

Incentive Structures and Criminal Justice

Aur lie Ouss *
University of Pennsylvania

December 2017

Abstract

A common assumption in economics of crime is that punishment levels are chosen to equate marginal costs and benefits from society’s perspective. I present empirical evidence suggesting that in practice, punishment is based on a narrower objective function. Incentives are often misaligned in the US: states pay for prison, but counties choose sentences. 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 drop in incarceration, and no increase in arrests. Cost and benefit misalignment can result in excess incarceration without crime reduction.

*aouss@upenn.edu. I thank David Abrams, Benjamin Feigenberg, Roland Fryer, Ludovica Gazze, Lawrence Katz, Jens Ludwig, Sendhil Mullainathan, Arnaud Philippe, Steven Raphael, Bruce Western, and Ekaterina Zhuravskaya for useful comments. I thank Teri Deal and Chaz Puzzanchera for their help in obtaining juvenile court data. The juvenile court data utilized in this paper were housed in and made available by the National Juvenile Court Data Archive which is maintained by the National Center for Juvenile Justice in Pittsburgh, Pennsylvania, and supported by a grant from the Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice. The data was originally collected by the California Bureau of Criminal Statistics and Special Services. Neither the California Bureau of Criminal Statistics and Special Services nor the National Center for Juvenile Justice bear any responsibility for the analyses or interpretations presented herein. I thank LEAP for financial support.

1 Introduction

The conventional assumption in economics of crime since Becker (1968)'s seminal paper is 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 on how punishments are chosen. In recent years, the policy focus in American criminal justice has shifted towards reducing unprecedented incarceration rates. To make progress on this issue, it matters to understand what parameters of the judicial system affect incarceration decisions. In this paper, I ask how incentive structures shape law enforcement policies and practices.

I focus on one of the determinants of incentive structures in criminal justice: its fragmented organization, which results in decisions and costs often not aligning. The American criminal justice offers a particularly good context to study how piecemeal organization affects law enforcement: in most states, prisons are paid for by states, but sentences depend on the decisions of county prosecutors and judges and of municipal police.¹ The overall objective of law enforcement is to reduce offending, but decisions are made and costs are paid at different levels. Counties only bear a fraction of the total cost of the prison sentences that they assign, so incarceration is largely subsidized by the state from their standpoint. Conversely, other crime-reduction instruments, such as policing, probation, drug clinics, or primary and secondary interventions are often provided and financed locally. While not typically modeled as such, demand for incarceration may be price-elastic. This may be the case in particular if there is a menu of law enforcement options, or if there are private benefits from punishment. In those cases, what costs are borne by the decision-maker might impact sentencing.

The first objective of this paper is to estimate whether incarceration responds to changes in who pays for it, keeping costs constant. Costs of law enforcement are typically not considered as a factor entering into sentencing decisions. 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. On the

¹See 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.

policy front, recent efforts to reduce the prison population have focused on approaches like mass releases or changes in the use of mandatory minima, but not changes in cost structures directly.

In order to explore the role of cost structures in sentencing, I exploit a natural experiment that modified the financial structure of juvenile corrections: the 1996 California Juvenile Justice Realignment, whose goal was to make counties more accountable for their criminal justice expenses. Before 1996, juvenile incarceration was mainly paid for by the state. The law shifted the cost burden onto counties. The overall cost of juvenile incarceration stayed constant, and the only change was in who paid for incarceration of juveniles. 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 law enforcement. I use two strategies to identify the effect of the change in cost structures on sentencing: a regression discontinuity design, focusing on the time window around the change in laws; and a difference-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 from 40% to 60%, depending on estimate. Turning to mechanisms, 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.

