

# Misaligned Incentives and the Scale of Incarceration in the United States

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## Abstract

The incarceration rate has increased substantially in the United States between the 1980s and the 2000s. In this paper, I explore an economic inefficiency 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 40% to 60% 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.

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# 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 a 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 people demonstrating efforts of rehabilitation.<sup>1</sup> Understanding mechanisms underlying incarceration decisions can help design policies that would effectively achieve this goal.

There are numerous studies on drivers of the growth in incarceration in the United States. Most theories highlight demographic and economic trends affecting offending, or tougher laws aiming to curb high crime rates in the 1980s and 1990s, in response to increased public demand for punitiveness (see Pfaff, 2007 and Raphael and Stoll, 2009 for a review of these theories). The first set of theories focus on determinants of potential offenders’ behaviors; the second highlight the role of legislative efforts. However, once these laws exist, they have to be applied, and there is much less work on how incentives shape choices of people making punishment decisions.<sup>2</sup> In this paper, I explore the role of one possible determinant of law enforcement practices: misaligned incentives across levels of government, resulting in economic inefficiencies.

The United States has a piecemeal criminal justice system: in most places, prisons are paid for by states, but sentences depend on decisions made by county-elected or appointed prosecutors and judges, and by municipal police.<sup>3</sup> 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, resulting in 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 provided and financed locally.

It is an empirical question whether and how these misaligned incentives

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<sup>1</sup><https://www.congress.gov/bill/115th-congress/house-bill/5682/text>

<sup>2</sup>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 the criminal justice.

<sup>3</sup>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 pre-trial 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.

affect sanctions. If punishments are only determined relative to the facts of the cases, or if judicial actors aren't aware of or don't consider costs, then the financing level of prisons would not matter for incarceration. However, for policies in other domains than criminal justice – such as healthcare provision, or unemployment benefits – there is evidence that misaligned incentives leads to large inefficiencies (Autor and Duggan, 2003, Zhuravskaya, 2000). In a lab study, Ouss and Peysakhovich (2015) find that punishments are higher (but offending is the same) when costs are pooled, rather than individually borne. 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 criminal justice context.

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 use two strategies to identify the effect of the change in payment structures on sentencing: a regression discontinuity design in time, focusing on the time window around the change in payment structures; and a differences-in-differences strategy, using young adults, who were not affected by the change in laws, as a comparison group. I use data from the National Corrections Reporting Program (NCRP), and I find that once the law was passed, the number of juveniles being sent to state facilities dropped by 40% to 60%, depending on the estimate. Using juvenile court records from two counties (Santa Clara and Orange County), I find that this change is driven mainly by an increase in the number of cases being dismissed, rather than a substitution to other modes of incarceration.

Why might decision-makers be sensitive to costs? My reduced-form results do not provide answers about precise mechanisms, but 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 county board of commissioners is, and may be adjusting priorities based on expenditures. It is also possible that even drawing attention to costs might be sufficient to considering 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 of incarceration costs might be welfare-increasing if incarceration has positive externalities across counties, for example, if potential delinquents are mobile and incapacitation decreases crime in all counties. However, there may be a free-riding problem, for example if incarceration is a substitute for privately-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.<sup>4</sup> The relative magnitude of these effects would help determine the right financing structures for incarceration. I look at changes in crimes averted at the time of the cost internalization. I find that the drop in juvenile incarceration due to the shift in costs was not mirrored by a change in juvenile arrests. This suggests that levels of incarceration under the “pooled cost” regime were inefficiently high: the extra incarceration expenditures did not provide extra safety.

This paper offers several contributions to the existing literature. First, this paper broadens 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, by establishing more financial accountability to reduce economic inefficiencies. Recent efforts to reduce the prison population have focused on approaches like diversion, mass releases, or changes in the use of mandatory minima. My findings highlight the importance of incentive structures, even within a legal context. If my results from the juvenile justice context also hold true in the adult context, this 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 case at hand that can influence judges, such as legal pragmatism or political motivations, but the cost of sentencing options is not mentioned. 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 offending. However, there is less work on the determinants of the supply side – or

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<sup>4</sup>For example, Aizer and Doyle (2015) find long-run negative impacts of juvenile incarceration, which increases likelihood of violent crimes and dropout from school.

on how punishments are chosen.<sup>5</sup> This paper shows the theoretical and policy importance 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 presents the organization of the California juvenile justice, the 1996 Juvenile Justice Realignment and datasources. Sections 4 to 6 show 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

The first question in this paper is whether sentencing decisions respond to costs. 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 sanctions – such as jails, 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.

There has been little research on how the cost structure affects 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 and Lee and McCrary, 2017). However, these papers do not explore whether payment structures impact the supply for different crime-control levers. 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 fraction of overall costs: punishments are higher when publicly instead of privately paid for, with no less offending. The current papers asks if these lab findings hold true in the field, and at the institutional (rather than individual) level.

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<sup>5</sup>Aside from the numerous studies on biases in judicial decision-making, which do not consider the role of how incentives shape decisions.

The possible over-demand of public goods for personal / electoral benefits (Weingast et al., 1981, Baqir, 2002) and the over-use of a subsidized good 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: less local fiscal incentives reduces the efficiency of public spending for example 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). There might be 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 may in theory exist for punishments. For example, electronic monitoring is much less expensive than incarceration, and DiTella and Schargrodsy (2013) also find that it reduces recidivism rates; but it may be underutilized if more expensive from the punisher’s perspective.

Turning to public safety, there could be horizontal (spatial) spillovers in the choices of levels of incarceration. Glaeser (2013) highlights mobility at the local level: all else equal, people might be more willing to move to cities or counties in which incarceration rates are higher if these are safer. Likewise, if potential offenders are mobile, 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. If offenders move to places with the least law enforcement, decentralization could lead to excessive law enforcement (Teichman, 2004), which a more centralized mode of provision might help mitigate. In other domains, studies of spatial interactions at the state (Figlio et al., 1999, Baicker, 2005) or local levels (Case et al., 1993), have found spatial correlations in taxation and 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 en-

forcement 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 arrestees awaiting trial 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, two things changed at the same time: the cost structure, but also the responsibility in housing arrestees. The authors highlight the role of the organizational changes as driving their results, rather than the change in cost structures; police evaluations and wages could depend on number of arrests, which would increase when costs are no longer internalized. My paper is unique in that it helps identify 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 Institutions and Data

#### 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.<sup>6</sup> 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 6 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: state juvenile facilities are run by the California Youth Authority (CYA), which was renamed the Department of Juvenile Justice in 2005.<sup>7</sup> In February 1996 there were 9,974 youths in CYA facilities.

Figure 1 presents a flowchart of what can happen to a juvenile after they

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<sup>6</sup>State police represents a small share of overall law enforcement, with a national average of 8%. The Highway Patrol represents the largest state agency in California (Reaves, 2007).

<sup>7</sup>The age of majority is 18 years old in California.

have been arrested for a felony or a misdemeanor. 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. A juvenile probation officer plays an important and unique role to determine a case's trajectory: their role is to assess a youth's risks and needs, and to 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. A probation officer can decide to dismiss or divert a case (in which case, the case will not be reviewed in juvenile court); or to send the case to juvenile court. At that stage, a judge can again decide to dismiss a case, or make a youth a ward of the court.

