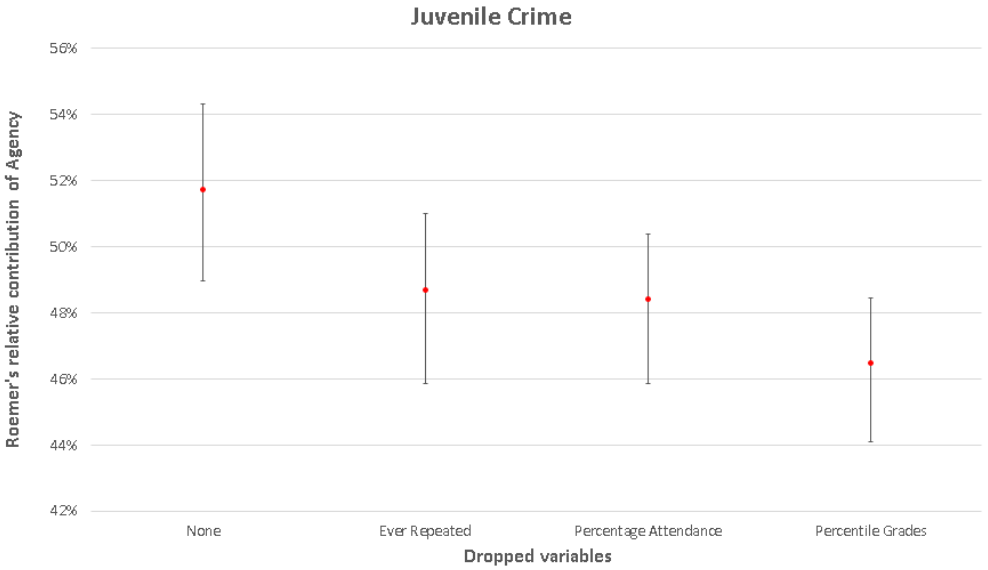
G The impact of variables on *Juvenile Crime*

Figure 7: Effect of dropping one variable on Roemer's relative contribution of circumstances



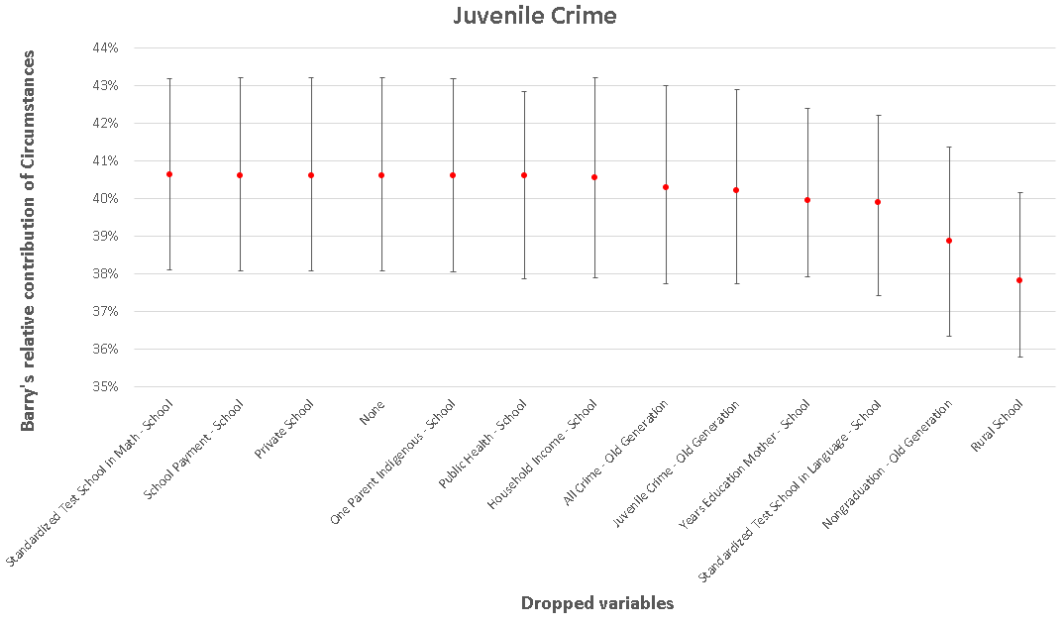
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 8: Effect of dropping one variable on Roemer's relative contribution of agency