I then investigate the overall costs and benefits in this shifting of the cost burden to individual counties. Pooling costs of incarceration might be welfare-increasing if incarceration has positive externalities for other counties. This could be the case, for example, if potential delinquents offend in various counties and incapacitation decreases crime in all counties. Likewise, sharing costs could enhance equity, with richer counties subsidizing incarceration in poorer counties. On the other hand, if motives other than optimal deterrence determine incarceration, or if alternative punishment options are more costly from the punisher’s standpoint, then cost-sharing might lead to over-incarceration. Furthermore, punishment choices might not fully capture the longer run costs of incarceration relative to other sanctions.²

In order to capture one dimension of the potential costs of this policy, I look at changes in crimes averted. I find that the drop in juvenile incarceration

²For example, Aizer and Doyle Jr (2015) find long-run negative impacts of juvenile incarceration, which increases likelihood of violent crimes and dropout from school.

due to the shift in costs was not mirrored by a change in arrests. This suggests that levels of incarceration under the “pooled cost” regime were inefficiently high: the extra incarceration expenditures did not provide extra safety.

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 concludes.

2 Financing Structures and Criminal Justice Organization

2.1 Governance and externalities

The first question in this paper is whether who pays for prison affects sentencing decisions. 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 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, and higher for more lenient sentences.

There has been little work on how the cost structure affects law enforcement, either theoretically or empirically. Becker (1968) discusses the relative costs and benefits of different law enforcement options, in particular of incarceration versus fines or community alternatives. 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 address the question of how cost structures impact the supply for different crime-control levers. In the basic Beckerian model of safety provision, the financing channel should not matter. Levels and methods of law enforcement are meant to sustain cost-effective levels of punishment, when considering the overall (social) costs and benefits. However, in a series of lab experiments, Ouss and Peysakhovich (2015) find that at the individual level, costs structure do matter. 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. In this paper, I ask if these lab findings hold true

in the field, at the institution level.

The possible over-use of a subsidized good has been documented in other contexts than criminal justice. 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 (law enforcement is not investigated). 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 exist for punishments. For example, electronic monitoring is much less expensive than incarceration, and DiTella and Schargrodsky (2013) also find that it reduces recidivism rates, but it may be underutilized if more expensive from the county’s perspective.

Turning to offending, 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. Likewise, 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), demonstrate spatial correlations in taxation and provision of public goods.

There is little work on the link between funding structures and the provision of criminal justice. 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. Ater et al. (2014) exploit a quasi-experimental 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 an imperfect factoring in of total costs of crime reduction when making arrest decisions. The authors highlight the role of the organizational changes as driving their results, beyond the change in cost structures; police evaluations and wages could depend on number of arrests, which would increase when costs are no longer internalized. The setup at the core of this paper is unique in that it helps identify the sole effect of shifts in cost structures, net of 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?

2.2 Law enforcement with multiple actors

While the costs that states pay for prison is determined by county and municipal actions, many of the laws that guide prosecution and sentencing are determined at the state level. In other words, the “rules of game” by which local agents decide what offenses to pursue are decided by the state. States only imperfectly observe how laws are locally applied: this is akin to an incomplete contracts setup, where the principal is the state legislator, and the agent is local law enforcement. The state (the principal) provides tools at the local level to incapacitate and deter effectively, but local authorities (the agent) have some form of discretion as to whom these laws and regulations will be applied to, a choice which will in turn affect state budgets.

In other words, there are two disconnects at play: the state makes laws which are applied at the local level; and locally determined sentences are funded by the state. Under what conditions of behaviors and externalities does this double disconnect lead to optimal levels of incarceration and crime control? Several mechanisms could interact, both in the lack of incentives to develop local alternatives to state prison, and given this fact, in the prosecuting choices of district attorneys and sentences eventually chosen. This paper focuses on the second source of disconnect, in the application of law.

3 Institutions and Data

3.1 Organization of Juvenile Justice in California

In California, cities, counties and the state all play roles in the criminal justice. Policing is mainly organized at the municipal and county levels, with

city police departments and county sheriff offices.³ 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.⁴ 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. 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 have been arrested for a felony or a misdemeanor. 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.⁵ 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 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. The Senate bill 681 proposed to establish a sliding scale, depending on the type of offense upon incarceration was less severe. Namely, the costs raised to:

\$150 for most severe offenses (murder, armed robbery...)

