Prison Break: The Causal Impact of Replacing¨ Short Incarceration with Fines*

Preliminary Draft

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Abstract

Replacing short prison sentences with administrative sanctions is a common policy proposed in response to prison overcrowding, prison costs, and doubts about prison effectiveness. However, little is known about the specific effects of such a policy-relevant substitution. The 2007 revision of the Swiss Criminal Code provided for the substitution of imprisonment with fines for unsuspended sentences of less than six months. I leverage the timing of this policy change in a difference-in-differences setting using individual-level matched panel data on the universe of convictions and on social security contributions. I find that short prison sentences do not reduce recidivism, while they consistently worsen the labor market position of the convicted. These findings suggest that substituting fines for imprisonment in the case of low-level offenses could be welfare enhancing, even in prison systems organized around the principles of rehabilitation and normality.

Keywords: Incarceration, Fines, Recidivism, Labor Market Outcomes
JEL Classification: J01, K14, K42

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1 Introduction

This paper provides quasi-experimental evidence on how the replacement of short incarceration with economic sanctions impacts convicted individuals' recidivism and labor market outcomes in the European context. The substitution of prison sentences with administrative sanctions for low-level offenses has been called by several institutions, such as the United Nations Office on Drugs and Crime (UNODC, 2013) and the Council of Europe's European Committee on Crime Problems (CDPC, 2016), and is on the political agenda of many countries, such as the United Kingdom (Mills, 2019; Farley and Nevett, 2024). There are three main reasons motivating such a policy change. First, incarceration is a costly policy. Inmates in Council of Europe (CoE) countries costed on average about €130 per day in 2022, with spikes of more than than €300 per day in Nordic countries (Aebi and Cocco, 2024). About 1 million people were held in prison in Europe on April 2024 a (Fair and Walmsley, 2024), resulting in an approximate cost of about €50 billions spent on inmates in Europe per year. Second, prisons are often overcrowded. The average occupancy rate of prisons among members of the Council of Europe (CoE) in January 2023 was 87.8%, with occupancy rates exceeding 100% in 12 out of 46 countries – including France, Italy and Sweden (Aebi and Cocco, 2024). Third, the effectiveness of short incarceration is unclear. Prison is meant to reduce crime through its deterrent and incapacitation effects, but also affects convicts' future recidivism rates. On the one hand, particularly in Europe, incarceration organized around the principle of rehabilitation may be cost-effective if it positively affects convicts' social reintegration. On the other hand, particularly for short sentences, incarceration may lack time to deliver rehabilitation experiences and result in criminogenic effects.

This paper exploits a policy change implemented in Switzerland. Switzerland provides an interesting context for studying the counterfactual consequences of imprisonment and administrative sanctions. In line with other European countries, Switzerland experienced stable incarceration rates in the last decades. Since the 1990s, the prison population in Switzerland constantly lied at around 70 individuals per 100.000 inhabitants. However, until recently, custodial sentences were the only available option for convictions more serious than simple contraventions – earning Switzerland a reputation as *world champion* in enforcing short prison sentences (Riklin, 2011). The 2007 revision of the General Provisions of the Swiss Criminal Code had the goal to change this, and unsuspended custodial sentences of less than six months were only allowed when explicitly motivated by the inability to perform a monetary or public works sentence (StGB/2007, Art 40-41). Using administrative data from the Conviction Statistics, I show that the reform drastically reduced the share of prison sentences among unsuspended sentences shorter than six months

from 100% to 33%.[1] Unsuspended sentences between six and twelve months were instead further largely punished with imprisonment (82%), which gives the opportunity to analyze the reform in a difference-in-differences setting. Moreover, individual panel data for Swiss Central Compensation Office allow to estimate the differential impact of the policy on labor market outcomes through event study models.

The findings suggest that the deterrent and incapacitation effects of prison do not lead to lower recidivism when compared to monetary sentences in the studied population. On the other hand, individuals convicted for custodial sentences are importantly worse off in the labor market – losing about CHF 18,000 in the five years following the offense date. Event studies confirm diverging post-conviction labor market earnings before and after the reform, whereas pre-conviction trends are fairly comparable and no difference is detected for longer sentences. These findings suggest that substituting imprisonment with fines in the sentencing of low- and medium-level offenders could be welfare enhancing, leaving recidivism untouched and benefiting offenders' labor market outcomes - even in a context where incarceration is organized around the principles of rehabilitation and normality.

This paper contributes to the literature evaluating the consequences of short incarceration on convicts' social reintegration, with particular focus on the comparison with fines as an alternative punishment method. Scholars have assessed causal impacts of incarceration on various measures of social integration (e.g. recidivism, labor market attachment) using a variety of identification strategies: random assignments of differently-stringent judges (e.g. Green and Winik (2010)), discontinuities in score-based sentencing guidelines (e.g. Rose and Shem-Tov (2021)), changes in sentencing or clemency policies (e.g. Drago et al. (2009)). Literature reviews (Loeffler and Nagin, 2022; Doleac, 2023) and meta-analyses (Villettaz et al., 2015) find that the evidence on the effects of post-conviction imprisonment on recidivism is mixed, mostly detecting small impacts and sometimes – depending on the context – reducing or augmenting effects. These heterogeneous impacts reflect the counteracting channels of the incarceration experience. Incarceration is thought to reduce re-offending through direct incapacitation (i.e. the physical isolation of offenders), specific deterrence (i.e. the punishment), and rehabilitation experiences (i.e. cultural re-education or skills training) – but may at the same time increase re-offending through its criminogenic effects (i.e. antisocial prison experience or stigmatization) or by indirectly worsening the offender's position in society (e.g. through exclusion from the labor market). Therefore, on the one hand, the question of *which incarceration* works has gained on importance. In the Norwegian context, Bhuller et al. (2020) have shown that imprisonment based on rehabilitation principles can reduce recidivism among individuals with poor labor market attachment. Recently, Alsan et al. (2024) have suggested that this result may also hold

[1] As explored in Appendix B, the remainder assignment of short prison sentences after the reform can be significantly predicted by pre-offense earnings and the place of residence.

in the United States. Despite some additional evidence on the effects of rehabilitative incarceration from other Scandinavian countries (e.g. Huttunen et al. (2020) in Finland; Dobbie et al. (2018) in Sweden; Michel and Hémet (2021) in Denmark), due to the scarce experience with this type of incarceration in the United States and to the shortage of proper data and identification methods in other countries, this strand of literature still remains relatively unexplored. On the other hand, there seems to be a literature gap on the exploration of prison alternatives that avoid criminogenic effects, but may reduce incapacitation effects (Doleac, 2023). This study therefore adds to this specific strand of literature, given that the Swiss approach to incarceration focuses on rehabilitation, basing on the principles of improving the social behavior of the inmates, promoting their ability to live without re-offending, and serving the sentence under conditions that correspond as much as possible to those of normal life (StGB/2024, Art. 75.1). It also provides causal evidence on the substitution of short imprisonment with monetary sanctions, instead of assessing absence (reduction) of penalty as a counterfactual impact.

The remainder of this paper is organized as follows. Section 2 describes the Swiss criminal, sentencing and incarceration landscape. Section 3 presents the data and Section 4 provides descriptive statistics. Section 5 discusses the identification strategy, and formalizes the empirical methodology. Section 6 presents the results, and Section 7 concludes.

2 Swiss Criminal Landscape

2.1 Criminal Activity

International comparisons in crime rates are difficult because of the lack of homogeneous indicators, but possible for selected offenses. Generally, criminal activity in Switzerland is comparable to that of other European countries. With respect to the United States, Switzerland has substantially lower rates for violent crimes such as homicides. However, for less violent crimes such as burglary, Switzerland and United States are similar.

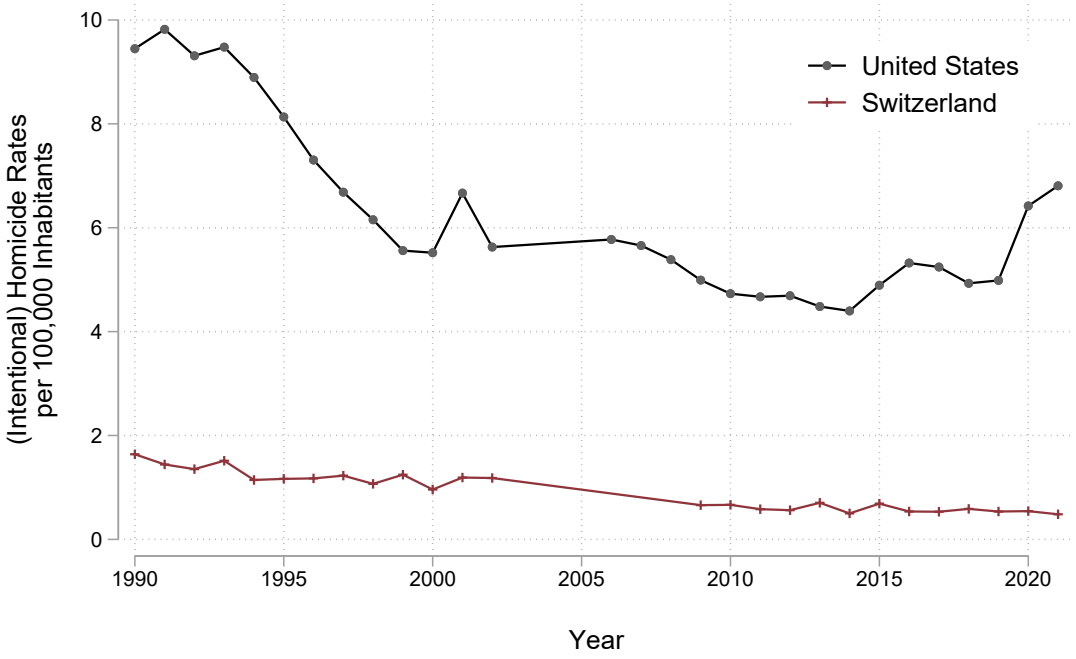
Figure 1 shows the evolution of the homicide rates in the United States and Switzerland since 1990 (World Bank, 2024). Homicide rates have been falling steadily in both countries, but the United States remain well above Switzerland (6.8 and 0.48 homicides per 100,000 inhabitants in 2021). As shown in Figure A7, Swiss homicide rates since the 1990s have been similar to those of other selected European countries.[2]

Figure 2 shows the evolution of the burglary rates in the United States and Switzerland

[2] OECD (2020) confirms the low homicide rate in Switzerland with 0.3 homicides per 100,000 inhabitants in 2020 – far below the United States (6.0) and the OECD average (2.6). Further, Switzerland ranks 5th out of 41 countries in the share of respondents indicating to feel safe walking alone at night (85.9%) – above the United States (78%) and OECD average (74%).

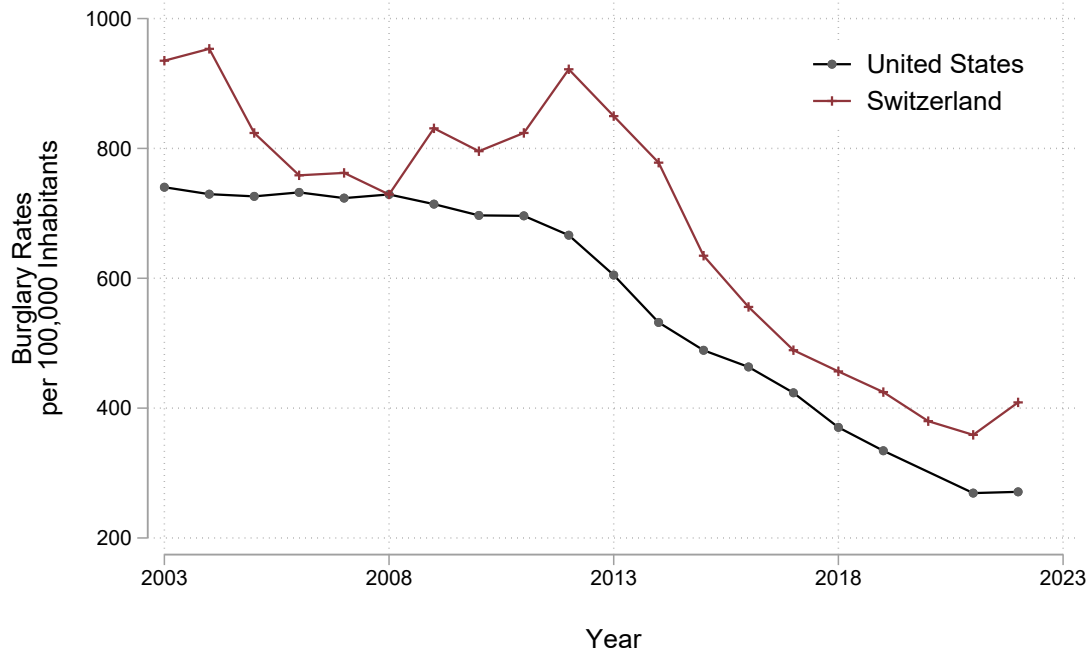
since 2003 (UNODC, 2024). Burglary rates have been falling steadily in both countries, but in this case Switzerland has even higher rates than the United States (409 and 271 burglaries per 100,000 inhabitants in 2022). As shown in Figure A8, Swiss burglary rates have been similar to those of other selected European countries.

Figure 1: Intentional Homicide Rates in Switzerland and United States, 1990-2020



Source: World Development Indicators (World Bank).

Figure 2: Burglary Rates in Switzerland and United States, 2003-2022



Source: UNODC.

2.2 Sentencing

Prosecution and adjudication by the federal and cantonal criminal justice authorities of offenses under federal law are regulated in the Swiss Criminal Procedure Code (*Strafprozessordnung, StPO*). Prosecution authorities are the police, the public prosecutor, and the authorities responsible for prosecuting contraventions (StPO, Art. 12), whereas courts have judicial powers in criminal proceedings (StPO, Art. 13). Most of the criminal rulings in Switzerland are sentenced by prosecutors in form of summary penalty order (StPO, Art. 352), which can impose penalties up to a length of six months. Appendix A summarizes the available sentences, which in the 2007 Swiss Criminal Code were custodial penalties, monetary penalties, public works and fines. Sentences are determined according to the culpability of the offender, taking into account previous conduct, personal circumstances and impact of the sentence (StGB/2007, Art. 47) as well as other mitigation grounds (StGB/2007, Art. 48).

Sentences for offenses classified as misdemeanors and felonies are registered in the criminal record (StGB/2007, Art. 366). Personal criminal records are accessible to some authorities and to the offender (StGB/2007, Art. 367,370). An extract from the criminal record may be requested in various life processes, such as when applying for a job, as a regular proof in the case of certain professions (e.g. airport, banks, judiciary), when renting an apartment, or in the naturalization process. Criminal records are expunged after a certain period of

time, depending on the severity of the crime. For unsuspended prison sentences under 1 year, suspended prison sentences, fines, public works and fines, criminal records are kept for 10 years.

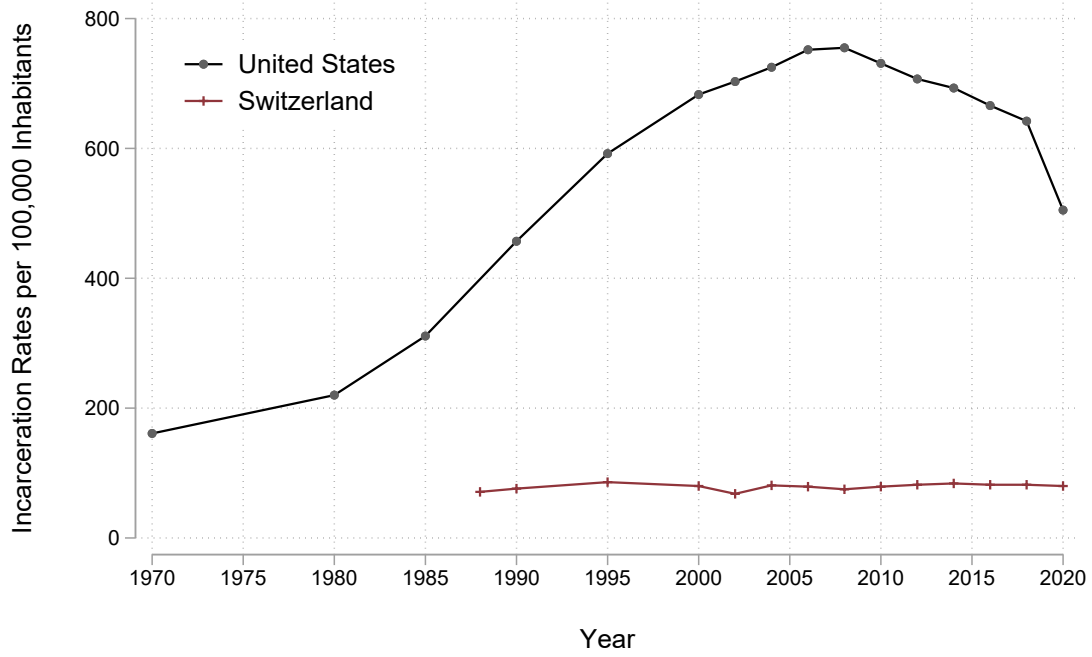
2.3 Incarceration

Incarceration Rates

Figure 3 compares the relative prison populations of the United States and Switzerland. Between 1970 and 2008, the prison population in the United States increased dramatically from 328,020 to 2,307,504 individuals and from 161 to 755 individuals per 100,000 inhabitants; it then stabilized above 2 million individuals until 2019, and recently dropped as a result of the Covid-19 pandemic reaching 1,767,200 individuals and 531 individuals per 100,000 inhabitants in 2021 (ICPR, 2024a). The emergence of mass incarceration in the United States is unique among OECD countries, and is not related to surges in crime rates, but rather to increases in the propensity and length of prison sentences (Raphael and Stoll, 2013).[3] Switzerland, on the other hand, experienced low and stable incarceration rates. Between 1988 and 2020, the prison population in Switzerland went from 4,679 individuals and 71 individuals per 100,000 inhabitants to 6,445 individuals and 73 individuals per 100,000 inhabitants (ICPR, 2024b). As shown in Figure A9, Swiss incarceration rates in recent decades have been similar to those of other selected European countries.

