Misaligned incentives and the scale of incarceration in the United States☆

Aurélie Ouss

University of Pennsylvania, United States of America

ARTICLE INFO

ABSTRACT

The incarceration rate has increased substantially in the United States between the 1980s and the 2000s. In this paper, I explore an institutional explanation for this growth: the fact that costs of incarceration are not fully internalized. Typically, prison is paid for at the state level, but county employees (such as judges, prosecutors or probation officers) determine time spent in custody. I exploit a natural experiment that shifted the cost burden of juvenile incarceration from state to counties, keeping overall costs and responsibilities unchanged. This resulted in a stark drop in incarceration, and no increase in arrests, suggesting an over-use of prison when costs are not internalized. The large magnitude of the change suggests that misaligned incentives in criminal justice may be a significant contributor to the current levels of incarceration in the United States.

© 2020 Elsevier B.V. All rights reserved.

1. Introduction

The incarceration rate in the United States is higher than in any other country, with around 700 per 100,000 inhabitants in prison, up from 200 per 100,000 in 1970, and compared to an average of 115 per 100,000 inhabitants in other OECD nations in 2013 (Kearney et al., 2014). In recent years, there have been bi-partisan efforts to reduce the scale of incarceration. For example, in May 2018, a bi-partisan group helped to pass in the House the First Step Act, which aims to reduce time served for individuals demonstrating efforts towards rehabilitation.[1] Understanding mechanisms underlying incarceration decisions can help design policies that would effectively achieve this goal.

There are numerous studies on the drivers of the growth in incarceration in the United States. Most of these highlight either demographic and economic trends affecting offending, or tougher laws aiming to curb high crime rates in the 1980s and 1990s, possibly enhanced by increased public demand for more punitive policies (see Pfaff, 2007 and Raphael and Stoll, 2009 for a review of these theories). The first set of theories focuses on determinants of potential offenders' behaviors; the second set highlights the role of legislative efforts. But once these laws exist, they have to be applied, and there is much less work on how incentives shape choices of individuals involved in punishment decisions.[2] In this paper, I explore one possible determinant of law enforcement practices: misaligned incentives across levels of government, which could be a factor that contributes to over-incarceration.

The United States has a piecemeal criminal justice system. In most jurisdictions, prisons are paid for by states, but sentences depend on decisions made by county-elected or appointed prosecutors and judges, and by municipal police.[3] As a result, counties only bear a fraction of the total cost of the prison sentences that they assign. In other words, incarceration is largely subsidized by the state, leading to what Zimring and Hawkins (1992) have referred to as a "correctional free lunch." Furthermore, crime-reduction instruments other than prison, such as policing, probation or drug clinics, are often locally provided and financed. It is an empirical question whether and how these misaligned incentives affect sanctions. If punishments are only determined relative to the

---

[1] https://www.congress.gov/bill/115th-congress/house-bill/5682/text.

---

[2] Note that there is a large body of research on biases in criminal justice decisions. However, these biases are generally presented as errors or deviations, rather than responses to incentives or features of criminal justice.

[3] See part VIII of Rottman et al. (2000) for a description of the court structures in US states. All states but Alaska, Connecticut, Delaware, Hawaii, Rhode Island and Vermont have two levels of incarceration: local jails, which in most cases are meant to house pretrial detainees and people convicted with sentences of less than one year; and state prisons. Roughly 60% of incarcerated people are in state prisons; 30% in local jails (more than half of which are awaiting trial); and 10% are in federal prisons (Sawyer and Wagner, 2019).

facts of the cases, or if judicial actors are not aware of or do not consider costs, then the financing level of prisons would not influence incarceration decisions. However, in other domains than criminal justice – such as healthcare provision, or unemployment benefits – there is evidence that misaligned incentives leads to inefficiencies (Autor and Duggan, 2003; Zhuravskaya, 2000). If demand for incarceration is price-elastic, the cost division of incarceration is expected to impact sentencing. This mechanism has not been directly investigated in the context of criminal justice.

In this paper, I provide evidence that incarceration is lower when costs are internalized, and that misaligned incentives may be playing an important role in the scale of incarceration in the United States. I exploit a natural experiment that modified the financial structure of juvenile corrections: the 1996 California Juvenile Justice Realignment. Before 1996, juvenile incarceration was mainly paid for by the state. The law shifted a larger share of the cost burden onto counties. Costs stayed constant, and the only change was in who paid for incarceration of juveniles. I identify the effect of the change in payment structures on sentencing using as my main empirical strategy a regression discontinuity design in time, focusing on the time window around the change in payment structures. Using data from the National Corrections Reporting Program, I find that once the law was passed, the number of juveniles sent to state facilities dropped by 40% to 60%. Using juvenile court records from two counties (Santa Clara and Orange County), I find that this change was driven mainly by an increase in the number of cases that were dismissed, rather than a substitution for other modes of incarceration.

Why might decision-makers be sensitive to costs? While this paper does not identify precise mechanisms, there are several possible channels. First, many criminal justice actors, such as judges or prosecutors, are elected by county voters. These voters might be sensitive to local criminal justice expenditures. And while other employees, such as probation officers, are typically not elected, the commissioners on county boards are, and may be adjusting priorities based on expenditures. It is also possible that drawing attention to costs might be sufficient to encourage these actors to consider less expensive alternatives.

I then investigate the cost-benefit tradeoff of this cost internalization, by asking how this drop in incarceration affected crime. This relation is ambiguous in theory. Public safety is one of the canonical examples of a public good. Pooling incarceration costs might be welfare-increasing if incarceration has positive externalities across counties, for example if people go to less punitive counties to commit crimes. In that case, incapacitation would decrease crime in all counties. Conversely, there could be a free-riding problem, for example if incarceration is a substitute for locally-paid tools to promote public safety. Cost-sharing might then lead to over-incarceration, all the more so if punishment choices do not fully capture the longer run costs of incarceration relative to other sanctions.[4] The relative magnitude of these effects would help determine the right financing structures for incarceration. I examine changes in crimes averted at the time of the cost internalization, using UCR juvenile arrest data. I find that the drop in juvenile incarceration due to the shift in cost structures was not mirrored by a change in juvenile arrests. These results have limits, particularly as it may take time for information about these changes in practices to translate into different offending patterns. But this analysis is suggestive that the levels of incarceration under the "pooled cost" regime did not provide extra safety.

This paper offers several contributions to the existing literature. First, I broaden the study of misaligned incentives in the provision of public goods to a new and important domain: criminal justice provision. My findings suggest a possible policy path to reduce the scope of incarceration in the United States, one which would establish more financial accountability. Recent efforts to reduce the prison population have focused on approaches like diversion, large-scale releases, changes in the use of mandatory minima, or not charging some offenses. My findings highlight the importance of incentive structures, even conditional on existing laws. If these results in juvenile justice replicate in the adult context, cost internalization could offer a path to reduce incarceration without increasing crime.

From a theoretical perspective, this paper shows that financing structures matter for sentencing decisions. This is not a factor typically considered as a determinant for punishment. For example, Posner (2008) explores many motives beyond the facts of the case at hand that can influence judges, such as legal pragmatism or political motivations, but does not examine the cost of sentencing options. Lastly, this evidence encourages more careful consideration of the conventional assumption in economics of crime since Gary Becker's seminal paper in 1968, that criminal justice system actors behave like social planners, choosing punishment levels to equate the marginal benefits and costs from society's perspective. A substantial theoretical and empirical literature asks how different aspects of criminal justice (longer sentences, more police, prison conditions) and outside options (employment, education) affect crime rates. However, there is less work on the determinants of the supply side – or on how punishments are chosen, conditional on underlying criminal and legislative environments.[5] This paper shows the theoretical and policy significance of these channels.

The rest of the paper is organized as follows. Section 2 discusses mechanisms through which cost structures might affect levels of incarceration. Section 3 provides an overview of the organization of juvenile justice in California and describes the 1996 Juvenile Justice Realignment. Sections 4 to 6 present results on incarceration, court outcomes and arrests. Section 7 discusses the policy implications of these results, and Section 8 concludes.

2. Financing structures and criminal justice organization

In the United States, in most states, criminal justice is fragmented vertically across various municipal, county and state governments, which are only loosely coordinated (Bierschbach and Bibas, 2017). States bear the costs of imprisonment, while sentencing decisions are made by county prosecutors and judges. Other legal responses – such as jail stays, house arrests, rehabilitation programs, halfway houses, and probation – are typically paid for by counties or municipalities. Therefore, the marginal cost of incarceration for a county is typically close to zero, but positive for more lenient sentences.[6]

There has been little research on how cost structures affect law enforcement, either theoretically or empirically. Empirically, extensive work considers the cost-effectiveness of incarceration and policing (see for example Abrams, 2012; Chalfin and McCrary, 2017; Lee and McCrary, 2017). However, these papers do not explore whether payment structures impact the supply for different crime-control levers.[7] Becker (1968) discusses tradeoffs of using different law enforcement strategies, but considers a single decision-maker. Law enforcement choices are meant to equalize overall (social) costs and benefits, regardless of the financing method. By contrast, in a series of lab experiments, Ouss and Peysakhovich (2015) find that cost structure does matter for punishment provisions. Individuals choose levels of punishment that exceed the Beckerian socially optimal levels when they bear only a

---

[4] For example, Aizer and Doyle (2015) find long-run negative impacts of juvenile incarceration, which increases likelihood of violent crimes and dropout from school. For adults, Mueller-Smith (2015) finds negative effects of incarceration on both recidivism and labor market outcomes.

[5] Aside from the numerous studies on biases in judicial decision-making, which do not consider how incentives shape decisions.

[6] This is not the case across the world, or even in other common law countries. For example, Lacey and Soskice (2017) show that several other Anglo-Saxon countries have a more centralized criminal justice organization.

[7] One notable exception is McCrary (2010), which highlights the importance of considering the *dynamic* (or intertemporal) nature of the government's problem of how to allocate criminal justice expenditures, and how this may affect policy choices. For example, hiring more police officers generates immediate costs whereas increasing sentence lengths will generate costs in the future. Policies like the Three Strike Laws are thus paid for several years in the future.

fraction of overall costs: punishments are higher when publicly instead of privately paid for, with no less offending. The current paper asks if these lab findings hold true in the field, and at the institutional (rather than individual) level.