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.<sup>8</sup> Overall, juvenile justice uses diversion much more frequently than adult justice.

### 3.2 1996 Juvenile Realignment

In February 1995, California Senator Rob Hurtt introduced a bill 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 CYA facilities. Hurtt's senate bill 681 (henceforth SB 681) proposed to establish 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. This is the fee that counties had to pay for offenses of categories 1 – 3 (category 1 being the most serious, and category 7 the least serious),<sup>9</sup> such as murder or armed robbery. 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:

\$1,300 (50% of the per capita institutional cost of the CYA) for level 5 offenses, which include residential robbery, burglary, or assault with deadly weapon.

\$1,950 (75% of the per capita institutional cost of the CYA) for level 6 offenses, which include second degree burglary and car theft

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<sup>8</sup>Figures from chapter 5 of Hill (2007)

<sup>9</sup>The full classification of offenses can be found title 15, division 4.5, chapter 2, article 3 of the California Code of Regulations.



\$2,600 (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 was to be 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 6 month sentence, the county of origin would pay the “low costs” for 4 months (September to December 1996); and the “high cost” for 2 months (January and February, 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 otherwise characterized by an increased punitiveness in California: 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.<sup>10</sup> This policy did not occur in an overall context of an unraveling of incarceration, or increased leniency towards juveniles, in California. There were no other 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.<sup>11</sup> 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 additional local alternatives to incarceration.

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<sup>10</sup>[http://www.lao.ca.gov/ballot/2000/21\\_03\\_2000.html](http://www.lao.ca.gov/ballot/2000/21_03_2000.html)

<sup>11</sup>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.

The adoption of this legislation offers a natural experiment: the law discontinuously changed the price that counties would have to pay to incarcerate juveniles. While later juvenile justice reforms also included funding for local alternatives to incarceration, this was not the case in 1996 – the only change at that time was in the payment structure that counties faced for their juveniles, providing a unique opportunity to isolate the effect of cost structures on sentencing decisions. 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 costs of incarceration.

### 3.3 Data

In order to determine the effect of the change in costs of juvenile incarceration, one would ideally like to see all juvenile dispositions before and after the change in laws. However, court dispositions are decided at the county level, and before 1997 that data was not collected for the whole state of California; only Santa Clara and Orange County had reliable juvenile court data for the full period that I was able to access. I therefore use two data main sources on corrections. The National Corrections Reporting Program (NCRP) data provides information on admission into CYA for all youth in California sentenced in criminal court. The advantage of the NCRP data is that it covers CYA admissions from criminal courts for the whole state of California. The disadvantage is that it does not present counterfactuals to incarceration, and that it only has data on admissions from criminal court, but not from juvenile court. The California juvenile court case records for Orange County and Santa Clara County offer a broader view of youth’s trajectory in the justice system, but only for two counties. The Uniform Crime Report data provides information on arrests.

**National Corrections Reporting Program Data.** The NCRP part 1 compiles administrative data on all admissions to state and federal adults facilities, and to the California Youth Authority. 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 composition of inmates in California, both in adult and juvenile state facilities. For my main results, I use the data from 1990 to 2001.

A couple of caveats apply to the NCRP data. 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 contentious variables such as age. They find that the California data presents no major inconsistencies. Another limitation of the data is that the NCRP contains admissions to CYA from criminal court, but not from juvenile court. Using additional yearly data from the California Department of Youth Authority helps establish that overall trends are similar for individuals entering the CYA via juvenile court.<sup>12</sup>

**California Juvenile Court Case Records.** Working with the National Juveniles Court Data Archive (NJCDA), I obtained data on juvenile court records for two counties: Orange County and Santa Clara, from 1992 to 2010. In California, court data is generally collected and stored at the county level.<sup>13</sup> 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. Orange County and Santa Clara county are large counties in California: third and sixth largest respectively in terms of overall population, and fourth and fifth in terms of juvenile populations.<sup>14</sup> They are both among the ten wealthiest counties in the state. 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 as a whole.

This 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 action (referral to juvenile court or dismissal / adjustment by probation), and final disposition; as well as date of birth, gender, and ethnicity. Summary statistics on case load and dispositions are presented in table 1. Between 1992 and 2010, 46% of cases are closed or dismissed without further action, while only 1.5% of cases led to incarceration in the CYA.

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<sup>12</sup>The report with yearly statistics can be found at [http://www.cdcr.ca.gov/Reports\\_Research/docs/research/2004-12YEAR.pdf](http://www.cdcr.ca.gov/Reports_Research/docs/research/2004-12YEAR.pdf)

<sup>13</sup>Data was collected at the state level until 1990, but that system was discontinued because of budget cuts. See Worrall and Schram (2000) for more details on data systems for incarcerated youth in California in the 1990s. In 1997, the NJCDA started collecting data for all counties, but it does not have systematic data before then.

<sup>14</sup>Data from US census, extracted from <http://factfinder.census.gov/> for the overall population and <http://ojjdp.gov/ojstatbb/ezapop/> for juvenile population

**Uniform Crime Report: Arrests by age, sex and race.** 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.

## 4 Cost structure and juvenile incarceration

### 4.1 Empirical Strategy

My identification strategy exploits the fact that the California Juvenile Justice Realignment introduced a discontinuous change in prices that counties had to pay for incarcerating juveniles in the CYA. I study the effects of this change in cost structures using two methods: a regression discontinuity design in time (RDD) and a differences-in-differences strategy, in which I compare juvenile incarceration to that of young adults.

For the RDD, I use several different forms of estimation. First, I estimate equations of the following form:

$$Y = \beta_0 + \beta_1 Post + \beta_2 f(Date) + \beta_3 X$$

where  $Y$  is the outcome of interest (intakes into juvenile prison, likelihood of going to an juvenile prison, or crime);  $Post$  is a dummy equal to 1 for events after the adoption of SB 681;  $f(Date)$  are linear and polynomial controls for time trends; and  $X$  are controls for case types (when relevant).  $\beta_1$  is the main coefficient of interest. In a second set of analyses, I follow Calonico et al. (2014), who use local-linear functions to obtain bias-corrected point estimates.

For the differences-in-differences strategy, I estimate equations of the following form:

$$Y = \beta_0 + \beta_1 Post * Juvenile + \beta_2 Post + \beta_3 Juvenile + \beta_4 Month$$

where again,  $Y$  is the outcome of interest;  $Post$  is a dummy equal to 1 for events after the adoption of SB 681;  $Juvenile$  is a dummy equal to 1 for incarcerations in juvenile; and  $Month$  is a month\*year control.  $\beta_1$  is the main coefficient of interest. Unless specified otherwise, standard errors are clustered at the month-year level.