[3] Indeed, FBI (2023) estimates that violent and property crimes halved between 1985 and 2022.

Figure 3: Incarceration Rates in Switzerland and United States, 1970-2020



Source: World Prison Brief (ICPR).

Incarceration Experience

The experience with incarceration in Switzerland is fundamentally different from that in the United States. Whereas the U.S. focuses primarily on deterrence and incapacitation (Andrews and Bonta, 2010), the Swiss approach focuses on rehabilitation. The enforcement of adult custodial sentences in Switzerland is regulated in the Swiss criminal code (Art. 75-89). It is based on the principles of improving the social behavior of the inmates, promoting their ability to live without re-offending, and serving the sentence under conditions that correspond as far as possible to those of normal life (StGB/2024, Art. 75.1). The institutions and the inmate cooperate in drawing up a sentence management plan, which includes details of the supervision offered, the opportunities for work and training, making reparations, relations with the outside world and preparations for release (StGB/2024, Art. 75.2-3). Prison inmates are obliged to work (StGB/2024, Art. 81), and receive a symbolic wage, part of which they can dispose of while serving their sentence (StGB/2024, Art. 83). Normally, the inmate spends his work, rest and leisure time in the institution (StGB/2024, Art. 77), but in some cases there is the possibility of day release and/or external accommodation (StGB/2024, Art. 77a). Inmates have the right to receive visitors and cultivate contacts with persons outside the institution (StGB/2024, Art. 84). Inmates who have served at least three months and two-thirds of their sentence on a good conduct may be released on parole (StGB/2024, Art. 86), subject to a probationary period for the

remainder of the sentence duration (StGB/2024, Art. 87).

The Swiss cantons are in charge of the execution of custodial sentences (BV/2024 Art. 123), and since the 1960s have operated within three regional penitentiary concordats: The Concordat of Latin Switzerland, the Concordat of Northwestern and Central Switzerland and the Concordat of Eastern Switzerland. The Correctional Services Commission (*Justizvollzugskommission, JuvKo*) organises nationwide exchange, coordination and a certain degree of harmonization between the concordats. On January 31st, 2023, Switzerland had a custodial capacity of 7,196 places distributed over 89 facilities, with a minimum of 5 and a maximum of 399 places, and a national occupancy rate of 90% (FSO, 2023a).

3 Data

3.1 Criminal Convictions

I use administrative data on criminal convictions from the Conviction Statistics (*Strafurteilsstatistik, SUS*) collected by the Swiss Federal Statistical Office. The data cover the universe of criminal convictions that constitute a criminal record and are pronounced on adults in Switzerland. The data provide information on the sentence (sentence imposed, offense law number, cantonal court, monthly date of the offense, monthly date of the sentence), and on the convicted person (sex, nationality, residence permit, age). The data have a personal offender identifier, which allows the construction of a panel structure. I have data on the universe of unsuspended sentences for the period 2005-2019 and on the universe of suspended sentences for the period 2005-2008 (data start on January 27, 2005).

Using the panel structure and focusing on unsuspended sentences, I construct measures of offender recidivism. For each month following an unsuspended sentence, I track whether the same individual is sentenced for another unsuspended offense (*sentence to sentence*) or commits an offense that later receives an unsuspended sentence (*sentence to offense*). To account for the impact of pre-trial measures, I repeat this exercise starting with the end date of offenses associated with an unsuspended sentence (*offense to sentence* and *offense to offense*). Finally, I aggregate recidivism measures into three types of outcomes. First, the probability of recidivism in a given month since sentencing (/offense) date. Second, the cumulative probability of having at least one recidivism event in all the months between the sentencing (/offense) date and the analyzed month. Third, the cumulative number of recidivism acts in all the months between sentencing (/offense) date and the analyzed month.

There are two main limitations of the data. First, the start of the data in 2005 does not allow first offenders to be properly identified. In fact, registered offenses may follow earlier unobserved offenses. Since the probability of recidivism typically decreases with

time, this limitation is especially problematic the closer the observation is to the begin of the series. Appendix D explains how I deal with this problem when constructing samples of first offenders at different distances from the start of the data. Second, the data does not provide information on the sentence execution. On the one hand, I can therefore only impute the timing of the execution around the date of the judgment. Monetary penalties had to be paid within 12 months from the conviction (StGB/2007, Art. 35), with a possible extension to 24 months (StGB/2007, Art. 36.3a). The law does not provide for a precise time limit for the execution of custodial sentences, which are often served as pre-trial detention already before the conviction. Moreover, for custodial sentences longer than 3 months, release on parole was possible after having served two thirds of the sentence on good conduct (StGB/2007, Art. 86). On the other hand, since the execution of monetary penalties is not monitored, there is no information on whether the penalty is converted into a custodial penalty. Finally, before 2007, public works were a form of custodial sentences and can not be distinguished from the latter.

3.2 Labor Market Outcomes

I use administrative data on individual contributions into the Swiss social security (*Individual Konten AHV*) collected by the Swiss Central Compensation Office (*Zentrale Ausgleichsstelle, ZAS*). Every adult residing or working in Switzerland is required to pay contributions, and any annual earned income exceeding CHF 2,300 is subject to contributions. The data provide information on an annual basis on the amount of contributions, the monthly contribution period and the source of contributions. Possible sources of contributions are employment, registered unemployment, disability, income replacement for military and civil service, as well as for maternity -, paternity -, adoption -, and care leave. The data have a personal identifier that allows the construction of individual labor market histories with panel structure. The data cover the years 1995 to 2021.

Using the panel structure, I construct measures of monthly labor market outcomes. On the earnings side, I distinguish between labor market earnings (earnings linked to an employment activity) and total earnings (earnings linked either to an employment activity or to social security). I am not able to infer variation within a spell period, and thus distribute earnings evenly over the covered months. On the employment side, I observe whether an individual has generated income from an employment activity in a given month. I also track whether an individual receives unemployment benefits in a given month. As described in Section 2.3, prison inmates in Switzerland are required to work (StGB/2007, Art. 81) for a symbolic wage (StGB/2007, Art. 83). To account for inmate employment, I construct a proper employment measure for individuals who earned at least CHF 1,000 from an employment activity in a given month.

A minor limitation of the data is the inability to disentangle periods of missing contributions due to inactivity from missing contributions due to emigration or decease. I keep periods between contribution spells in the sample and impute absence of earning activities and zero earnings. For the sample of individuals convicted between 2005 and 2008, the median duration of these imputed spells is 3 months, with 26.9% lasting just one month and 82.8% lasting less than 12 months (see Figure A10).

3.3 Data Merge

Data on criminal convictions were matched to labor market data at the individual level by the Federal Statistical Office. The matching process was based on name, surname, and date of birth. In the period 2005-2008, 68.92% out of the 64,420 unsuspended sentences (excluding fines) and 76.12% of all the pronounced 379,000 sentences could be matched to a labor market outcome in the same year. Between 2005 and 2019 period, 65.60% out of 340,957 unsuspended sentences (excluding fines) were matched. Table A5 shows how the characteristics of sentences in the matched sample differ from those that could not be matched. In particular, the matched sample includes significantly more convictions of individuals born and living in Switzerland, and fewer violations of the Foreign Nationals Act.

4 Descriptive Statistics

4.1 Criminal Convictions

Table 1 summarizes the data on criminal convictions in the 2005-2008 period for the whole sample and for the subsample of unsuspended sentences.[4] In total, the sample counts 379,303 offenses - of which 64,423 receive an unsuspended sentence (37%). Partially suspended sentences are a minority (less than 1%), whereas most of the sentences are suspended (62%).

Offender Characteristics: On average, offenders are relatively young (35 years) and in large part men (86%). Half of the convicted were born in Switzerland (50%), and the majority resides in Switzerland (81%). In line with general demographic figures, among the convicted living in Switzerland, 59% live in a German-speaking canton and 41% live in a French- or an Italian-speaking canton.[5] Offenders sentenced to unsuspended sentences are slightly younger, more often men, and less likely to be born or reside in Switzerland

[4] Offenses punished with a fine as a main sentence are not considered in the sample of unsuspended sentences. With the reform, fines – as main penalty – are mainly substituted by conditional monetary sentences.

[5] The officially multilingual cantons of Bern and Grisons were classified as German-speaking, whereas Fribourg and Valais were classified as French-speaking.

than offenders in the whole sample.

Sentence Characteristics: Keeping in mind the effects of the 2007 Revision of the Swiss Criminal Code – which led to replacement of most short prison sentences with monetary sentences (see Section 5)–, in the whole sample two fifth of the sentences are monetary (42%), two fifth are prison or public works (38%) and one fifth are fines (20%). Focusing on unsuspended sentences, the weight of prison sentences increases substantially. As shown also in Figure A11, about 95% of the charges are sentenced under four laws: Road Traffic Act, Criminal Code, Narcotics Act and Foreign Nationals Act.[6] Looking at all convictions, more than half of the charges are under the Road Traffic Act (52%), and one quarter under to the Criminal Code (26%). Focusing on unsuspended sentences, the Road Traffic Act loses weight (34%) and has a comparable size to the Criminal Code (36%), and charges under the Foreign Nationals Act (7% to 14%) and the Narcotics Act (9% to 13%) also gain weight. The large majority of the convictions are sentenced to a short sentence under six months (94% in the whole sample, 87% in the unsuspended sentences subsample). The average length of unsuspended penalties is 27 days in the whole sample and 138 days in the sample of unsuspended sentences. Suspended penalties have an average length of 29 days.

Process Characteristics: On average, sentences are given about six months after the offense date. In 13% of all conviction cases and in 32% of the cases receiving unsuspended sentences, individuals are subjected to detention before the trial. Pre-trial detention lasts on average 7 days in the whole sample and 29 days in case of unsuspended sentences. Finally, most of the decisions are taken in form of summary penalty by prosecutors (75% in the whole sample and 65% in the subsample of unsuspended sentences).

[6] Sentences containing multiple charges are allocated proportionally to the share of charges of each law. For simplicity, charges are weighted equally in this calculation.

Table 1: Descriptive Statistics: Criminal Convictions, 2005-2008

	All Sentences				*Unsuspended Sentences*			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Sentence Conditionality:								
Unsuspended (%)	37.1	48.3	0	100	100.0	0.0	100	100
Part. Suspended (%)	0.9	9.4	0	100	0.0	0.0	0	0
Suspended (%)	62.0	48.5	0	100	0.0	0.0	0	0
Offender Characteristics:								
Age (y)	34.3	12.5	18	97	32.8	10.7	18	85
Men (%)	85.5	35.2	0	100	91.3	28.2	0	100
Born in CH (%)	49.7	50.0	0	100	42.8	49.5	0	100
Living in CH (%)	80.8	39.4	0	100	79.0	40.7	0	100
Living in Lat. CH (%)	33.0	47.0	0	100	34.1	47.4	0	100
Sentence type:								
Prison or Pub. Works (%)	38.0	48.5	0	100	72.5	44.6	0	100
Prison (%)	36.0	48.0	0	100	65.8	47.4	0	100
Pub. Works (%)	2.0	14.0	0	100	6.7	25.1	0	100
Monetary (%)	41.9	49.3	0	100	27.5	44.6	0	100
Fines (%)	20.1	40.1	0	100	0.0	0.0	0	0
Offence Law:								
Road Traffic Act (%)	52.2	48.5	0	100	34.4	45.3	0	100
Criminal Code (%)	25.8	41.4	0	100	36.0	43.3	0	100
Foreign Nationals Act (%)	6.9	22.1	0	100	13.6	29.1	0	100
Narcotics Act (%)	9.4	28.0	0	100	12.6	30.3	0	100
Sentence Length:								
Uns. Short (<6M) (%)	97.4	15.8	0	100	87.3	33.4	0	100
Uns. Med (6-12M) (%)	1.0	9.9	0	100	4.6	20.9	0	100
Uns. Long (>12M) (%)	1.6	12.5	0	100	8.2	27.4	0	100
Uns. Length (d)	27.0	170.4	0	32,872	138.3	424.2	1	32,872
Sus. Length (d)	29.3	72.3	0	1,278	0.1	5.7	0	730
Process Characteristics:								
Decision Length (M)	6.4	10.2	0	395	6.0	9.7	0	320
Pre-Trial Detention (%)	13.4	34.0	0	100	31.5	46.5	0	100
Pre-Trial Detention (d)	6.7	50.7	0	3,124	28.5	111.5	0	3,124
Process: Prosecutors (%)	75.4	43.0	0	100	64.9	47.7	0	100
Observations	379,290				64,323			
Individuals	258,274				28,107			

Source: SUS. Unsuspended sentences excluding fines. Public work included as prison in 2005/06.

4.2 Labor Market Outcomes

Table 2 summarizes the data on labor market outcomes for matched individuals with a criminal conviction sentenced in the 2005-2008 period for the whole sample and for the subsample of unsuspended sentences (excluding fines). Individual labor market outcomes are constructed taking the average of the 12 months prior to offense end. Offense date is preferred to sentence end, because the outcomes of some individuals may distorted by pre-trial detention.

Generally, the table shows how convicted individuals are worse off on the labor market when compared to average national level statistics. Also, as expected, individuals convicted for unsuspended sentences exhibit worse average labor market outcomes than individuals convicted for suspended sentences or fines. Specifically, the average monthly total earnings are CHF 3,825 in the whole sample and CHF 2,434 in the sample of unsuspended sentences. Focusing on labor market earnings only, the figures are very similar. As a comparison, the median wage in 2008 in Switzerland was around CHF 5,800 (FSO, 2009). Focusing on employment, 74.4% of the whole sample and 56.3% of the subsample with unsuspended sentences generate some earnings from employment. However, a substantial part of them generates less than CHF 1,000 per month and individuals above this threshold are just 65.7% and 47.2%. The percentage of individuals in registered unemployment was 6.0% in the whole sample and 7.6% in the subsample of unsuspended sentences. As expected, this value is higher than at national level, where the registered unemployment rate between 2005 and 2008 was 3.1% (SECO, 2009). Invalidity and income replacement are found in a small part of the two samples.

Table 2: Descriptive Statistics: Labor Market Outcomes, 2005-2008

	All Sentences				*Unsuspended Sentences*			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Earnings (CHF):								
Total	3,825	8,981	0	3,161,133	2,434	3,601	0	211,707
Total (>0)	4,741	10,348	1	3,161,133	3,245	4,255	1	211,707
Labor Market	3,665	9,038	0	3,161,133	2,248	3,686	0	211,707
Labor Market (>0)	5,405	11,357	1	3,161,133	4,576	4,888	1	211,707
Activity (%):								
Employment	74.4	37.8	0	100	56.3	43.1	0	100
Employment (>1,000)	65.7	41.8	0	100	47.2	44.0	0	100
Unemployment	6.0	18.3	0	100	6.8	19.3	0	100
Income Replacement	0.5	4.5	0	100	0.3	3.4	0	100
Invalidity	0.4	5.2	0	100	0.3	4.7	0	100
Observations	271,969				42,795			
Individuals	218,535				22,915			

Source: SUS and ZAS. Period: 2005-2008.

5 Methods

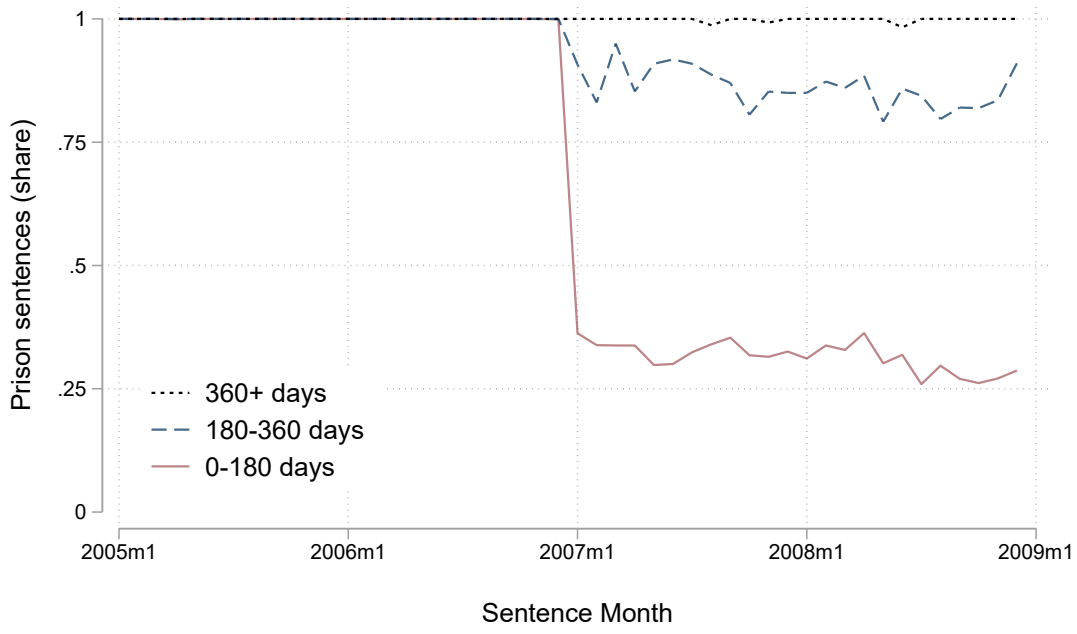
5.1 The 2007 Revision of the Swiss Criminal Code

On January 1, 2007, a revision of the General Provisions of the Swiss Criminal Code (*Allgemeiner Teil des Schweizerischen Strafgesetzbuches*, AT-StGB) came into force. This reform addressed Switzerland's history as a "world champion" in enforcing short prison sentences (Riklin, 2011). Short prison sentences were to be replaced by the newly introduced monetary penalties, assigned as personal conditions-dependent daily rates (see Appendix A for a description of the available sentences). For suspended sentences, the replacement was complete. For unsuspended sentences, judges were in principle only allowed to hand down prison sentences of less than six months if neither a monetary penalty nor public works could be performed (StGB/2007, Art. 40 and 41.1), and only behind an explicit motivation (StGB/2007, Art. 41.2). Possible motivations included the inability to pay, or to the risk of avoiding a non-custodial sentence, for example by fleeing Switzerland. In practice, as pointed out by Killias (2011) and investigated in Appendix B, these rules have resulted in substantially lower declines of prison sentences for poorer individuals and foreigners.