The possible over-demand of public goods for personal/electoral benefits (Weingast et al., 1981; Baqir, 2002) and the over-use of subsidized goods has been conceptualized and documented in other contexts than criminal justice. For example, Zhuravskaya (2000) shows the importance of fiscal incentives for local governments to provide efficient levels of public goods. Local fiscal incentives help promote efficiency of public spending in healthcare or education provision. In the US context, the most commonly described disconnects are between federal and state levels of taxation and expenditures (Dahlby, 1996; Baicker, 2001; Keen and Kotsogiannis, 2002; Baicker et al., 2012). Several papers document an over-use of federally-funded programs relative to state-funded programs which are partial substitutes, such as unemployment insurance and disability insurance (Autor and Duggan, 2003). Similar substitutions away from lower-priced alternatives to incarceration could exist for punishment. For example, electronic monitoring is less expensive than incarceration, and DiTella and Schargrodsky (2013) also find that it reduces recidivism rates. However, it may be underutilized if more expensive from the punisher's perspective.

Turning to public safety, there could be horizontal (spatial) spillovers in criminal justice choices. Glaeser (2013) highlights concerns with mobility at the local level: all else equal, people might seek to move to cities or counties in which incarceration rates are higher if these are safer. Conversely, if people move across counties to commit crimes, failure to incapacitate through incarceration in one county could increase crime in neighboring counties, generating a free-rider problem regarding safety provision (Acemoglu et al., 2015). This type of argument was behind "Aimee's law" passed by Congress in 2000: states are held financially accountable for violent crimes committed elsewhere by violent offenders who received an early release. This is a way for states to internalize horizontal externalities due to offending outside their jurisdiction. Decentralization could lead to excessive law enforcement if crimes are committed where law enforcement is lowest (Teichman, 2004), and a more centralized mode of provision might help mitigate this. In other domains, studies of spatial interactions at the state (Figlio et al., 1999; Baicker, 2005) or local levels (Case et al., 1993), find spatial correlations between taxation and the provision of public goods.

A few papers explore the link between funding structures and the provision of criminal justice. Taking a historical perspective, Ball (2014) and Ball (2016) document the funding considerations behind the organization of criminal justice in the United States, and Ball (2011) interprets recent judicial reforms in California with a fiscal responsibility lense. Baicker and Jacobson (2007) investigate the role of direct financial incentives in police work, and find that asset forfeiture laws changed both policing practices and allocation of law enforcement budgets. A handful of papers have examined the principal-agent problem in law enforcement – for example, McAdams et al. (2015) examine its impact on selection to be a law enforcement agent, and resulting deviation from society's punishment objectives. Closest to my paper, Ater et al. (2014) explore the effects of a change in arrest processing in Israel: the responsibility of housing people pretrial was transferred from the local police to the prison authority. As a result, there was a sharp increase in arrests, which is consistent with imperfect consideration of total costs of crime reduction when making arrest decisions. However, in this context, there were two concurrent changes: in the cost structure, but also in the responsibility of pretrial detention. The authors highlight the role of the organizational changes as driving their results, rather than the change in the cost structure. Police evaluations and wages could depend on number of arrests, which would increase when costs are no longer internalized. My paper examines the sole effect of shifts in cost structures, without any change in responsibilities. This paper contributes more generally to the public economics literature: what happens when costs are shifted, but no other organizational component is changed in a public sector branch?

3. Institutional and policy context

3.1. Organization of juvenile justice in California

In California, cities, counties and the state all play roles in safety provision. Policing is mainly organized at the municipal and county levels, with city police departments and county sheriff offices.[8] For instance, probation and prosecution take place at the county level: California has a superior court for each one of its 58 counties. Judges are elected every six years in nonpartisan elections, and each court has an exclusive juvenile jurisdiction. District attorneys and public defenders are also attached to a county court. Corrections in California have both local and state components. Counties provide both jails and community supervision, and the state runs prisons. This also holds true for juveniles[9]: state juvenile facilities are run by the California Youth Authority (CYA), which was renamed the Department of Juvenile Justice in 2005. In February 1996 there were 9974 youths in CYA facilities.

Fig. 1 presents a simplified flowchart of outcomes after a juvenile is arrested for a felony or a misdemeanor.[10] When a youth is arrested, their case can be diverted at several points. First, a police officer may choose to release the youth right away. Alternatively, they can refer a youth to juvenile probation. Juvenile probation officers play an important role to determine a case's trajectory: they assess a youth's risks and needs and make a recommendation regarding further processing (Macallair, 1994). Importantly for this research, they are a court agency, and so operate and are funded at the county level. Probation officers can send a case to juvenile court, or dismiss or divert it (it is then not reviewed in juvenile court). At that stage, a judge can again decide to dismiss a case, or make a youth a ward of the court. There are two main points in the process when a case can be referred to criminal (adult) court: after it is referred to probation, during the probation intake screening; and during a pretrial hearing in juvenile court. This determination is based on several factors, such as the current charges, a youth's criminal record, or their rehabilitation potential. More serious cases go to criminal court instead of juvenile court.[11]

Many juvenile cases are dropped in preliminary phases. For example, in 2005, among youth who were arrested, 13% were released, 60% were referred to probation but their cases were dismissed or diverted, before or after a juvenile court hearing. The remaining 28% of youth arrested were made wards of the court.[12] In general, juvenile justice uses diversion much more frequently than adult justice.

3.2. 1996 Juvenile Realignment

In February 1995, California Senator Rob Hurtt introduced senate bill 681 (henceforth SB 681) to change the financing structure of California's juvenile justice. At that time, counties paid a flat fee of $25 a month per juvenile incarcerated in a CYA facility. SB 681 established a sliding scale, depending on the type of offense leading to incarceration. The base rate was raised from $25 to $150, which represents 5% of the per capita institutional cost of the CYA. Counties had to pay this fee for offenses of categories 1–3 (category 1 being the most serious, and category 7 the least serious),[13] such as murder or armed robbery.

---

[8] State police represents a small share of overall law enforcement. In California, the Highway Patrol represents about 6% of employees in state and local law enforcement agencies (Reaves, 2007).

[9] The age of majority is 18 years old in California.

[10] For clarity, this figure presents the most common outcomes.

[11] For example, in 1995, among CYA admissions, the most common lead charges for youth sentenced through criminal court were aggravated robbery (22%), aggravated assault (20%) and unarmed robbery (12%). The most common offenses for youth sentenced through juvenile court in Santa Clara and Orange County were assault (22%), probation violations (14%), escaping from a facility (14%), and robbery (13%).

[12] Figures from chapter 5 of Hill (2007).

[13] The full classification of offenses can be found title 15, division 4.5, chapter 2, article 3 of the California Code of Regulations.
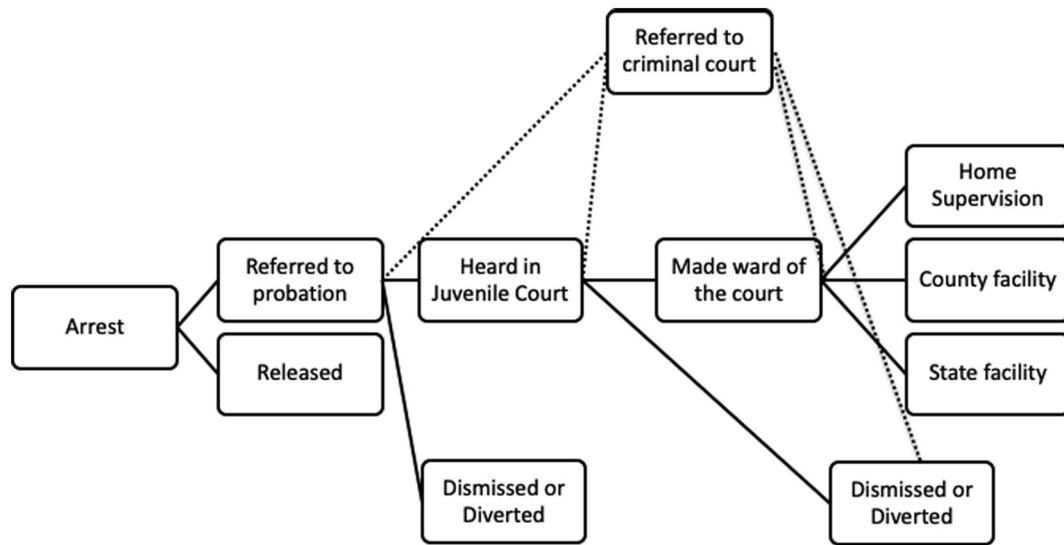
Fig. 1. Most common possible outcomes after a juvenile arrest in California. Note: This flowchart represents a simplified version of what can happen after a juvenile is arrested, focusing on the most likely outcomes. "State facilities" refer to juvenile facilities operated, during the study period, by the California Youth Authority (CYA), and later by the California Department of Juvenile Justice. The two points at which a case can be referred to criminal (adult) court is after it is referred to probation, during the probation intake screening; and during a pretrial hearing in juvenile court. The possible outcomes from criminal court are the same as from juvenile court.

For offenses of categories 5 to 7, fees were determined according to a sliding scale. Specifically, counties had to pay the following fees per month of incarceration:

$1300 (50% of the per capita institutional cost of the CYA) for level 5 offenses, which include residential robbery, burglary, or assault with deadly weapon.

$1950 (75% of the per capita institutional cost of the CYA) for level 6 offenses, which include second degree burglary and car theft.

$2600 (100% of the per capita institutional cost of the CYA) for level 7 offenses, which include technical parole violation and misdemeanors.

One way to think about this change in laws is that it shifted from a model in which counties were choosing the "tax rate" (i.e. the total amount that *all* counties would pay for incarceration) to choosing their own contribution to prison. The idea behind this bill was to reduce the over-reliance by counties on the Youth Authority for less serious juvenile offenders, and to encourage counties to create a fuller spectrum of locally available programs that would meet the specific needs of juvenile offenders. The bill was adopted in its final state in August 1996. The increase in costs applied to all juveniles in CYA custody after January 1st, 1997, including those sentenced before that date. So for example, if a youth was sent to the CYA on September 1, 1996, for a 12 month sentence, the county of origin would pay the "low costs" for 4 months (September to December 1996); and the "high cost" for 8 months (January and August 1997). The cost increases could therefore affect sentences pronounced before January 1st, 1997.

This bill was not intended to reduce punitiveness. This time period was generally characterized by an increased punitiveness in California. For example, in March 1994, Proposition 184 (known as the "Three Strikes" initiative) became effective, and in 2000, Proposition 21 made it easier to prosecute juveniles as adults for gang-related activities and violent or serious crimes.[14] There were no other notable changes in the organization of juvenile justice in the 1995–2000 period of focus.

In later years, there were more systematic attempts to reform juvenile justice in California, which culminated in the 2007 Juvenile Justice Realignment.[15] The Juvenile Justice Crime Prevention Act of 2000 explicitly provided counties with resources for counties to expand local confinement options and prevention measures for juveniles. Later, the youth advocates who spearheaded the 2007 reform specifically pushed for more local initiatives, which they believed would be more effective towards rehabilitating juvenile offenders. As part of the 2007 bill, a "Youthful Offender Block Grant" provided funding to counties for rehabilitation and diversion options. However, the 1996 Juvenile Realignment did not provide specific measures aimed at increasing funding for counties to develop local alternatives to incarceration.