Each estimation approach has its strengths and weaknesses. For example, trends in juvenile and adult offending and criminal justice responses were not exactly the same in the pre-1996 period, making adult incarceration and crime an imperfect counterfactual for that of juveniles over that period in time. However, the advantage is that adults in California were subject to the same possible changes in overall determinants of crime and incarceration (such as economic conditions, policing practices...) as juveniles were. An RDD in time does not present the exact same features as more classic regression discontinuities; 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. Recently, Hausman and Rapson (2017) discuss the specificities of the use of RDD in time, and provide some recommendations for testing the robustness of results. Using both an RDD in time and a differences-in-differences approach provides two possible sets of counterfactuals, and results are qualitatively the same using both strategies.

## 4.2 Results

**RDD in time estimates.** The main identifying assumption for the RDD approach to be valid is that there is no selection in cases around the policy change. Ideally, one would like to see the full trajectory of juvenile cases, before and after this date. While I do not have this information for the full sample of youth sentenced in California (the NCRP data only contains information on people admitted into state facilities), I am able to look at case characteristics in Santa Clara and in Orange County. Figure 2 and table 2 show the number and composition of court cases around the reform. In figure 2, each dot represents the monthly counts or means of each variable of interest. The lines represent 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. Both the figure and table present no discontinuous change in baseline characteristics, except for age, where the change is small in magnitude. This suggests that there was no “gaming” in term of cases being examined around the date when the cost structure changed.

I now turn to outcomes, looking at changes in number of youth being sent to juvenile facilities. The NCRP data has information about individuals entering state prisons and the CYA. Figure 3 presents the change in the number of juveniles being incarcerated each month, using the same notations as figure 2. This figure illustrates the discontinuous drop in the number of juveniles being

incarcerated at this date. Moving to regression analyses, I first look at changes in overall admissions into CYA facilities, using NCRP data. The first three columns of table 3 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). The outcome in column 4 is the number of juveniles admitted to prison, either at CYA or in the adult system; and the outcome in column 5 is the number of young adults (aged 19 to 20 years old) admitted into California prisons. This serves as a placebo group, since adult incarceration was not subject to a change in cost structures. 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. Conversely, column 5 shows no effect on the placebo group of young adults.

At the individual level, I 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. The base rate is 5.4%. 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. I include the following individual-level characteristics: age at incarceration, gender, race, ethnicity, offense, and number of days already served in prison and in jail. Results are presented in table 4. Column 1 includes all years in the data (1990 - 2001); column 2 reduces the time window to 1 year around August 1996; and column 3 uses bandwidth and standard error calculations from Calonico et al. (2014). In all specifications, controlling for case observables and various time specifications I find there to be a statistically significant discontinuous drop in likelihood of being sent to a CYA facility, relative to an adult facility, after August 1996. The order of magnitude is similar to that of the change in number of admissions into CYA (30% to 56% decrease in the probability of being sent to CYA).

**Differences-in-differences estimates.** An alternative specification is to compare the evolution of incarceration for juveniles to that of adults in California. These can be seen as a potential counterfactual group for juveniles: policing and the economic or social contexts – all of which are determinants of crime and incarceration – were the same before and after the change in laws. However, the cost structure of incarceration only changed for juveniles and not for adults at this date. A simultaneous discontinuous change in adult incarcerations would raise concerns about potential confounding changes in

the California judicial or relevant social context around this period of time.

Figure 4 shows the change in adult intakes over the same period of time: there was no discontinuous change as there was for juveniles, presented in figure 3. 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 in the same period of time. Furthermore, incarceration numbers and rates are very different for adults and juveniles. These differences in trends before the reform make the whole adult intakes a problematic counterfactual to CYA intakes, since policies and practices at the time were differentially affecting juveniles and adults overall.

Focusing on younger adults helps to address this concern. Figure 5 presents trends in intakes into CYA, and into adult facilities for young adults. Trends are similar 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 offenders (Helland and Tabarrok, 2007). For these institutional and empirical reasons, the differences-in-differences estimates focus on adolescents and young adults.

Tables 5 presents differences-in-differences regression analyses of the change in number of inmates around the law cutoff. Columns 1 and 2 present results for all years, columns 3 and 4 narrow the window to  $\pm 2$  years and 1 year around the change in laws, respectively. The comparison group is people aged 19 at time of incarceration, which as discussed earlier is a more adequate comparison group given similarities in pre-trends than the full sample of adults.<sup>15</sup> In all specifications, after the passage of the law, there are less juveniles being incarcerated relative to 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. However, the point estimates for the differences-in-differences estimations are to be taken with caution, since the trends in adult and juvenile incarceration were not exactly the same before the change in laws: juvenile incarceration had already begun to decrease (though not discontinuously), while incarceration of young adults, was if anything increasing over that period time.

**Robustness: criminal court compared to Juvenile court.** As mentioned earlier, the NCRP data has information for a subset of intakes to CYA

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<sup>15</sup>Results are similar using other age groups as a comparison group.

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 figure 6.<sup>16</sup> Throughout the period, there are fewer youth being admitted via criminal courts (dashed line) versus juvenile court (full line). However, there is the same drop in admissions for youth sentenced through juvenile court as that documented for youths admitted to the CYA from criminal courts. If anything, the drop in intakes is steeper for youths admitted from juvenile courts, suggesting that the results using the NCRP data may understate the true effect of changes in cost structure on commitments to state facilities.

## 5 Costs Internalization and Substitution Across Sanctions

The first objective of this paper is to establish the effect of cost structures on law enforcement decisions. To understand the policy implications of this change, it is important to determine what substitutions happened as a result of the drop in use of CYA. This can help understand the net effects of the change in cost structures. Several mechanisms are addressed here.

### 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 price changes, without an actual change in juvenile incarceration.

Figure 5 shows the evolution of young adults entering in adult prisons, contrasted to that of individuals entering the CYA (dark line in figure 5). There is no discontinuous change in the number of 18-19 year-olds or 19-20 year-olds entering adult facilities. However, there appears to be a slight increase in the number of individuals less than 18 years old entering adult facilities (dotted line), which suggests that there was in fact some substitution from juvenile to adult state facilities. This substitution is in itself an indicator that costs are

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<sup>16</sup> 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](http://www.cdcr.ca.gov/reports_research/docs/research/12YR-2005.pdf)



factored into criminal justice decisions. This suggests that different punishments appear to be at least partial substitutes, and a partial internalization of costs of punishments can 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. To consider this substitution pattern, column 4 of table 3 looks at the change in number of juveniles (defined as youth who were younger than 18 at admission) incarcerated in any prison (CYA or adult facilities). The percent change in juvenile admission to any California state prison is similar to that in intakes into CYA. This confirms the small magnitude of juveniles being incarcerated in adult facilities, relative to the decrease in CYA admissions. On net, the change in costs resulted in less youth being incarcerated in California state prisons altogether.

Even though this increase in juveniles incarcerated with adults is relatively 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.**

Juveniles can be incarcerated in different 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. While there is no data source on juvenile incarceration prior to 1997 for the whole state, I can look at trends in local court sanctions for Santa Clara and Orange counties. Beyond capturing how the policy changed juveniles' experiences with the criminal justice, this exercise can also help shed light on mechanisms, since 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 diversions, 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.