Figure 4 shows the effect of the reform on the share of unsuspended prison sentences in all unsuspended sentences by month of the sentence and by sentence length. Monetary

sentences are assigned in form of daily rates, which are equivalent to days of custody in case the convicted can not pay (StGB/2007, Art. 36.1), and thus provide a comparable measure for sentence length. With the entry into force of the reform in January 2007, the average share of prison sentences falls drastically from 100% to 33% for sentences of short duration (less than six months). For longer sentences, the replacement is much lower: the average prison share drops from 100% to 82% for sentences of medium duration (six to twelve months), and remains at 100% for long sentences (above one year). As shown in Figure A14 and Figure A15, the same replacement pattern is recognizable when focusing on the absolute number of sentences, and over a longer period of time. The claimed reduction in short prison sentences is therefore largely confirmed by the data.

Figure 4: Share of Unsuspended Prison Sentences by Sentence Month and Sentence Length, 2005-2008

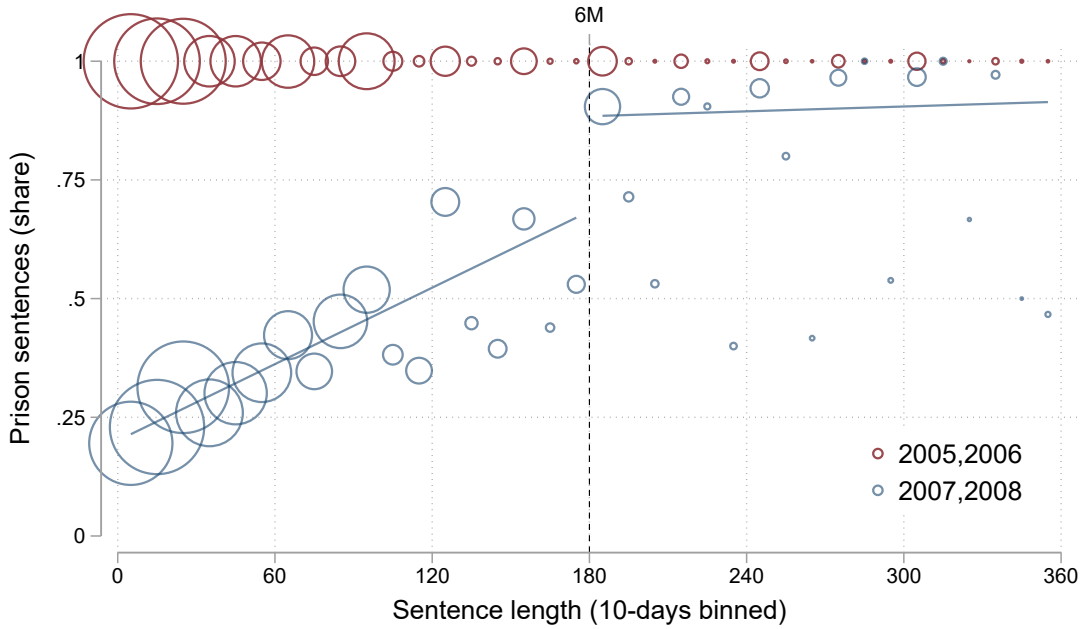


Source: SUS individual data.
Sample: Unconditional sentences (fines excluded). Public Works included as prison.

Figure 5 further explores the role of sentence length in the reduction of prison sentences. To improve the clarity of the graph, sentences are grouped into 10-days intervals (see Figure A16 for a comparison without binning). The size of the bubbles indicates the number of sentences of a given length, indicating that shorter sentences are more common. In years 2005 and 2006, i.e. before the reform (red bubbles), all unsuspended sentences implied imprisonment. In years 2007 and 2008, i.e. after the reform (blue bubbles), prison sentences were largely replaced by monetary ones. The substitution was the stronger, the shorter the sentence. Furthermore, according to the linear fits, a jump in the proportion

of prison sentences is visible around the six-months threshold set by law. As analyzed in Appendix C using non-parametrical regression discontinuity methods, the share of prison sentences increases by 37.7 percentage points at the six months threshold (standard error of statistically significant at the 1%-level).

Figure 5: Share of Unsuspended Prison Sentences by Sentence Length, 2005/06 and 2007/08



Source: SUS individual data.
Sample: Unconditional sentences (<360d). Public Works included as prison.

5.2 Identification Strategy

The 2007-revision of the Swiss Criminal Code serves as a quasi-experimental setting to study the effects of incarceration relative to monetary penalties for low-level offenses. Indeed, ceteris paribus, a person convicted of an offense carrying an unsuspended sentence of less than six months was significantly less likely to be incarcerated after the reform than before. On the other hand, this drop does not apply to unsuspended sentences longer than six months. Equation (1) formalizes the change in the probability of prison and monetary sentences assignment for short (below six months) and longer sentences (above six months).

$$\begin{aligned} &\Pr(D_i = 1 | t < 2007 \cap unsusp. \cap < 6M) > \Pr(D_i = 1 | t \geq 2007 \cap unsusp. \cap < 6M), \\ &\Pr(D_i = 1 | t < 2007 \cap unsusp. \cap > 6M) \approx \Pr(D_i = 1 | t \geq 2007 \cap unsusp. \cap > 6M), \end{aligned} \tag{1}$$

$$\text{where } D_i = \begin{cases} 1 & \text{is a prison sentence} \\ 0 & \text{is a monetary sentence} \end{cases}$$

In order to interpret this policy change as an exogenous shock affecting exclusively the probability of being incarcerated, several assumptions must hold. Their violation would mainly affect the sample composition of the treated and the control groups, and could introduce a selection bias if the induced characteristics are: i) unobserved, i.e. not captured by the control variables and the fixed effects; ii) correlated with the analyzed outcomes, i.e. future recidivism and changes in labor market outcomes.

First, I assume the absence of (unobservable) endogenous adaptation of the low- to medium-level criminal behavior to the policy (*consequences adaptation*). Indeed, a change in the propensity to commit crimes or in the type of offenses depending on the expected punishment could introduce a selection bias in the convicted sample. Most of the charges analyzed in my setting are of relatively low severity, which may indicate that those convicted are less attentive to changes in the law and not prone to adapt their criminal behavior to the sentencing environment.

Second, I assume absence of timing manipulation of the sentence (*timing manipulation*). This would occur if the actors involved – such as judges or lawyers – can expedite or delay proceedings in order to sentence a case according to their preferred criminal code. Notice that if an offense was committed before the reform took effect but was tried later, the convicted person would be sentenced under the most lenient code (StGB/2007, Art. 2.2). Therefore, actors seeking harsher sentences would try to accelerate trials before January 1, 2007, while actors seeking more lenient sentences would try to delay sentences after that date. Figure A17 shows the absolute number of sentences around the reform entry into law, while Figure A18 shows it by month and year to account for the seasonality of crime

and sentencing. There appears to be a shift in convictions from January 2007 to December 2006, suggesting some anticipation effects. A possible solution to this problem is to exclude the close transition period.

Third, I assume that judges do not endogenously adapt their sentencing (*sentencing adaptation*) to the different sets of options. For example, if judges consider monetary sentences more lenient than imprisonment and are determined to counteract the reform, they might give longer sentences after the reform, or replace some suspended sentences with unsuspended ones. This is the most critical assumption in this context. An argument that could mitigate these dynamics is the fact that penalties are officially convertible, i.e. one day of prison corresponds to one monetary daily rate, and the conversion is effective when individuals are unable to pay. At the moment, I can only deal with this issue by controlling for as many observables as possible and by considering pre-trends. However, selection could be acting through unobservables. Therefore, I plan to test for judges' behavioral adaptation using plausibly unaffected observables, such as the charge codes.

Fourth, I assume absence of events that coincidentally affect the pool of convicts or their outcomes differently around the time of introduction of the reform (*time effects*). For example, no external factor should affect the reasons for committing a crime differently before and after the reform. Furthermore, the labor market situation after the offense date should be comparable in the analyzed period. The use of pre-trends, of month fixed effects and the difference-in-differences setting help attenuate this threat.

5.3 Observables Check

Table 3 summarizes observable characteristics before and after the reform implementation, using the subsample of unsuspended sentences under six months that could be matched with social security data.[7] The table reports mean values of the given characteristic for sentences pronounced in the 2 years before (2005-06) and after (2007-08) the reform, a t-test difference in the mean values, and the difference in terms of regression discontinuity with cutoff at implementation time (January 2007). Regression discontinuities are calculated using local polynomial continuity-based approach and are computed by a linear polynomial approximation using triangular kernel weighting on the whole-period bandwidth (see Figure A19, Figure A20, Figure A21, Figure A22, and Figure A23). To account for sentence seasonality, in the RDDs I control for the sentence month. The RDDs help to disentangle differences in the sample composition related to general time trends from abrupt differences resulting from the reform's sample selection. Table A3 and Table A4 provide the same information for the subsample of unsuspended sentences between 6 and

[7] Table A2 repeats the exercise on non-labor market characteristics keeping also the unmatched observations, with very similar results.

12 months and for the whole sample (suspended and unsuspended sentences), respectively.

First, as expected, the impact of the reform is clear when looking at the type of given sentences. Whereas in 2005-06 only custodial sentences and public works were assigned, in 2007-08 72% of the sentences were monetary. As reported in Table A3, this change is rarer among medium-length sentences, with just 18% of monetary sentences in 2007-08.

Second, focusing on personal characteristics of the convicted, the samples is balanced in terms of age, gender, and country origin. A 0.7 percentage points increase in the share of convicted living in Switzerland is found after the reform, which is visible also in the RDD (Figure A21), though not being statistically significant.

Third, in terms of composition of the convictions regarding the offense laws, significant shifts can be noticed: Road Traffic Act convictions increase (+7.3pp), while the share of convictions based on the Criminal Code (-3.7pp) and Foreign National Act (-4.9pp) drops. However, looking at the RDDs, the increase in Road Traffic Act convictions and the decrease in Criminal Code convictions are quite smooth around the reform introduction – suggesting that the cause might rather lie in time trends. This suggestion is confirmed by the presence of similar trends also among the medium-length unsuspended sentences (Table A3) and in the whole sample of suspended and unsuspended sentences (Table A4). In contrast, the drop in the share of convictions tied to the Foreign National Act is sharp.

Fourth, focusing on sentence characteristics, I find that the average length of the sentences increases by 5.4 days and is confirmed in the RDDs . The increase in the share of sentences pronounced by prosecutors and the decrease in pre-trial detention length is instead detected when comparing mean values, but not statistically significant in the discontinuity. Finally, sentence decision length is unaffected.

Finally, looking at labor market outcomes in the 12 months prior to offense date, the individuals convicted in 2007-08 are generally better off than those convicted in 2005-06. They have higher employment rates (+8.9pp), are more often employed in jobs earning at least CHF 1,00 per month (+9.4pp), exhibit lower unemployment rates (-2.15pp) and earn more in total (+ 496 CHF per month) and on the labor market (+ 582 CHF per month).

Table 3: Balancedness of Observables, Matched Short Unsuspended Sentences 2005-08

	Mean 05-06	Mean 07-08	Δ t-test		Δ RDD	
Sentence Type:						
Prison or Pub. Works (%)	100.00	27.60	-72.40***	(0.31)	-71.59***	(1.16)
Prison (%)	-	9.38	-		-	
Pub. Works (%)	-	18.22	-		-	
Monetary (%)	0.00	72.40	72.40***	(0.31)	71.59***	(1.16)
Demographics:						
Age (y)	34.63	34.64	0.01	(0.11)	-0.35	(0.37)
Men (%)	89.35	89.78	0.43	(0.31)	0.91	(1.05)
Born in Switzerland (%)	60.82	60.83	0.00	(0.50)	1.74	(1.70)
Live in Switzerland (%)	94.70	95.42	0.72***	(0.22)	0.70	(0.78)
Offense Law:						
Road Traffic Act (%)	47.12	54.39	7.27***	(0.49)	5.31***	(1.65)
Criminal Code (%)	34.11	30.40	-3.71***	(0.44)	-2.05	(1.51)
Foreign Nationals Act (%)	13.63	8.76	-4.87***	(0.28)	-4.21***	(0.96)
Narcotics Act (%)	1.63	2.00	0.37***	(0.13)	0.27	(0.47)
Sentence Characteristics:						
Uns. Length (d)	36.96	42.34	5.39***	(0.35)	5.30***	(1.16)
Decision Length (d)	5.19	5.08	-0.11	(0.07)	0.01	(0.24)
Process: Prosecutors (%)	70.55	72.96	2.41***	(0.46)	-1.90	(1.56)
Pre-Trial Detention (d)	1.56	0.82	-0.73***	(0.19)	-1.07*	(0.55)
Activity (12M before offense):						
Empl. (%)	53.14	62.06	8.92***	(0.44)	5.50***	(1.51)
Empl. over CHF 1,000 (%)	43.82	53.24	9.42***	(0.45)	5.46***	(1.53)
Unempl. (%)	7.89	5.74	-2.15***	(0.20)	-0.12	(0.69)
Invalidity (%)	0.29	0.38	0.08*	(0.05)	0.09	(0.17)
Income Repl. (%)	0.28	0.37	0.09**	(0.04)	0.20*	(0.12)
Earnings (12M before offense):						
Labor Market (CHF)	2,024	2,606	582***	(37)	498***	(115)
Total (CHF)	2,248	2,744	496***	(36)	510***	(112)
Observations	17,215	21,324	38,539		38,539	

Source: SUS and ZAS. Sample: Matched unsuspended sentences of less than 6 months, fines excluded. Method: Heteroskedasticity-robust standard errors in parenthesis. RDD controls: Sentence month.

	Mean 05-06	Mean 07-08	Δ t-test		Δ RDD	
Sentence Type:						
Prison or Pub. Works (%)	100.00	33.71	-66.29***	(0.47)	-61.55***	1.79
Prison (%)	-	10.99	-		-	
Pub. Works (%)	-	22.73	-		-	
Monetary (%)	0.00	66.29	66.29***	(0.47)	61.55***	1.79
Demographics:						
Age (y)	34.90	34.35	-0.55***	(0.17)	-0.49	0.57
Men (%)	93.24	91.75	-1.49***	(0.41)	-1.79	1.43
Born in Switzerland (%)	58.69	58.76	0.06	(0.78)	3.41	2.67
Live in Switzerland (%)	94.48	94.87	0.39	(0.36)	0.22	1.25
Offense Law:						
Road Traffic Act (%)	54.85	55.25	0.40	(0.73)	0.90	2.48
Criminal Code (%)	28.98	28.17	-0.81	(0.64)	-1.28	2.19
Foreign Nationals Act (%)	11.57	10.79	-0.79*	(0.40)	-0.28	1.44
Narcotics Act (%)	1.89	2.48	0.59***	(0.21)	0.41	0.82
Sentence Characteristics:						
Uns. Length (d)	70.89	69.79	-1.10**	(0.48)	0.50	1.63
Decision Length (d)	6.21	5.75	-0.46***	(0.12)	-0.25	0.44
Process: Prosecutors (%)	62.89	67.12	4.24***	(0.75)	-5.95**	2.58
Pre-Trial Detention (d)	2.65	1.42	-1.23***	(0.19)	-1.77***	0.65
Activity (12M before offense):						
Empl. (%)	55.39	60.64	5.25***	(0.68)	2.19	2.34
Empl. over CHF 1,000 (%)	47.10	51.57	4.46***	(0.70)	2.63	2.37
Unempl. (%)	8.13	6.16	-1.97***	(0.32)	0.05	1.12
Invalidity (%)	0.33	0.33	0.00	(0.07)	0.23	0.25
Income Repl. (%)	0.28	0.39	0.11**	(0.06)	0.07	0.22
Earnings (12M before offense):						
Labor Market (CHF)	2,266	2,482	216***	(61)	232	(165)
Total (CHF)	2,509	2,659	150**	(60)	283*	(165)
Observations	6,631	10,147	16,778		16,778	

5.4 Estimation Models

Cross-Sectional, Instrumental Variable Models

Using the sample of individuals convicted to an unsuspended sentence between 2005 and 2008, I estimate the differential effect of receiving a short unsuspended sentence as a prison or as a monetary penalty through following instrumental variable regression:

$$\text{First stage: } Prison_i = \alpha_1 + \beta \cdot (R_i \cdot S_i) + W_i\eta + u_i \tag{2}$$

$$\text{Second stage: } y_{i,\tau} = \alpha_2 + \delta \cdot \widehat{Prison}_i + W_i\zeta + v_i, \tag{3}$$

$$\text{Reduced form: } y_{i,\tau} = \alpha_3 + \gamma \cdot (R_i \cdot S_i) + W_i\xi + e_i, \tag{4}$$

where $y_{i,\tau}$ represents recidivism or a labor market outcome (employment, labor market earnings) of individual i in τ months from the offense date. Prison_i is a dummy variable indicating whether the offense was sentenced with a custodial ($\text{Prison}_i = 1$) or a monetary penalty ($\text{Prison}_i = 0$). I estimate discrete intensity models with $\text{Prison}_i \in \{0, 1\}$, and models with varying intensity by the sanction's length in days s_i with $\text{Prison}_i \in \{0, s_i\}$. R_i is a dummy variable indicating whether the offense was judged under the StGB/2006 ($R_i = 1$, between 2005 and 2006), or under the StGB/2007 ($R_i = 0$, between 2007 and 2008). S_i is a dummy variable indicating whether the offense was sentenced with a sanction below 180 days ($S_i = 1$) or between 180 and 360 days ($S_i = 0$). W_i is a vector of control variables containing individual- and sentence-related characteristics.[8] α_1, α_2, and α_3 are constant terms, u_i, v_i, and e_i are the idiosyncratic error terms.