The adoption of this legislation offers a natural experiment: the law discontinuously changed the price that counties would have to pay to incarcerate juveniles. However, in order to isolate the effect of cost structures on sentencing decisions using regression discontinuity in time, it is important to make sure that there weren't other changes in policy that could affect sentencing. As discussed in the previous paragraph, there were other changes in criminal legislation, but in prior year. Later juvenile justice reforms also included funding for local alternatives to incarceration, but this was not the case in 1996 – the only change at that time was in the payment structure that counties faced for their juveniles. Since there were no other changes in juvenile justice or law enforcement at this date, discontinuous change in juvenile incarceration or offending around this threshold can be attributed to the change in cost structures.

4. Cost structure and juvenile incarceration

If decision-makers respond to cost, one would expect to see is a drop in CYA admissions when their financial burden increases. In this section, I present evidence using data from the National Corrections Reporting Program (NCRP) that the policy indeed resulted in a large decrease in commitments to CYA facilities.

4.1. NCRP data

The NCRP part 1 compiles administrative data on all admissions to state and federal adult facilities, and on admissions to the California Youth Authority from criminal courts. The Bureau of Justice Statistics collects this data each year. Covariates include date of birth, sentence length, offense, incarceration date, and some information on prior criminal history. With this data, I can track changes in the number and

---

[14] http://www.lao.ca.gov/ballot/2000/21_03_2000.html.

[15] Chapters 24–26 of Macallair (2015) provide a review of juvenile justice reforms in California from the 1990s to the 2000s. This paragraph draws from this overview.
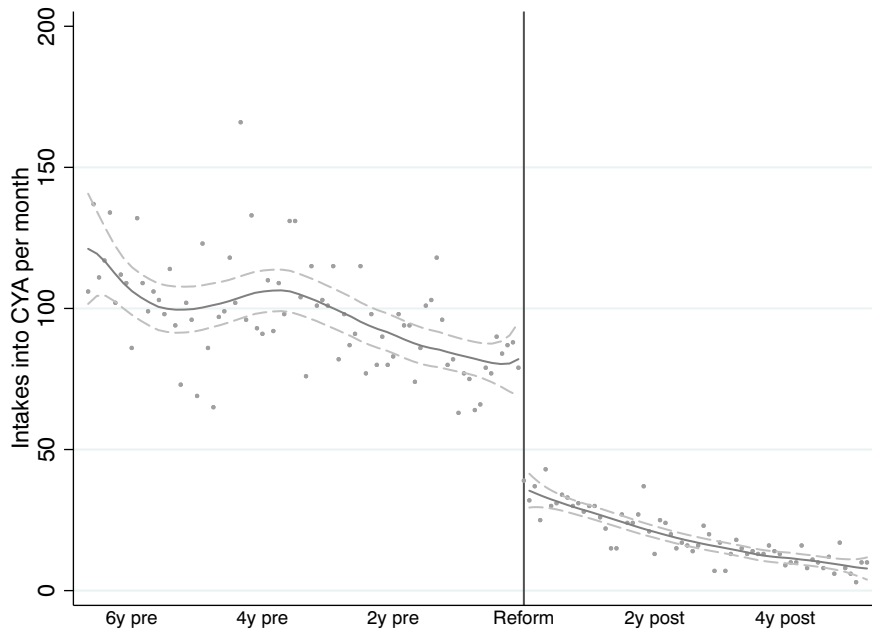
Fig. 2. Commitments to California Youth Authority facilities. Note: This figure presents a scatter plot of the monthly averages for intakes into California Youth Authority (CYA) facilities, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval. Data source: NCRP.

composition of inmates in California, both in adult and juvenile state facilities.

There are a few caveats to keep in mind when analyzing the NCRP data. First, Pfaff (2011) and Neal and Rick (2014) raise concerns about quality of the data in some states. In the appendixes to both papers, the authors proceed to internal and external consistency checks on multiple variables, in terms of overall flows, and problematic variables such as age. They find that the California data presents no major inconsistencies. A second limitation is that the NCRP data contains admissions to CYA from criminal court, but not from juvenile court. Turning back to the flowchart of Fig. 1, this could happen after referral to probation, or during a pretrial hearing in juvenile court. As explained in Section 3.1, the determination of whether a case will go to criminal court is based on several factors, but these are generally more serious cases, in terms of the current charge, past offending, or perceived chances of rehabilitation. The results presented using the NCRP data should be interpreted as holding for more serious cases.

4.2. Drop in commitments to CYA

I first present graphical evidence on the changes in commitments to CYA in Fig. 2. Each dot represents the monthly counts number of CYA admissions. The line represents a kernel-weighted local polynomial regression of the number of juveniles entering CYA on months, before and after the August 1996 cutoff. The vertical line is placed at August 1996, which was the date of adoption of SB 681. This figure illustrates a stark drop in the number of juvenile commitments at this date, providing some first suggestive evidence that decision-makers did in fact respond to costs. This figure also shows that there was a decrease in intakes when the law was adopted in August 1996, and not in January 1997, when the cost increase would be effective. This is consistent with costs mattering, since the increases apply to all juvenile sentences still running in January 1997, even if they were sentenced earlier. The median sentence length in 1995 was 48 months; most intakes after August 1996 would therefore entail costs in January 1997.

To estimate the magnitude of the drop in juvenile incarceration, I use a regression discontinuity design in time (RDD). Note that an RDD in time does not present the exact same features as more classic regression discontinuities, as discussed by Hausman and Rapson (2017). For example, since time is the running variable, it does not make sense to run a density test for the running variable. In the economics of crime literature, Doleac and Sanders (2015) and Hansen et al. (2017) have recently used similar RDD in time approaches.

I first estimate monthly equations of the following form:

$$ \tag{1} $$

where CYA_m is the number of commitments to the CYA in month m; $Post_m$ is a dummy equal to 1 for events after the adoption of SB 681; and $f(Date_m)$ are linear and polynomial controls for monthly time trends. β_1 is the main coefficient of interest. For a second set of analyses, I follow Calonico et al. (2014), using local-linear functions to obtain bias-corrected point estimates. As specified in Section 3.2, while there were several changes in juvenile justice in the 1990s in California, the Juvenile Justice Realignment was the only change in 1996. Since nothing else changed at this time, any change in incarceration would be attributable to the change in cost structure alone.

The main results are presented in Table 1. The first three columns present the change in the number of youth being admitted into CYA, at the monthly level. Column 1 includes linear month controls, column 2 includes second-order polynomials; and column 3 uses bandwidth and standard error calculations from Calonico et al. (2014). In all specifications, there is a discontinuous drop in the number of juveniles being admitted after the change in cost regimes: depending on the specification, the RDD estimates indicate that the change in costs resulted in a 38–63% drop in number of youth being incarcerated. I then look at the probability of being incarcerated in a CYA facility instead of an adult facility for youth under the age of 25 upon entry. I regress a dummy that takes the value 1 if a person is incarcerated in a CYA facility, and 0 if they are incarcerated in an adult prison. Bandwidth and standard error calculations follow Calonico et al. (2014). I include the following individual-level controls: age at incarceration, gender, race, ethnicity, offense, and number of days already served in prison and in jail (column 4). The order of magnitude is similar to that of the change in number of admissions into CYA: I find a 42% decrease in the probability of being sent to CYA. This first set of results suggests that decision-makers do respond to changes in cost structures.

Table 1

Effects of the Juvenile Justice Realignment on monthly intakes into CYA facilities.

| | Admissions to CYA | | | Probability of CYA admission | Adult admissions | | Difference in differences |
| | | | | | 19yo | <18yo | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
After August 1996	−46.1 ***	−36.7 ***	−50.9 ***	−0.0192 ***	7.9	−3.4	20.4 *
	(4.6)	(6.0)	(4.3)	(0.002)	(12.5)	(2.8)	(7.9)
Juvenile							−60.7 ***
							(5.1)
Juvenile*After August 1996							−64.1 ***
							(9.0)
Monthly controls							
Linear	X	X					X
Quadratic, Post*Linear, Post*Quadratic		X					
Linear*Juvenile							X
Person-level controls				X			
Mean Dep Var	94	94	79	0.046	152	8	94
Observations	121	121	144	258,234	144	144	242
Effective RD obs.			31	77,935	33	23	
BW for estimation			16	654	17	11	
BW for bias			28	994	24	22	

This table presents regression discontinuity design estimates (columns 1–6) and difference-in-difference estimates (column 7) of the effect of the Juvenile Justice Realignment on CYA admissions. The outcome in columns 1–3 is monthly admissions into a CYA facility. Columns 1 and 2 estimate Eq. (1). Column 1 includes a linear time trend; column 2 includes linear and quadratic time trends, interacted with a dummy for being after the Juvenile Justice Realignment policy. Estimations in columns 3–6 follow Calonico et al. (2014). In column 4, the outcome is the probability of being admitted into a CYA facility for juveniles under the age of 25 years old, and the estimation includes controls for age at incarceration, gender, race, ethnicity, offense, and number of days already served in prison and in jail. In columns 5 and 6, the outcomes are, respectively, the number of 19-year-olds and the number of under 18-year-olds admitted in adult prisons. Column 7 presents difference-in-differences estimates, where the comparison group is 19-year-olds admitted in adult prisons. This estimation includes differential linear time trends. 'Mean Dep Var' is the mean of the dependent variable before the Juvenile Justice Realignment. Data source: NCRP. Standard errors in parentheses. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

Before moving to mechanisms, recall that the NCRP data has information for a subset of intakes to CYA facilities: juveniles who were committed to CYA through a criminal court. How indicative of the overall effects of this measure is this subgroup? Using yearly reports from the Department of Youth Authority, I examine changes in the number of youth admitted to CYA from criminal courts versus juvenile courts. This is presented in Fig. 3.[16] Reassuringly, this figure confirms results using the NCRP data: there were fewer youth admitted from criminal court (dashed line). But there was also a large drop in CYA admissions from juvenile court (dotted line). The full line presents the change in CYA admissions overall. Between 1995 and 1997, there were 1543 less juvenile admissions, with a larger drop (roughly 920) from juvenile courts. Since more CYA admissions come from juvenile court, the percent change was smaller for commitments from juvenile court. So, Fig. 3 suggests that the drop in CYA was not unique to adult courts. More averted admissions came from juvenile courts; but the percent-change estimating using the NCRP data may be larger than for all juvenile admissions.