More generally, the court records allow me to see at what level along the juvenile justice chain (documented in figure 1) juvenile dispositions are changing. I look at the effect of the change of law both on flows of court cases (whether more cases are dropped), and outcomes of cases: sentenced to local facilities, deferred, or non-custodial sentences. Beyond exploring mechanisms, from a policy implication standpoint, this helps to understand what the counterfactual to incarceration is for youth who are processed in the “high cost of CYA” regime.

I first look graphically at potential changes in the prosecution flows. A change in the number of court cases might indicate that at the arrest stage, youth detectives are more likely to release youth and less likely to send the case to court. Figure 2 shows that there is no discontinuous change in the number of cases overall: the change in costs is not echoed by police behaviors. Moving to dispositions of cases brought to court, figures 7 indicate 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 6 presents the change in dispositions in Santa Clara and Orange County. Columns 1 - 4 of table 6 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 in one method of confinement for another. The main change is in the number of cases being dismissed or diverted. This could be done either before or after a case is heard in juvenile court (column 5).

Finally, this datasource allows me ask whether the change in CYA usage is greater when the fraction of costs born by counties is bigger. To do so, I exploit the fact that not all offenses lead to the same shift in costs born by counties. I break down my analysis into two groups of youth: those who are convicted for offenses level 1-4 (which are the most serious offenses) and those who are convicted for offenses of levels 5-7. 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 (\$1,300 – \$2,600 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. Column 7 of table 6 presents changes in CYA referrals for violent offenses, and there is no effect of the change in pricing structures on the probability that youth convicted of these offenses be sent to CYA. The results are thus driven by changes in incarceration for youth convicted of non-violent offenses, as shown in column 7 of table 6: this further demonstrates a responsiveness to prices for the youth for whom prices changes most.

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 parole 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.

Beyond these mechanisms, this 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 this change in costs. This suggests that the subsidizing of prison led to over-reliance on confinement, relative to its usage when true costs were borne. 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 in particular to do a cost-benefits analysis, I now turn to potential changes in offending that less deterrence and incapacitation could have yielded.

## 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, resulting in more offending. In order to examine this, I look at the policy's effect on juvenile offending.

Specifically, 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. Note that minor offenses, such as disorderly conduct or liquor laws, would not have led to incarceration even after an arrest. I present analyses overall, and for more serious offenses (part 1 UCR violent and property offenses) that are

more likely to lead to incarceration. In figure 8 and in table 7, I show that there is no discontinuous change in the number of juveniles being arrested. However, the orders of magnitude are different for the incarceration results and for the offending results: arrests are of the orders of thousands per month. Looking at different categories of offenses yields estimates with more comparable orders of magnitude, and where the relation with incarceration would be more proximate. There is no discontinuous change around the date that SB 681 was adopted 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 1,500 and 2,500 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. Table 7 presents regression discontinuity estimates. As suggested by the graphs, there is no increase in number of arrests for any age or offense categories at the time of the change in laws, and if anything, property crimes were going down at that time.

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, which is looking at case dispositions. 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 figure 8 presents the evolution in immediate releases: they do not discontinuously change in August 1996. Column 4 of table 7 statistically confirms this result. While I cannot

directly test that police officers were changing their arresting decisions, this shows that there were no changes in the adjudication decisions that are in their control.

This finding indirectly contributes to the literature on the deterrent effect of incarceration for juveniles. Levitt (1998) and Lee and McCrary (2017) both find (to different degrees) that youth respond to increased punishment as they become adults. One explanation for this difference is that the change in sentences is much larger at the age of majority. Alternatively, changes in sentences at age of majority are likely to be much more widely known. If this is the case, legislation with more complicated sentencing implications could potentially reduce incarceration, without reducing deterrence. There is little research on how variations in the application of existing laws might affect offending or recidivism, relative to the severity of the laws themselves.

Overall, 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 a state of the world where more money was spent for the same level of a public good – safety.

## 7 Discussion: Policy Relevance

The 1996 Juvenile Justice Realignment offers a natural experiment to examine how shifting the cost burden of incarceration from states to counties affects both incarceration and overall crime. In the context of juvenile law enforcement, I find that this policy resulted in less incarceration, with no subsequent 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. It is an open empirical question as to whether in the adult system, there would 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 politicians 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.<sup>17</sup> 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

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<sup>17</sup>See for example NPR coverage of <https://www.npr.org/2018/03/31/598318897/philadelphias-new-da-wants-prosecutors-to-talk-cost-of-incarceration-while-in-cou>

decisions. Stuntz (2011) describes the American criminal justice system as a “relay race”, where nobody fully controls the process that determines ultimate incarceration rates. The 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. However, it is possible that this lack of cost internalization may play an especially large role when incarceration is considered as the key policy lever in response 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 in benefits affect criminal justice in the United States might help in explain 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 a very cheap policy to implement, and it could lead to a lower use of state prison spaces. The responsibility of counties argument is also perhaps a way to decrease incarceration without sounding soft on crime. 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 of potential offenders, in particular through sentencing laws, while 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**, “Estimating the Deterrent Effect of Incarceration Using Sentencing Enhancements,” *American Economic Journal: Applied Economics*, 2012, 4 (4), 32–56.
- Acemoglu, Daron, Camilo Garcia-Jimeno, and James A Robinson**, “State capacity and economic development: A network approach,” *The American Economic Review*, 2015, 105 (8), 2364–2409.
- Aizer, Anna and Joseph J Doyle**, “Juvenile incarceration, human capital, and future crime: Evidence from randomly assigned judges,” *The Quarterly Journal of Economics*, 2015, 130 (2), 759–803.
- Ater, Itai, Yehonatan Givati, and Oren Rigbi**, “Organizational structure, police activity and crime,” *Journal of Public Economics*, 2014, 115, 62–71.
- Austin, James, Kelly Dedel Johnson, and Maria Gregoriou**, *Juveniles in adult prisons and jails: A national assessment*, US Department of Justice, Office of Justice Programs, Bureau of Justice Assistance Washington, DC, 2000.
- Autor, David H. and Mark G Duggan**, “The rise in the disability rolls and the decline in unemployment,” *The Quarterly Journal of Economics*, 2003, 118 (1), 157–205.
- Baicker, Katherine**, “Government decision-making and the incidence of federal mandates,” *Journal of public economics*, 2001, 82 (2), 147–194.
- , “The spillover effects of state spending,” *Journal of Public Economics*, 2005, 89 (2), 529–544.