These cross-sectional models allow to analyze both labor market and recidivism outcomes, and exploit the information about the actual assignment of custodial sentences in the first stage. They do not however include individual fixed effects, focusing on control variables to absorb potential selection biases.

Event-Study, Reduced-Form Models

Using 2000-2018 observations from the sample of individuals convicted to an unsuspended sentence, I estimate the differential effect of receiving a short unsuspended sentence as a prison or as a monetary penalty in a dynamic context through the following difference-in-

[8] Control variables include gender, age (2nd polyn.), sentence length in unsuspended days (2nd polyn.), offense month, 6-months and 12-months pre-offense labor market outcomes (total and labor market earnings, months of employment and unemployment), a Swiss born dummy, dummy for each law by article charge, and cantonal court dummies.

difference reduced-form regression:

$$y_{i,t} = \sum_{\ell=-23}^{60} \delta_\ell \cdot (T_{i,t-\ell} \cdot R_i \cdot S_i) + \sum_{\ell=-23}^{60} \zeta_\ell \cdot (T_{i,t-\ell} \cdot R_i) + \sum_{\ell=-23}^{60} \gamma_\ell \cdot (T_{i,t-\ell} \cdot S_i) + \alpha_i + \lambda_t + u_{i,t}, \tag{5}$$

where y_{it} represents the labor market outcome (employment, labor market earnings) of individual i in month t. $T_{i,t}$ is the treatment status with changes $\Delta T_{i,t}$ in the month of the offense date. I estimate discrete intensity models with $\Delta T_{i,t} = T_{i,t} - T_{i,t-1} = \mathbb{1}[t = E_i] \in \{0, 1\}$, and models with varying intensity by the sanction's length in days s_i with $\Delta T_{i,t} = T_{i,t} - T_{i,t-1} = \mathbb{1}[t = E_i] \cdot s_i$. For each individual, I estimate 24 leads and 60 lags with binned endpoints. R_i is a dummy variable indicating whether the offense was judged under the under the StGB/2006 ($R_i = 1$, between 2005 and 2006), or under the StGB/2007 ($R_i = 0$, between 2007 and 2008).[9] S_i is a dummy variable indicating whether the offense was sentenced with a sanction below 180 days ($S_i = 1$) or between 180 and 360 days ($S_i = 0$). Normalization is implemented at $\delta_{-1} = 0$. α_i is the individual fixed effect, λ_t the month fixed effect, and u_{it} the idiosyncratic error term. δ_l is the coefficient of interest, indicating the difference in labor market outcomes with respect to period $l = -1$ for an offense sentenced to a short unsuspended penalty with respect to a longer unsuspended penalty, when the short sentence is much more likely to be a prison sentence.

6 Results

6.1 The Effects on Recidivism

Table 4 shows results on the impact of the difference-in-differences, instrumental variable estimation presented in Equation (2) on the cumulative probability of recidivism and the cumulative acts of recidivism, at different points in time after the offense date (1, 3 and 5 years). Recidivism is considered as the beginning of another offense, which is later tried to an unsuspended sentence. The instrument is strong (t-statistic: 27.99), with the reform reducing the probability of a prison sentence by 48.9 percentage points more for sentences under six months than for sentences between six and twelve months. On the long run, at the five years horizon, no significant difference in both types of recidivism outcomes can be detected when comparing prison with monetary penalties. In the medium term, however, the results suggest that prison tends to significantly increase recidivism when compared to fines (+11.5pp on the probability of recidivism after 3 years, +13.3pp on the acts of

[9] In order to properly estimate the time fixed effects, individuals treated since 2009 are kept in the regression with a value of $R_i = 0$ and a supplementary dummy $R_{2,i}$ being 1 after 2009 and 0 before, which is itself interacted with $T_{i,t-\ell}$ and S_i.

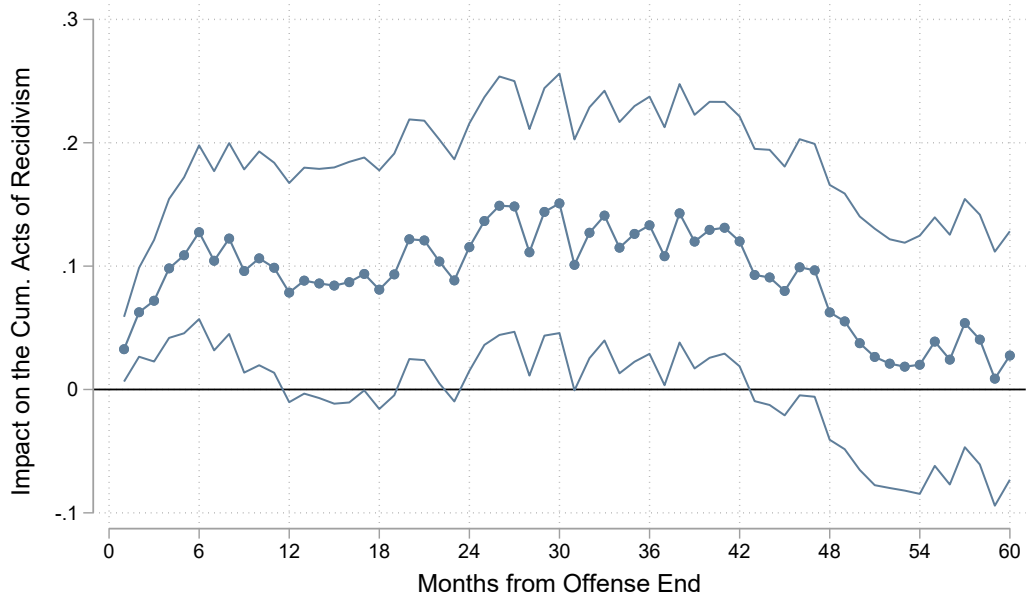
recidivism after 3 years). Figure 6 displays the differential impact of prison and monetary sentences on the cumulated acts of recidivism up to a given month.

Table 4: DiD-2SLS Prison Impact on Cumulative Recidivism

	Cum. Prob. of Recidivism			Cum. Acts of Recidivism		
	12 Months	36 Months	60 Months	12 Months	36 Months	60 Months
Second stage						
Prison	0.067	0.115**	0.023	0.079*	0.133**	0.028
	(0.044)	(0.051)	(0.051)	(0.047)	(0.053)	(0.053)
Adj. R^2	0.13	0.21	0.25	0.13	0.21	0.25
First stage						
Pre-Reform#Short	-0.489***	-0.489***	-0.489***	-0.489***	-0.489***	-0.489***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Adj. R^2	0.63	0.63	0.63	0.63	0.63	0.63
Reduced form						
Pre-Reform#Short	0.033	0.056**	0.011	0.038*	0.065*	0.014
	(0.021)	(0.024)	(0.024)	(0.022)	(0.026)	(0.025)
Adj. R^2	0.16	0.23	0.26	0.15	0.23	0.26
Controls	✓	✓	✓	✓	✓	✓
Observations	29,647	29,647	29,647	29,647	29,647	29,647

Source: SUS. Note: Public works included as prison. Sample: Unsuspended sentences, first offenders, 2005-08. Method: Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure 6: DiD-2SLS Prison Impact on the Cumulative Acts of Recidivism, 2005-2008.



Source: SUS and ZAS. Sample: Unsuspended sentences, first offenders.
Methods: 2SLS with controls, DiD. 95%-CI reported.

6.2 The Effects of Prison on Labor Market Outcomes

Table 5 and Table 6 present results on the impact of the difference-in-differences, instrumental variable estimation presented in Equation (2) on cumulative earnings and cumulative employment, at different points in time after the offense date (1, 3 and 5 years). Again, the instrument is strong (t-statistic: 27.99), with the reform reducing the probability of a prison sentence by 49 percentage points more for sentences under six months than for sentences between six and twelve months. All earnings estimates are consistent with a pattern of deteriorating labor market outcomes following the assignment of a prison sentence instead of a monetary sentence, although they mostly lack of statistical significance. An offender convicted for a custodial sentence earned about CHF 17,915 less five years after the offense than an offender convicted for a monetary sentence (about CHF 3,600 per year and CHF 300 per month), after taking into account differences in observable characteristics (including pre-offense labor market outcomes) and the impact on earnings for individuals convicted for longer sentences. Labor market earnings and employment activity follow a similar pattern.

Table 5: DiD-2SLS Prison Impact on Cumulative Earnings

	Total (CHF)			Labor Market (CHF)		
	12 Months	36 Months	60 Months	12 Months	36 Months	60 Months
Second stage						
Prison	−5,603*	−9,867	−17,915	−3,867	−9,757	−17,704
	(2,928)	(9,268)	(15,530)	(3,126)	(9,708)	(16,181)
Adj. R^2	0.81	0.77	0.73	0.79	0.76	0.72
First stage						
Pre-Reform#Short	-0.487***	-0.489***	-0.490***	-0.487***	-0.489***	-0.490***
	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)
Adj. R^2	0.63	0.63	0.63	0.63	0.63	0.63
Reduced form						
Pre-Reform#Short	-1,884*	-4,772	-8,668	-2,731***	-4,826	-8,771
	(1,033)	(3,338)	(5,987)	(969.4)	(3,182)	(5,684)
Adj. R^2	0.80	0.76	0.72	0.81	0.77	0.74
Controls	✓	✓	✓	✓	✓	✓
Observations	29,233	28,373	27,536	29,233	28,373	27,536

Source: SUS. Note: Public works included as prison. Sample: Unsuspended sentences, first offenders, 2005-08. Method: Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: DiD-2SLS Prison Impact on Cumulative Employment Activity

	Months Employed			Months Unemployed		
	12 Months	36 Months	60 Months	12 Months	36 Months	60 Months
Second stage						
Prison	−0.726*	−1.309	−2.199	−0.262	0.179	−0.179
	(0.413)	(1.162)	(1.931)	(0.260)	(0.588)	(0.833)
Adj. R^2	0.66	0.56	0.53	0.01	0.03	0.04
First stage						
Pre-Reform#Short	-0.487***	-0.489***	-0.490***	-0.487***	-0.489***	-0.490***
	(0.0179)	(0.0182)	(0.0185)	(0.0179)	(0.0182)	(0.0185)
Adj. R^2	0.63	0.63	0.63	0.63	0.63	0.63
Reduced form						
Pre-Reform#Short	-0.354*	-0.640	-1.077	-0.128	0.088	-0.088
	(0.210)	(0.589)	(0.983)	(0.122)	(0.261)	(0.383)
Adj. R^2	0.64	0.60	0.58	0.25	0.16	0.15
Controls	✓	✓	✓	✓	✓	✓
Observations	29,233	28,373	27,536	29,233	28,373	27,536

Source: SUS. Note: Public works included as prison. Sample: Unsuspended sentences, first offenders, 2005-08. Method: Heteroskedasticity-robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

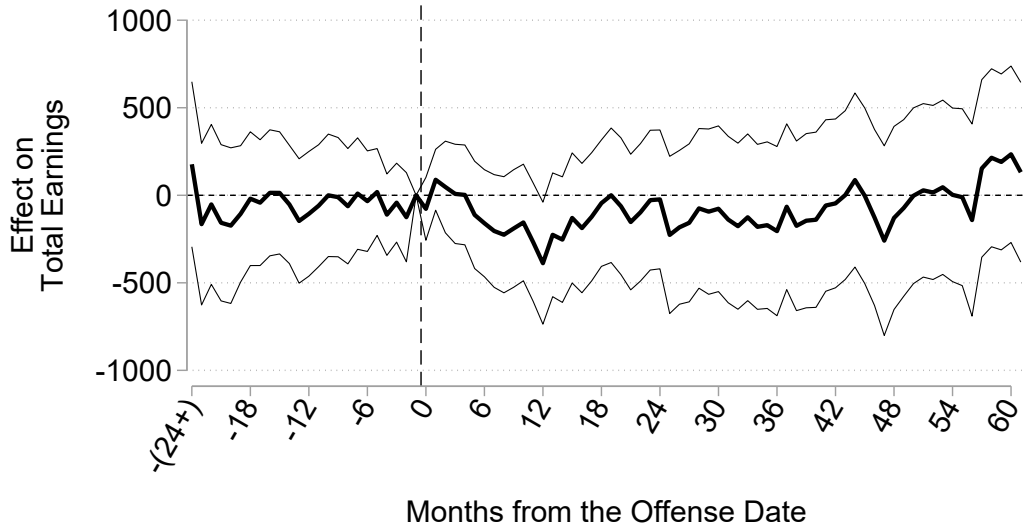
As discussed in Section 5.4, the panel data on labor-market outcomes can be exploited in an event study model. Figure 7 shows the differential effect of being sentenced to a short prison penalty in comparison to a monetary sentence, imputed by leveraging the reform timing and the sentence length as a exogenous variation in a difference-in-differences event study setting. The effect is estimated using two-way fixed effects and corresponds to the coefficient δ_k presented in Equation (5). The estimation includes later-treated individuals sentenced by 2019, which are crucial to properly estimate the monthly effects. The graph shows a decreases in earnings of up to CHF 200 per month over a five-year period. Reassuringly, pre-trends appear to be stable around a zero difference. Statistical significance is difficult to achieve for single monthly outcomes, especially given the small sample of the medium-length sentences. However, the pattern indicates a convincing drop that is realized a few months after the offense date.

One step earlier, Figure 8 and Figure 9 show the differential time-impact of sentences before and after the reform, for sentences below six months and between six and twelve months respectively. As expected, a consistent decrease can be observed for short sentences – where the replacement of prison with fines is large –, but not so much for medium sentences – where the replacement of prison with fines is limited. Reassuringly, also at this level,

pre-trends appear stable around a zero-difference.

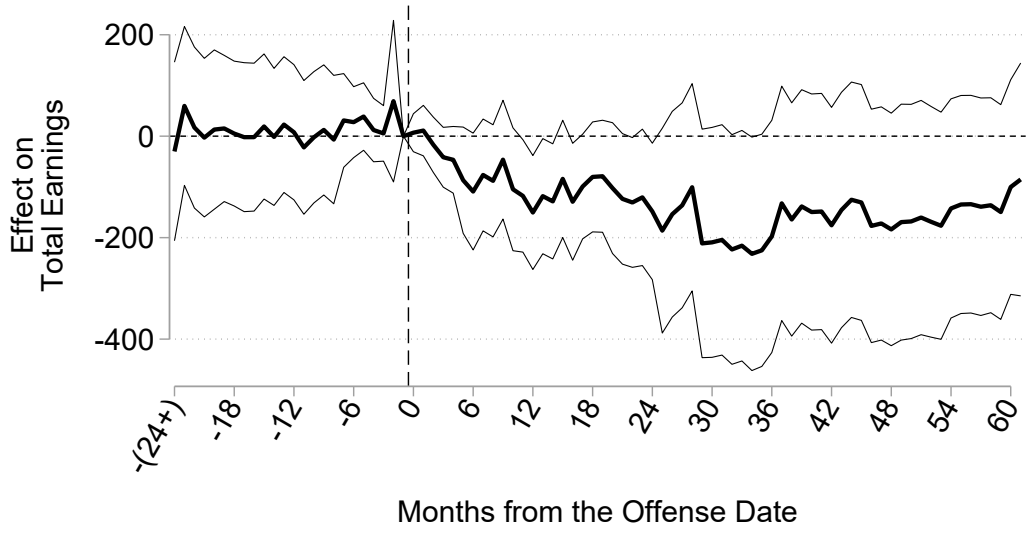
Finally, Figure A24 and Figure A25 provide a further disaggregation of the time-effects for short and medium-length sentences, before and after the reform. Here the lock-in effects after the offense are visible, followed by a recovery of earnings in the long term. The difference in the earnings' drop and recovery is visible for individuals convicted for short sentences before and after the reform, but not for those sentenced for longer than six months.

Figure 7: Short-Medium Differential Impact on Total Earnings by Offense Date and Criminal Code, 2005-2008 (Fines as Baseline).



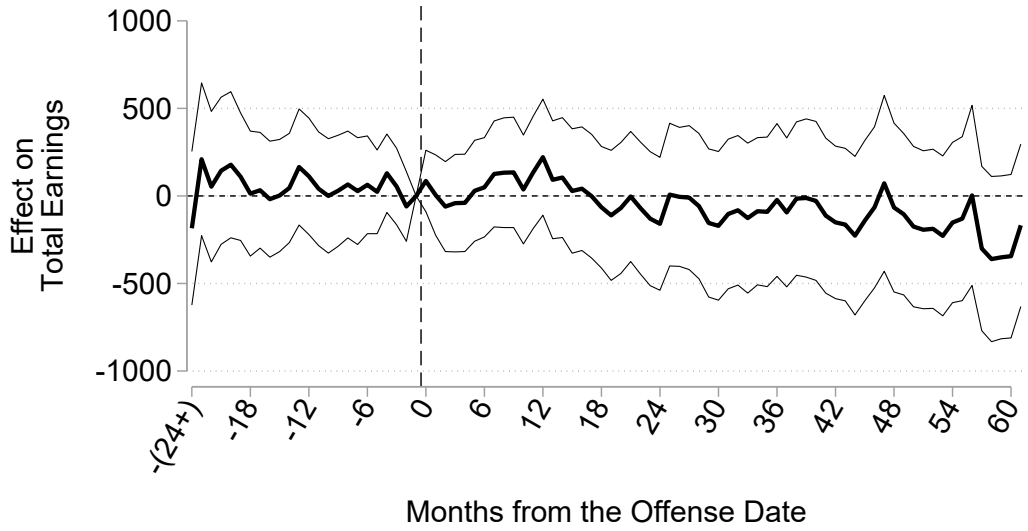
Source: SUS and ZAS.
Method: DiD, Reduced-form event study. 95% CI reported.
Sample: Unsuspended sentences up to 360d, first offenders.
Obs: 12703843; Ind: 92,596; T: 137.2 (4/2000 - 11/2017)

Figure 8: Difference in Short Sentences Impact on Total Earnings by Offense Date and Criminal Code, 2005-2008 (Fines as Baseline).