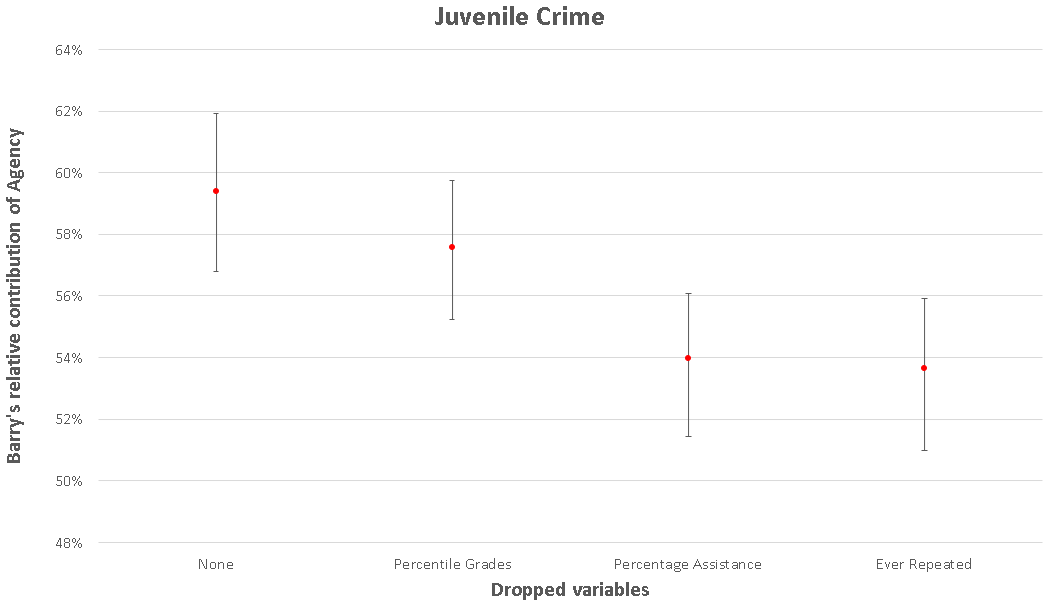
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 9: Effect of dropping one variable on Barry's relative contribution of circumstances



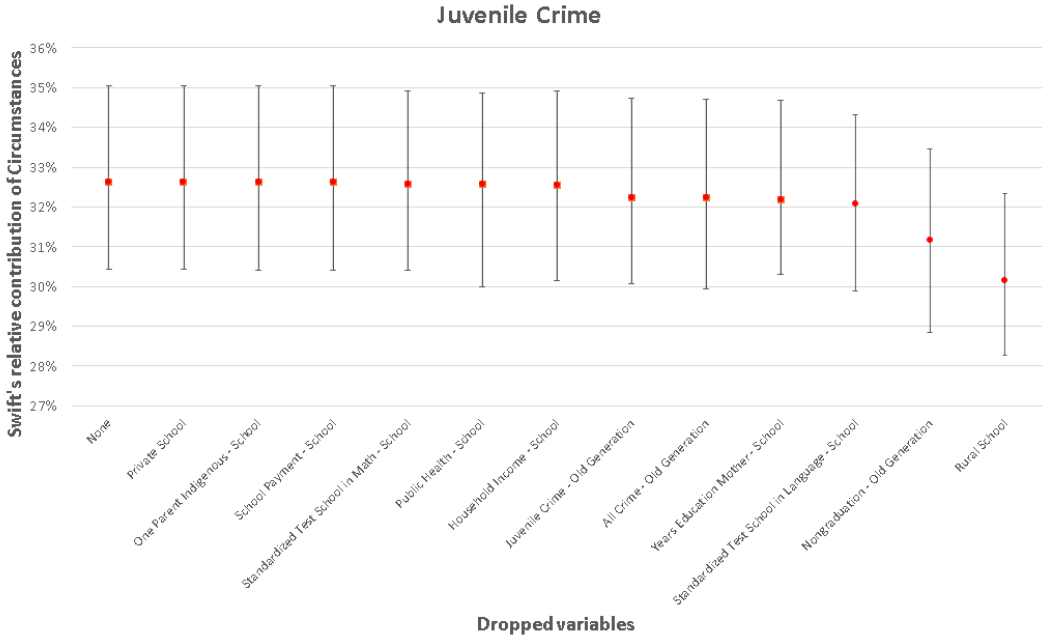
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 10: Effect of dropping one variable on Barry's relative contribution of agency



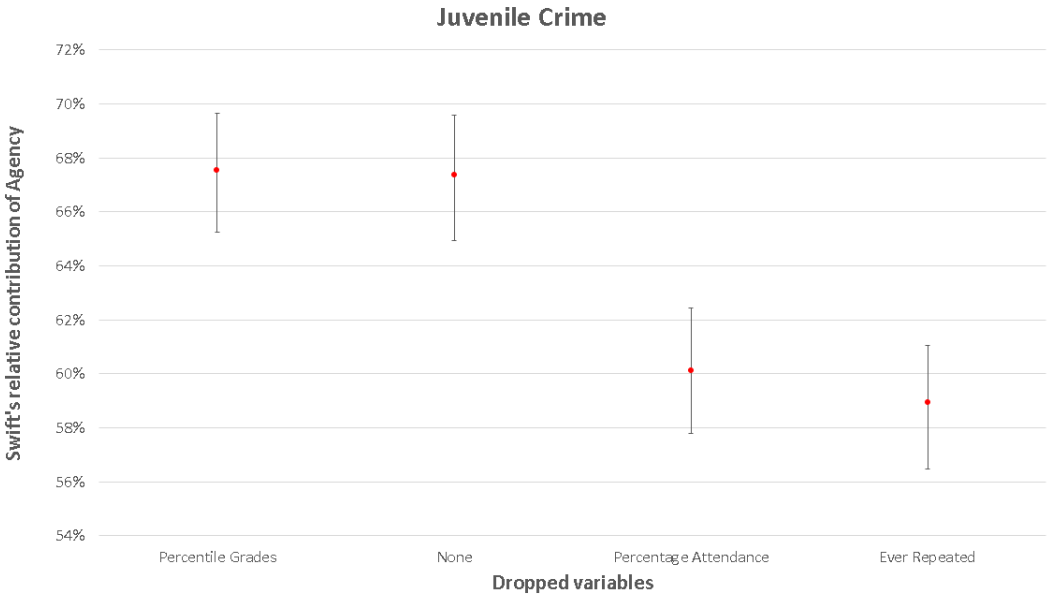
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 11: Effect of dropping one variable on Swift's relative contribution of circumstances