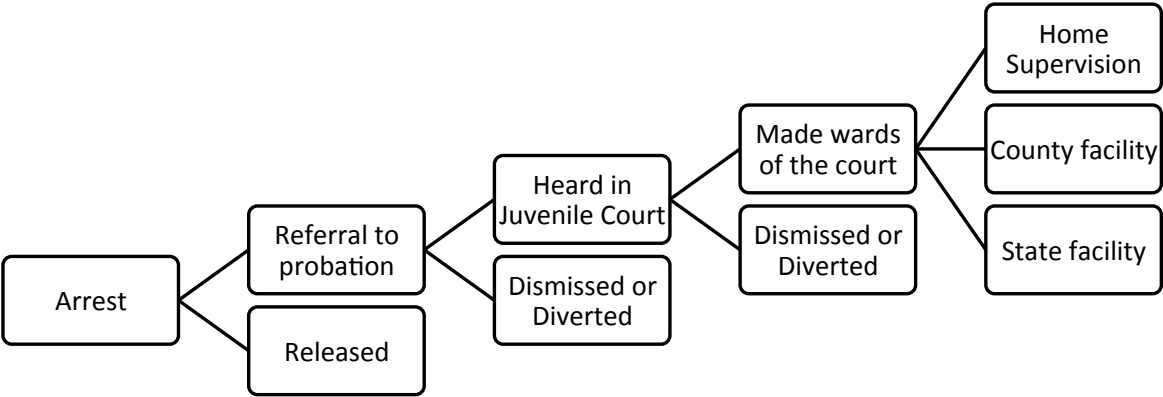
- **and Mireille Jacobson**, “Finders keepers: Forfeiture laws, policing incentives, and local budgets,” *Journal of Public Economics*, 2007, *91* (11), 2113–2136.
- **, Jeffrey Clemens, and Monica Singhal**, “The raise of the states: US fiscal decentralization in the postwar period,” *Journal of Public Economics*, 2012, *96* (11), 1079–1091.
- Ball, W David**, “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.*, 2011, *28*, 987.
- **, “Why state prisons,”** *Yale L. & Pol’y Rev.*, 2014, *33*, 75.
- **, “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*, 2016, *664* (1), 26–42.
- Baqir, Reza**, “Districting and government overspending,” *Journal of political Economy*, 2002, *110* (6), 1318–1354.
- Becker, Gary S.**, “Crime and Punishment: An Economic Approach,” *The Journal of Political Economy*, 1968, *76* (2), 169–217.
- Bierschbach, Richard A and Stephanos Bibas**, “Rationing Criminal Justice,” *Mich. L. Rev.*, 2017, *116*, 187.
- Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik**, “Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs,” *Econometrica*, 2014, *82* (6), 2295–2326.
- Case, Anne C, Harvey S Rosen, and James R Hines**, “Budget spillovers and fiscal policy interdependence: Evidence from the states,” *Journal of public economics*, 1993, *52* (3), 285–307.
- Chalfin, Aaron and Justin McCrary**, “Are US cities underpoliced? Theory and evidence,” *Review of Economics and Statistics*, 2017, *1* (100).
- Chen, Keith M. and Jesse M. Shapiro**, “Do harsher prison conditions reduce recidivism? A discontinuity-based approach,” *American Law and Economics Review*, 2007, *9* (1), 1.
- Cook, Philip J and Jens Ludwig**, “Economical crime control,” Technical Report, National Bureau of Economic Research 2010.

- Dahlby, Bev**, “Fiscal externalities and the design of intergovernmental grants,” *International Tax and Public Finance*, 1996, 3 (3), 397–412.
- DiTella, Rafael and Ernesto Schargrotsky**, “Criminal recidivism after prison and electronic monitoring,” *The Journal of Political Economy*, 2013, 121 (1), 28–73.
- Doleac, Jennifer L and Nicholas J Sanders**, “Under the cover of darkness: How ambient light influences criminal activity,” *Review of Economics and Statistics*, 2015, 97 (5), 1093–1103.
- Donohue, John and Peter Siegelman**, “Allocating resources among prisons and social programs in the battle against crime,” *The Journal of Legal Studies*, 1998, 27 (1).
- Figlio, David N, Van W Kolpin, and William E Reid**, “Do states play welfare games?,” *Journal of Urban economics*, 1999, 46 (3), 437–454.
- Glaeser, Edward L.**, “Urban Public Finance,” *Handbook of Public Economics*, 2013, 5, 195–256.
- Hansen, Benjamin, Keaton Miller, and Caroline Weber**, “The taxation of recreational marijuana: Evidence from Washington state,” Technical Report, National Bureau of Economic Research 2017.
- Hausman, Catherine and David S Rapson**, “Regression discontinuity in time: Considerations for empirical applications,” Technical Report, National Bureau of Economic Research 2017.
- Helland, Eric and Alexander Tabarrok**, “Does three strikes deter? A nonparametric estimation,” *Journal of Human Resources*, 2007, 42 (2), 309–330.
- Hill, Elizabeth G.**, “California’s criminal justice system: A primer,” 2007.
- Kearney, Melissa S, Benjamin H Harris, Elisa Jácome, and Lucie Parker**, *Ten economic facts about crime and incarceration in the United States*, Hamilton Project, Brookings, 2014.
- Keen, Michael J and Christos Kotsogiannis**, “Does federalism lead to excessively high taxes?,” *American Economic Review*, 2002, pp. 363–370.
- Lee, David S and Justin McCrary**, “The deterrence effect of prison: Dynamic theory and evidence,” *Advances in Econometrics*, 2017, 38.

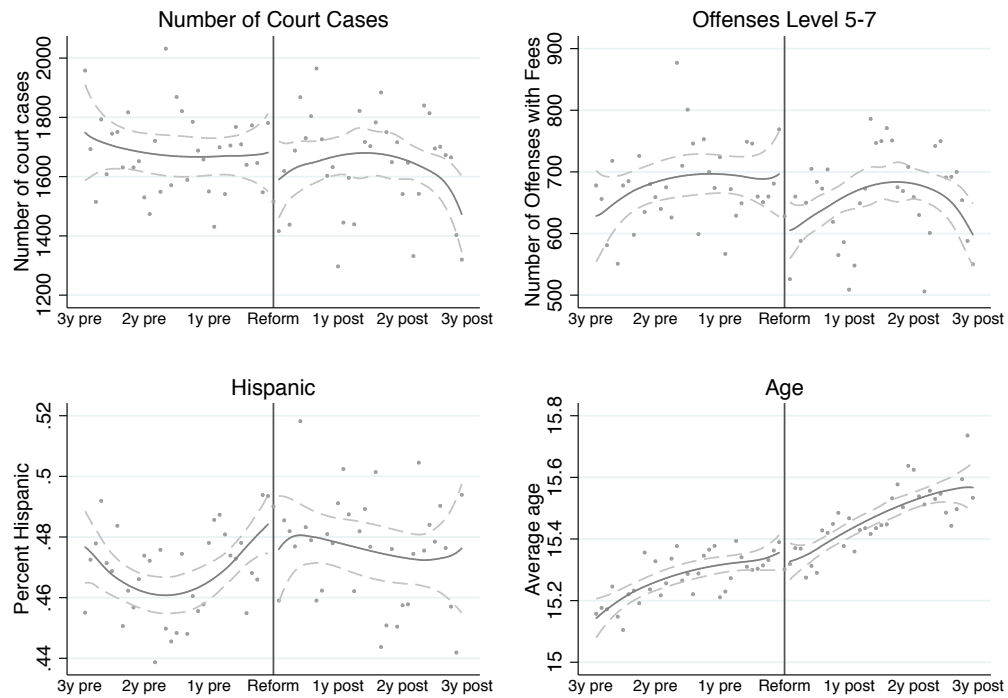
- Levitt, Steven D**, “Juvenile crime and punishment,” *Journal of political Economy*, 1998, 106 (6), 1156–1185.
- Macallair, Dan**, “Disposition case advocacy in San Francisco’s juvenile justice system: A new approach to deinstitutionalization,” *Crime & Delinquency*, 1994, 40 (1), 84–95.
- Macallair, Daniel E**, *After the doors were locked: A history of youth corrections in California and the origins of twenty-first century reform*, Rowman & Littlefield, 2015.
- McAdams, Richard H, Dhammika Dharmapala, and Nuno Garoupa**, “The law of police,” *The University of Chicago Law Review*, 2015, pp. 135–158.
- Mukherjee, Anita**, “Does Prison Privatization Distort Justice? Evidence on Time Served and Recidivism,” *SSRN working paper*, 2014.
- Neal, Derek and Armin Rick**, “The prison boom and the lack of black progress after smith and welch,” Technical Report, National Bureau of Economic Research 2014.
- Ouss, Aurélie and Alexander Peysakhovich**, “When punishment doesn’t pay: Cold glow and decisions to punish,” *The Journal of Law and Economics*, 2015, 58 (3), 625–655.
- Pfaff, John F**, “The empirics of prison growth: A critical review and path forward,” *J. Crim. L. & Criminology*, 2007, 98, 547.
- , “The Myths and Realities of Correctional Severity: Evidence from the National Corrections Reporting Program on Sentencing Practices,” *American law and economics review*, 2011, 13 (2), 491–531.
- Posner, Richard A.**, *How judges think*, Harvard University Press, 2008.
- Raphael, Steven and Michael A Stoll**, “Why are so many Americans in prison?,” *Do prisons make us safer*, 2009, pp. 27–72.
- Reaves, Brian**, “Census of state and local law enforcement agencies, 2004,” Technical Report, US Department of Justice, Office of Justice Programs 2007.

