



# Impact of the Reform to Non-custodial Sanctions in Chile

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## Abstract

**Objectives** This paper assesses the impact of the new regime of non-custodial sanctions implemented in Chile in 2013. It aims to contribute to the evidence regarding structural changes in systems involving non-custodial sanctions.

**Methods** To identify the causal effect of the new regime of non-custodial sanctions on recidivism, we perform three complementary estimations. First, a before and after regression model of recidivism was estimated. Second, in order to compare cohorts with non-custodial and custodial sanctions, we build a difference-in-difference estimation to control for time-invariant confounding factors. Additionally, we use controls to address potential differences across groups not related to the change in treatment status. Third, we estimate the yearly effect through difference-in-differences for multiple periods.

**Results** The results suggest a small statistically significant increase of 1.54 percentage points in the recidivism rate, attributable to the reform of non-custodial sanctions during the first year of its implementation. After that, the reform impact on recidivism begins to stabilise at zero.

**Conclusions** The results are consistent with a neutral scenario whereby the recidivism rate eventually remains stable after the reform was implemented despite the increase in the number of people sentenced. Considering that the reform helped to decongest prisons, a neutral scenario on recidivism seems favourable for the Chilean penal system.

**Keywords** Non-custodial sanctions · Impact assessment · Recidivism · Difference-in-differences

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## Introduction

Non-custodial or alternative sanctions have been implemented in several legislations searching for better results in recidivism rates, lowering sentencing costs and avoiding prison overcrowding, among other purposes (Petersilia 1999; Cavadino and Dignan 2002). Most evaluations on non-custodial sanctions have assessed their rehabilitative potential by measuring their recidivism compared to prison sentences; mainly finding no statistically significant differences between non-custodial sanctions and prison (Gendreau et al. 1999; Villettaz et al. 2006, 2015).

The introduction of intermediate sanctions such as Intensive Supervision Programmes (ISP), electronic monitoring and community service in the late 1980s (Petersilia 1999) opened up the scope for evaluation. Not only did they allow for comparisons between prison outcomes, but also an exploration as to whether adding surveillance components through the introduction of ISP or electronic monitoring could result in better recidivism outcomes for the same original sanction (probation or curfew) due to their eventual deterrent effects. The results show no significant reductions in recidivism for ISP (Nath et al. 1976; Erwin 1986; Petersilia and Turner 1993; Hyatt and Barnes 2017) and mixed results for electronic monitoring (Renzema and Mayo-Wilson 2005; Bouchard and Wong 2018).

Besides the little differences in recidivism outcomes, this body of research has highlighted the reduced cost of non-custodial sanctions *vis à vis* prison as well as their potential preventive effect on the development of criminal-prone ties. Still, those studies have primarily focused on changes to specific sanctions, while evidence of more structural changes in alternative sanctions within a broader scope of the non-custodial system as a whole is still an unresearched area.

This article contributes toward filling in this gap by focusing on a non-custodial sanction reform implemented in 2013 in Chile, which sought to both improve surveillance and promote the rehabilitation of offenders while reducing prison overcrowding.

The main changes included in the Chilean reform were the introduction of an intensive version of probation which provided more surveillance by probation officers and a new repertoire of treatment programmes for offenders, and the introduction of electronic monitoring as a form of enhancing surveillance, amongst others. The purpose was to lend more “credibility” to these sentences in the eyes of stakeholders, particularly judges and the general public, while reducing the use of imprisonment (Morales and Salinero 2020).

Assessing the impact of structural changes, such as reforms in the criminal justice field, represents an important methodological challenge. Experimental randomisation is practically non-viable unless a progressive application of the reform can be taken into account. Therefore, quasi-experimental designs emerge as the best approach, which have generally been poorly implemented (Villettaz et al. 2015). In order to solve this problem, this research paper utilises a robust, quasi-experimental design to control for both observable and non-observable confounders, using repeated cross-sectional administrative data and comparable sample universes.