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

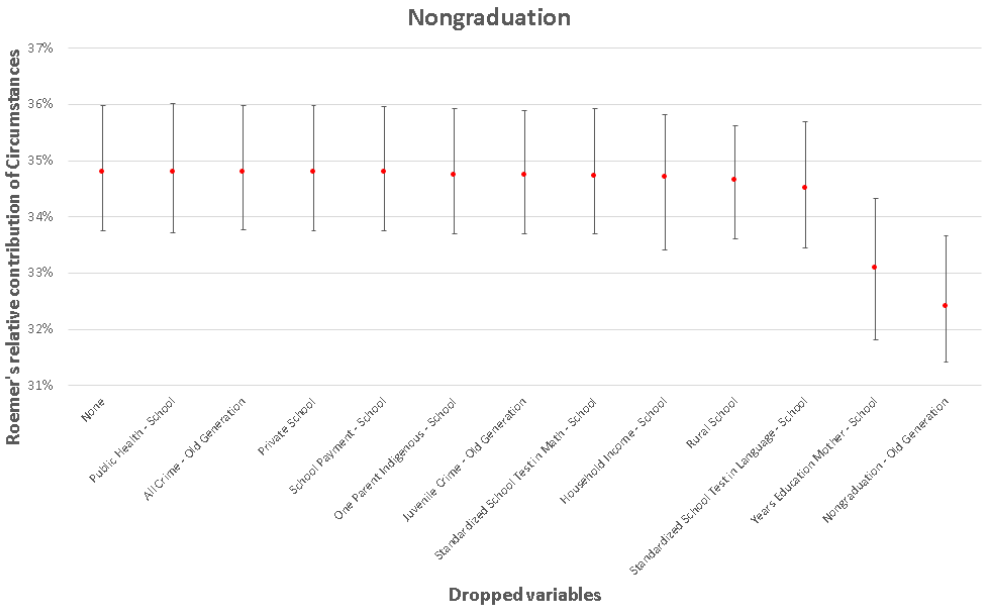
Figure 12: Effect of dropping one variable on Swift's relative contribution of agency



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

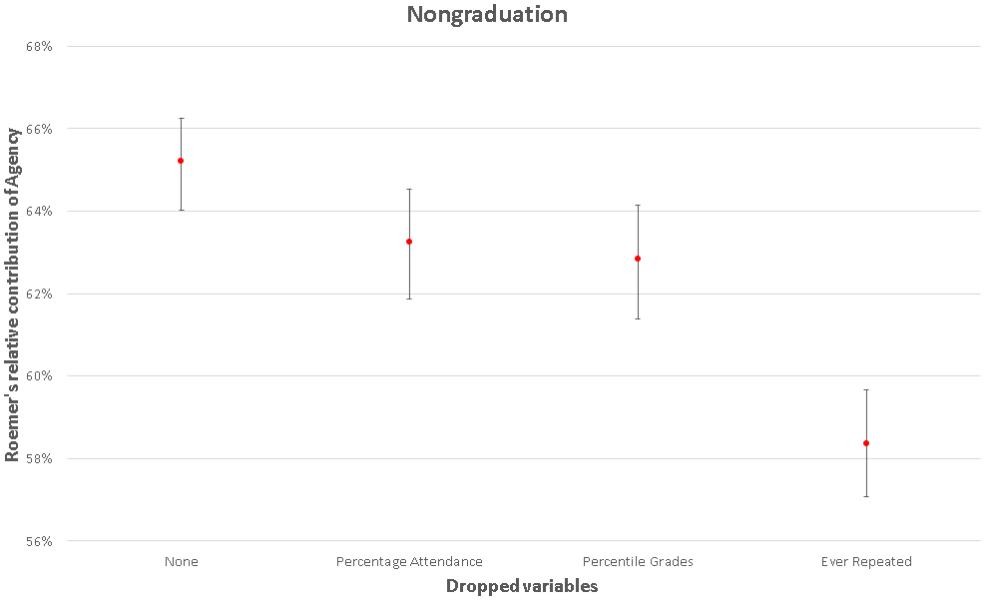
H The impact of variables on *Nongraduation*

Figure 13: Effect of dropping one variable on Roemer's relative contribution of circumstances