- Rottman, David B, Carol R Flango, Melissa T Cantrell, Randall Hansen, and Neil LaFountain**, *State court organization 1998*, US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics Washington, DC, 2000.
- Scott, Ryan W**, “How (not) to Implement cost as a Sentencing Factor,” *Federal Sentencing Reporter*, 2012, 24 (3), 172–177.
- Stuntz, William J.**, *The collapse of American criminal justice*, Harvard University Press, 2011.
- Teichman, Doron**, “The market for criminal justice: federalism, crime control and jurisdictional competition,” *Michigan Law Review*, 2004, 103, 1831–1876.
- Weingast, Barry R, Kenneth A Shepsle, and Christopher Johnsen**, “The political economy of benefits and costs: A neoclassical approach to distributive politics,” *Journal of political Economy*, 1981, 89 (4), 642–664.
- Worrall, John L and Pamela Schram**, *Evaluation of California’s State-level Data Systems for Incarcerated Youth*, Center for California Studies, California State University, Sacramento, 2000.
- Zhuravskaya, Ekaterina**, “Incentives to provide local public goods: fiscal federalism, Russian style,” *Journal of public economics*, 2000, 76 (3), 337–368.
- Zimring, Franklin E and Gordon Hawkins**, *Prison population and criminal justice policy in California*, Institute of Governmental Studies Press, University of California Berkeley, CA, 1992.

**Figure 1:** Possible Outcomes after a Juvenile Arrest in California

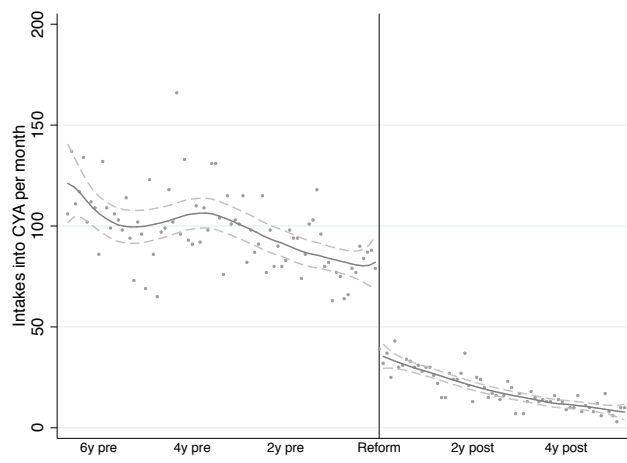


**Figure 2:** Discontinuities in number of cases and baseline characteristics in Orange County and in Santa Clara



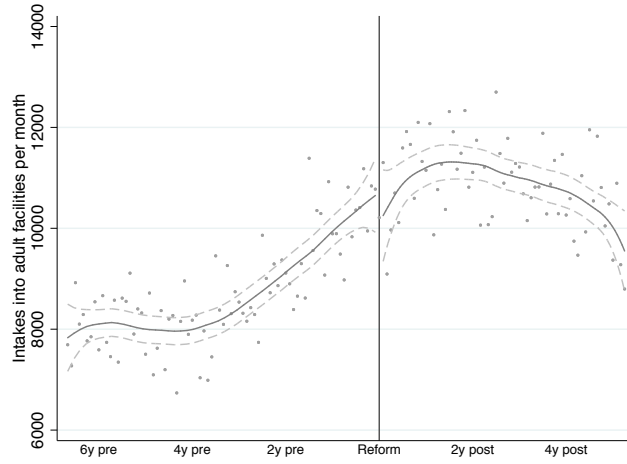
Note: These figures present a scatter plot of monthly averages for each outcome, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. Level 5-7 offenses are the least serious offenses: instead of an increase from \$25 to \$150 (that of level 1-4 offenses), counties paid between \$1,300 and \$2,600 per month of CYA incarceration. The dashed lines present the 95% confidence interval. Data source: California Juvenile Court Case Records

**Figure 3:** Commitments to CYA: Pre / Post August 1996



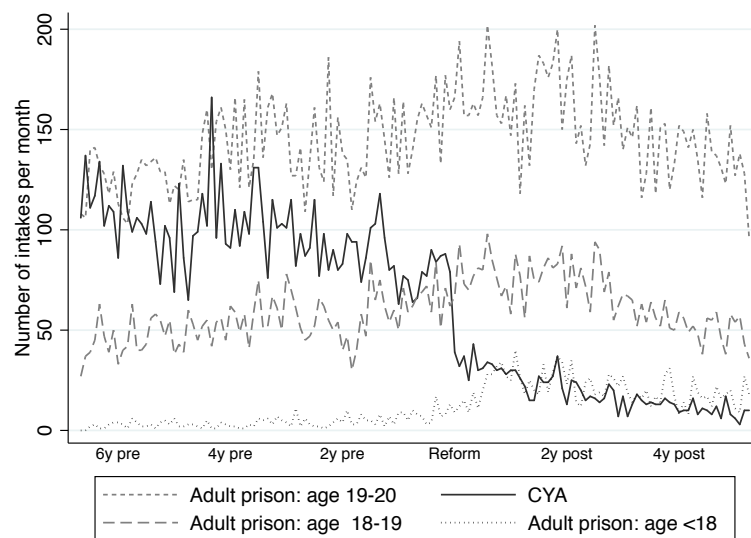
Note: The figure presents a scatter plot of the monthly averages for intakes into California Youth Authority (CYA) facilities, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval. Data source: NCRP