The article is organised as follows: Sect. 2 describes the literature focused on the evaluation of non-custodial sanctions. Section 3 describes the main changes introduced by the Chilean reform and its policy objectives. Section 4 describes the evaluation design and the data used. Section 5 presents the results. Section 6 performs a sensitivity analysis. Finally, Sect. 7 concludes and discusses the results and policy recommendations.

## Literature Review

Non-custodial sanctions have been commonly conceived as an alternative to imprisonment; as a consequence, most studies have focused on comparing their effectiveness against short-term imprisonment. In general, studies with high evaluative standards (randomised experiments and meta-analysis) have not found important differences regarding recidivism in favour of the alternative sanctions (e.g., Gendreau et al. 1999; Killias et al. 2000, 2010; Villettaz et al. 2006, 2015).

In contrast, few studies have paid attention to the difference that may exist between distinct alternative sanctions or have intended to evaluate changes in how they are executed. Those studies rest on two theories of offender behaviour based on either deterrence or rehabilitation. The deterrence approach maintains that enhanced control over the offender deters them by increasing the frequency of visits or checks by officers, together with curfews, urinalysis and, in some cases, electronic monitoring. Conversely, based on social learning or treatments, the rehabilitation approach claims that recidivism declines after offenders are placed in a behavioural programme (Clear and Hardyman 1990; Weinrath et al. 2015).

A pivotal element in this area has been the introduction of Intensive Supervision Programmes (ISP). Based mainly on a deterrence approach, they are designed as intermediate sanctions under the desirability of developing mid-range punishment for offenders for whom incarceration was unnecessarily severe and probation was inappropriately light (Petersilia 1999). Although the rehabilitation approach was part of their design, it appeared to be the least developed feature of these programmes (Hyatt and Barnes 2017). They can be conceived as intensive versions of probation and their performance has been evaluated compared to regular probation. The earliest ISP evaluations were completed in Georgia and Florida in the United States, using quasi-experimental methods, and results indicated that intensive probation had little impact on recidivism (Nath et al. 1976; Erwin 1986). One of the largest and most robust studies evaluating ISP was carried out by Petersilia and Turner (1993), which measured the impact of closer surveillance applied to probationers through ISP in 12 US jurisdictions. The researchers randomly assigned more than 2000 eligible offenders to ISP or routine probation. The results showed that, for high-risk offenders, ISP was apparently no more effective than routine probation in lowering recidivism rates after a 1-year follow-up period (37% of arrest rates for ISP and 33% for the control group). The researchers also showed that ISP could be linked to higher technical violation rates and, ultimately, to increased levels of incarceration, especially when programmes vigorously enforce their technical conditions combined with an apparent lack of a deterrent effect through closer monitoring of high-risk offenders.

More recently, Hyatt and Barnes (2017) in Pennsylvania State, USA, assessed the impact of introducing closer surveillance of high-risk offenders by randomly assigning high-risk probationers to intensive supervision ( $n = 447$ ) and ordinary probation ( $n = 385$ ). Participants under intensive supervision received more restrictive interventions and experienced greater office contact, more home visits and drug screenings. After 12 months, the results showed no differences in recidivism. These results were observed in different types of crimes, including violent, non-violent, property and drug-related crimes.

Another programme that shares some features with ISP is the Honest Opportunity Probation with Enforcement (HOPE) programme, which started in Probation Hawaii and is currently implemented in more than 40 jurisdictions across the United States (Cullen et al. 2018). Like ISP, this programme also changed the way in which probation is executed by

providing close monitoring and frequent random drug testing, alongside other measures. However, one of its main features is that supervision is carried out under a “swift, certain and fair” (SCF) approach, by which the programme introduced certain but not severe graduated sanctions to deter probationers from violating the conditions of their probation (Lattimore et al. 2016). The theoretical grounds that support this approach are again based on deterrence; however, emphasis is put on certainty and celerity rather than the severity of the response in line with recent evidence (Durlauf and Nagin 2011, p. 14). By contrast, rehabilitation under the HOPE model was de-emphasised and thus was provided only to those who requested it or those who failed multiple drug tests (Hawken 2010; Hawken and Kleiman 2009; Cullen et al. 2018).