Source: SUS and ZAS.
Method: Event study, difference pre vs. post reform. 95% CI reported.
Sample: Unsuspended sentences up to 360d, first offenders.
Obs: 11790793; Ind:86,008; T: 137.1 (4/2000 - 11/2017)

Figure 9: Difference in Medium-Length Sentences Impact on Total Earnings by Offense Date and Criminal Code, 2005-2008 (Fines as Baseline).



Source: SUS and ZAS.
Method: Event study, difference pre vs. post reform. 95% CI reported.
Sample: Unsuspended sentences up to 360d, first offenders.
Obs: 913,050; Ind: 6,588; T: 138.6 (4/2000 - 11/2017)

7 Conclusion

I investigate the counterfactual impact of prison and monetary sentences on recidivism and labor market outcomes for low-level offenses in Switzerland. The replacement of short prison sentences with administrative sanctions has been repeatedly called for as a consequence of prison overcrowding, prison costs, and doubts about prison effectiveness (UNODC, 2013; CDPC, 2016). However, causal evidence on the effects of such a replacement is lacking, in particular for rehabilitative prison systems. Switzerland represents an interesting context for studying this issue because its prison system is based on the principles of rehabilitation and normality and because, until recently, Switzerland was very active in the use of short prison sentences. The 2007 revision of the General Provisions of the Swiss Criminal Code drastically replaced unsuspended prison sentences with monetary penalties for sentences of less than six months. I leverage the timing of the reform and the length of sentences in a quasi-experimental setting in which the first stage for receiving a prison sentence instead of a monetary sentence is reduced more for short- (under six months) than for medium-length (six to twelve months) sentences. Findings suggest that – if anything – fines do not increase recidivism in the studied population. However, those convicted for prison are significantly worse off in the labor market. These findings suggest that replacing imprisonment with fines in the sentencing of low- and medium-level offenders could be welfare enhancing, leaving recidivism untouched and benefiting offenders' labor market outcomes - even in a context where incarceration is organized around the principles of rehabilitation and normality.

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8 Appendix

A Sentences in the Swiss Criminal Code

This description is based on the 2007 Swiss Criminal Code (*Schweizerisches Strafgesetzbuch, StGB/2007*). Crimes are classified by severity into contraventions, misdemeanors and felonies. Contraventions are punishable by fines, misdemeanours are punishable by monetary or custodial sentences of less than 3 years, and felonies are punishable by custodial sentences of more than 3 years. The penalty execution shall (partly) suspend the execution of a penalty of no more than 2 years (StGB/2007, Art. 42), and impose a probationary period of from 2 to 5 years (StGB/2007, Art. 44).

Custodial Penalties: Custodial penalties are generally imposed to sentences of more than 6 months (StGB/2007, Art. 40), unless the court explicitly states the impossibility of executing a monetary sentence or of public works (StGB/2007, Art. 40). Custodial penalties are expressed in "days" to be served.

Monetary Penalties: Monetary penalties are assigned as daily rates, which are usually limited to a maximum of 360 daily rates (StGB/2007, Art. 34.1). The daily rates are then converted in monetary terms under consideration of the personal and economic conditions of the convicted person at the the time of sentencing (StGB/2007, Art. 34.1).[10] Daily rates are determined by the court and set forth in the judgement. They range from a minimum of CHF 10 to a maximum of CHF 3,000, which may be paid in installments within a period of 1 to 12 months (StGB/2007, Art. 34.2; StGB/2007, Art. 35.1).[11] If the convicted person does not pay, the sentence is converted into a custodial sentence, where a daily rate corresponds to one day in prison (StGB/2007, Art. 36.1).

Public Works: Public works are assigned by the court in accordance to the convicted person in place of a prison sentence of less than six months or a monetary penalty of less than 360 daily rates (StGB/2007, Art. 37.1). Public work is limited to a maximum of 720 hours (StGB/2007, Art. 37.1) and must be performed – free of charge – for the benefit of social institutions, works in the public interest or persons in need of assistance (StGB/2007, Art. 37.2). The sentencing authority sets the convicted person a time limit, not exceeding two years, within which she must perform the service (StGB/2007, Art. 38). If the convicted person fails to do so, the sentence is converted into a monetary or custodial penalty, where four hours of public works correspond to a daily rate (StGB/2007, Art. 39.1/2) or to a day in prison (StGB/2007, Art. 39.1-3).

[10] The calculation of the daily rate considers income, wealth, living expenses, any family and support obligations, and the minimum subsistence level.

[11] If the economic situation changes, a recalculation of the daily rate, an extension, or a conversion into non-profit public work can be decided (StGB/2007, Art. 35.3)

Fines: Fines are imposed as a fixed amount with a maximum of CHF 10,000 (StGB/2007, Art. 106). If the fine can not be paid, the sentence is converted into a custodial sentence of 3 to 30 days, with CHF 100 of the fine corresponding to one day in prison. Fines can not be suspended.

Other measures: Besides penalties, other measures can be ordered to counter the risk of further offending, or if offender requires treatment (StGB/2007, Art. 56). Among these are therapeutic measures (StGB/2007, Art. 59-61), occupational bans (StGB/2007, Art. 67), driving bans (StGB/2007, Art. 67b). Expulsion from Switzerland of foreign nationals convicted of certain criminal offenses for a period of 5-15 years was introduced only in 2015 (StGB/Oct. 2015, Art. 66a).

B The Determinants of Prison Assignment

As described in Section 5.1, the 2007 revision of the General Provisions of the Swiss Criminal Code aimed to replace short prison sentences with monetary sentences. In the case of unsuspended sentences of less than six months, prison sentences were in principle only allowed if neither a monetary penalty nor public works could be performed (StGB/2007, Art. 40 and 41.1), and only with an explicit motivation (StGB/2007, Art. 41.2).

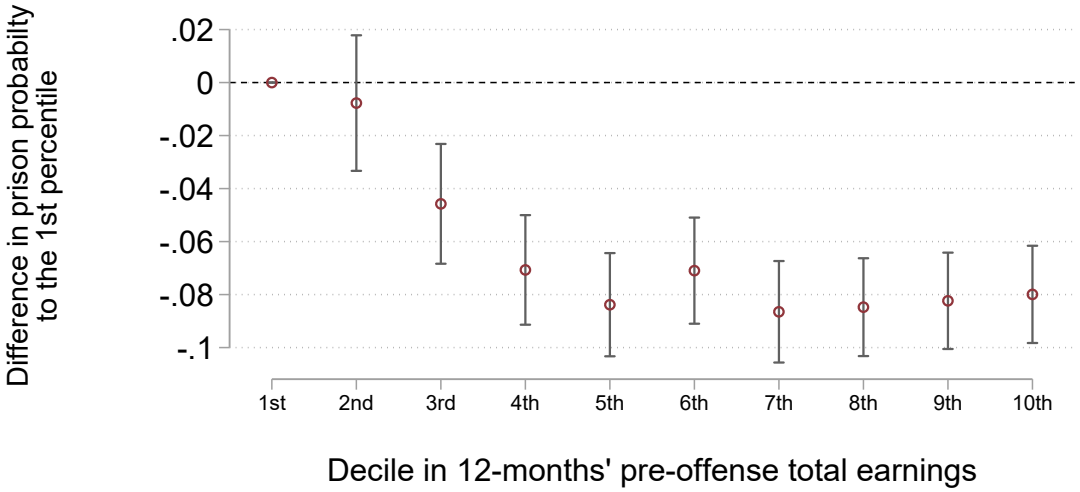
I use data on unsuspended sentences of less than six months in 2007-08 to describe the role of offender characteristics as determinants of the prison assignment. Figure A1 shows the predictive power of pre-offense earnings on the probability of receiving a prison sentence, after controlling for all relevant available observable characteristics ($R^2 = 21.52\%$). Individuals with pre-offense earnings in the first two deciles of the distribution were – all other observable characteristics being equal – about 8pp (+65%) more likely to receive a prison sentence than individuals with earnings in the 4^{th} decile or above.[12] Consistently, above the 4^{th} decile, differences in the likelihood of imprisonment are negligible. Moreover, as shown in Figure A2, living in Switzerland drastically reduces the probability of being imprisoned (-11.5pp, -67%), while being born in Switzerland (-0.8pp, -12%) or being a men (+1.6pp, +34%) have smaller effects.

Aside from possible estimation bias (e.g. omitted variables), these results are consistent with the predictive role of insolvency and the risk of flight in the assignment of prison over monetary sentences. The observation that the reform decreased the probability of imprisonment less for poorer individuals and those living abroad, as pointed out by Killias (2011), is therefore confirmed. Indeed, the average pre-offense earnings of individuals sentenced to short unsuspended prison (or to public works[13]) dropped from CHF 33,295 in 2005/06 to CHF 23,659 in 2007/08. Note that average pre-offense earnings slightly grew from CHF 33,292 in 2005/06 to CHF 38,383 in 2007/08 in the whole sample of short unsuspended sentences. Similarly, the share of individuals living in Switzerland among those sentenced to short unsuspended imprisonment (or to public works) fell from 96.1% in 2005/06 (11,190 out of 11,648) to 94.7% in 2007/08 (3604 out of 3807), while their proportion on the total of short unsuspended sentences remained constant (96.3%, 15,177 out of 15,768).

[12] The results are very similar when only labor market earnings are considered.

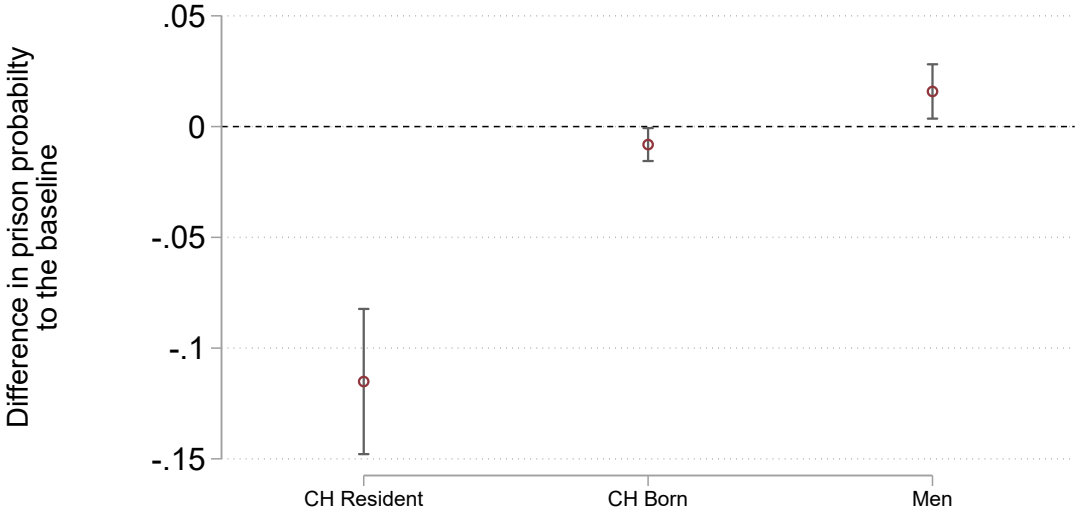
[13] In 2005/06 data, public works can not be distinguished from prison.

Figure A1: Pre-offense Earnings and Prison Sentence Probability, 2007/08



Source: SUS individual data.
Sample: First offenders since 2007 (unsuspended sentences), below 6 months.
Controls: law article of the charge, sex, age, sentence length (days, linear and squared), Swiss born, Swiss domicile, cantonal court.
Decile start values: 0 4208 4814 10714 19700 30743 41129 50441 59204 72046.
Average prison probability in the first decile: 12.38%.
Observations: 15444. 95%-heteroskedasticity robust CI reported.

Figure A2: Offender Characteristics and Prison Sentence Probability, 2007/08



Source: SUS individual data.
Sample: First offenders since 2007 (unsuspended sentences), below 6 months.
Controls: law article of the charge, sex, age, sentence length (days, linear and squared), Swiss born, Swiss domicile, cantonal court, total earnings' deciles.
Baseline average probability: Not CH Res.: 17.22; Not CH Born: 6.61; Women: 4.68.
Observations: 15444. 95%-heteroskedasticity robust CI reported.

C Discontinuity in the Propensity of Prison Sentences

The 2007 revision of the General Provisions of the Swiss Criminal Code aimed to replace short prison sentences with monetary sentences. For unsuspended sentences, judges were in principle only allowed to hand down prison sentences of less than six months if neither a monetary penalty nor public works could be performed (StGB/2007, Art. 40 and 41.1), and only for an explicit reason (StGB/2007, Art. 41.2). Further, monetary sentences could be assigned for sentences of length up to 360 daily rates (StGB/2007, Art. 34).

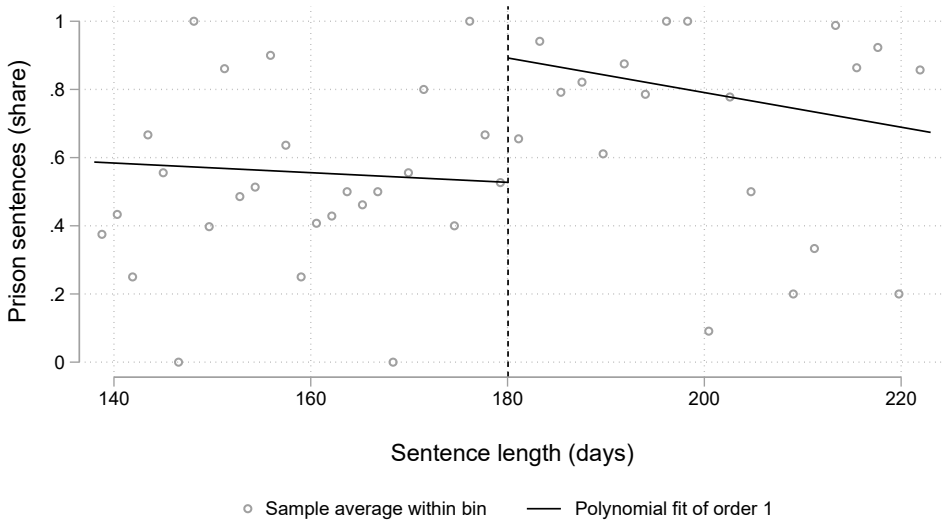
Section 5.1 discusses and describes the impact of the reform by sentence length, and suggests the presence of a discontinuity around the statutory cutoff of six months. This discontinuity is explored in more detail here using non-parametric approaches. Following Cattaneo et al. (2019)'s local polynomial continuity-based approach, I implement a linear polynomial approximation using triangular kernel weighting on mean square error (MSE) optimal bandwidths. Table A1 presents the results for common and separate MSE optimal bandwidth selection, and different inference methods (conventional, bias-corrected and robust). Figure A3 and Figure A4 provide visualizations of the results for common and separate MSE-optimal bandwidths, respectively. All the estimates find a drastic increase in the propensity to impose prison sentences above six months, with estimates ranging from 27.1 to 37.8 percentage points and being statistically significant at the 1%-level.

Table A1: Share of Unsuspended Prison Sentences, Discontinuity at 180 Days, 2007/08

	Bandwidth	
	Common	Separate
Conventional	0.362***	0.271***
	(0.0419)	(0.0260)
Bias-corrected	0.378***	0.304***
	(0.0419)	(0.0260)
Robust	0.378***	0.304***
	(0.0434)	(0.0374)
Observations	28,236	28,236
Effective obs. (left)	665	5,104
Effective obs. (right)	701	1,523
Bandwidth (left)	43	108.7
Bandwidth (right)	43	268.7

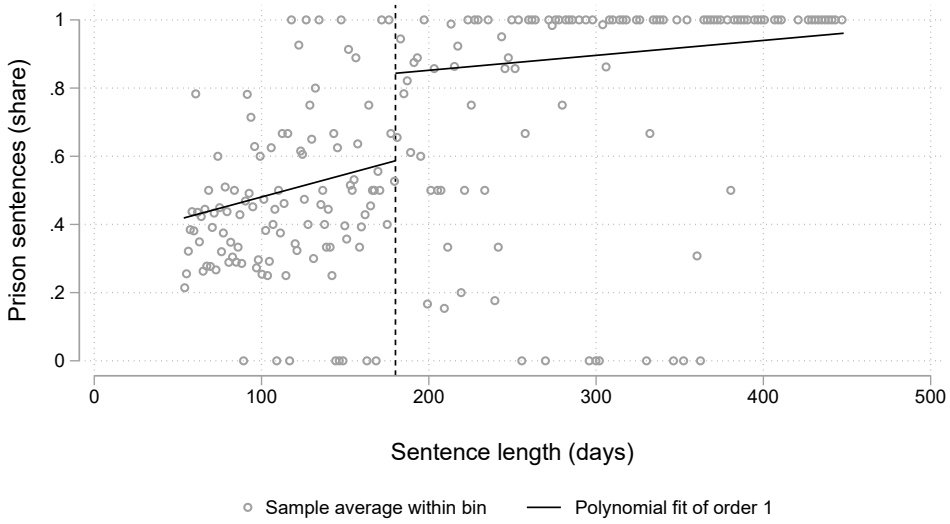
Source: SUS. Sample: Unsuspended sentences (fines excluded); Public Works included as prison. Methods: Linear polynomial fit, triangular kernel weighting, common or separate MSE-optimal bandwidths. */**/*** denotes statistical significance at the 10%/5%/1%-level.

Figure A3: Share of Unsuspended Prison Sentences, Discontinuity at 180 Days, 2007/08



Source: SUS individual data.
Sample: Unsuspended sentences (fines excluded); Public Works included as prison.
Methods: Linear polynomial, triangular kernel, common MSE-optimal bandwidth.
Estimate: .378 (.043).

Figure A4: Share of Unsuspended Prison Sentences, Discontinuity at 180 Days, 2007/08



Source: SUS individual data.
Sample: Unsuspended sentences (fines excluded); Public Works included as prison.
Methods: Linear polynomial, triangular kernel, separate MSE-optimal bandwidths.
Estimate: .304 (.037).