**Figure 4:** Commitments to adult state prisons: Pre / Post August 1996



Note: The 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

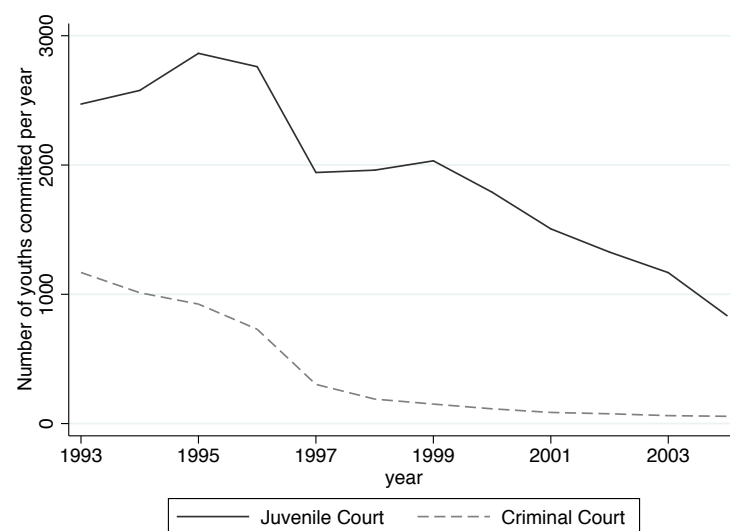
**Figure 5:** Commitments into California state prisons, by age at intake and prison type (CYA or adult facility)



Data Source: NCRP

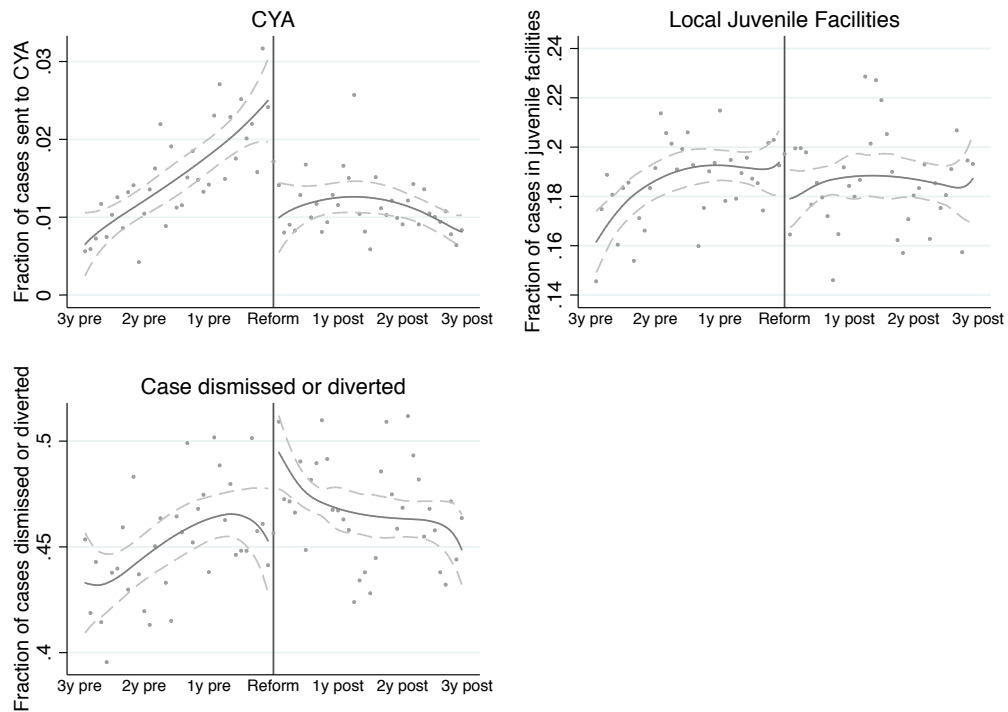


**Figure 6:** Intakes into CYA, by court of commitment: juvenile and criminal courts



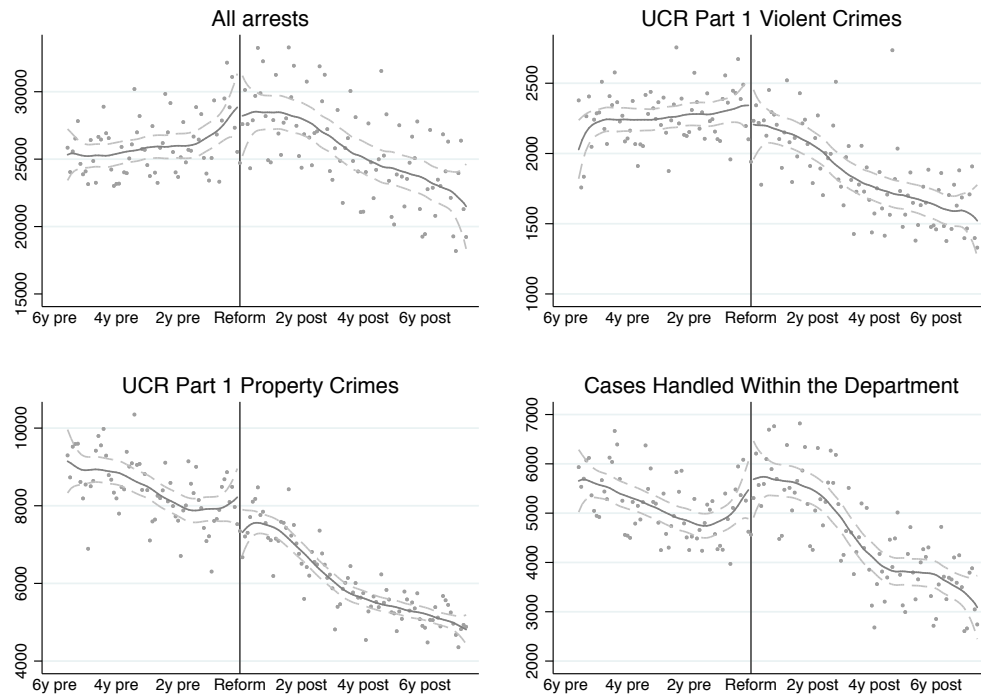
Source: Yearly data from the State of California Department of the Youth Authority report

**Figure 7:** 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: California Juvenile Court Case Records

**Figure 8:** Juvenile Arrests in California: 1991 - 2003



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 1:** Juvenile Court Case in Santa Clara and Orange County between 1992 and 2010

|                                    | Number  | Percent |
|------------------------------------|---------|---------|
| <i>Total Number of court cases</i> |         |         |
| Santa Clara                        | 129,396 | 36%     |
| Orange County                      | 225,876 | 62%     |
| <i>Demographics</i>                |         |         |
| Black                              | 24,955  | 7%      |
| Hispanic                           | 189,213 | 53%     |
| Female                             | 67,963  | 19%     |
| Age at entry (average)             | 15.5    |         |
| <i>Final disposition in 1995</i>   |         |         |
| Closed, dismissed                  | 9,299   | 46%     |
| Probation                          | 1,988   | 18%     |
| Own, relative's home               | 3,836   | 19%     |
| Secure county facility             | 3,900   | 19%     |
| CYA                                | 311     | 1.5 %   |

**Table 2:** RDD estimates: monthly court cases and characteristics in Santa Clara and Orange County, pre-post August 1996

|                           | (1)                          | (2)                | (3)               | (4)                  |
|---------------------------|------------------------------|--------------------|-------------------|----------------------|
|                           | Number of court cases for... |                    |                   | Average Age          |
|                           | All offenses                 | Level 5-7 Offenses | Hispanics         |                      |
| After Cutoff Date         | -135.9<br>(82.10)            | -86.52<br>(44.21)  | -70.30<br>(49.19) | -0.0707*<br>(0.0325) |
| Pre-reform mean           | 1656.875                     | 680.188            | 786.800           | 15.318               |
| Effective RD observations | 33                           | 33                 | 31                | 27                   |
| Bandwidth for estimation  | 17                           | 17                 | 16                | 13                   |
| Bandwidth for bias        | 27                           | 28                 | 26                | 22                   |

Standard errors in parentheses. Outcomes are specified in the column headers.