\$1,300 for residential robbery, burglary, assault with deadly weapon

\$1,950 for commercial battery, battery...

\$2,600 for technical parole violation, misdemeanors

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

³State 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).

⁴The age of majority is 18 years old in California.

⁵Figures from chapter 5 of Hill (2007)

specific needs of juvenile offenders. The bill was adopted in its final state in August, 1996. This increase in costs was to be applied to all juveniles in CYA custody after January 1st, 1997, including those sentenced before that date.

This bill was not intended to reduce punitiveness, but to increase individual counties' fiscal responsibility. These years are otherwise characterized by an increased punitiveness in California: in March 1994, Proposition 184 ("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.⁶ Potential changes in incarceration levels 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.

The adoption of this legislation offers a natural experiment: the law discontinuously changed the price that counties would have to pay to incarcerate 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 costs of incarceration. There are three candidate moments for when the change in cost structures could affect dispositions: when the law is first introduced (February, 1995), when the law is adopted (August, 1996), or when the law was effective (January, 1997).

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. Unfortunately, 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. 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 juvenile courts for the whole state of California. The disadvantage is that it does not present counterfactuals to incarceration. 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.

⁶http://www.lao.ca.gov/ballot/2000/21_03_2000.html

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 the California data to be particularly good and to present 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.⁷

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.⁸ 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.⁹ 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.

⁷The report with yearly statistics can be found at http://www.cdcr.ca.gov/Reports_Research/docs/research/2004-12YEAR.pdf

⁸Data 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.

⁹Data from US census, extracted from <http://factfinder.census.gov/> for the overall population and <http://ojjdp.gov/ojstatbb/ezapop/> for juvenile population

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.

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.

4 Cost structure and juvenile incarceration

My main identification strategy exploits the fact that the California Juvenile Justice Realignment introduced a discontinuous change in prices that counties had to pay for juvenile incarceration. Because of the Senate bill adopted in August 1996, each slot in a CYA facility starting January 1st, 1997, cost substantially more for the counties than before that date. I study this change in laws using two methods: a temporal regression discontinuity design (RDD) and a difference-in-differences strategy, in which I compare juvenile incarceration to that of young adults. I present each in turn.

The main identifying assumption for the RDD to be valid is that there is no selection in cases around this date. 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 shows the relationship between the number and composition of cases around the reform. I observe no discontinuous change in baseline characteristics. 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. Each dot represents the average monthly number of

admissions to CYA facilities. The vertical line is placed at August 1996, which was the date at which was passed the bill that changed the cost of incarcerating juveniles in the CYA. The lines represent kernel-weighted local polynomial regression of the number of juveniles entering CYA on months, before and after the August 1996 cutoff. This figure illustrates the discontinuous drop in the number of juveniles being incarcerated at this date.

This figure also indicates that the change in incarceration appeared in August 1996, and not January 1997, which is when the costs actually increased (including for people sentenced before then). Likewise, there is no change in February 1995, which is when the law was initially introduced. This indicates that the date in which the law was passed is the relevant moment in which changes in costs was internalized by actors, which is in itself an interesting finding from a political economy standpoint.

Moving to regression analyses, I first look at changes in overall admissions into CYA facilities, using NCRP data. Table 2 presents 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.

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 3. 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).

Difference in difference estimates. An alternative specification is to compare the evolution of incarcerations 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 big contributors to the increase in the California prison population in the 1990's were mandatory minima for strikeable offenses, which in general applied to older offenders (Helland and Tabarrok, 2007). For these institutional and empirical reasons, the difference-in-difference estimates focus on adolescents and young adults.

Tables 4 presents difference-in-difference 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 ± 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.¹⁰ 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 adult incarceration around this date confirms the idea that the change in juvenile incarceration was not due to a more general change in the organization of incarceration in

¹⁰Results are similar using other age groups as a comparison group.

California. However, the point estimates, and in particular the difference in difference estimates, 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.

5 Mechanisms: substitution across sanctions

The first objective of this paper was to establish the effect of cost structures on law enforcement decisions. To understand the policy implications of this change, is it 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.