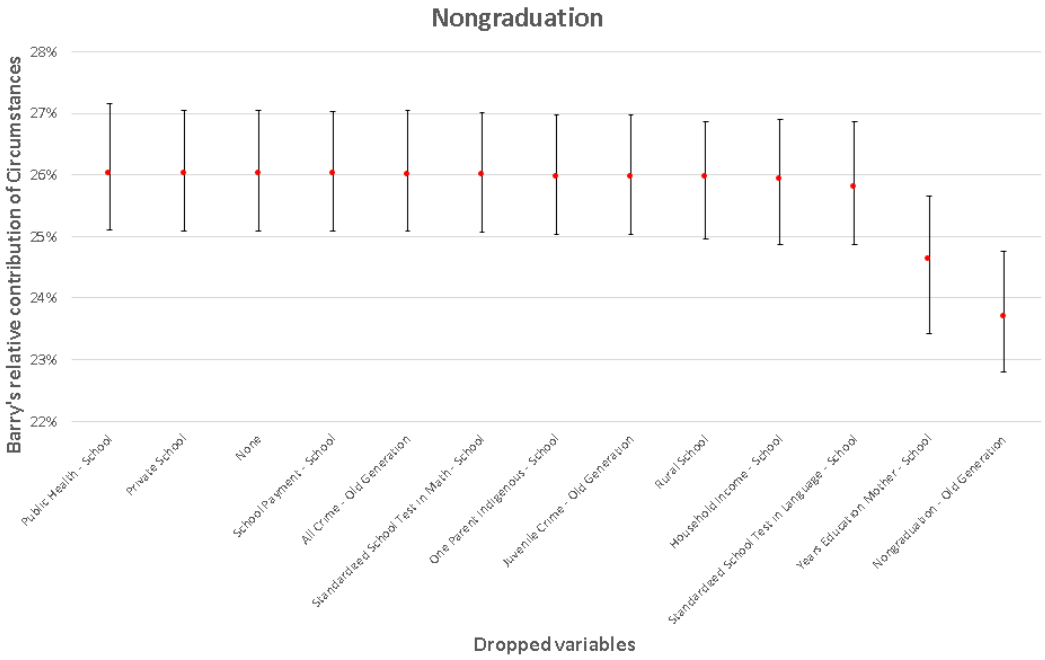
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 14: Effect of dropping one variable on Roemer's relative contribution of agency



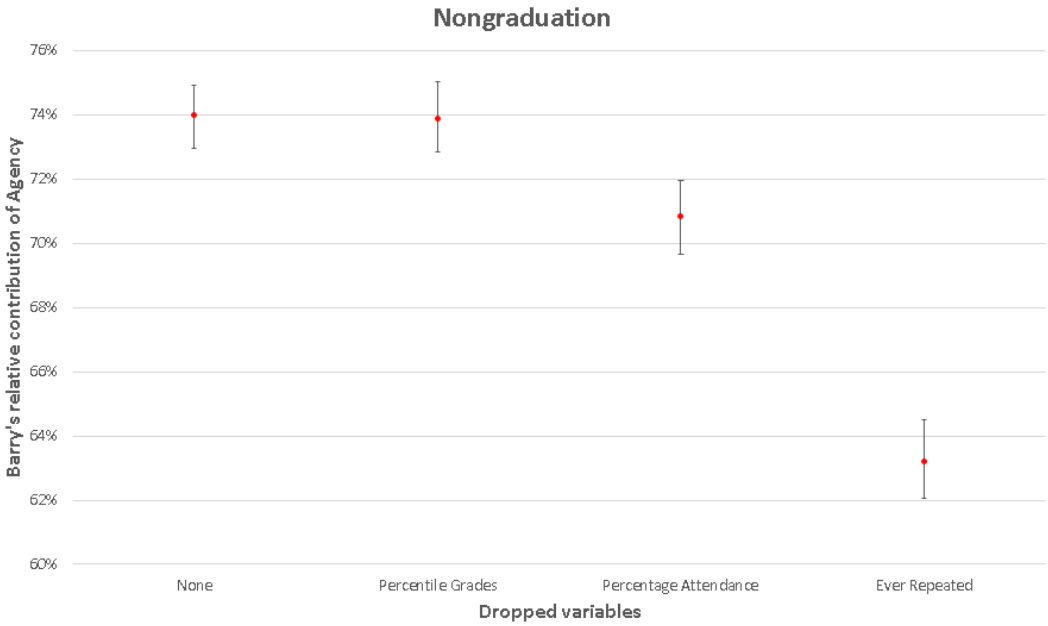
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 15: Effect of dropping one variable on Barry's relative contribution of circumstances



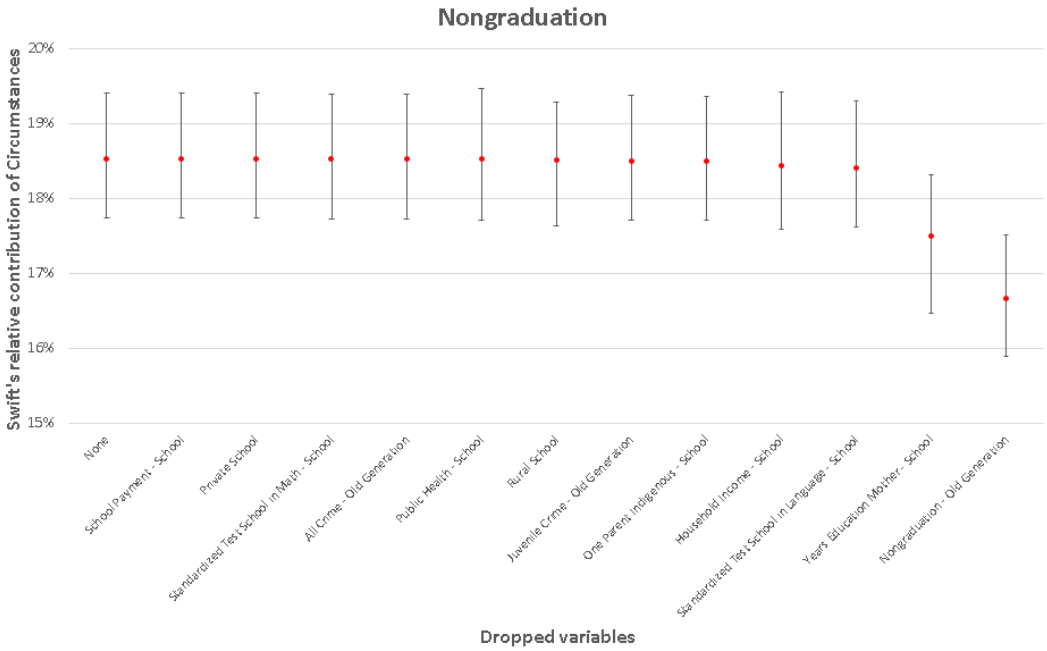
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 16: Effect of dropping one variable on Barry's relative contribution of agency