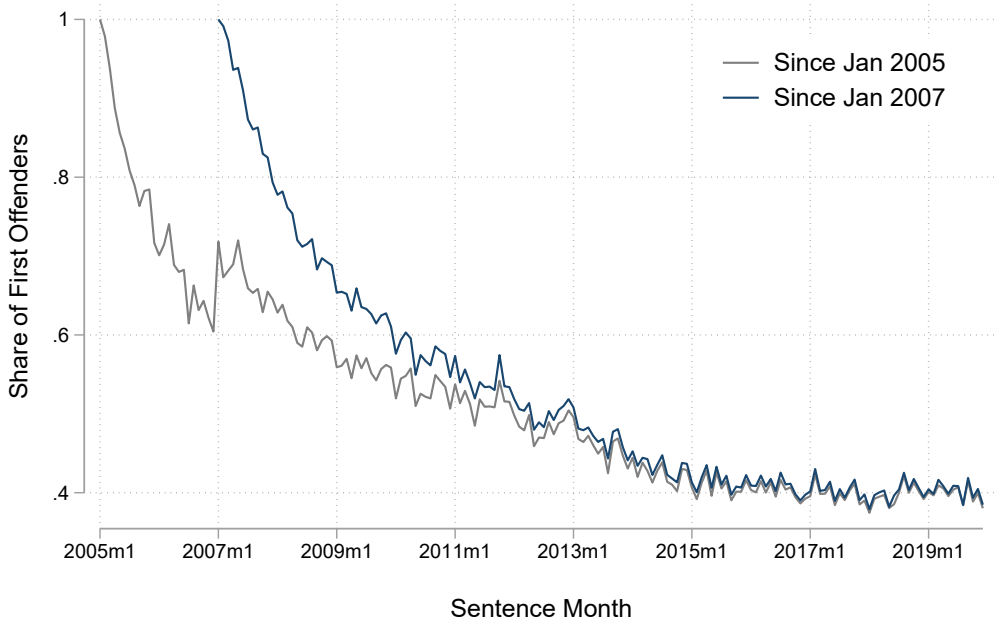
D Constructing the Sample of First Offenders

When using event study design, I restrict the sample to first offenders. However, this restriction is complicated by the fact that the SUS data start in January 2005, close to the implementation of the 2007 revision of the Swiss Criminal Code. Ideally, I would be able to follow the criminal activity of individuals throughout their lives and then select first offenders in the 2005/06 and 2007/08 periods. However, the missing data before 2005 lead to an oversampling of first offenders in the subsequent years, as some offenders may have already been convicted before 2005. In particular, given that recidivism is generally more likely in the short than in the long run, the bias from missing data is greater close to the start of the series. Without adjustments, the sample would contain fewer *true* first offenders in 2005/06 than in 2007/08.

To deal with this problem, when selecting first offenders in 2007/08, I ignore their criminal records prior to 2007. By reproducing the bias in the selection of first offenders in 2005/06 and 2007/2008, I expect the sampling of the two groups to be fairly comparable. Figure A5 shows the share of first offenders on the total number of unsuspended sentences in a given month, starting counting in January 2005 (gray line) or in January 2007 (blue line). The oversampling bias is recognisable by the declining path of first offenders on the total of sentences, which starts at 100% at the begin of the count period and stabilizes around 40% on the long run. As shown in Figure A6, which focuses on the 2005-2008 period, the patterns of the two series appear to be similar.

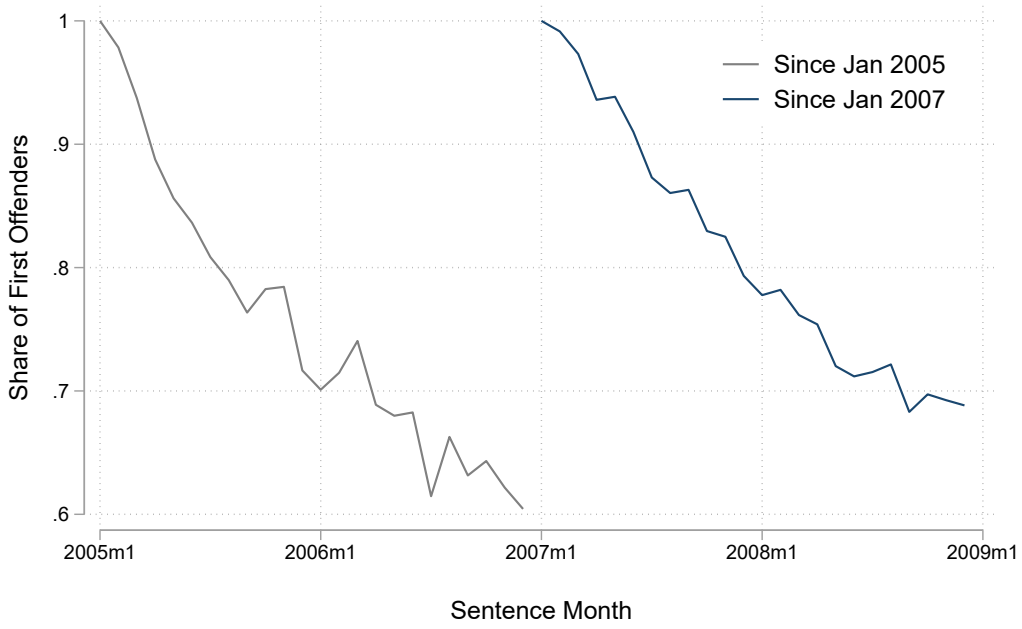
The resetting of the count of first offenses at the begin of the period avoids a different sampling in the 2005/06 and the 2007/08 groups, but creates a new challenge. Indeed, some individuals are selected as first-offenders in both samples. Therefore, when estimating panel models in the first offender samples (such as Equation (5)), I use replacement for the individuals that commit a crime in both periods.

Figure A5: Share of First Offenders, 2005-2020



Source: SUS. Sample: Unconditional sentences.

Figure A6: Share of First Offenders, 2005-2008



Source: SUS. Sample: Unconditional sentences.

E Additional Tables

Table A2: Balancedness of Observables, Short Unsuspended Sentences, 2005-08

	Mean 05-06	Mean 07-08	Δ t-test		Δ RDD	
Sentence Type:						
Prison or Pub. Works (%)	100.00	32.90	-67.10***	(0.30)	-65.71***	(1.11)
Prison (%)	-	16.15	-		-	
Pub. Works (%)	-	16.75	-		-	
Monetary (%)	0.00	67.10	67.10***	(0.30)	65.71***	(1.11)
Demographics:						
Age (y)	34.00	34.40	0.40***	(0.10	-0.24	(0.35)
Men (%)	90.03	90.01	-0.02	(0.28)	0.53	(0.93)
Born in Switzerland (%)	52.57	54.53	1.96***	(0.47)	2.24	(1.58)
Living in Switzerland (%)	89.24	90.04	0.80***	(0.29)	0.42	(1.01)
Offense Law:						
Road Traffic Act (%)	40.84	48.87	8.03***	(0.44)	5.33***	(1.49)
Criminal Code (%)	35.02	31.05	-3.97***	(0.41)	-2.94**	(1.37)
Foreign Nationals Act (%)	13.66	9.12	-4.54***	(0.26)	-3.06***	(0.89)
Narcotics Act (%)	7.19	6.82	-0.37	(0.23)	0.10	(0.82)
Sentence Characteristics:						
Uns. Length (d)	38.73	43.80	5.07***	(0.32)	4.83***	(1.08)
Decision Length (d)	4.87	4.92	0.05	(0.06)	0.01	(0.24)
Process: Prosecutors (%)	71.62	73.87	2.25***	(0.42)	-2.19	(1.40)
Pre-Trial Detention (d)	2.28	1.48	-0.80***	(0.20)	-0.52	(0.68)
Observations	20,991	24,885	45,876		45,876	

Source: SUS. Sample: Unconditional sentences of less than 6 months, fines excluded. Method: Heteroskedasticity-robust standard errors in parenthesis. RDD controls: Sentence month.

Table A3: Balancedness of Observables, Medium Unsuspended Sentences, 2005-2008

	Mean 05-06	Mean 07-08	Δ t-test		Δ RDD	
Sentence Type:						
Prison or Pub. Works (%)	100.00	82.14	-17.86***	(1.03)	-12.88***	(3.20)
Prison (%)	-	74.05	-		-	
Pub. Works (%)	-	8.09	-		-	
Monetary (%)	0.00	17.86	17.86***	(1.03)	12.88***	(3.20)
Demographics:						
Age (y)	34.83	34.35	-0.48	(0.44)	0.66	(1.47)
Men (%)	94.31	94.31	0.01	(0.95)	-5.00	(3.18)
Born in Switzerland (%)	52.51	47.45	-5.06**	(2.06)	7.08	(6.83)
Living in Switzerland (%)	84.36	83.53	-0.84	(1.51)	0.58	(4.61)
Offense Law:						
Road Traffic Act (%)	24.46	29.09	4.63***	(1.57)	7.18	(5.03)
Criminal Code (%)	51.86	45.90	-5.95***	(1.64)	-3.87	(5.54)
Foreign Nationals Act (%)	17.43	14.49	-2.94**	(1.17)	-3.33	(4.07)
Narcotics Act (%)	2.55	6.75	4.20***	(0.67)	-0.81	(1.96)
Sentence Characteristics:						
Uns. Length (d)	230.05	223.16	-6.89***	(2.02)	-1.51	(6.73)
Decision Length (d)	12.95	9.67	-3.28***	(0.53)	-2.89*	(1.56)
Process: Prosecutors (%)	8.20	20.04	11.84***	(1.38)	1.96	(4.78)
Pre-Trial Detention (d)	44.19	38.84	-5.35*	(3.10)	-1.25	(11.43)
Observations	1,036	1,372	2,408		2,408	

Source: SUS Individual Data. Sample: Unconditional sentences between 6 and 12 months, fines excluded.

Method: Heteroskedasticity-robust standard errors in parenthesis. RDD controls: Sentence month.

Table A4: Balancedness of Observables, All Sentences, 2005-2008

	Mean 05-06	Mean 07-08	Δ t-test		Δ RDD	
Sentence Type:						
Prison or Pub. Works (%)	62.04	13.33	-48.71***	(0.14)	-50.40***	(0.45)
Prison (%)	-	9.26	-		-	
Pub. Works (%)	-	4.07	-		-	
Fines (%)						
Monetary (%)	0.00	84.98	84.98***	(0.08)	80.86***	(0.33)
Demographics:						
Age (y)	34.39	35.18	0.80***	(0.04)	-0.15	(0.14)
Men (%)	85.57	85.47	-0.10	(0.11)	0.52	(0.38)
Born in Switzerland (%)	50.05	49.44	-0.61***	(0.16)	-1.50***	(0.54)
Living in Switzerland (%)	82.00	79.56	-2.44***	(0.13)	-2.99***	(0.43)
Offence Law:						
Road Traffic Act (%)	50.37	54.02	3.64***	(0.16)	1.51***	(0.53)
Criminal Code (%)	26.77	24.77	-2.00***	(0.13)	-2.32***	(0.45)
Foreign Nationals Act (%)	7.41	6.34	-1.07***	(0.07)	-0.61**	(0.24)
Narcotics Act (%)	9.61	9.28	-0.33***	(0.09)	1.55***	(0.32)
Sentence Characteristics:						
Uns. Length (d)	25.39	28.52	3.13***	(0.57)	3.58*	(1.96)
Decision Length (d)	6.15	6.63	0.48***	(0.03)	-0.18	(0.12)
Process: Prosecutors (%)	75.15	75.74	0.59***	(0.14)	-1.59***	(0.47)
Pre-Trial Detention (d)	6.33	7.15	0.82***	(0.16)	1.50**	(0.62)
Observations	192,409	186,891	379,300		379,300	

Source: SUS Individual Data. Sample: Unconditional sentences of less than 6 months, fines excluded.

Method: Heteroskedasticity-robust standard errors in parenthesis. RDD controls: Sentence month.

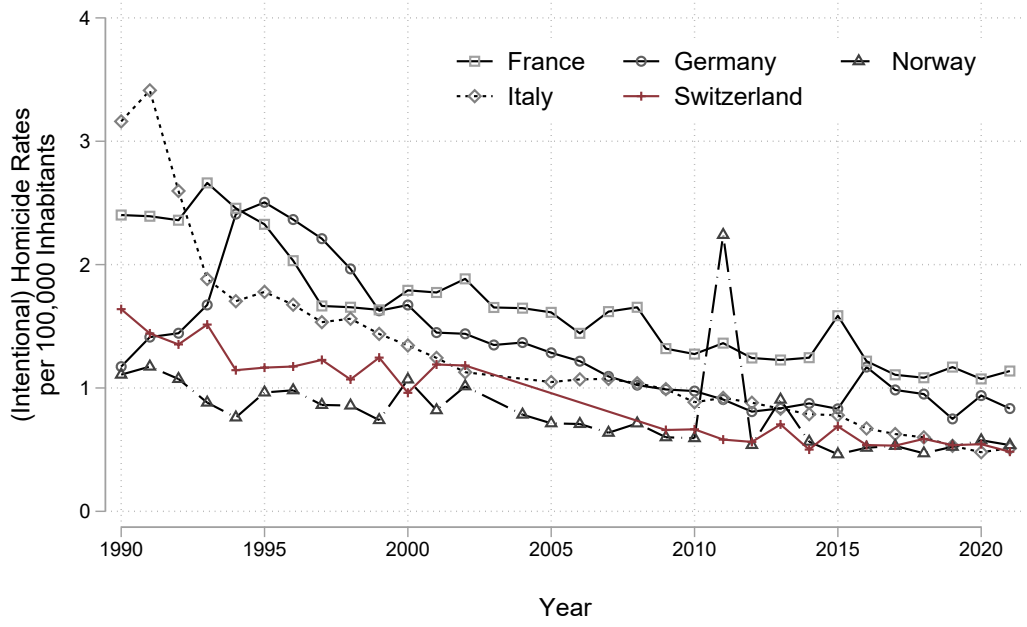
Table A5: Descriptive Statistics on Matched Samples

	Unsuspended (2005-08)			*Total (2005-08)*			*Unsuspended (2005-19)*		
	Matched	Not	Δ	Matched	Not	Δ	Matched	Not	Δ
Demographics:									
Age (y)	34.9	29.8	5.1***	34.7	35.1	-0.4***	35.9	32.4	3.5***
Born in CH (%)	60.0	4.8	55.1***	62.2	10.1	52.1***	57.4	6.3	51.1***
Living in CH (%)	94.6	44.7	49.8***	95.1	35.1	60.1***	94.1	36.7	57.3***
Men (%)	90.0	94.1	-4.0***	85.5	85.5	0.1	88.7	93.5	-4.8***
Offence Act:									
Criminal Code (%)	34.6	39.0	-4.4***	26.4	23.9	2.5***	33.5	35.8	-2.4***
Foreign Nationals Act (%)	2.0	36.0	-34.0***	3.1	29.7	-26.6***	3.3	41.2	-37.9***
Narcotics Act (%)	12.4	16.9	-4.4***	6.5	8.0	-1.5***	9.2	12.4	-3.2***
Road Traffic Act (%)	45.8	6.5	39.3***	56.9	33.6	23.3***	48.2	9.2	39.0***
Sentence Characteristics:									
Other (%)	5.2	1.6	3.6***	7.1	4.8	2.2***	5.9	1.5	4.4***
Prison or Pub. Works (%)	64.3	90.9	-26.7***	35.8	45.1	-9.3***	29.6	74.4	-44.8***
Prison (%)	55.1	89.5	-34.4***	33.4	44.6	-11.2***	22.5	73.4	-51.0***
Pub. Works (%)	9.1	1.4	7.7***	2.5	0.5	1.9***	7.1	1.0	6.2***
Monetary (%)	35.7	9.1	26.7***	43.0	38.2	4.8***	70.4	25.6	44.8***
Fines (%)	0.0	0.0	0.0	56.4	42.3	14.2***	0.0	0.0	0.0
Length (d)	125.1	208.3	-83.1***	26.3	29.9	-3.6***	105.3	142.1	-36.7***
Sentences	44,397	20,023	64,420	288,731	90,569	379,300	223,674	117,283	340,957
Individuals			35,752			258,288			142,341

Note: *Total* contains all types of sentences, *Unsuspended* contains unsuspended sentences (excluding fines). "Matched" are sentences merged at individual level with an entry in the labor market data in the same year. */**/*** denotes statistical significance at the 10%/5%/1%-level with clustered standard errors at individual level.