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 \$1,300 and \$2,600 per month of CYA incarceration.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 3:** RDD estimates: monthly intakes into CYA pre-post August 1996

|                                | (1)               | (2)                  | (3)               | (4)               | (5)           |
|--------------------------------|-------------------|----------------------|-------------------|-------------------|---------------|
| After Cutoff Date              | -46.1***<br>(4.6) | -36.7***<br>(6.0)    | -50.9***<br>(4.3) | -54.5***<br>(4.3) | 7.9<br>(12.5) |
| Month                          | -0.5***<br>(0.07) | -1.0**<br>(0.3)      |                   |                   |               |
| Quadratic Month                |                   | -0.003<br>(0.004)    |                   |                   |               |
| [After cutoff]*Quadratic Month |                   | 0.0001*<br>(0.00005) |                   |                   |               |
| [After cutoff]*Month           |                   | 0.4<br>(0.5)         |                   |                   |               |
| CYA intake mean pre-reform     | 94                | 94                   | 79                | 86                | 152           |
| Observations                   | 121               | 121                  | 144               | 144               | 144           |
| Effective RD observations      |                   |                      | 31                | 29                | 33            |
| Bandwidth for estimation       |                   |                      | 16                | 14                | 17            |
| Bandwidth for bias             |                   |                      | 28                | 29                | 24            |

Standard errors in parentheses

In columns 1-3, the outcome is the number of intakes into the CYA.

In column 4, the outcome is number of juveniles in California state prisons.

In column 5, the outcome is the number of 19-20 year-olds admitted to prison (placebo).

In columns (3) to (5), the estimations follow Calonico et al. (2014).

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 4:** RDD estimates: likelihood of being sent to CYA for inmates < 25 years old at the age of entry, pre-post August 1996

|                           | (1)                   | (2)                   | (3)                   |
|---------------------------|-----------------------|-----------------------|-----------------------|
| After Cutoff              | -0.028***<br>(0.0018) | -0.015***<br>(0.0025) | -0.019***<br>(0.0022) |
| Percent CYA pre-reform    | 0.05                  | 0.05                  | 0.05                  |
| Observations              | 258234                | 85127                 | 258234                |
| Effective RD observations |                       |                       | 77935                 |
| Bandwidth for estimation  |                       |                       | 654                   |
| Bandwidth for bias        |                       |                       | 994                   |

Standard errors in parentheses

Regressions include controls for offense, gender, ethnicity, age, and age squared.

Columns (1) and (2) also include linear and quadratic time trends.

(1): 1990 - 2001; (2) 2 years around the August 1996 cutoff;

(3) Estimation following Calonico et al. (2014). Bandwidths are in days.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 5:** DD estimates: number of intakes per month, CYA vs. 19-year-olds to adult prison, pre-post August 1996

|                         | (1)               | (2)                | (3)               | (4)                |
|-------------------------|-------------------|--------------------|-------------------|--------------------|
| Juvenile*[after cutoff] | -14.0***<br>(3.2) | -14.0***<br>(3.2)  | -17.2**<br>(5.2)  | -15.8*<br>(6.2)    |
| Juvenile                | -91.4***<br>(2.0) | -91.4***<br>(2.0)  | -97.0***<br>(3.6) | -101.4***<br>(4.4) |
| After cutoff date       | 10.6**<br>(3.2)   | 10.8*<br>(4.9)     | 4.8<br>(7.1)      | 1.7<br>(10.2)      |
| date                    |                   | -0.0001<br>(0.002) | 0.01<br>(0.008)   | 0.03<br>(0.02)     |
| Observations            | 6413              | 6413               | 2083              | 1043               |

Standard errors are clustered by month. (1) - (2): CYA vs. 19yo adults, 1990 - 2001. (3) and (4): CYA vs. 19yo adults, +/-2years and +/-1year respectively

**Table 6:** RDD estimates: probability that that a youth be sent to CYA, to a County Secure Facility; or that their case be closed, in Orange County and Santa Clara County

|                           | (1)                 | (2)                 | (3)                   | (4)                    | (5)              | (6)                         | (7)                         |
|---------------------------|---------------------|---------------------|-----------------------|------------------------|------------------|-----------------------------|-----------------------------|
|                           | CYA                 | CYA,<br>Court cases | County<br>Court cases | County,<br>Court cases | Case<br>Closed   | CYA<br>Offense<br>Level 1-4 | CYA<br>Offense<br>Level 5-7 |
| After Cutoff              | -0.01***<br>(0.002) | -0.02***<br>(0.004) | -0.005<br>(0.008)     | 0.009<br>(0.01)        | 0.03**<br>(0.01) | -0.07<br>(0.05)             | -0.02***<br>(0.004)         |
| Pre-reform mean           | 0.018               | 0.036               | 0.191                 | 0.355                  | 0.464            | 0.205                       | 0.033                       |
| Effective RD observations | 75959               | 32738               | 48972                 | 28050                  | 42371            | 1173                        | 30462                       |
| Bandwidth for estimation  | 695                 | 564                 | 458                   | 489                    | 395              | 635                         | 685                         |
| Bandwidth for bias        | 1071                | 856                 | 724                   | 825                    | 610              | 949                         | 1101                        |

For level 1-4 offenses (level 1 being the most serious), fees that counties paid went from \$25 to \$150 per month in CYA; compared to an increase to \$1,300 – \$2,600 for level 5-7 offenses (depending on the offense).

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Table 7:** RDD estimates: monthly juvenile arrests pre-post August 1996

|                           | (1)             | (2)            | (3)              | (4)         |
|---------------------------|-----------------|----------------|------------------|-------------|
|                           | Arrests         | Part 1 violent | Part 1 property  | Released    |
| After Cutoff              | -1059<br>(1469) | -200<br>(128)  | -1022**<br>(343) | 37<br>(417) |
| Pre-reform mean           | 26029           | 2260           | 8416             | 5164        |
| Effective RD observations | 51              | 45             | 27               | 45          |
| Bandwidth for estimation  | 26              | 23             | 13               | 22          |
| Bandwidth for bias        | 46              | 35             | 26               | 42          |

Standard errors in parentheses. The estimations follow Calonico et al. (2014).

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$