Results from a randomised control trial done by O’Connell et al. (2016) and a four-site RCT done by Lattimore et al. (2016), in which they assigned more than 1500 probationers to either probation as usual or to the HOPE programme, have shown no significant differences in the average number of arrests or convictions nor in the time that it took participants to get rearrested. Especially in the case of revocations, which are particularly addressed by the swift and certain approach, these showed no differences between participants in the HOPE programme and those on regular probation.

In short, these studies show that adding greater surveillance to probation does not deter offenders and therefore is not related to greater reductions in criminal recidivism in the case of high-risk offenders. This is also consistent with Lipsey and Cullen (2007) and MacKenzie and Farrington (2015) who have argued that interventions seeking greater surveillance and control of offenders are not effective in preventing crime.

On the other hand, given that the ISP programme also differs on the level of including rehabilitation interventions, some studies have searched for evidence on the relative impact of those differences on recidivism. Following this distinction, Lowenkamp et al. (2010) performed a study on ISP where they sought to examine which intensive supervision programmes were most effective in terms of programme philosophy (deterrence vs rehabilitation) and treatment integrity. They based their research on the existence of considerable variations in the composition of ISP programmes across jurisdictions. For that purpose, the results of 58 programmes designed to reduce recidivism were analysed and then meta-analytical techniques were used to compare the differences in the effectiveness of each programme. The findings suggest that intensive supervision programmes that only focus on deterrence may be ineffective, but that those aimed at rehabilitation and integrity show more promising results.

In the same vein as the aforementioned study, a quasi-experimental research project carried out by Bonta et al. (2000) in Canada also tested the effectiveness of adding a rehabilitative component, particularly the participation in a cognitive behavioural programme (learning resources programme) of either probationers or offenders sentenced to electronic monitoring and comparing them to a control group made up of released prisoners who received no treatment. In addition, the authors carried out a matching exercise according to the risk of recidivism among the subjects analysed, previously determined through a questionnaire. Once the subjects were categorised as high, medium or low risk, the results showed that those at high risk treated intensively (with the aforementioned programme plus electronic monitoring or probation) presented less recidivism (31.6%) than those not treated (51.5%); and that low-risk offenders, treated in the same way, i.e. intensively, evidently presented greater recidivism, coinciding with Andrews and Bonta’s statements (2000) on the need to adapt the type of intervention to the particular risk of the offender.

Although the problem of both studies (Bonta et al. 2000; Lowenkamp et al. 2010) is that they are not as robust as the ISP experiments described above, they still offer insight into

the potential of rehabilitative treatment in the context of supervision, as well as highlighting the relevance of the risk principle and effective intervention.

Finally, some studies have turned their attention to the impact of electronic monitoring both as a source of deterrence and a tool linked to rehabilitation. However, apart from the Bonta et al. (2000) study which analysed a group under electronic monitoring and compared it to probationers and released prisoners, most research has concentrated exclusively on seeking out their benefits compared to imprisonment. In this area, robust meta-analyses have shown mixed results, with Renzema and Mayo-Wilson (2005) concluding that electronic monitoring did not have an impact on the reduction of recidivism rates; while, more recently, Bouchard and Wong (2018) have suggested that the aggregate analysis of studies on recidivism shows a strong and positive effect, suggesting that offenders who are sentenced to house arrest are significantly less likely to engage in criminal behaviour compared to offenders released from prison. Also, there are particular studies that have tested home curfew with electronic monitoring compared to other sanctions executed within the community, such as: release on parole (Gies et al. 2016), doing a follow-up with a specialised caseload (Turner et al. 2015) or transferring inmates to residential community centres (Sandhu et al. 1993). These studies have found better recidivism outcomes in the case of home curfews with electronic monitoring.