4.3. No change in adult incarceration

As described in Section 3.2, there were no other changes in criminal justice policies. The NCRP data offers the possibility for a placebo test: adult admissions to prison in California. Policing and the economic or social contexts – all of which are determinants of crime and incarceration – were the same for juveniles and young adults. However, the cost structure of incarceration only changed for juveniles and not for adults at this date. A simultaneous discontinuous change in adult incarceration would raise concerns about potential confounding changes in the California judicial or relevant social context around this period of time.

Fig. 4 shows the intakes into adult California prisons: there was no discontinuous change as there was for juveniles, presented in Fig. 2.

However, this figure also illustrates that trends in juveniles and adult incarceration were different over that period of time: adult incarceration was increasing during in the 1990s, while juvenile incarceration was slightly decreasing. Furthermore, incarceration numbers and rates are very different for adults and juveniles. Focusing on younger adults helps identify a more comparable group. Fig. 5 presents trends in intakes into CYA, and into adult facilities for young adults, broken down by age group: less than 18, 18, or 19 years old. Trends are closer before the change in law for these age groups. This is likely driven by the fact that one of the contributors to the increase in the California prison population in the 1990's were mandatory minima for offenses subject to the "three strikes" laws, which in general applied to older people, who had accumulated longer criminal records (Helland and Tabarrok, 2007).

The outcome in column 5 of Table 1 is the number of young adults (aged 19 years old) admitted into California prisons. This serves as a placebo group, since adult incarceration was not subject to a change in cost structures. There is no change for the placebo group of young adults. The absence of discontinuous changes in trends for adults around this date confirms the idea that the change for juveniles was not due to a more general change in the organization of incarceration in California. Column 7 of Table 1 presents difference-in-difference estimates, using young adults (aged 19 years old) admitted into California prisons as a control group. This regression includes differential linear time trends. The results are similar to the RDD estimates: admissions to CYA, relative to admissions of 19-year-olds, declined by 68% after the Juvenile Justice Realignment. However, the point estimates from the differences-in-differences estimation are to be taken with caution, since trends in admissions into CYA and into adult facilities for 19-year-olds were not exactly the same leading up to the policy change. Indeed, Fig. 6 presents an event-study style coefficient plot, where a dummy for juvenile admission is interacted with lead/lag dummy variables that each correspond to one year of admissions: four before and five after the policy. This figure shows that there was a divergence in admission trends in the year prior to the reform. The gap after the policy change is bigger, but we cannot rule out differential trends before.

Taken together, the results in this section show a clear drop in the use of CYA once costs were internalized, suggesting that criminal justice actors respond to cost considerations.
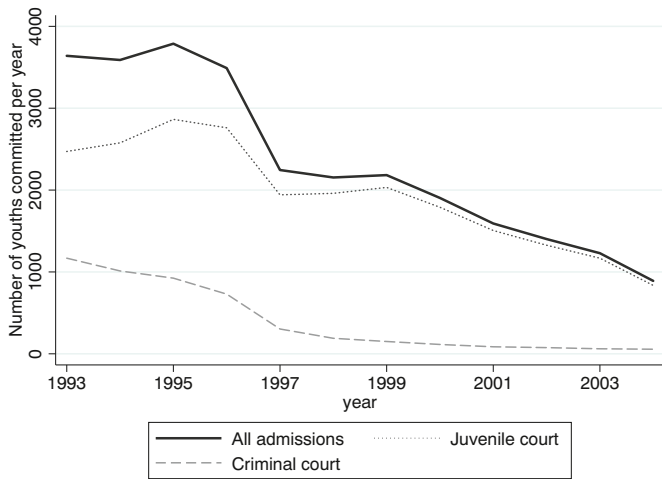
---

[16] Author's calculations, using yearly official statistics from the California Department of Corrections and Rehabilitation http://www.cdcr.ca.gov/reports_research/docs/research/12YR-2005.pdf.

Fig. 3. Intakes into CYA, by court of commitment. Note: This figure presents yearly intakes into CYA for commitments from juvenile court, from criminal court, and overall. Data source: yearly data from the State of California Department of the Youth Authority report.

5. Costs internalization and substitution across sanctions

To understand the policy implications of the change in cost structures, it is important to determine what substitutions happened as a result of the drop in intakes into CYA. This can help understand the net effects of the change in cost structures. In this section, I explore several mechanisms.

5.1. Substitution to adult prisons

I first ask whether young adults and minors were more likely to be incarcerated in adult facilities. An increase in the number of youth incarcerated in adult facilities would indicate a displacement across prison types in response to the price change, without an actual change in juvenile incarceration.

Fig. 5 shows the evolution of young adults entering in California adult prisons and CYA. There is no discontinuous change in the number of 18 year-olds or 19 year-olds entering adult facilities. There appears to be a slight increase in the number of individuals less than 18 years old entering adult facilities (dotted line); there could have been some substitution from juvenile to adult state facilities. Such a substitution could be interpreted an indicator that different punishments may be at least partial substitutes. Internalizing costs of punishments could lead to more use of *other* subsidized options.

Note however that this increase is much smaller than the decrease in number of individuals entering the CYA: this does not seem to be the leading substitution mechanism. Furthermore, the timing of the increase was not immediate. To consider this substitution pattern, column 6 of Table 1 looks at the change in number of juveniles (youth who were younger than 18 at admission) incarcerated in adult prison. The regression coefficient is negative, suggesting that the increase in admissions to adult facilities shown in Fig. 5 was after the relevant time-window. It is possible that this increase was caused by other policy changes. Even though this increase in juveniles incarcerated with adults is later (and so may not be a result of this cost internalization) and appears to be small, it might have had on average negative effects. There are many descriptive studies about differences in experiences between juvenile and adult incarceration (see for example Austin et al., 2000 for a review of this work), but, to our knowledge, there is no research on the causal impact on future outcomes of incarcerating youth in adult versus juvenile facilities. However, Chen and Shapiro (2007) find that harsher living conditions are likely to increase recidivism – so, youth who served some time in adult prisons might have had worse long-term outcomes. The effect of this transfer could be investigated in future research, using adult data.

5.2. Mechanisms: juvenile court outcomes in Santa Clara and Orange County

So far, using NCRP data, I was able to identify change in intakes to CYA from criminal court and to adult prisons. These first results leave many open questions. First, juveniles can be incarcerated in different
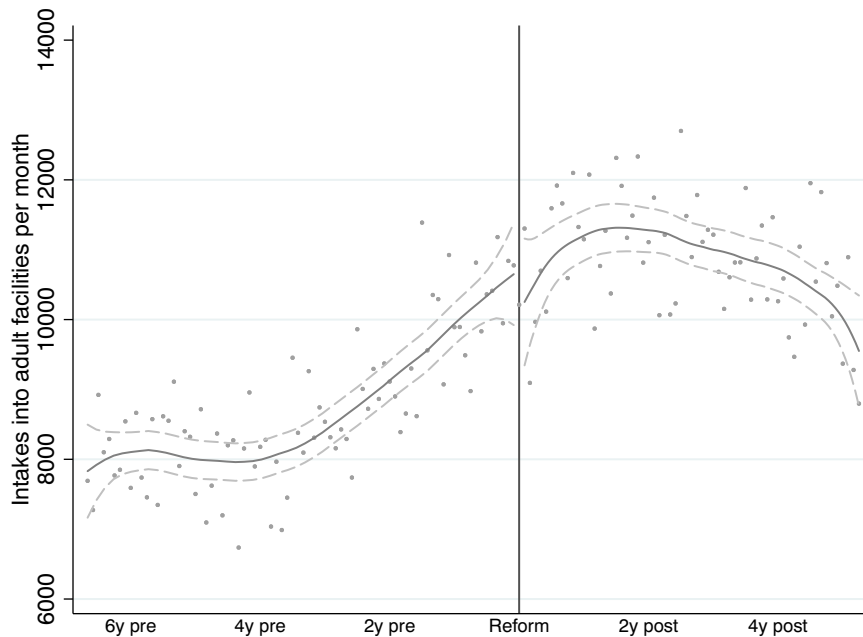

Fig. 4. Commitments to adult state prisons in California. Note: This figure presents a scatter plot of the monthly averages for intakes into the California adult facilities, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval. Data source: NCRP.
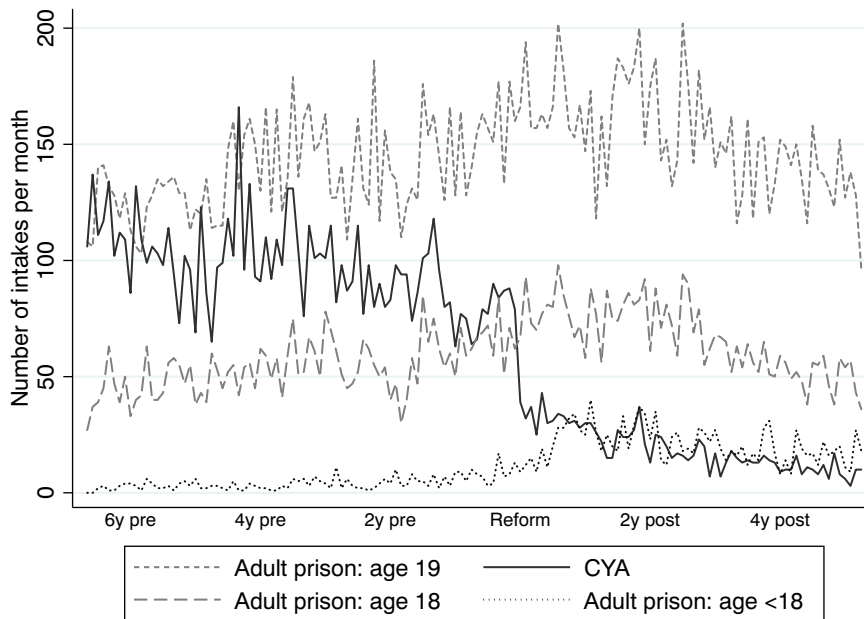
Fig. 5. Monthly commitments into California state prisons, by age at intake and prison type (CYA or adult facility). Note: This figure presents monthly intakes into California adult state prisons, for ages 19, 18, or less than 18 at intakes; and commitments to CYA facilities.
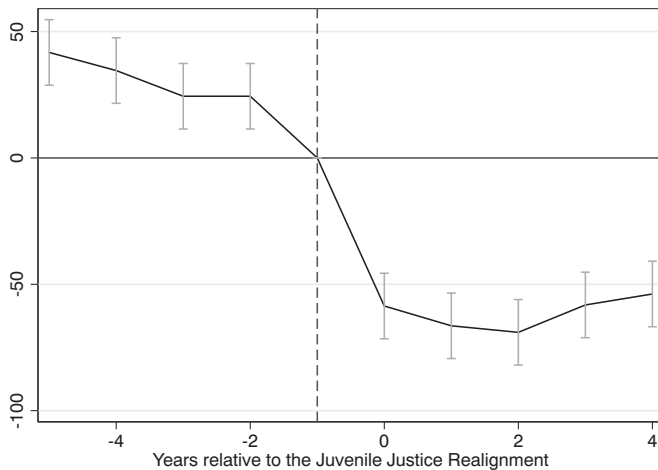Data Source: NCRP.