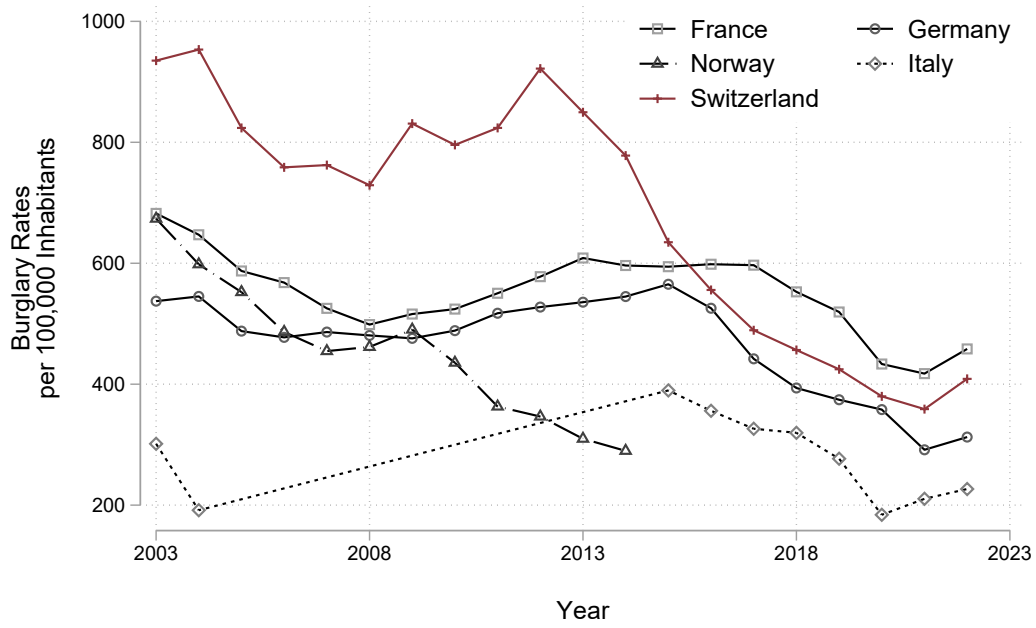
F Additional Figures

Figure A7: Intentional Homicide Rates in Selected European Countries, 1990-2020



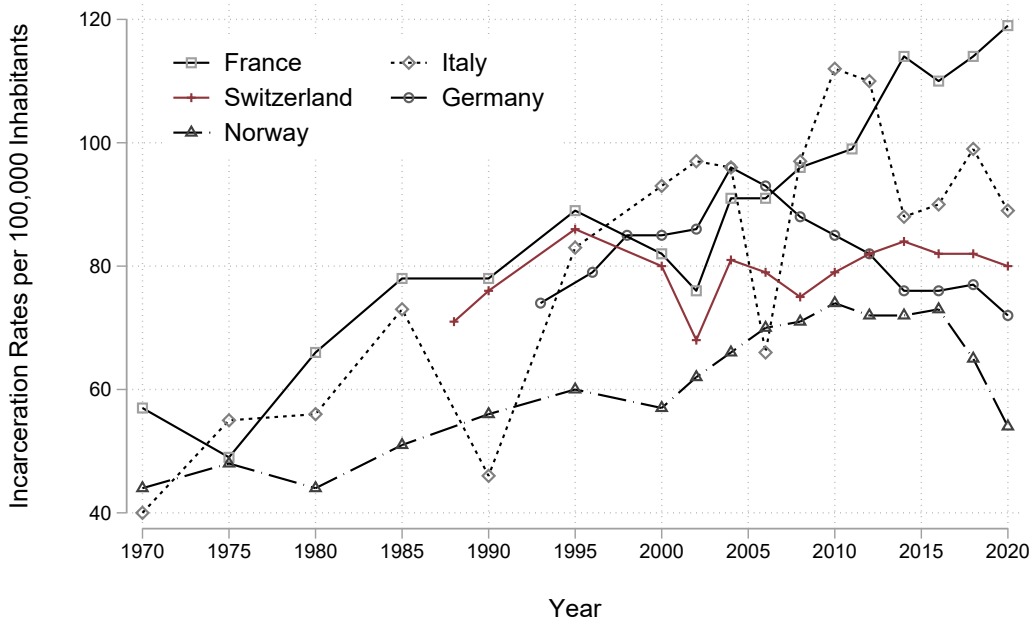
Source: World Development Indicators (World Bank).

Figure A8: Burglary Rates in Selected European Countries, 2003-2022



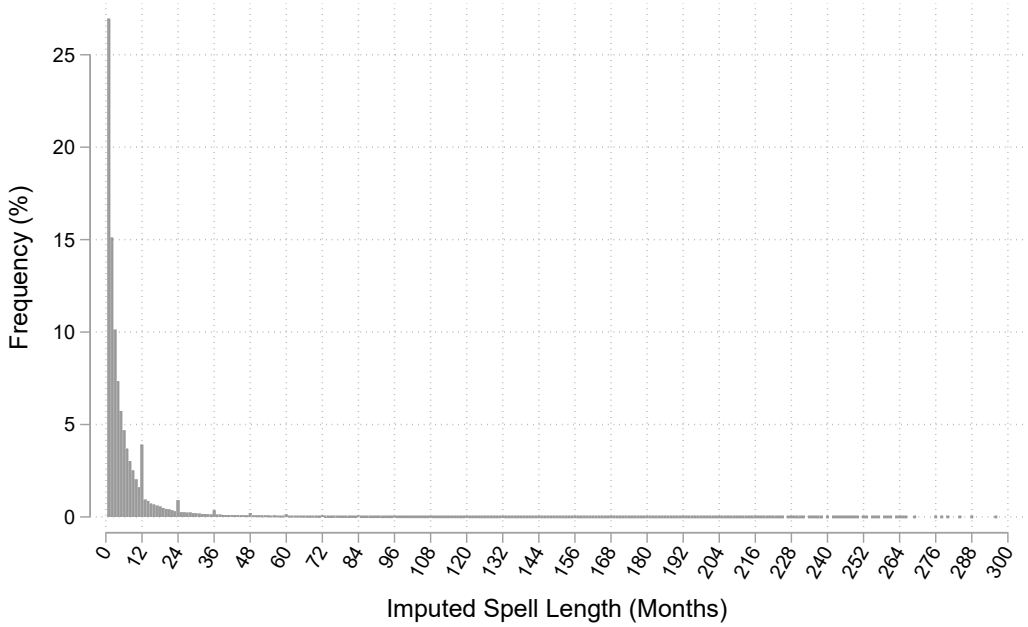
Source: UNODC.

Figure A9: Incarceration Rates in Selected European Countries, 1970-2020



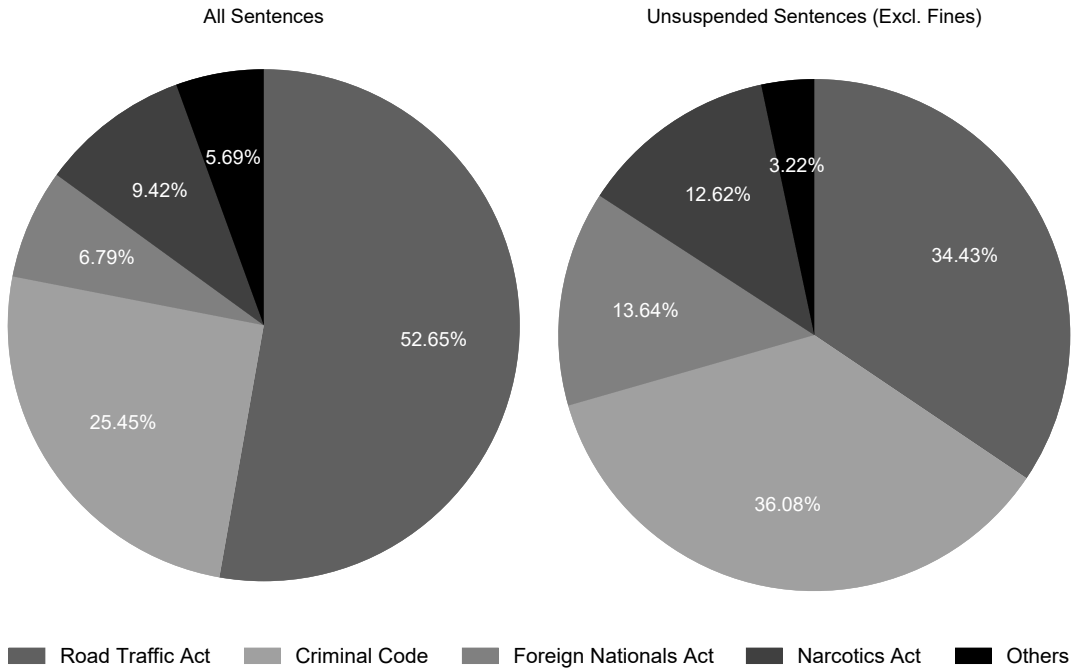
Source: World Prison Brief (ICPR).

Figure A10: Frequency of the Imputed Zero-Contributions Spells by Spell Length



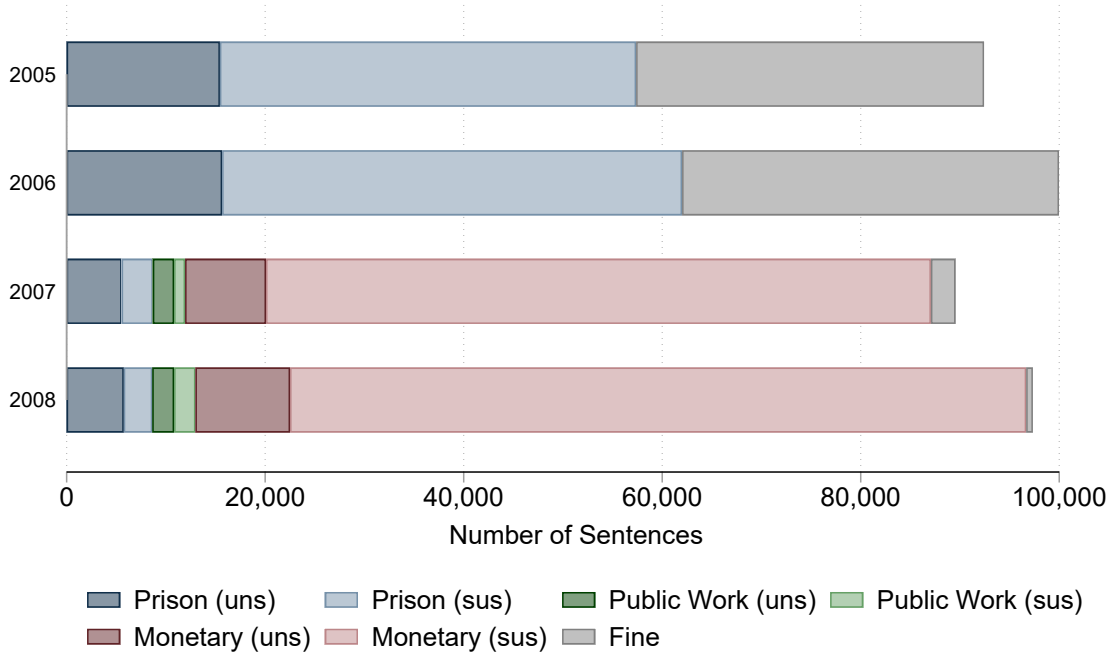
Source: SUS and ZAS. Sample: Individuals sentenced between 2005 and 2008.

Figure A11: Share of Sentences by Act, 2005-2008



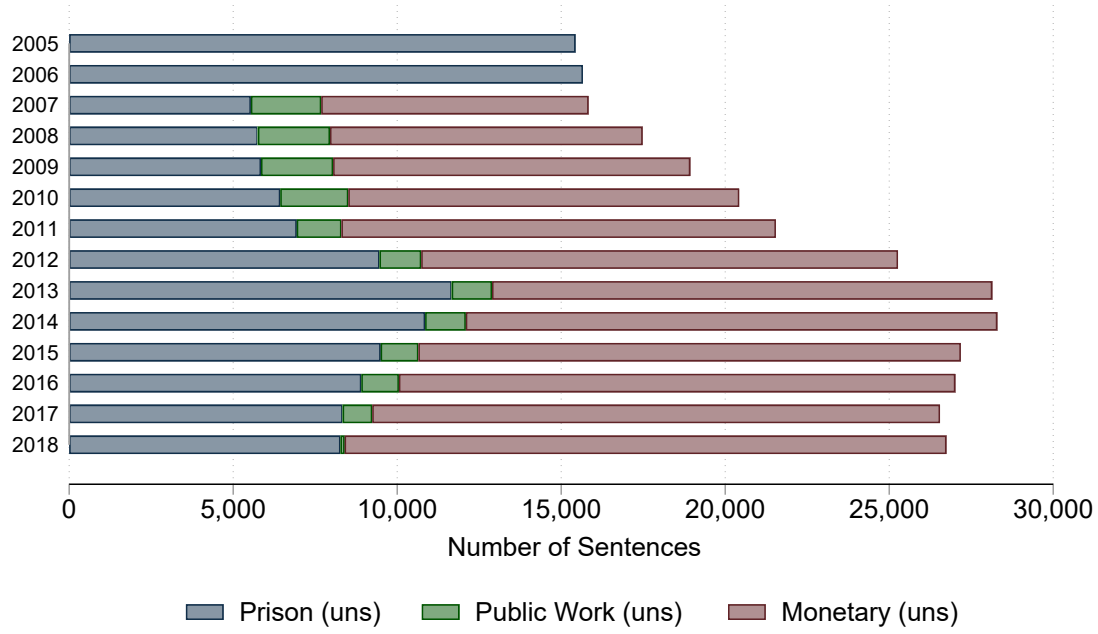
Source: SUS individual data.

Figure A12: Yearly Sentences by Sentence Type, 2005-2008



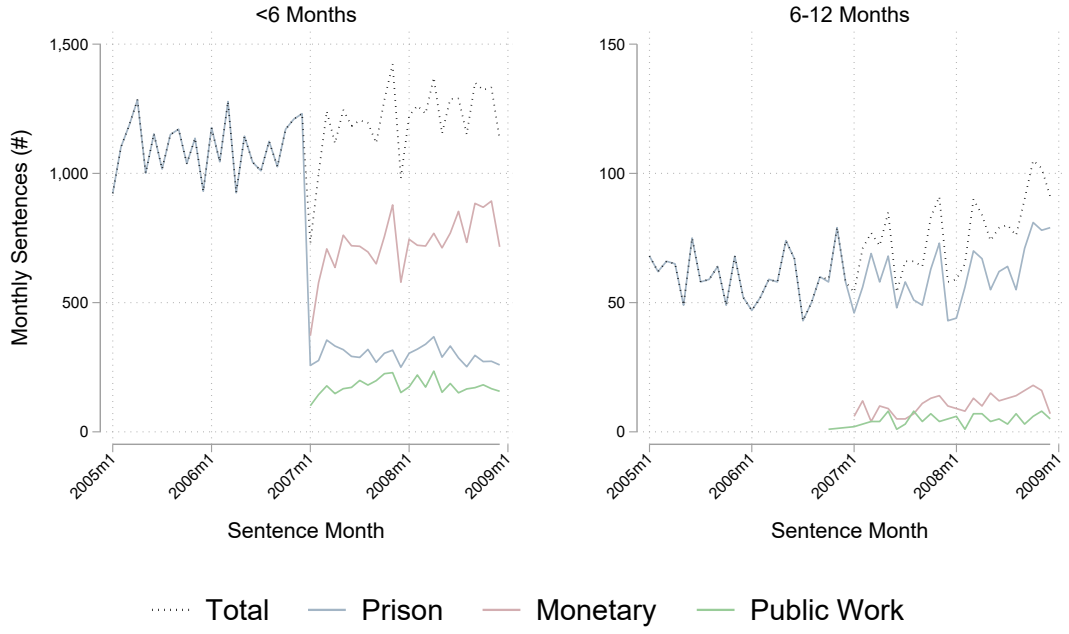
Source: SUS individual data.

Figure A13: Yearly Unsuspended Sentences by Sentence Type, 2005-2018



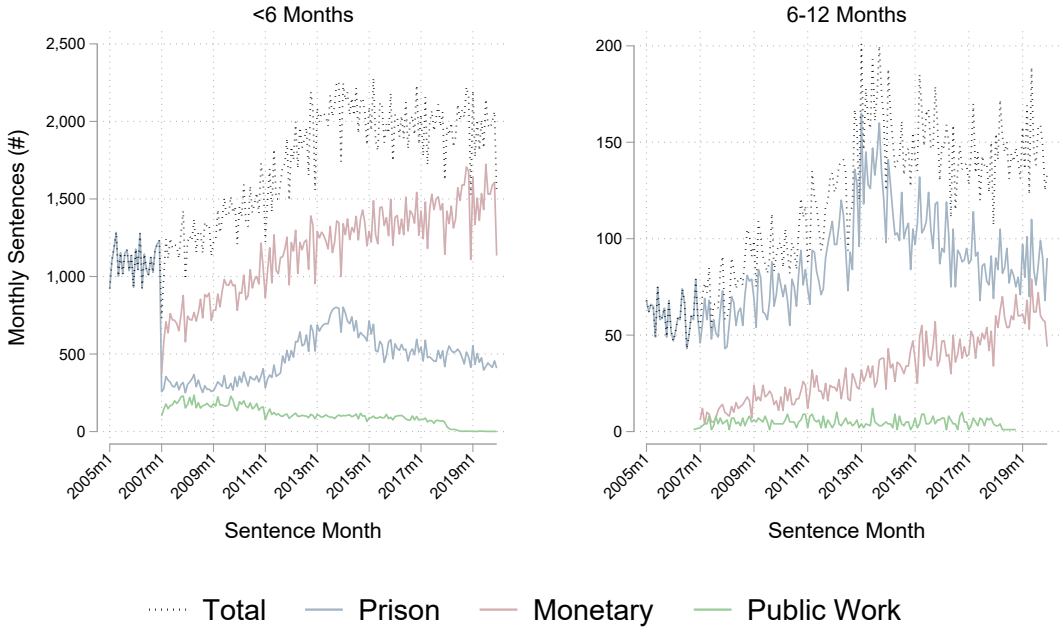
Source: SUS individual data.
Note: Public work counted as prison until 2007.