Age patterns. 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 the 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. Interestingly, this discontinuous substitution is in itself an indicator that costs are factored into criminal justice decisions. However, 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 2 looks 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.

Note that even though this increase in juveniles incarcerated with adults is relatively small, it might have had on average negative effects. While no

research has looked at the causal impact of incarcerating youth in adult versus juvenile facilities, but Chen and Shapiro (2007) find that harsher living conditions are likely to increase recidivism. The effect of this transfer could be investigated in future research, using adult data.

Criminal court compared to Juvenile court. As mentioned earlier, 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 figure 6.¹¹ 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.

Juvenile court outcomes: 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 incarceration for Santa Clara and Orange counties.

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. Had there been a change in the number of court cases, this might indicate that at the arrest stage, youth detectives were more likely to release youth and less

¹¹Author’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

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 5 presents the change in dispositions in Santa Clara and Orange County. Columns 1 - 4 of table 5 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 to break down the analysis for two groups: those who are convicted for offenses level 1-4 (which are the most severe offenses) and those who are convicted for offenses of levels 5-7. The former group had a lesser change in price of incarceration to CYA (\$150 instead of \$25 per month), while the latter had a steep increase of prices (\$1,300 – \$2,600 per month, instead of \$25 before). Column 7 of table 5 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 8 of table 5: 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 confirms the state-wide lesser reliance on CYA after the change in laws. Interestingly, 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. Finally, this also indicates that the net effect of the policy was that less youth were being incarcerated altogether. To determine the overall effect of this lesser incarceration, and in particular to do a cost-benefits analysis, I now turn to potential changes in offending that this lesser deterrence and incapacitation could have yielded.

6 Juvenile Arrests

In order to look at the effect of lesser use of incarceration on juvenile offending, I use data from the “Uniform Crime Report: Arrests by age, sex and race” database. A large share of more minor offenses, such as disorderly conduct or liquor laws, would not have led to incarceration even after an arrest. Results are presented overall, and for more severe offenses (part 1 UCR violent and property offenses) that are more likely to lead to incarceration. In figure 8 and in table 6, 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 order of magnitude, and where the relation with incarceration would be more proximate.

There is no discontinuous change around the threshold 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 severe 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 severe offenses.

The UCR data also contains a count for the number of juvenile arrests that were dealt with within the department, and led to a release without further actions. Supposing that police would modify behaviors regarding juveniles due to the change in probability of incarceration, this would be a credible place where this could happen. 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. The last sub-figure of figure 8 presents the evolution in immediate releases: they do not discontinuously change in August 1996. Column 4 of table 6 statistically confirms this result. Table 6 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.

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, that increase may be much more widely known. If this is one of the mechanisms here, this suggests that changes in how laws are implemented could potentially reduce costs of 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 law 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 other words, this is not only a context in which marginal costs of the change in cost structures exceeded marginal benefits – there seem to have been no benefits from increased use in incarceration. 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 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. Use of 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) 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 there are externalities across space in crime control, centralized provision of incarceration might be more efficient.

The effects of this disconnect in choices and payments of incarceration in the United States is important to understand, as it might help in understanding one overlooked cause of growth in incarceration, and a possible pathway to reduce the financial burden of incarceration on states’ budgets. This disconnect might also be part of the explanation for the massive use of incarceration in the United States, even though policing appears to be more cost-effective (Donohue and Siegelman, 1998, Cook and Ludwig, 2010). Realignment 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 they might be less costly per day in prison, these savings might be off put by increased stays in prison that private prisons promote through more disciplinary incidents, to increase their revenue. 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 Jr**, “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.
- 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.
- 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,” 2017.
- 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, (0).
- 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 Schargrodsky**, “Criminal recidivism after prison and electronic monitoring,” *The Journal of Political Economy*, 2013, 121 (1), 28–73.
- 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.
- 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.
- 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.
- 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 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.
- Reaves, Brian**, “Census of state and local law enforcement agencies, 2004,” 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.
- 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.
- 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.