These results are also in line with the criminological literature which has argued that, besides the underlying rationale for using electronic monitoring as a deterrent and a surveillance tool under the belief that constant supervision would instil self-regulation (Jespersen et al. 2007), some rehabilitative effects of electronic monitoring may also be expected as observed in Bouchard and Wong's (2018) findings. Indeed, qualitative results suggest that home confinement, controlled by electronic monitoring, can play an important role in the disarticulation of certain habits and in the decoupling of criminogenic peers and environments, reducing "antisocial capital" while also improving "prosocial capital" levels through encouraging offenders to connect with influences linked to desistance, such as family and work (Hucklesby 2008; Andersen and Andersen 2014).

In summary, the literature shows little or no impact on criminal recidivism by changing features of non-custodial sanctions to increase deterrence, although there is some potential impact when interventions include a rehabilitation component. Nevertheless, the evidence is still scarce and based on changes introduced to specific sanctions. To the best of our knowledge, no analysis has attempted to evaluate the impact of changes in non-custodial sanctions when they have affected the whole system at the same time. The case of the reform implemented in 2013 in Chile gives us an opportunity to look into this issue.

## Non-custodial Sanctions in Chile

The Chilean criminal justice system is based on an adversarial model, introduced in 2000 via a new criminal procedure code (Riego 2008). In terms of sanctions, the new procedural regulation did not include structural changes and, thus, crimes are still those contained in the Penal Code in force since 1874 and which has been the object of numerous patchy and inorganic amendments in its almost 150 years of existence (Fernández 2006). The Penal Code features two main sanctions that can be imposed on offenders: fines and custody. However, in the case of offenders sentenced to custody for five years or less, the prison sentence can be replaced by a non-custodial alternative.

This possibility of replacing a prison sentence with a non-custodial alternative is regulated in Law N°18,216 enacted in 1983. Originally, the law set three types of non-custodial sanctions known as *medidas alternativas* (alternative measures). Those were: “Conditional remission” (*remisión condicional*) consisting of a monthly signature on administrative records held by the Chilean Prison Institution (“*Gendarmería de Chile*”); night imprisonment (“*reclusion nocturna*”), by which the offender had to spend every night from 10 pm to 6 am in a special penitentiary institution for a period of time and, finally, probation (“*libertad vigilada*”) that consisted of a monthly meeting at the local Reinsertion Centre with a probation officer or *delegado*.

Under that legal framework, judges had limited discretion because they had to decide between sentencing the offender to prison or to one of these measures, but the law established which alternative measure could be imposed depending mainly on the compliance with some objective requirements (type of offence committed, the existence of previous convictions) and subjective requirements (offenders’ resettlement possibilities) (Morales and Salinero 2020).<sup>1</sup>

The non-custodial system was amended by Law N°20,603, which was enacted in 2012, implemented in 2013, but was not completely in operation until 2015. The new legal framework expanded the array of sanctions from three to six options and changed the way some sanctions were executed while also changing their name from “alternative measures” to “substitute sanctions”, in line with more “punitive turns” imposed on alternatives to custody in the last few decades (Newburn 2007; Worrall and Hoy 2005; Robinson and Ugwudike 2012; Robinson et al. 2013), in order to highlight the fact that the offender had to comply with a sanction instead of merely a lenient alternative.

The new catalogue of “substitute sanctions” consisted of: conditional remission, probation, intensive probation, partial confinement, community service and deportation of foreigners.