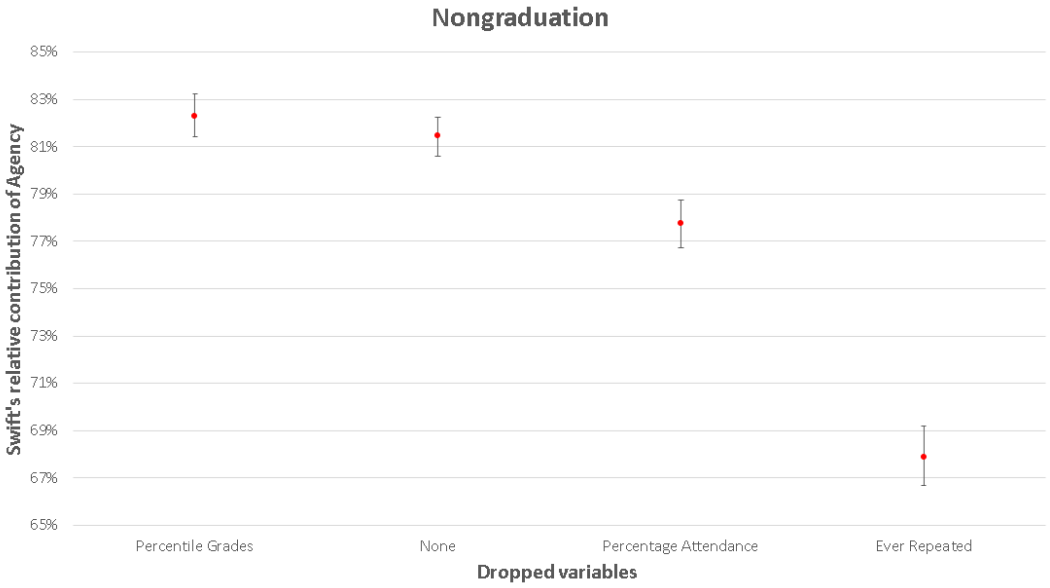
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 17: Effect of dropping one variable on Swift's relative contribution of circumstances



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

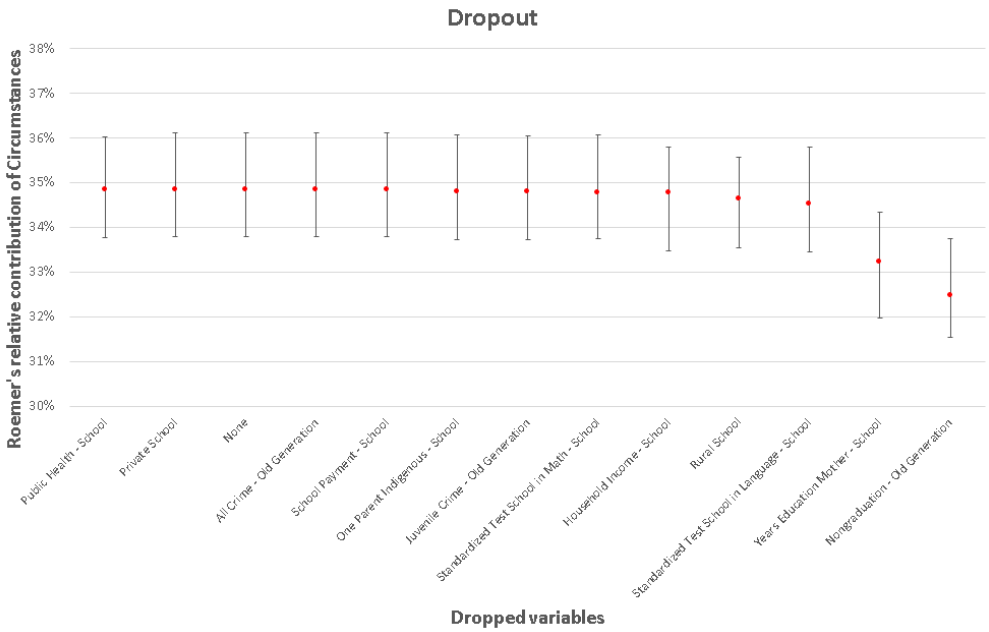
Figure 18: Effect of dropping one variable on Swift's relative contribution of agency