Figure 1: Possible Outcomes after a Juvenile Arrest in California

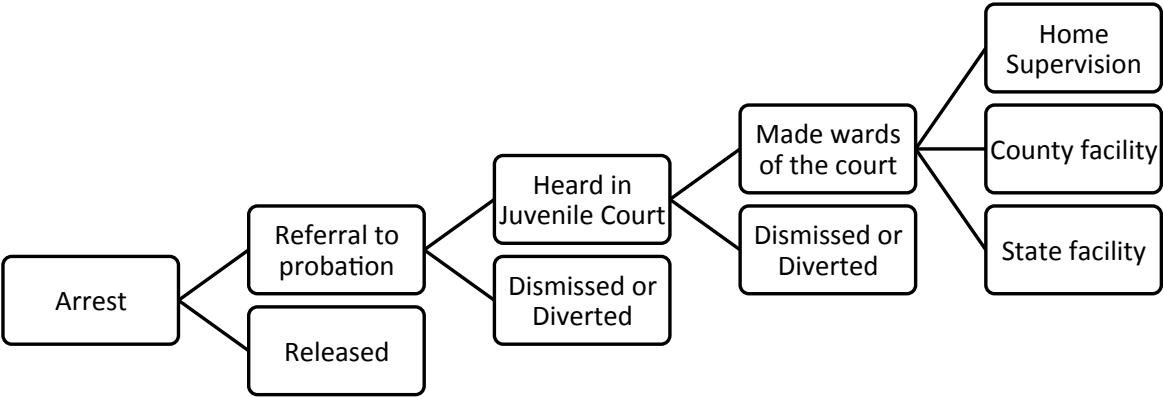
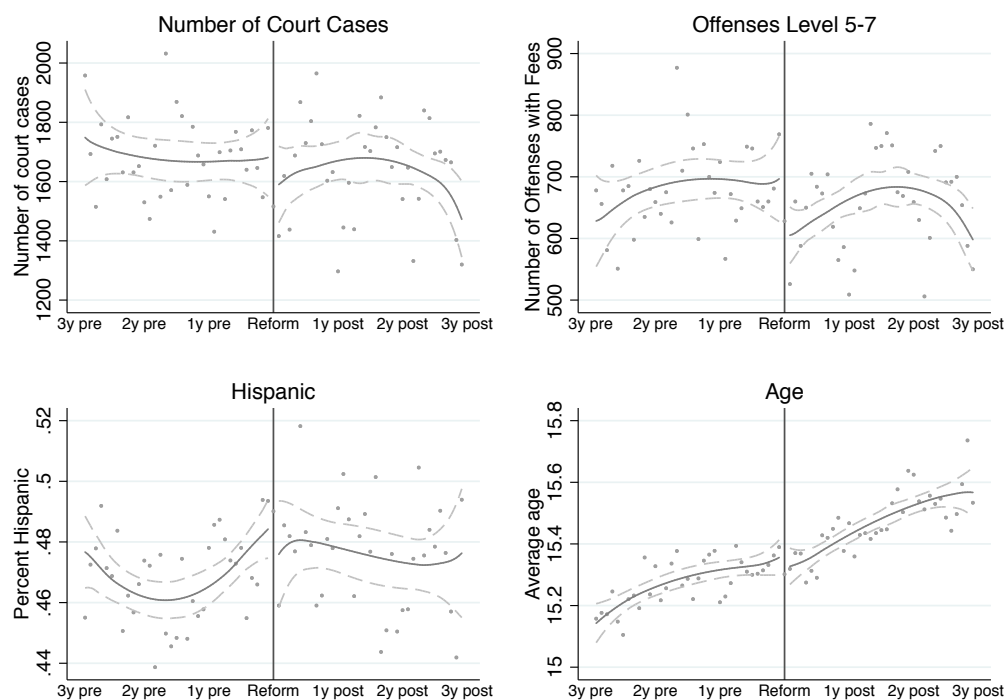
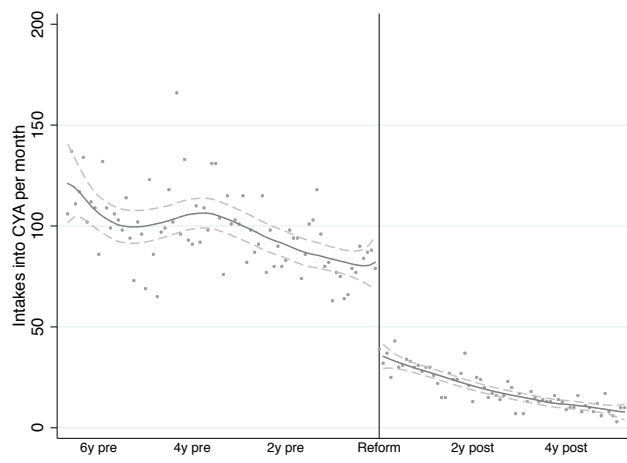