Regarding conditional remission, the reform maintained its original concept, undergoing minor modifications. In the case of partial confinement, the changes contained in the reform are undoubtedly radical. As is evident, partial confinement is the natural heir of night confinement, which not only changes its name but also changes its form of execution. In effect with the reform, offenders can now be confined during the day, at night or over the weekend for a total of 56 h a week, usually at home, controlled by electronic monitoring. The regulation also sought to restrict its application in the case of repeated offenders, limiting the imposition of partial reclusion to two times. In this sense, although the reform maintained the possibility of its imposition in the case of recidivists sentenced up to two years in prison, it limited its application in the case of multi-recidivists serving short sentences of up to two times.

Another profound change in the legislation came hand-in-hand with the strengthening of probation. The reform restricted the regulatory framework of probation to cases that risked custodial sentences between two and three years; and also in the case of prison sentences

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<sup>1</sup> Conditional remission could be imposed if the offender had no previous convictions, was sentenced to a sanction up to three years and if the measure appeared suitable for the offender’s resettlement possibilities; probation could be imposed if the offender had no previous convictions, was sentenced to a sanction up to five years and if the measure appeared suitable for the offender’s resettlement possibilities; while night imprisonment could be imposed if the offender had no previous convictions, was sentenced to a sanction up to three years and if the measure appeared suitable for the offender’s resettlement possibilities and also in the case of offenders with previous convictions sentenced to a sanction up to two years and if the measure appeared suitable for the offender’s resettlement possibilities.

greater than 541 days and less than three years, in the case of micro-trafficking or drunk driving causing serious injuries or death. The idea behind this proposal was to prevent the imposition of the most benign punishment (conditional remission), which did not allow treatment, opting for intervention through probation or partial reclusion.

A similar solution was given in the case of intensive probation, which can be imposed in the case of offenders sentenced to imprisonment between three and five years; or sentenced to 541 days up to three years for committing particular domestic violence or sex crimes. Along with the above, in a case where the offender suffers from problematic drug or alcohol consumption, and the problematic use has been confirmed by a diagnostic evaluation, the reform gives the judge the possibility of imposing, in the same sentence, the obligation to attend outpatient or residential rehabilitation treatment or a combination of both.

Probation also suffered major changes in relation to the provision of treatment programmes, mainly due to the implementation of the “Risk, need and responsivity model (RNR)”.<sup>2</sup> Currently, probation is based on case management, which involves at least one risk assessment that determines the intensity of supervision, an evaluation of criminogenic needs to define the objectives of the work with the offender, and the activities contained in an individual interest plan (ISUC 2017; Ministerio de Justicia 2012). If the offender is determined as being high risk, they will have to attend specialised programmes<sup>3</sup> and/or individualised intervention with a probation officer and will be subject also to continuous control<sup>4</sup> (ISUC 2017).

Furthermore, in the case of both sanctions—probation and intensive probation—the court is obliged to impose some conditions related to residence, work, education and being subject to the guidance of the probation officer, which were also required before the implementation of the reform. However, in the case of the latter (intensive probation), in addition to regular meetings with the probation officer, the judge has an obligation to impose additional rules of conduct consisting of “do not” obligations (prohibition of going to certain places, approaching the victim(s) or their family members and/or other people) or “to do” obligations (to remain at home for a period of 8 continuous hours and to comply with certain training programmes, e.g. work, cultural, road safety, sex education or treatment of violence). Furthermore, the reform empowered the judge with the possibility of imposing electronic monitoring, specifically in the case of offenders sentenced to intensive probation for the commission of certain domestic violence and sex crimes (Biblioteca del Congreso Nacional 2012).

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<sup>2</sup> This model relies on the basis of three main principles: Risk, that contends that the higher risk offenders should receive the greater dosage of treatment; Need, that states that treatment should target offenders' criminogenic needs; and Responsivity, that proposes that treatment is more likely to be effective if it is a cognitive-behavioural treatment programme and if the style of service delivery matches with the offender's learning style (Andrews et al. 1990; Andrews and Bonta 2016; Gendreau 1996).