Figure A14: Monthly Unsuspended Sentences by Sentence Length and Type, 2005-2008



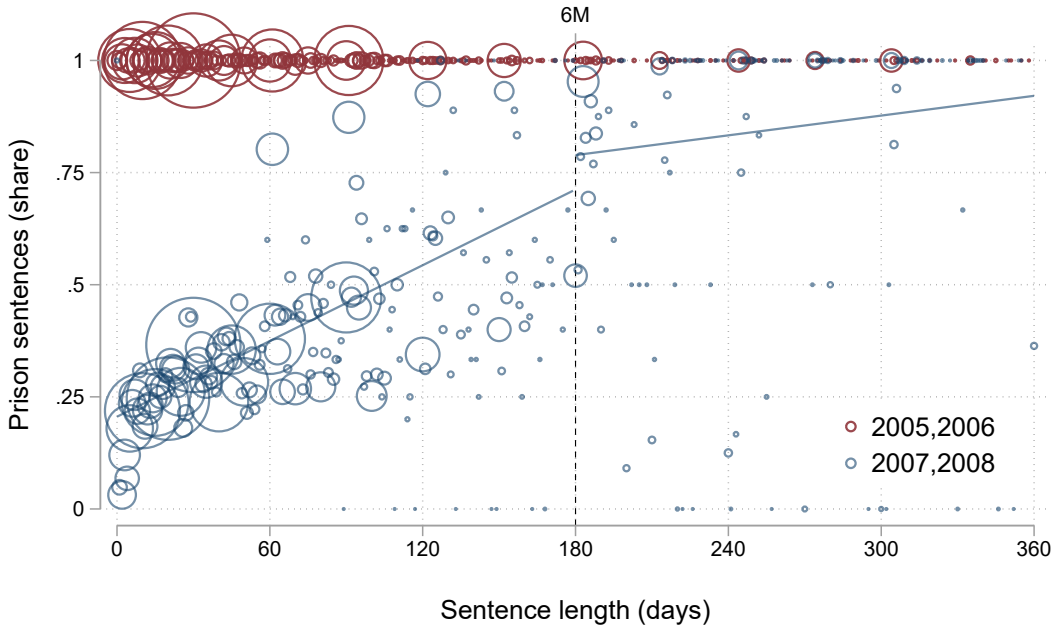
Source: SUS individual data.
Note: Public work sentences were assigned as prison sentences until 2007.

Figure A15: Monthly Unsuspended Sentences by Sentence Length and Type, 2005-2019



Source: SUS individual data.
Note: Public work sentences were assigned as prison sentences until 2007.

Figure A16: Share of Unsuspended Prison Sentences by Daily Sentence Length, 2005/06 and 2007/08

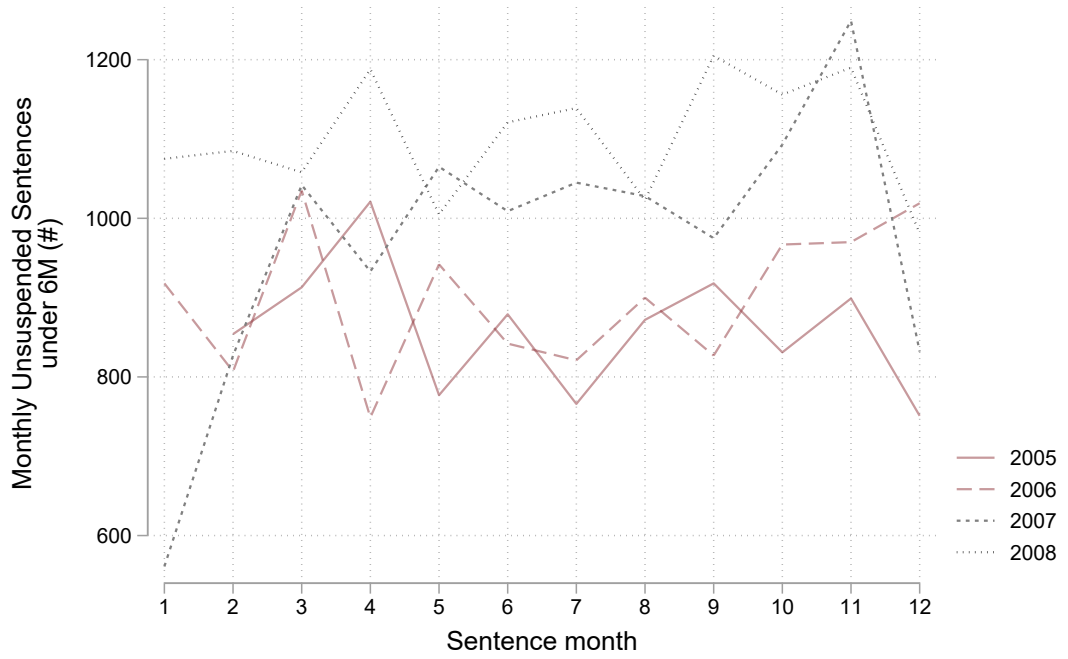


Source: SUS individual data.
Sample: Unconditional sentences (<360d). Public Works included as prison.

Figure A17: Monthly Unsuspended Sentences under 6 Months, 2005-2008

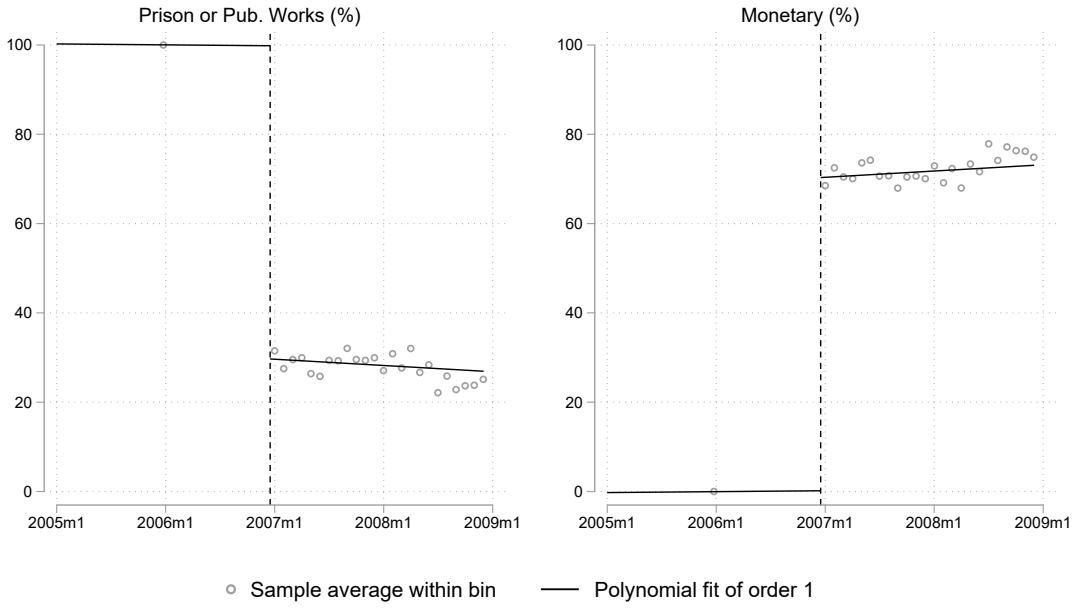
Source: SUS individual data.

Figure A18: Monthly Unsuspended Sentences under 6 Months by Month and Year, 2005-2008



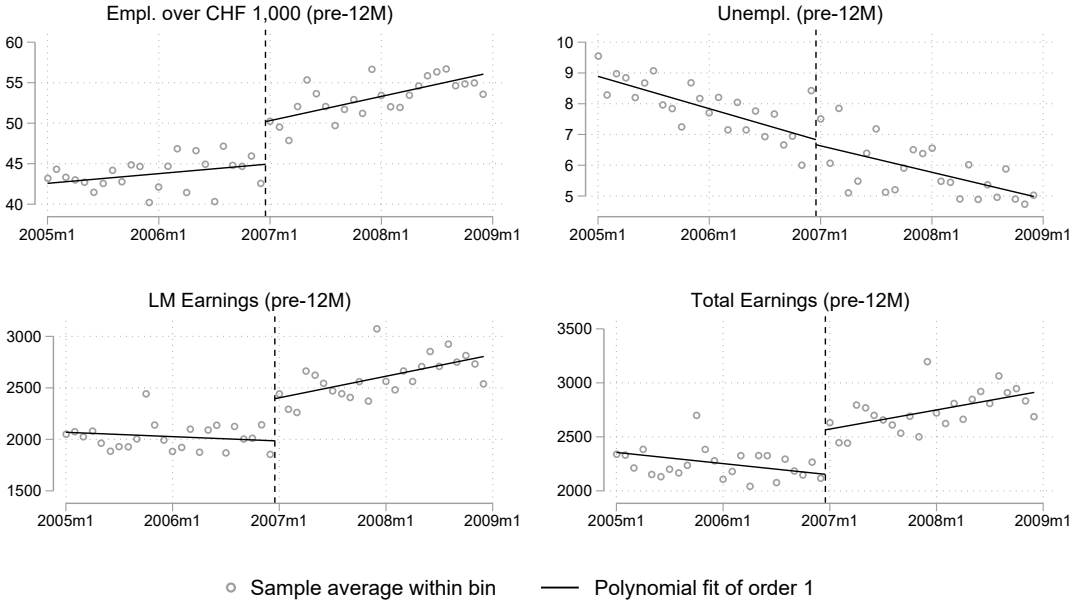
Source: SUS individual data.

Figure A19: RDD on Sentence Types, 2005-2008



Source: SUS and ZAS.
Sample: Matched unsuspended sentences of less than six months, fines excluded.
Method: RDD, triangular kernel, controlling for sentence month.

Figure A20: RDD on Labor Market Outcomes, 2005-2008

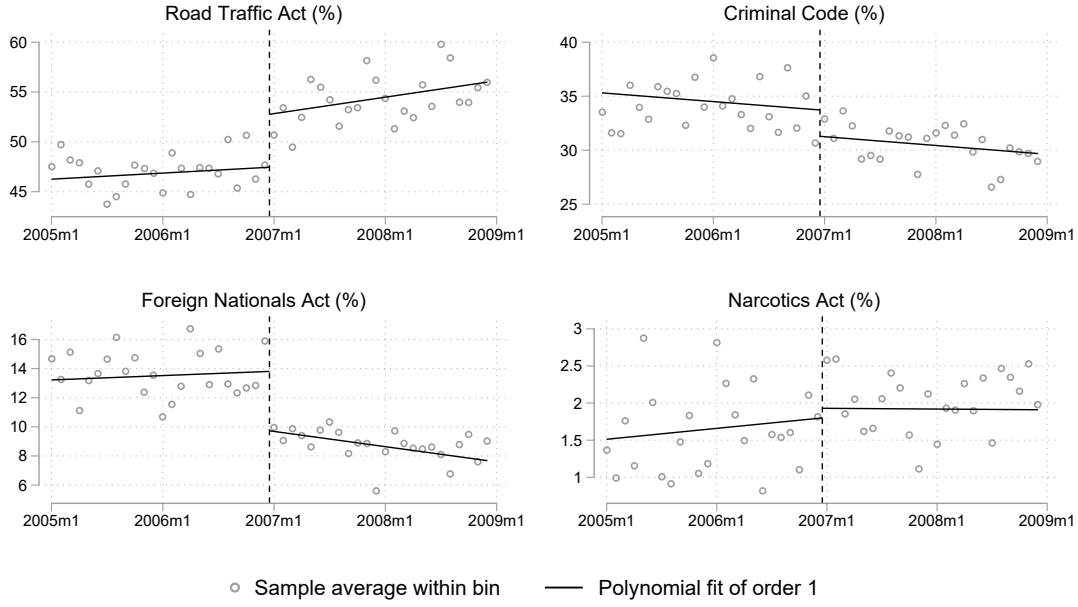


Source: SUS and ZAS.
Sample: Matched unsuspended sentences of less than six months, fines excluded.
Method: RDD, triangular kernel, controlling for sentence month.

Figure A21: RDD on Socio-demographic Characteristics, 2005-2008

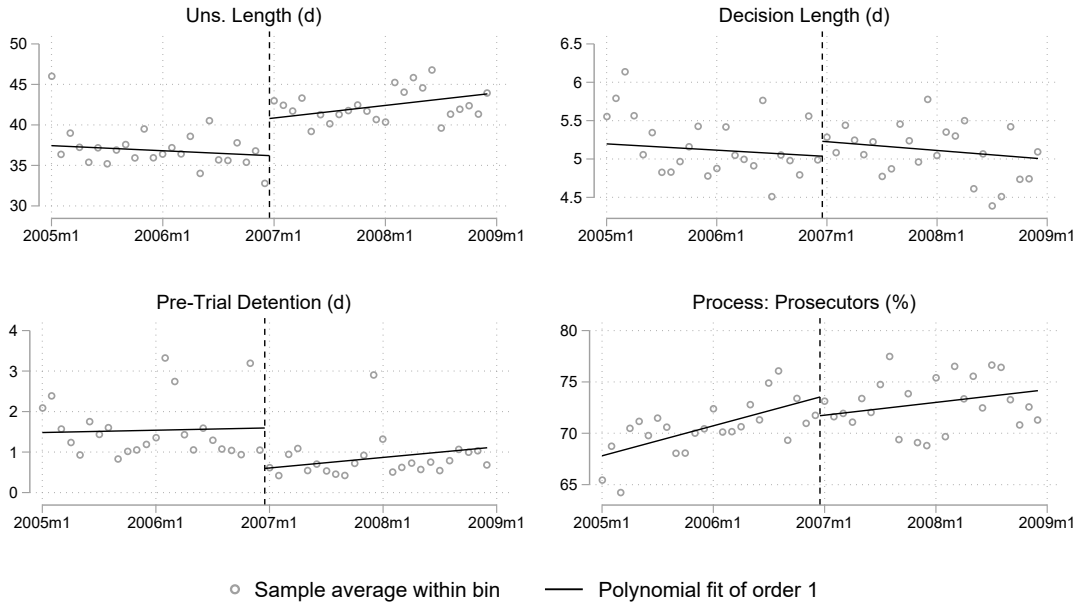
Source: SUS and ZAS.
Sample: Matched unsuspended sentences of less than six months, fines excluded.
Method: RDD, triangular kernel, controlling for sentence month.

Figure A22: RDD on Offense Laws, 2005-2008



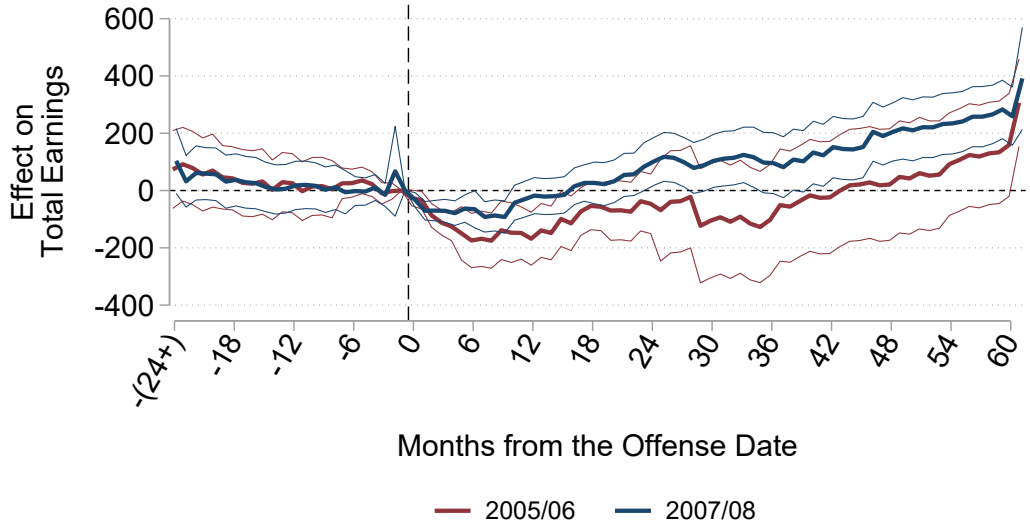
Source: SUS and ZAS.
Sample: Matched unsuspended sentences of less than six months, fines excluded.
Method: RDD, triangular kernel, controlling for sentence month.

Figure A23: RDD on Sentence Characteristics, 2005-2008



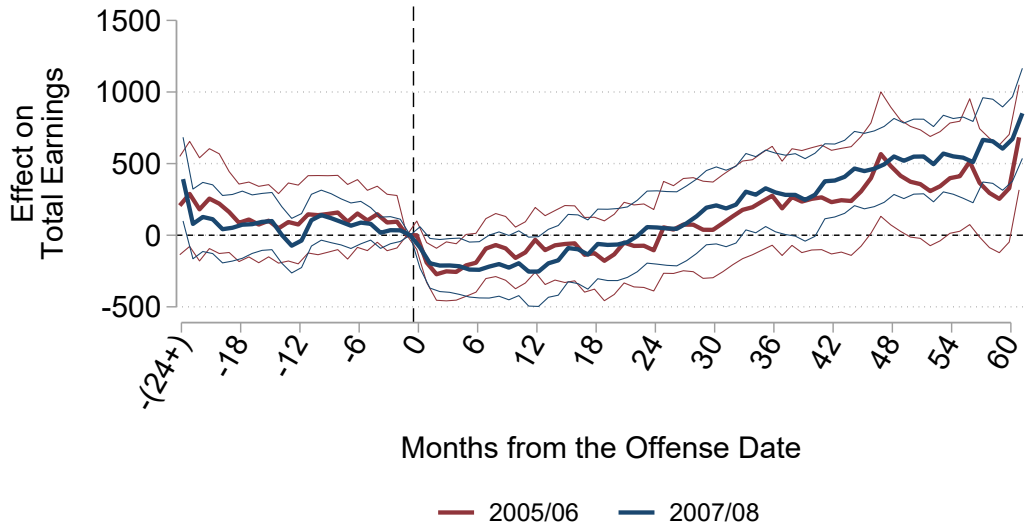
Source: SUS and ZAS.
Sample: Matched unsuspended sentences of less than six months, fines excluded.
Method: RDD, triangular kernel, controlling for sentence month.

Figure A24: Short Sentences Differential Impact on Total Earnings by Offense Date and Criminal Code, 2005-2008.



Source: SUS and ZAS.
Method: Event study, pre-reform and post-reform. 95% CI reported.
Sample: Unsuspended sentences up to 360d, first offenders.
Obs: 11790793; Ind:86,008; T: 137.1 (4/2000 - 11/2017)

Figure A25: Medium-Length Sentences Differential Impact on Total Earnings by Offense Date and Criminal Code, 2005-2008.



Source: SUS and ZAS.
Method: Event study, pre-reform and post-reform. 95% CI reported.
Sample: Unsuspended sentences up to 360d, first offenders.
Obs: 913,050; Ind: 6,588; T: 138.6 (4/2000 - 11/2017)