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

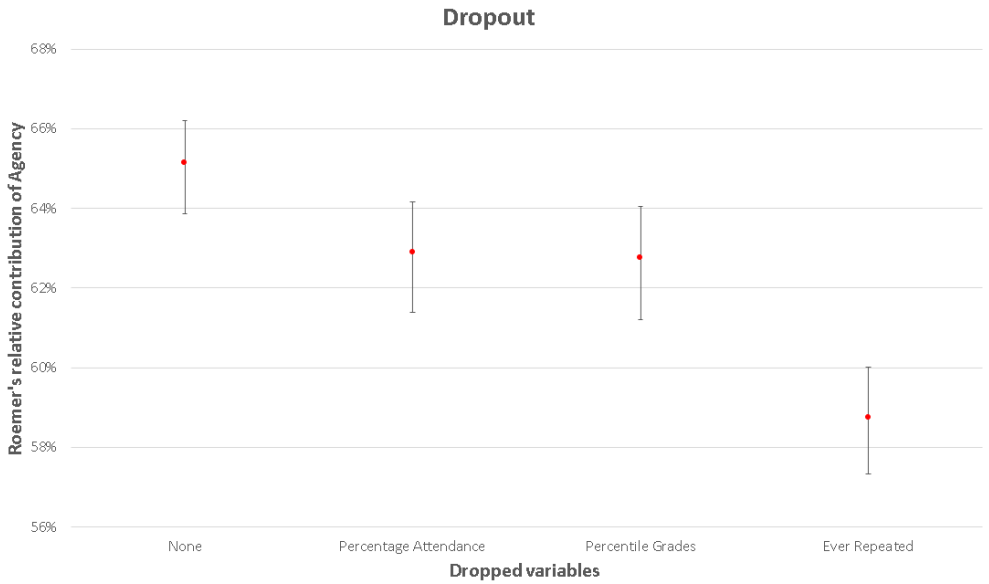
I The impact of variables on *Dropout*

Figure 19: Effect of dropping one variable on Roemer's relative contribution of circumstances



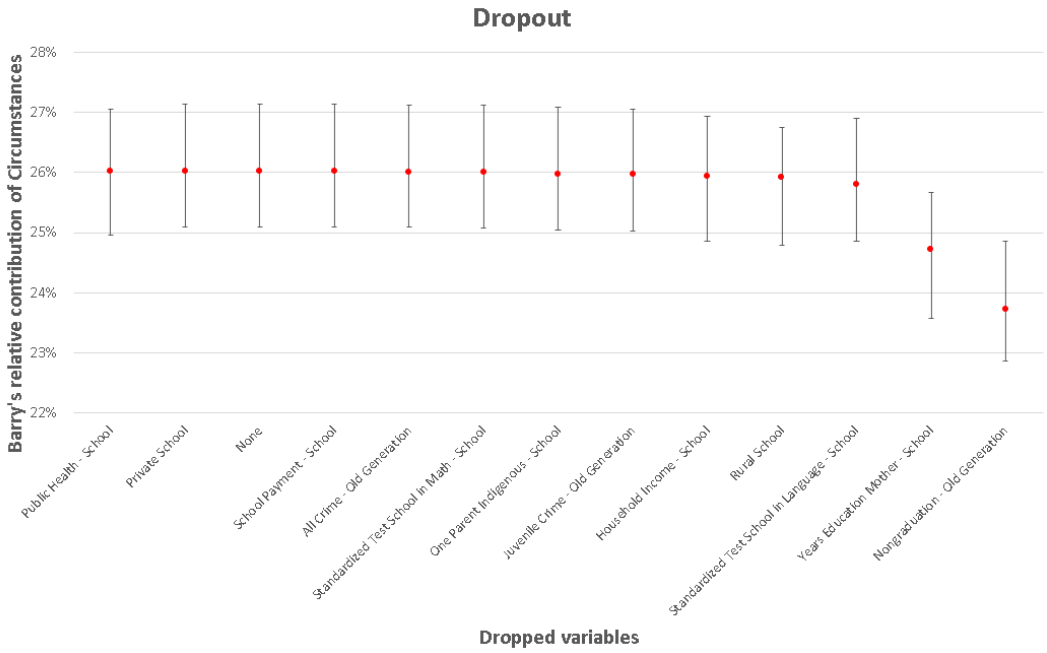
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 20: Effect of dropping one variable on Roemer's relative contribution of agency