Figure 2: Discontinuities in number of cases and baseline characteristics in Orange County and in Santa Clara



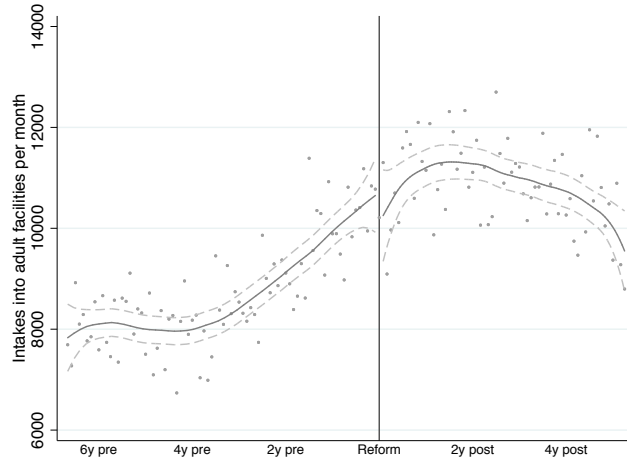
Note: These figures present a scatter plot of monthly averages for each outcome, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. Level 5-7 offenses are the least severe offenses, for which the increase in costs was greatest (\$25 to \$1,300 – \$2,600). The dashed lines present the 95% confidence interval. Data source: California Juvenile Court Case Records

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



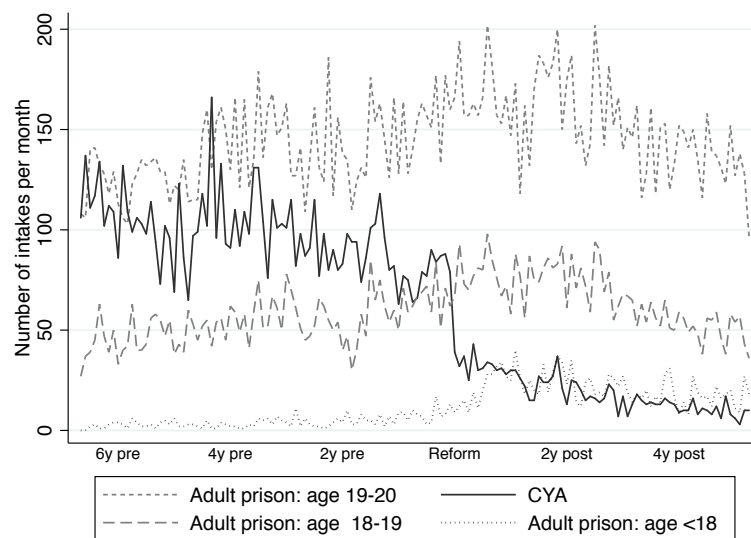
Note: The figure presents a scatter plot of the monthly averages for intakes into California Youth Authority (CYA) facilities, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval.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