Fig. 6. Difference-in-differences estimates with leads and lags for how the Juvenile Justice Realignment affected admissions to CYA vs. 19-year-old admissions to adult facilities. Note: This figure plots the difference-in-difference coefficients obtained from estimating a single equation with yearly leads and lags, with the bars representing 95% confidence interval of the coefficient estimate. Specifically, it plots regression coefficients from the following equation: . The treatment group is CYA admissions and the control group is admissions to adult facilities of 19-year-old. The vertical dashed line indicates the year prior to 1996, which is left out as the comparison category.
Data Source: NCRP.

types of facilities: state facilities and local facilities. The drop in incarceration at the state level could have been offset by an equal increase in the number of juveniles in local facilities, leaving incarceration unchanged. From a policy implication standpoint, it is important to learn about this to understand what the counterfactual to state incarceration is for youth who are processed in the "high cost of CYA" regime. Second, these "end point" results make it difficult to understand mechanisms, and so whether these results might replicate in the adult setting as well. In the juvenile setting, different agencies are responsible for different decision points. For example, police officers make the initial decision of dropping a case or of referring it to probation, while probation officers

are responsible for early diversion decisions, and judges choose sentences in juvenile court. Exploring where the substitution took place can help understand the mechanisms through which the cost internalization affected juvenile justice outcomes, and what actors seem to respond to costs.

To shed some light on these questions, I worked with the National Juveniles Court Data Archive (NJCDA), to obtain data on juvenile court records from 1992 to 2010 for two counties: Orange County and Santa Clara. In California, court data is generally collected and stored at the county level.[17] The NJCDA reached out to all California counties for data prior to 1996, and Orange County and Santa Clara were the only two counties that had reliable court data that the NJCDA could easily share. Both are large counties: third and sixth largest respectively in terms of overall population, and fourth and fifth in terms of juvenile populations.[18] They are both among the ten wealthiest counties in the state, but close to state averages in terms of crime and adult incarceration. The arrest rates for property crime were similar to state-wide rates, while the arrest rates for violent crime rate was lower in Santa Clara and especially in Orange County, relative to the rest of the state.[19] Adult incarceration rates were also lower than the average incarceration rates for California in 1995.[20] While not representative of California as a whole, these two counties offer the opportunity to do a case study on how the change in cost structures affects youth dispositions at a more fine-grained level.

The juvenile court data contains information on all juvenile delinquency cases referred to juvenile probation after arrests – so for all cases that had not been immediately dismissed by the police. Each case contains information on offenses, date of action, type of judicial

Table 2
Juvenile court case characteristics in Santa Clara and Orange County.

	Number	Percent
Total number of court cases		
Santa Clara	129,396	36%
Orange County	225,876	62%
Demographics		
While	24,955	7%
Black	24,955	7%
Hispanic	189,213	53%
Female	67,963	19%
Age at entry (average)	15.5	
Final disposition in 1995		
Closed, dismissed	9299	46%
Probation	1988	18%
Own, relative's home	3836	19%
Secure county facility	3900	19%
CYA	311	1.5%

This table presents court case characteristics of cases processed in Santa Clara and Orange County. The first two sections are between 1992 and 2010; the last section presents final dispositions in 1995. Data source: juvenile court records, obtained from the National Juvenile Court Data Archives.

Table 3
Balances test for court case characteristics in Santa Clara and Orange County.

	Number of court cases for …			Average age
	All offenses	Level 5–7 offenses	Hispanics	
	(1)	(2)	(3)	(4)
After August 1996	−135.9	−86.52	−70.30	−0.0707 *
	(82.10)	(44.21)	(49.19)	(0.0325)
Mean Dep Var	1657	680	787	15.3
Effective RD obs	33	33	31	27
BW for estimation	17	17	16	13
BW for bias	27	28	26	22

This table presents regression discontinuity design estimates of changes in observable defendant characteristics after the Juvenile Justice Realignment policy in August of 1996. Estimations follow Calonico et al. (2014). In column 2, Level 5–7 offenses are the least serious offenses: instead of an increase from $25 to $150 (that of level 1–4), counties paid between $1300 and $2600 per month of CYA incarceration. 'Mean Dep Var' is the mean of the dependent variable before the Juvenile Justice Realignment. Data source: juvenile court records, obtained from the National Juvenile Court Data Archives. Standard errors in parentheses. $^*p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

action (referral to juvenile court or dismissal/adjustment by probation), and final disposition; as well as date of birth, gender, and ethnicity. Table 2 presents summary statistics on case load and dispositions. In 1995, 46% of cases were closed or dismissed without further action. That same year (the last full year before the Juvenile Justice Realignment), 19% of cases were sent to a secure facility, while only 1.5% of cases led to incarceration in the CYA. Note that many more cases are sent to county secure facilities than to the CYA, even when costs were not internalized. The results presented so far suggest that changes in

costs can impact decisions, but the low CYA usage before cost internalization implies that costs are by no means the only factor that criminal justice actors consider.

The first advantage of the juvenile data is that since I observe juvenile delinquency cases referred to juvenile probation after arrests, I can explore whether there were changes either in the number of cases, or in case characteristics. Jumps in the value of covariates around the date that the reform was implemented would be a cause for concern, suggesting that there may be some strategic sorting that would undermine the RDD research design. Fig. 7 (which uses the same notations as Fig. 2) and Table 3 show the number and composition of court
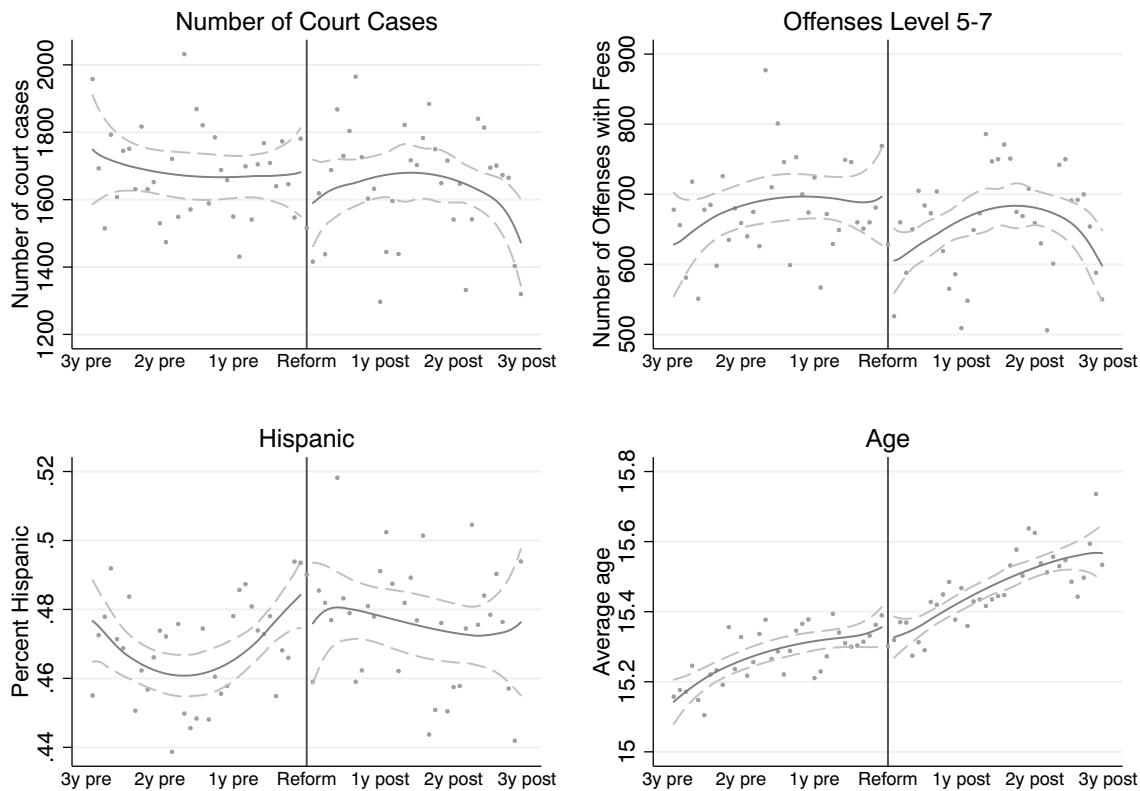
Fig. 7. Discontinuities in number of cases and baseline characteristics in Orange County and in Santa Clara. Note: These figures present a scatter plot of monthly averages for each outcome, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. Level 5–7 offenses are the least serious offenses: instead of an increase from $25 to $150 (that of level 1–4 offenses), counties paid between $1300 and $2600 per month of CYA incarceration. The dashed lines present the 95% confidence interval. Data source: juvenile court records, obtained from the National Juvenile Court Data Archives.