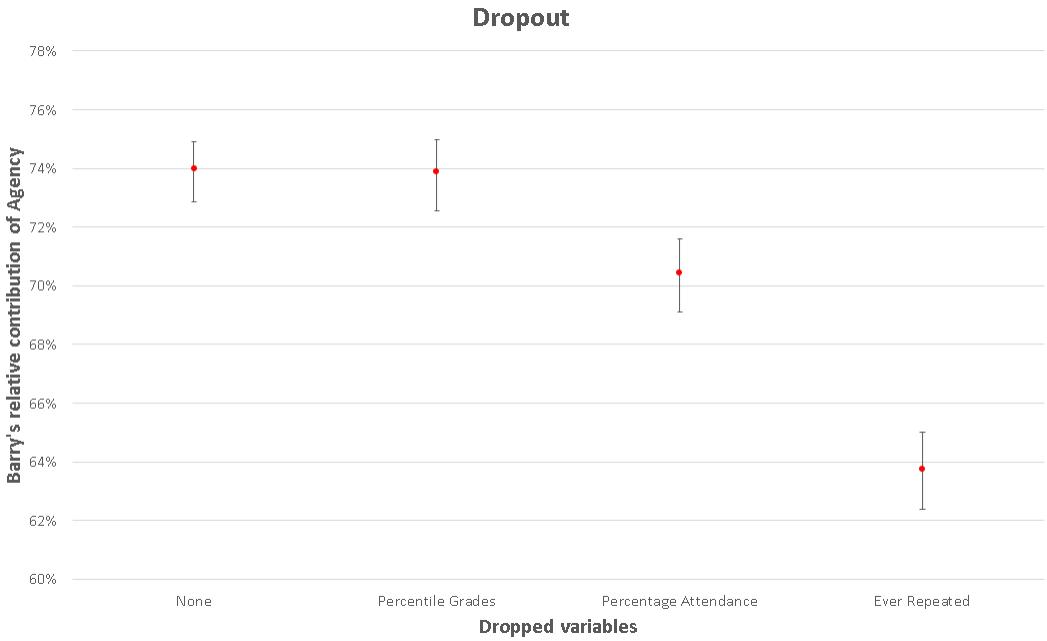
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 21: Effect of dropping one variable on Barry's relative contribution of circumstances



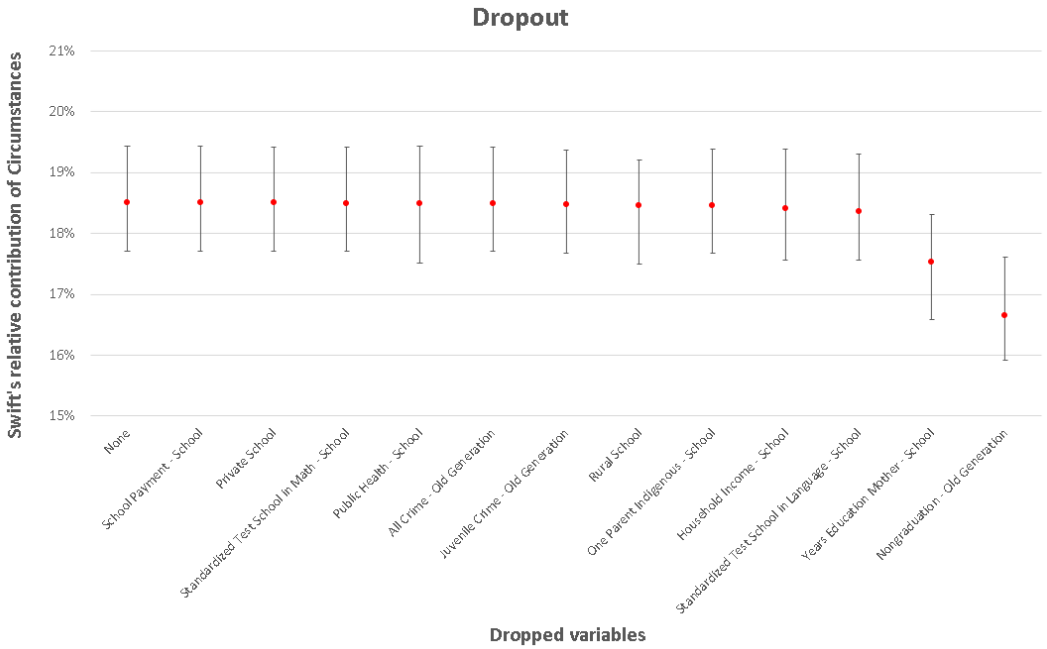
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 22: Effect of dropping one variable on Barry's relative contribution of agency



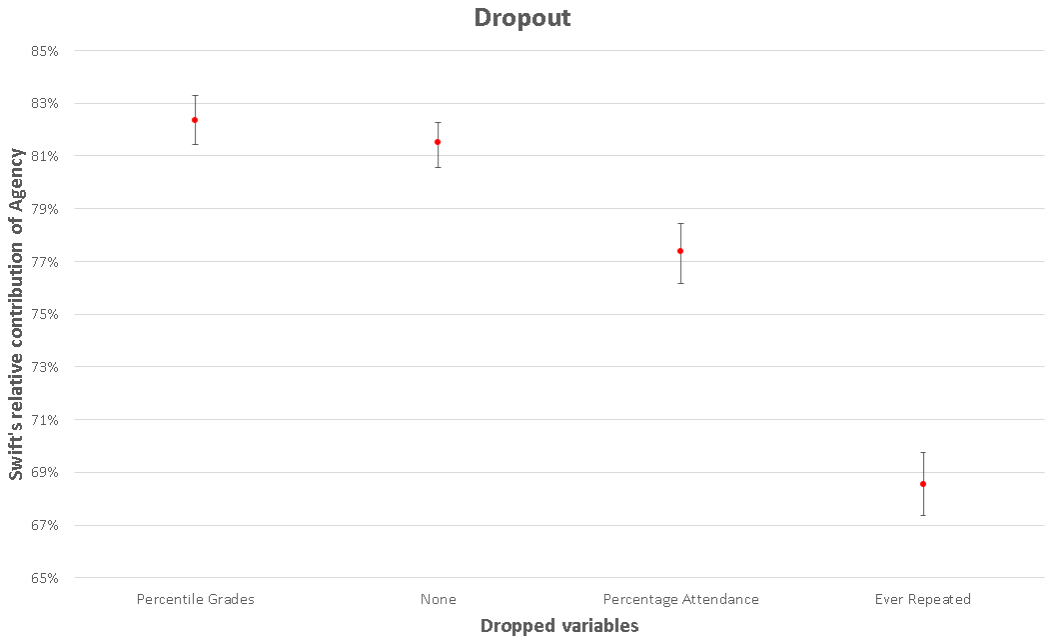
Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 23: Effect of dropping one variable on Swift's relative contribution of circumstances