<sup>3</sup> In the case of common offences, the sentenced person will have to attend a "Social Competencies Programme" (PCS), which is a cognitive behavioural programme implemented in 2014 for males that have committed common crimes. If the offender has been punished for sexual abuse, they will have to participate in the "Programme for Sexual Offenders" (PAS), which is a programme based on the RNR model combined with the “Good Life Model” for sex offenders (Ward 2002) implemented in 2014 for males that have committed sexual offences; while in case of offenders punished for domestic violence, they will have to attend the "Programme for Aggressors of a Partner" (PAP), which is a programme that combines the ecological model, gender approach and construction of new masculinities, cognitive-behavioural approach, transtheoretical model of change, and RNR for persons sentenced for committing domestic violence offences (ISUC 2017).

<sup>4</sup> Activities designed to ensure compliance with the conditions imposed.

A new sanction considered by the reform was the introduction of community service, by which the court is empowered to replace a prison sentence equal to or less than 300 days, but only once in subsidy of the rest of the substitutive penalties. Another innovation of the reform was that the regulation introduced the expulsion of foreigners, which allows the substitution of a penalty equal to or less than five years for the expulsion from the territory of the republic; in the case that the offender was a foreigner, not legally residing in the country (Biblioteca del Congreso Nacional 2012).

As with the previous legal framework, judges also have limited discretion because, once again, the law establishes which substitute sanctions could be imposed depending on the compliance with objective and subjective requirements. This is important because, unlike other legislations (i.e. 2003 Criminal Justice Act, United Kingdom) where judges are able to determine the suitable requirements of a sanction based on a pre-sentencing report that indicates the needs of the offender, in Chile, judges basically have to decide whether or not to imprison the offender but are not able to choose the most suitable sanction according to the needs of the offender according to a pre-sentencing report.

Although several objectives were declared by the government as goals driving this reform (Biblioteca del Congreso Nacional 2012; Ministerio de Justicia 2012), those that arose most clearly during the discussion of the bill were (i) to reduce the use of imprisonment, (ii) to provide effective surveillance of the sanctions and (iii) to enhance the offender's rehabilitation.