Fig. 8. Court outcomes in Orange County and Santa Clara: CYA, county juvenile facilities and probation. Note: These figures present a scatter plot of monthly averages for each outcome, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval. Data source: juvenile court records, obtained from the National Juvenile Court Data Archives.
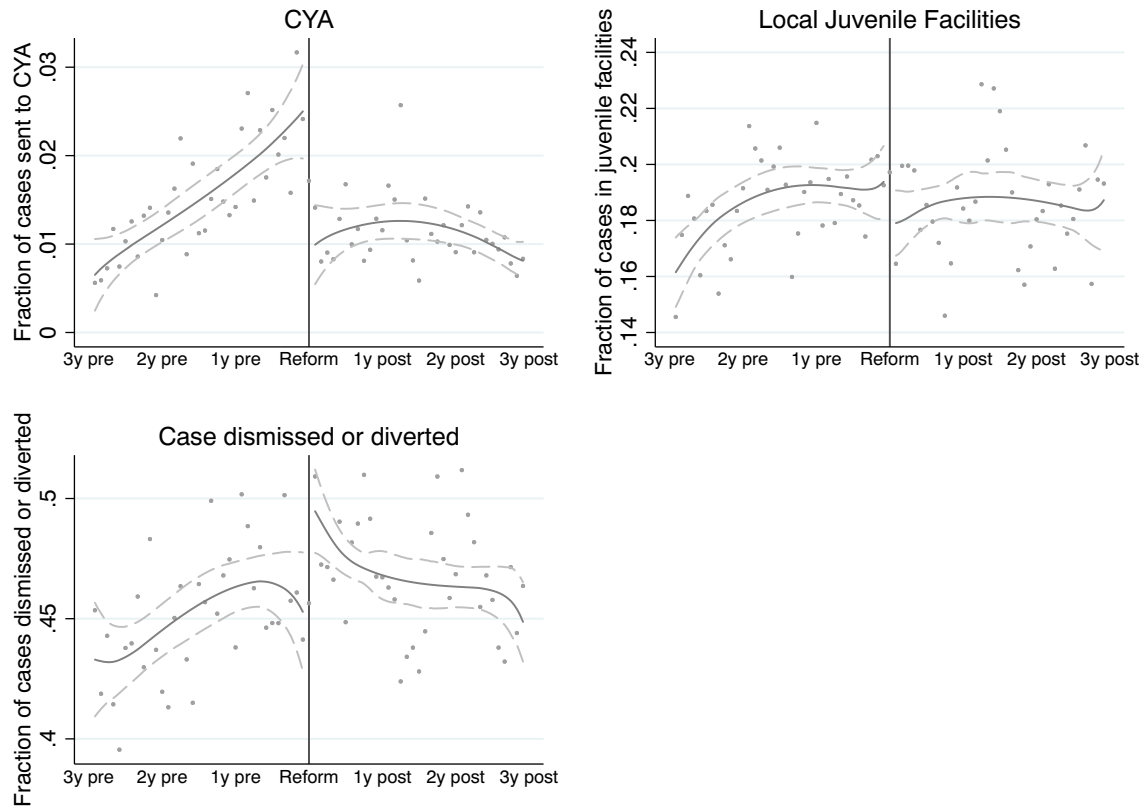
cases around the reform. Fig. 7 suggests that changes around the cutoff were overall smooth. Table 3 presents negative coefficients on the number of cases, and on the number of lower-level offenses. These coefficients are not significant, but they suggest that there may have been slightly less referrals to probation. One potential concern could have been that some criminal justice actors (for example, defense attorneys) were waiting for a more favorable context to bring on certain cases. Note that this is somewhat unlikely; but if this were the case, we would have expected to see *more* cases after the change in cost structure; we observe the opposite. This suggests that there was no "gaming" to send cases in a more favorable context. Assuming that the kinds of cases that are less frequent are the least serious cases, if anything, we would be understating the magnitude of our estimates. Again, note most of the coefficients are not significant. The change in age is significant, but it is small in magnitude.

I then look at changes in dispositions of cases brought to court. I consider entering a CYA facility, going to a county-run facility, or having one's case dismissed or diverted. Fig. 8 indicates that there is no discontinuous change in number of youth being sent to county facilities, but an increase in the fraction of youth being diverted from incarceration altogether after the change in laws. Table 4 presents the change in dispositions in Santa Clara and Orange County. Columns 1–4 show changes in the number of youth referred to CYA and county secure facilities, overall (columns 1 and 3), and when cases were brought to court (columns 2 and 4) – i.e. not dropped after referral to probation. The change in number of youth referred to CYA is statistically significant, and the magnitude is larger when looking only at youth being referred by court. Conversely, there is no significant change in the number of youth sent to county facilities: there is not a one-for-one substitution across modes of confinements. Instead, the main change is in the number of

Table 4
Effects of the Juvenile Justice Realignment on court outcomes in Santa Clara and Orange County.

	CYA admissions		County admissions		Case Closed	CYA admissions	
	All cases	Court cases	All cases	Court cases		Offense Level 1–4	Offense Level 5–7
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
After August 1996	−0.01 ***	−0.02 ***	−0.005	0.009	0.03 **	−0.07	−0.02 ***
	(0.002)	(0.004)	(0.008)	(0.01)	(0.01)	(0.05)	(0.004)
Mean Dep Var	0.018	0.036	0.191	0.355	0.464	0.205	0.033
Effective RD obs.	75,959	32,738	48,972	28,050	42,371	1173	30,462
BW for estimation	695	564	458	489	395	635	685
BW for bias	1071	856	724	825	610	949	1101

This table presents regression discontinuity design estimates of changes in case outcomes after the Juvenile Justice Realignment policy in August of 1996. Estimations follow Calonico et al. (2014). Columns 1 and 3 present estimates for all court cases; columns 2 and 4 present estimates for cases that made it to juvenile court. In column 5, "case closed" refers to cases that were either dismissed or diverted. In column 6, level 1–4 offenses are the more serious offenses, for which counties paid between $25 and $150 per month of CYA incarceration. In column 7, Level 5–7 offenses are the least serious offenses, for which counties paid between $1300 and $2600 per month of CYA incarceration. 'Mean Dep Var' is the mean of the dependent variable before the Juvenile Justice Realignment. Data source: juvenile court records, obtained from the National Juvenile Court Data Archives. Standard errors in parentheses. *p<0.05, **p<0.01, ***p<0.001.

cases being dismissed or diverted. This could be done either before or after a case is heard in juvenile court (column 5).

Finally, this data source allows me ask whether the change in CYA usage is greater when the fraction of costs borne by counties is bigger. To do so, I exploit the fact that not all offenses lead to the same shift in costs borne by counties. I break down my sample into two groups of youth: those convicted for offenses level 1–4 (which are the most serious offenses) and those convicted for offenses of levels 5–7, in columns 6 and 7 of Table 4. Counties experienced a smaller change in price of CYA incarceration for the former group ($150 instead of $25 per month) than for the latter group ($1300 – $2600 per month, instead of $25 before). As a reminder, level 1–4 offenses include murder or armed robberies; and level 5–7 offenses range from residential robbery and burglary to misdemeanors and parole violations. The point estimates are only statistically significant for less severe offenses. Note that the sample size is smaller for the more serious offenses, since these are less frequent. However, the percent change is also larger for level 5–7 offenses. These results suggest a greater response for cases where prices changed most. There could be another explanation for this differential treatment effect: it could reflect differences in the perceived substitutability of alternatives to incarceration, depending on the offense severity. Since price changes and offense severity are correlated, we cannot disentangle both explanations.

There are several lessons from this case study of Santa Clara and Orange County. First, it sheds some light on mechanisms. Because the substitution appears to be from incarceration to cases being diverted or dropped, this suggests that probation officers are most likely to be responding to cost structures. They are funded at the county level, and they might be especially aware of the relative costs and benefits of different punishment options. Because they operate at the county level, they may be especially likely to internalize the increased cost for counties of sending youth to prison.

This case study also clarifies the net effect of this policy in terms of punitiveness. I replicate in these two counties the state-wide lesser reliance on CYA after the change in laws. The substitution was not for local modes of confinement. More youth were kept out of incarceration altogether as a result of the change in costs. This suggests that prison subsidizing led to over-reliance on confinement, relative to its usage when costs were borne directly. This also indicates that the net effect of the policy was that less youth were being incarcerated altogether. To determine the overall effect of less incarceration, and to explore possible costs of this reduced reliance on incarceration, I now turn to potential changes in offending that less deterrence and incapacitation could have generated.

6. Less prison, more crime?

Shifting the cost burden from state to counties resulted in a drop in juvenile incarceration. While this policy resulted in less criminal justice expenditures, it may have come at the cost of an increase in offending. Less incarceration could have decreased both deterrence and incapacitation. In order to examine this, I look at the policy's effect on juvenile offending.

I use data from the "Uniform Crime Report: arrests by age, sex and race" database, which allows me to look at trends in juvenile arrests. This data provides information on the number of arrests reported to the Federal Bureau of Investigation's Uniform Crime Reporting Program each year by police agencies in the United States. For each reporting agency, it presents counts of arrests by age, sex, and race for each offense. This allows me to compute the number of arrests for juveniles. I cannot use data on overall crime rates, since this would not allow me to differentiate changes in crimes committed by juveniles versus adults.

Note that minor offenses, such as disorderly conduct or liquor laws, would not have led to incarceration even after an arrest. I present
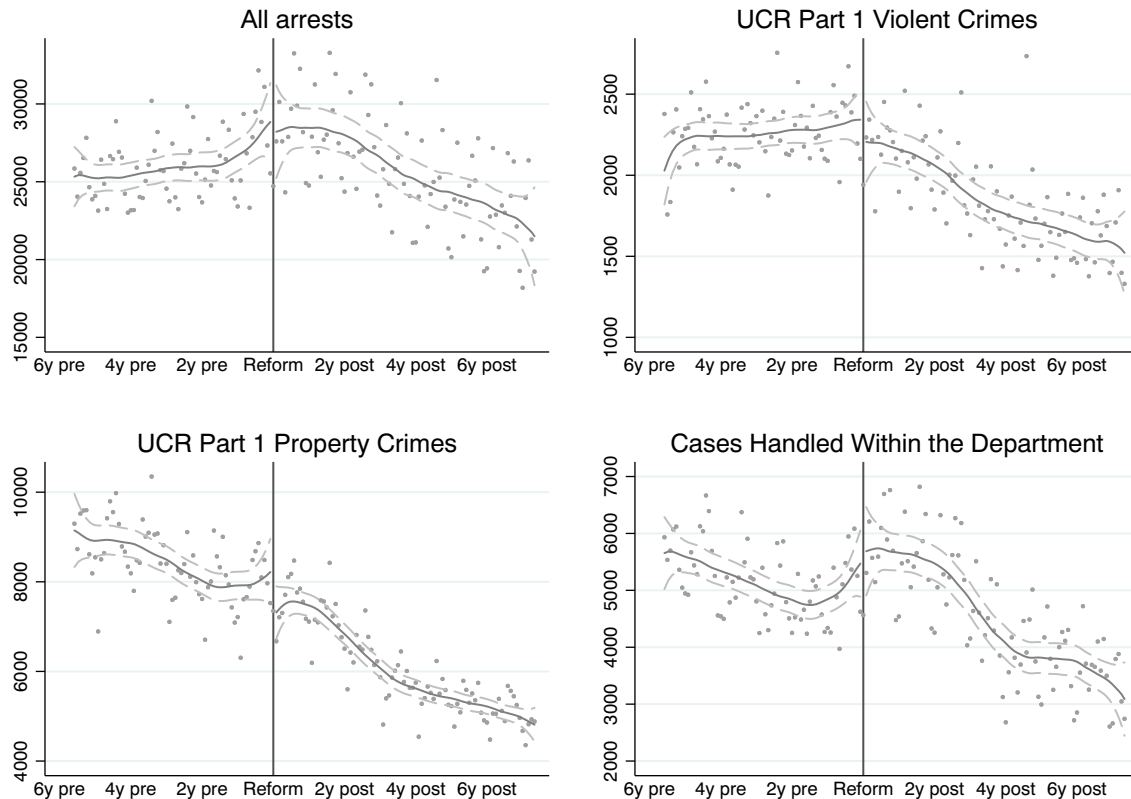

Fig. 9. Juvenile arrests in California. Note: These figures present a scatter plot of monthly averages for each outcome, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval.
Data source: Uniform Crime Report: Arrests by age, sex and race.