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



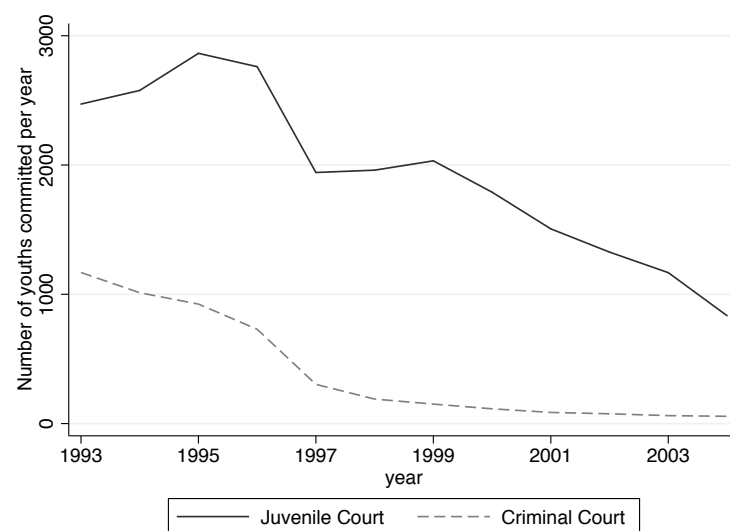
Note: The figure presents a scatter plot of the monthly averages for intakes into the California adult facilities, and local-polynomial regression lines before and after the August 1996, based on the aggregated data at the monthly level. The dashed lines present the 95% confidence interval. Data source: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