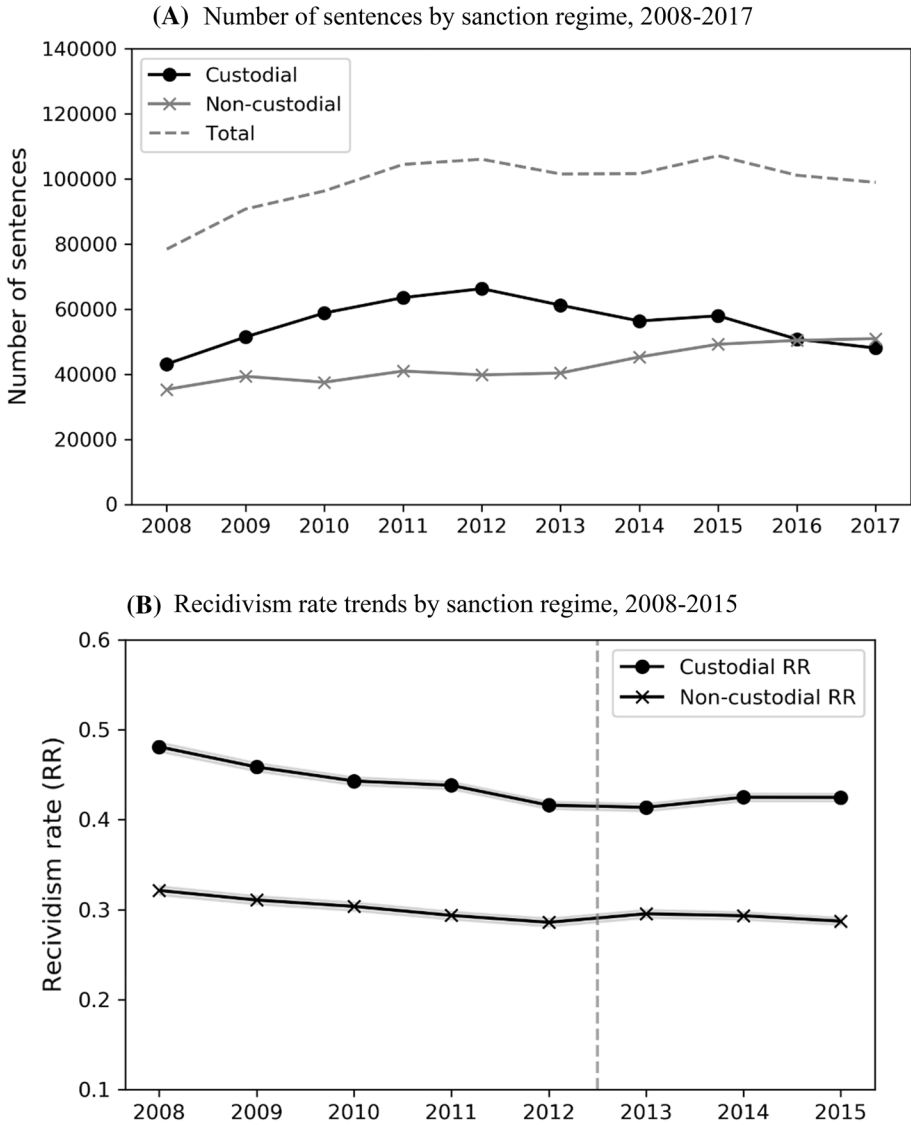
In relation to the use of imprisonment, Chile exhibits high imprisonment rates—as well as other Latin American countries—and, while the bill was still under discussion in Congress, the year 2010, in particular, marked the highest imprisonment rate ever seen in the country with 305 inmates per 100 thousand inhabitants (Walmsley 2011). So, as a way of dealing with that problem and following the path of other legislation in this area, the reform sought to promote the use of non-custodial sanctions (Petersilia 1999; Cavadino and Dignan 2002) by allocating substantial resources towards the control of night imprisonment through electronic monitoring, by increasing the number of probation officers and implementing new treatment programmes, as explained. The purpose was to generate more trust on the part of the judges who imposed these sentences, hoping to give them greater confidence that the sanction would be supervised properly and, therefore, expecting more offenders to be sentenced to non-custodial sanctions.

In the case of the second objective, a perceived lack of surveillance encouraged changes at both jurisdictional and administrative levels. With the former, new rules changed the workflow of criminal judges by establishing judicial follow-up hearings and procedures for cases of non-compliance and revocation. To that end, the law dictated that the accomplishment of the sanction should be supervised by the judge annually in the case of probation and twice a year in the case of intensive probation.

Finally, regarding rehabilitation, embracing the “RNR model” implied the adoption of an evidence-based model, by which important reductions in recidivism were expected due to research that has supported its positive outcomes in that arena (Lösel 1995; Redondo et al. 1999).

## The Evaluation Design

To implement an appropriate strategy in order to identify whether the reform of non-custodial sanctions in Chile produces a reduction in recidivism, it is important to understand how the Chilean penal system has evolved over time. Figure 1a presents the number of



**Fig. 1** **a** Number of sentences by sanction regime, 2008–2017, **b** recidivism rate trends by sanction regime, 2008–2015

offenders sanctioned by both penal regimes (non-custodial and custodial), and Fig. 1b shows the recidivism rate by sanction regime between 2008 and 2017.

The global trend of offenders shows an increase in sanctions from 2008 to 2010 and a relatively stable trend of around 100,000 sanctions per year thereafter, exhibiting trending differences between penal regimes. While the non-custodial regime sentences have been increasing in a relatively stable pattern, the sentences handed down in the custodial regime reached a maximum in 2012 and later declined, suggesting the substitution of custodial sentences for non-custodial ones.