Table 5
Effects of the Juvenile Justice Realignment on juvenile arrests.

	(1)	(2)	(3)	(4)
	All	Part 1	Part 1	
	Arrests	Violent	Property	Released
After August 1996	−1059	−200	−1022 **	37
	(1469)	(128)	(343)	(417)
Mean Dep Var	26,029	2260	8416	5164
Effective RD obs	51	45	27	45
BW for estimation	26	23	13	22
BW for bias	46	35	26	42

This table presents regression discontinuity design estimates of changes in monthly juvenile arrests after the Juvenile Justice Realignment policy in August of 1996. Estimations follow Calonico et al. (2014). 'Mean Dep Var' is the mean of the dependent variable before the Juvenile Justice Realignment. Data source: Uniform Crime Report: Arrests by age, sex and race. Standard errors in parentheses. $^*p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

analyses overall, and for more serious offenses (part 1 UCR violent and property offenses) that are more likely to lead to incarceration. Fig. 9 and Table 5 show that there is no discontinuous change in the number of juveniles being arrested. However, the orders of magnitude are different for incarceration and offending overall. But results are similar for more serious crimes, which are both less frequent are more likely to result in incarceration: there is no change in the number of juveniles being arrested for part 1 violent offenses, and if anything, a decrease at that time in the number of arrests for part 1 property offenses. Note that limiting to these three most serious offenses, the numbers of arrests are much smaller: there are between 1500 and 2500 arrests for these motives per month. There are no crimes for which there is a discontinuous increase in arrests after 1996. This indicates that the overall absence of change in arrests is not due to more frequent, lesser offenses (which cannot be punished by prison and thus were not affected by the law) swamping out more serious offenses.

One limit of using arrest data is that it reflects both offending and police behaviors. I cannot use offending data, since the age of a perpetrator (needed to differentiate juvenile from adult offending) is only known if a suspect was arrested. One concern is that police officer behaviors might also be changing. It is possible that police officers were discouraged by a perceived increase leniency in the juvenile justice, and so this null result could reflect the joint effect of more crime but less arrests of juveniles. While I cannot test this directly, I offer another test of whether police officers changed their behaviors. Had police officers been discouraged by more leniency in the criminal justice, they might have dismissed more cases within the department, rather than pass them on to the courts.

The UCR data records the number of arrests that were dealt with within the department and led to a release without further action. If police officers modified their behaviors because of the change in incarceration practices, this would be a credible decision point. Upon finding out whether a person is less than 18 (and so less likely to be sent to juvenile prison after 1996), officers may have been more likely to drop cases, thus reducing time on a case and paperwork. It is plausibly more difficult to determine the exact age of a suspect when making an arrest. The bottom right sub-figure of Fig. 9 presents the evolution in immediate releases: they do not discontinuously change in August 1996. Column 4 of Table 5 statistically confirms this result. This shows that there were no changes in an important adjudication decision within police control.

How do these findings fit with the literature on the crime-prevention effect of incarceration? First, in the juvenile context, Levitt (1998) and Lee and McCrary (2017) both find (to different degrees) that youth respond to increased punishment as they become adults. The difference with the results from this paper could plausibly be due to the fact that the change in sentences at the age of majority is much larger, or more widely known. Note also that not all research finds large deterrent effects of juvenile punishment. For example, Hjalmarsson (2009) finds that there is an increase in the perception of

severity of punishment at majority (though smaller than true increase), but no change in offending. And beyond the juvenile setting, the evidence on the general deterrence effect of different punishment regimes is mixed, possibly due to variations in knowledge of sentencing (see Apel, 2013 for a review of the literature on individuals' perceptions of expected punishments). Some recent empirical studies suggest a disconnect between real and perceived punishments (Kleck et al., 2005), and the absence of general deterrence effects even of policies that had wide media coverage (Philippe, 2020). There is still little work on how the application of existing laws affects offending or recidivism. However, this body of work suggests that even in the adult setting, policies changing practices rather than sentences could reduce incarceration without increasing crime, since these changes may not be very salient. Lastly, note that crime prevention through incarceration decreases with the incarceration rate. The marginal person avoiding a prison spell is likely to commit less crimes in a population where the incarceration rate is higher – a finding confirmed empirically by Buonanno and Raphael (2013). The incarceration rate is much lower for juveniles than for adults, so the marginal adult not incarcerated is likely to be less criminally active than the marginal juvenile. This may be especially true given that offending typically peaks at late adolescence and declines thereafter (Farrington, 1986). This adds to the plausibility that the null effect on crime would replicate in the adult setting.

There are some limits to these findings. In particular, it is possible that deterrence would have decreased over time, as juveniles learn about lower incarceration. The RDD framework allows for the identification of short-run responses, so this paper cannot provide insights on longer-term responses. Changes due to a lower incapacitation effect would be more immediate. Our results suggest that at least at this scale, this change in incapacitation (for potential new entrants into prison) did not result in an uptick in juvenile offending. However, since the median sentence is 48 months, it is possible that the incapacitation effects were not detectable because the flow of incarcerated juveniles is small relative to the stock of youth in CYA at that time.

Keeping these caveats in mind, these results indicate that the change in use of incarceration was not mirrored by a change in levels of arrests detectable with the current data, even for offenses which would most likely lead to incarceration. In this context, there seem to have been no benefits in terms of public safety from the increased use in incarceration due to misaligned incentives. The marginal person in prison when costs were externalized did not contribute to extra public safety. Placing the cost burden of prison on states instead of counties resulted in more money being spent for the same level of a public good – safety.

7. Discussion: policy relevance

In the context of juvenile law enforcement, I find that internalizing costs resulted in less incarceration, with no immediate increase in offending. In this section, I explore the question of external validity, in particular to the adult system, and I ask whether lessons from this paper could be drawn for policy-makers who seek to reduce incarceration without increasing crime.

A first important question is whether these results in the juvenile setting would port into the adult system. Results from Santa Clara and Orange County suggest that one actor played an important role, which is juvenile probation officers. They play a unique role in the juvenile justice in California: their recommendations can impact juvenile processing at several points in time, and in particular, at early stages of the criminal justice processing. To some extent, they may be playing the role of "regulators" within the county – they might have an especially broad view of what all available options are, and an especially good understanding of the relative costs and benefits of these options. In the adult system, depending on the county, there may not be a similar criminal justice actor who would internalize the changing costs to the county. However, there are settings in the adult context where this mechanism could translate. For example, under the 2011 adult

realignment in California, Community Corrections Partnerships were designed to help coordinate efforts across criminal justice actors. They could play a regulation role, internalizing costs of different sentencing options.

Beyond the exact mechanism through which this cost internalization may change criminal justice decisions, this paper makes several points relative to the role of costs in sentencing. First, it offers a proof of concept that there are ways in which cost structures *can* be internalized in criminal justice decisions. Furthermore, given that juveniles are rarely incarcerated, this paper shows that even small differences in relative costs in punishment (rather than absolute impact on a local entity's budget) can matter. And in fact, recently, local policy-makers have also tried to pull the cost lever. For example, in 2010, the Missouri Sentencing Advisory Commission decided to make costs of different punishments available to sentencing judges (Scott, 2012). More recently, the Philadelphia district attorney Larry Krasner, elected in 2017, has recommended that prosecutors contrast the costs of offered prison sentences to the cost of crime-prevention alternatives.[21] While not directly pushing for cost internalization, this approach has a similar goal of making costs of punishment more salient. One way to make costs of prison more visible is by forcing agencies responsible of sentencing to internalize these costs (as was the case after the 1996 Juvenile Justice Realignment); making costs of various sentencing options more salient could be another way to adjust behaviors. This paper provides evidence that this kind of attention to costs could in fact result in less prison, with no more offending.

8. Conclusion

Shifting the cost burden of incarceration from the state to counties entailed a large decrease in the number of juveniles being sent to state facilities. Incarceration responds to costs borne, not to overall social costs; and this disconnect in the levels of sentencing and the payment for prison affects incarceration decisions. Stuntz (2011) described the American criminal justice system as a "relay race", where nobody fully controls the process that determines ultimate incarceration rates. Different actors – police officers, probation officers, district attorneys, judges, correction officers – are not accountable to one another. This disconnect need not necessarily be nefarious: there could be organizational gains from separating the decision-making process (Ater et al., 2014), and if externalities in crime control are large enough, centralized provision of incarceration might be more efficient. Furthermore, this disconnect already existed in decades prior to the 1980s, and did not translate into uniquely high incarceration rates. The lack of cost internalization may play an especially large role when incarceration is considered as the key policy lever in response to high crime, as was the case in the 1980s and 1990s in the United States, but not before. Results in this paper suggest that in the context of juvenile incarceration in the 1990s, lack of accountability caused more incarceration with no gains in public safety.

Understanding how these disconnects in costs and benefits affect criminal justice in the United States might shed light on one overlooked cause of growth in incarceration, and a possible pathway to reduce the financial burden of incarceration on states' budgets. These misaligned incentives might also explain why incarceration increased so much in the United States, even though policing appears to be more cost-effective (Donohue and Siegelman, 1998; Cook and Ludwig, 2010). Realigning costs and incentives is inexpensive to implement, and it could lead to a lower use of state prison spaces. Our estimates furthermore reflect changes only in costs of juvenile incarceration, which represent only a very small fraction of overall incarceration. A remaining question is whether adult incarceration would likewise be affected by

changes in the cost burden, and if counties could be encouraged to explore local options through that channel.

Beyond the question of sentencing in the federal context of the USA, this paper more generally illustrates the importance of alignment of incentives in law enforcement. In another context, Mukherjee (2014) demonstrates how the rise in private prisons also has negative side-effect due to misaligned incentives. While private prisons cost less on a daily basis, the author finds that these savings are offset by increased incarceration length, caused by more disciplinary incidents. And even in countries which have unified funding structures in their criminal justice, such as France, misaligned incentives can affect tradeoffs in law enforcement practices. For example, prison directors are responsible not only for inmates' confinement, but also for their rehabilitation. Even though the latter can have large effects on future public safety, it is much harder to observe and hold prisons accountable for, relative to the former. The most discussed lever to reduce crime has been changing incentives for people considering committing a crime, for example through more policing or longer sentences. This paper demonstrates the role that incentives also for play in choosing crime control policies. This research on institutions, law enforcement and offending, opens up the question of how to design mechanisms that would best align incentives across different criminal justice actors and sectors.