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_C^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

Figure 24: Effect of dropping one variable on Swift's relative contribution of agency



Notes: This table reports the effects of dropping one variable at a time on $\text{cov}\left(\hat{O}_A^j, \hat{O}^j\right) / \text{cov}\left(\hat{O}^j, \hat{O}^j\right)$

J Proof that dropping one agency variable does not necessarily imply that the relative contribution of agency has to diminish

In order to prove this we will suppose an example where the outcome y is linearly determined as:

$$y = \alpha c_1 + \beta a_1 + \gamma a_2 + \mu \tag{12}$$

where:

$$a_1 = \delta a_2 + \theta c_1 + \epsilon \tag{13}$$

y can be rewritten as:

$$y^* = (\alpha + \beta\theta)c_1 + (\beta\delta + \gamma)a_2 + \beta\epsilon + \mu \tag{14}$$

Now let's assume that c_1, a_2 and μ are independent normally distributed variables with a mean of 0 and a standard deviation of 1. ϵ distributes as a normal variable with a mean of 0 and a standard deviation of 0.1.

If we assume a large sample size so that the estimated OLS coefficients are indeed the true values then the variance of $\hat{y}$ and its decomposition is given by:

$$var(\hat{y}) = E[(\alpha c_1 + \beta a_1 + \gamma a_2)(\alpha c_1 + \beta a_1 + \gamma a_2)] = \alpha^2 + 2\alpha\beta\theta + \beta^2(\delta^2 + \theta^2 + 0.1^2) + 2\beta\gamma\delta + \gamma^2 \tag{15}$$

$$cov(\hat{y}, \hat{y_C}) = E[(\alpha c_1 + \beta a_1 + \gamma a_2)(\alpha c_1)] = \alpha^2 + \alpha\beta\theta \tag{16}$$

$$cov(\hat{y}, \hat{y_A}) = E[(\alpha c_1 + \beta a_1 + \gamma a_2)(\beta a_1 + \gamma a_2)] = \alpha\beta\theta + \beta^2(\delta^2 + \theta^2 + 0.1^2) + 2\beta\gamma\delta + \gamma^2 \tag{17}$$

Now we have to study what would have happened in case we would have ommited a_1 as a regressor. Using Equation 14 we can rewrite the new decomposition of variances:

$$var(\hat{y}^*) = E[((\alpha + \beta\theta)c_1 + (\beta\delta + \gamma)a_2)((\alpha + \beta\theta)c_1 + (\beta\delta + \gamma)a_2)] = (\alpha + \beta\theta)^2 + (\beta\delta + \gamma)^2 \tag{18}$$

$$cov(\hat{y}^*, \hat{y_C}^*) = E[((\alpha + \beta\theta)c_1 + (\beta\delta + \gamma)a_2)((\alpha + \beta\theta)c_1)] = (\alpha + \beta\theta)^2 \tag{19}$$

$$cov(\hat{y}^*, \hat{y_A}^*) = E[((\alpha + \beta\theta)c_1 + (\beta\delta + \gamma)a_2)((\beta\delta + \gamma)a_2)] = (\beta\delta + \gamma)^2 \tag{20}$$

Table 26 summarises the relative contribution of each factor under the real model and under the omission of a_1:

Table 26: Decomposition of inequality

	Relative contribution of circumstances	Relative contribution of agency
y	$\frac{\alpha^2+\alpha\beta\theta}{\alpha^2+2\alpha\beta\theta+\beta^2(\delta^2+\theta^2+0.1^2)+2\beta\gamma\delta+\gamma^2}$	$\frac{\alpha\beta\theta+\beta^2(\delta^2+\theta^2+0.1^2)+2\beta\gamma\delta+\gamma^2}{\alpha^2+2\alpha\beta\theta+\beta^2(\delta^2+\theta^2+0.1^2)+2\beta\gamma\delta+\gamma^2}$
y*	$\frac{(\alpha+\beta\theta)^2}{(\alpha+\beta\theta)^2+(\beta\delta+\gamma)^2}$	$\frac{(\beta\delta+\gamma)^2}{(\alpha+\beta\theta)^2+(\beta\delta+\gamma)^2}$

Notes: This table reports in its first column the cov $(\hat{y}_C, \hat{y})$ / cov $(\hat{y}, \hat{y})$ and on its second column the cov $(\hat{y}_A, \hat{y})$ / cov $(\hat{y}, \hat{y})$. First row corresponds to Equation 12 and second row to 14.

Depending on the values of α, β, γ, and δ, it is possible that the inequality related to agency (relative contribution of agency) is bigger under Equation 14. For instance, if $\alpha = 0.5$, $\beta = 0.2$, $\gamma = 0.8$, $\delta = 0.43$ and $\theta = -0.62$ then the relative contribution of agency with all agency variables is 0.8 and the relative contribution of agency when dropping a_1 is 0.85.