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



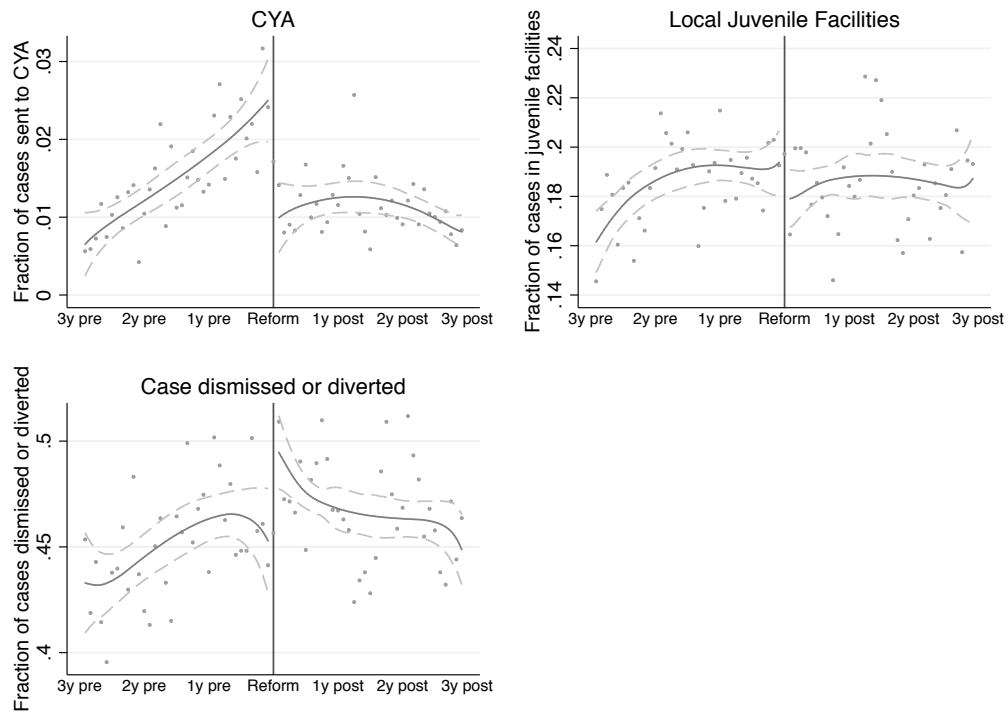
Data Source: NCRP

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



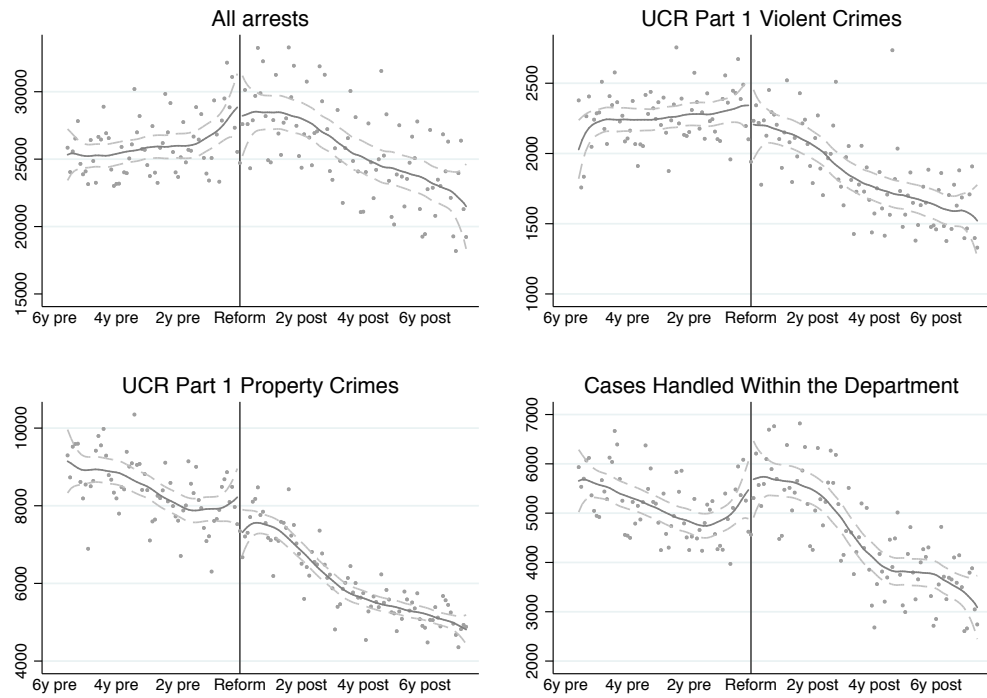
Source: Yearly data from the State of California Department of the Youth Authority report

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 intakes into CYA pre-post August 1996

	(1)	(2)	(3)	(4)
After Cutoff Date	-46.1*** (4.6)	-36.7*** (6.0)	-50.9*** (4.3)	-54.5*** (4.3)
Month	-0.5*** (0.07)	-1.0** (0.3)		
Quadratic Month		-0.003 (0.004)		
[After cutoff]*Quadratic Month		0.0001* (0.00005)		
[After cutoff]*Month		0.4 (0.5)		
Mean pre-reform	94	94	79	86
Observations	121	121	144	144
Effective RD observations			31	29
Bandwidth for estimation			16	14
Bandwidth for bias			28	29

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 columns (3) and (4), the estimations follow Calonico et al. (2014).

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

Table 3: 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*** (0.0018)	-0.015*** (0.0025)	-0.019*** (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

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

(3) Estimation following Calonico et al. (2014).

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

Table 4: 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]	-91.7*** (3.8)	-91.7*** (3.8)	-75.2*** (6.0)	-60.0*** (6.9)
Juvenile	-42.4*** (2.9)	-42.4*** (2.9)	-62.0*** (4.4)	-75.3*** (4.6)
After cutoff date	13.3*** (3.6)	28.9*** (5.3)	18.1* (7.1)	4.4 (10.1)
Month		-0.2*** (0.05)	0.04 (0.2)	1.0 (0.7)
Observations	288	288	92	46

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 5: 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, Court cases	County Court cases	County, Court cases	Case Closed	CYA Offense Level 1-4	CYA Offense Level 5-7
After Cutoff	-0.01*** (0.002)	-0.02*** (0.004)	-0.005 (0.008)	0.009 (0.01)	0.03** (0.01)	-0.07 (0.05)	-0.02*** (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

Standard errors in parentheses

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

Table 6: RDD estimates: monthly juvenile arrests pre-post August 1996

	(1)	(2)	(3)	(4)
	Arrests	Part 1 violent	Part 1 property	Released
After Cutoff	-1059 (1469)	-200 (128)	-1022** (343)	37 (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).

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