References

Abrams, David S., 2012. Estimating the deterrent effect of incarceration using sentencing enhancements. Am. Econ. J. Appl. Econ. 4 (4), 32–56.

Acemoglu, Daron, Garcia-Jimeno, Camilo, Robinson, James A., 2015. State capacity and economic development: a network approach. Am. Econ. Rev. 105 (8), 2364–2409.

Aizer, Anna, Doyle, Joseph J., 2015. Juvenile incarceration, human capital, and future crime: evidence from randomly assigned judges. Q. J. Econ. 130 (2), 759–803.

Apel, Robert, 2013. Sanctions, perceptions, and crime: implications for criminal deterrence. J. Quant. Criminol. 29 (1), 67–101.

Ater, Itai, Givati, Yehonatan, Rigbi, Oren, 2014. Organizational structure, police activity and crime. J. Public Econ. 115, 62–71.

Austin, James, Johnson, Kelly Dedel, Gregoriou, Maria, 2000. Juveniles in Adult Prisons and Jails: A National Assessment. US Department of Justice, Office of Justice Programs, Bureau of Justice Assistance, Washington, DC.

Autor, David H., Duggan, Mark G., 2003. The rise in the disability rolls and the decline in unemployment. Q. J. Econ. 118 (1), 157–205.

Baicker, Katherine, 2001. Government decision-making and the incidence of federal mandates. J. Public Econ. 82 (2), 147–194.

Baicker, Katherine, 2005. The spillover effects of state spending. J. Public Econ. 89 (2), 529–544.

Baicker, Katherine, Jacobson, Mireille, 2007. Finders keepers: forfeiture laws, policing incentives, and local budgets. J. Public Econ. 91 (11), 2113–2136.

Baicker, Katherine, Clemens, Jeffrey, Singhal, Monica, 2012. The raise of the states: US fiscal decentralization in the postwar period. J. Public Econ. 96 (11), 1079–1091.

Ball, W. David, 2011. Tough on crime (on the state's dime): how violent crime does not drive california counties' incarceration rates- and why it should. Ga. St. UL Rev. 28, 987.

Ball, W. David, 2014. Why state prisons. Yale L. & Pol'y Rev. 33, 75.

Ball, W. David, 2016. A false idea of economy: costs, counties, and the origins of the california correctional system. The ANNALS of the American Academy of Political and Social Science 664 (1), 26–42.

Baqir, Reza, 2002. Districting and government overspending. J. Polit. Econ. 110 (6), 1318–1354.

Becker, Gary S., 1968. Crime and punishment: an economic approach. J. Polit. Econ. 76 (2), 169–217.

Bierschbach, Richard A., Bibas, Stephanos, 2017. Rationing criminal justice. Mich. L. Rev. 116, 187.

Buonanno, Paolo, Raphael, Steven, 2013. Incarceration and incapacitation: evidence from the 2006 Italian collective pardon. Am. Econ. Rev. 103 (6), 2437–2465.

Calonico, Sebastian, Cattaneo, Matias D., Titiunik, Rocio, 2014. Robust nonparametric confidence intervals for regression-discontinuity designs. Econometrica 82 (6), 2295–2326.

Case, Anne C., Rosen, Harvey S., Hines, James R., 1993. Budget spillovers and fiscal policy interdependence: evidence from the states. J. Public Econ. 52 (3), 285–307.

Chalfin, Aaron, McCrary, Justin, 2017. Are US cities underpoliced? Theory and evidence. Rev. Econ. Stat. 1 (100).

Chen, Keith M., Shapiro, Jesse M., 2007. Do harsher prison conditions reduce recidivism? A discontinuity-based approach. Am. Law Econ. Rev. 9 (1), 1.

Cook, Philip J., Ludwig, Jens, 2010. Economical Crime Control. National Bureau of Economic Research (Technical Report).

Dahlby, Bev, 1996. Fiscal externalities and the design of intergovernmental grants. Int. Tax Public Financ. 3 (3), 397–412.

---

[21] See for example NPR coverage of https://www.npr.org/2018/03/31/598318897/philadephias-new-da-wants-prosecutors-to-talk-cost-of-incarceration-while-in-cou.

DiTella, Rafael, Schargrodsky, Ernesto, 2013. Criminal recidivism after prison and electronic monitoring. J. Polit. Econ. 121 (1), 28–73.

Doleac, Jennifer L., Sanders, Nicholas J., 2015. Under the cover of darkness: how ambient light influences criminal activity. Rev. Econ. Stat. 97 (5), 1093–1103.

Donohue, John, Siegelman, Peter, 1998. Allocating resources among prisons and social programs in the battle against crime. J. Leg. Stud. 27 (1).

Farrington, David P., 1986. Age and crime. Crime Justice 7, 189–250.

Figlio, David N., Kolpin, Van W., Reid, William E., 1999. Do states play welfare games? J. Urban Econ. 46 (3), 437–454.

Glaeser, Edward L., 2013. Urban public finance. Handbook of Public Economics. 5, pp. 195–256.

Hansen, Benjamin, Miller, Keaton, Weber, Caroline, 2017. The Taxation of Recreational Marijuana: Evidence From Washington State. National Bureau of Economic Research (Technical Report).

Hausman, Catherine, Rapson, David S., 2017. Regression Discontinuity in Time: Considerations for Empirical Applications. National Bureau of Economic Research (Technical Report).

Helland, Eric, Tabarrok, Alexander, 2007. Does three strikes deter? A nonparametric estimation. J. Hum. Resour. 42 (2), 309–330.

Hill, Elizabeth G., 2007. California's Criminal Justice System: A Primer.

Hjalmarsson, Randi, 2009. Crime and expected punishment: changes in perceptions at the age of criminal majority. Am. Law Econ. Rev. 11 (1), 209–248.

Kearney, Melissa S., Benjamin, H. Harris, Jácome, Elisa, Parker, Lucie, 2014. Ten Economic Facts About Crime and Incarceration in the United States. Hamilton Project, Brookings.

Keen, Michael J., Kotsogiannis, Christos, 2002. Does federalism lead to excessively high taxes? Am. Econ. Rev. 363–370.

Kleck, Gary, Sever, Brion, Li, Spencer, Gertz, Marc, 2005. The missing link in general deterrence research. Criminology 43 (3), 623–660.

Lacey, Nicola, Soskice, David, 2017. American exceptionalism in crime, punishment and disadvantage. American Exceptionalism in Crime and Punishment, p. 53.

Lee, D., McCrary, Justin, 2017. The deterrence effect of prison: dynamic theory and evidence. Adv. Econ. 38.

Levitt, Steven D., 1998. Juvenile crime and punishment. J. Polit. Econ. 106 (6), 1156–1185.

Macallair, Dan, 1994. Disposition case advocacy in San Francisco's juvenile justice system: a new approach to deinstitutionalization. Crime Delinq. 40 (1), 84–95.

Macallair, Daniel E., 2015. After the Doors Were Locked: A History of Youth Corrections in California and the Origins of Twenty-first Century Reform. Rowman & Littlefield.

McAdams, Richard H., Dharmapala, Dhammika, Garoupa, Nuno, 2015. The law of police. Univ. Chic. Law Rev. 135–158.

McCrary, Justin, 2010. Dynamic perspectives on crime. In: Benson, Bruce, Zimmerman, Paul R. (Eds.), Handbook on the Economics of Crime. Edward Elgar Publishing, Cheltenham, pp. 82–107 (chapter 4).

Mueller-Smith, Michael, 2015. The Criminal and Labor Market Impacts of Incarceration. 18 (Unpublished Working Paper).

Mukherjee, Anita, 2014. Does Prison Privatization Distort Justice? Evidence on Time Served and Recidivism (SSRN working paper).

Neal, Derek, Rick, Armin, 2014. The Prison Boom and the Lack of Black Progress After Smith and Welch. National Bureau of Economic Research (Technical Report).

Ouss, Aurélie, Peysakhovich, Alexander, 2015. When punishment doesn't pay: cold glow and decisions to punish. J. Law Econ. 58 (3), 625–655.

Pfaff, John F., 2007. The empirics of prison growth: a critical review and path forward. J. Crim. L. & Criminology 98, 547.

Pfaff, John F., 2011. The myths and realities of correctional severity: evidence from the National Corrections Reporting Program on sentencing practices. Am. Law Econ. Rev. 13 (2), 491–531.

Philippe, Arnaud, 2020. Learning by Doing. How Do Criminals Learn the Criminal Law? (Technical Report, Working paper)

Posner, Richard A., 2008. How Judges Think. Harvard University Press.

Puzzanchera, C., Kang, W., 2017. Easy access to FBI arrest statistics 1994–2014," National Center for Juvenile Justice. Office of Juvenile Justice and Delinquency Prevention Retrieved from http://www.ojjdp.gov/ojstatbb/ezaucr.

Raphael, Steven, Stoll, Michael A., 2009. Why are so many Americans in prison? Do Prisons Make Us Safer, pp. 27–72

Reaves, Brian, 2007. Census of State and Local Law Enforcement Agencies, 2004. US Department of Justice, Office of Justice Programs (Technical Report).

Rottman, David B., Flango, Carol R., Cantrell, Melissa T., Hansen, Randall, LaFountain, Neil, 2000. State Court Organization 1998. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, Washington, DC.

Sawyer, Wendy, Wagner, Peter, 2019. Mass Incarceration: The Whole Pie 2019. Prison Policy Initiative, p. 19.

Scott, Ryan W., 2012. How (not) to implement cost as a sentencing factor. Federal Sentencing Reporter 24 (3), 172–177.

Stuntz, William J., 2011. The Collapse of American Criminal Justice. Harvard University Press.

Teichman, Doron, 2004. The market for criminal justice: federalism, crime control and jurisdictional competition. Michigan Law Review 103, 1831–1876.

Vera Institute of Justice, 2019. Incarceration Trends Dataset. data retrieved from. https://github.com/vera-institute/incarceration_trends.

Weingast, Barry R., Shepsle, Kenneth A., Johnsen, Christopher, 1981. The political economy of benefits and costs: a neoclassical approach to distributive politics. J. Polit. Econ. 89 (4), 642–664.

Worrall, John L., Schram, Pamela, 2000. Evaluation of California's State-level Data Systems for Incarcerated Youth. Center for California Studies, California State University, Sacramento.

Zhuravskaya, Ekaterina, 2000. Incentives to provide local public goods: fiscal federalism, Russian style. J. Public Econ. 76 (3), 337–368.

Zimring, Franklin E., Hawkins, Gordon, 1992. Prison Population and Criminal Justice Policy in California. Institute of Governmental Studies Press, University of California Berkeley, CA.