The above trends should also be contextualised within the Chilean “prison crisis”, dubbed as such by the Chilean media and which manifested itself starkly in the death of 81 inmates due to a fire at the San Miguel Penitentiary Centre on December 8, 2010. That event brought the dramatic situation regarding prisons directly into the public eye, exposing poor housing conditions, serious overcrowding (Instituto Nacional de Derechos Humanos 2013) and the highest imprisonment rate in South America (Walmsley 2011). The San Miguel prison fire led to the adoption of transitory measures for prison decongestion, such as the 2012 general pardon, some changes in parole requirements and the reform of the non-custodial sanction regime.

The reform to non-custodial sanctions came along with a change in the profiles of the offenders sanctioned by each regime (custodial and non-custodial), where some offenders who were sanctioned exclusively by imprisonment before the reform started to be considered for a non-custodial sanction.

Consequently, concerns about the marginal offender under each regime arose. Indeed, without a clear understanding of the context and evolution of the main trends in the Chilean penal system, the estimation strategy could lead to biased results. For example, some usual strategies like a simple before-and-after comparison or even a regression discontinuity design could demonstrate an underlying recidivism change in the whole penal system or changes in the offenders’ risk profiles rather than an effect brought on by the reform itself. Furthermore, a simple difference-in-differences strategy would not consider the changes in the profile of offenders in each regime (see Fig. 1b).

The previous figure shows, firstly, a differential in recidivism rates in favour of the non-custodial regime, where the recidivism rate of individuals released from prison is about 50% greater than the recidivism of individuals who initiate a non-custodial sanction. Secondly, by visual inspection, the recidivism rate also shows a parallel trend between custodial and non-custodial regimes, consistent with a systemic evolution of recidivism throughout the entire penal system. Finally, the trend of recidivism decreased from 2008 to 2012 but jumped a little in 2013 for the non-custodial regime.

As can be seen, the reform scenario and its context are complex. On the one hand, the reform affects both non-custodial and custodial regimes and can modify the risk profiles of marginal offenders, reflected in a transition of offenders from the custodial regime to the non-custodial regime with a significant differential in recidivism profiles. On the other hand, a consistent symmetric evolution of recidivism between the two sanction regimes is observed, revealing a systemic change in recidivism that may or may not be associated with the non-custodial reform.

To process the aforementioned observations, the proposed estimation model strives to both (i) balance the offender’s observable characteristics and (ii) control for the underlying recidivism trend of the penal system. The balance of covariates, such as the type of crime, is considered fundamental for a correct comparison of the groups since reoffending is highly determined by these characteristics (Harper and Chitty 2005; Howard et al. 2006; May et al. 2009). Thus, the proposed model is essentially a difference-in-differences using control variables for the criminal profile. The details of the sample data and the specific estimation model are presented below.

## Sample and Variables

The Chilean justice system holds administrative records for all adults who receive either a prison sanction or a non-custodial sanction. For this study, we gained access to a dataset that

included: the date of sentencing, type of sanction, the duration of time for each sanction, the crime(s) punished, the birth date and sex of the offender. To track each offender, the dataset includes a unique ID variable relating to each individual. The data covers all sanctions (prison and non-custodial) imposed on each individual during the period 2008–2017. The total number of individuals that received a non-custodial sanction was 300,296, while 364,289 received prison.

Recidivism is measured as a dummy variable indicating whether the individual relapsed during a 2-year follow-up period. In non-custodial cases, the follow-up period commences from the beginning of the sanction because the individual is complying with the sanction on freedom. Conversely, in custodial cases, the follow-up period starts when the offender is released from prison.

## Identification Methodology

Given the impossibility of observing the same individuals being affected (treated group) and non-affected (control group) by the reform to non-custodial sanctions, we follow the potential outcome framework developed by Rubin (1974) to estimate counterfactual scenarios. We considered three complementary estimations.

The first approach estimates a linear model of the recidivism rate before and after the reform, including control variables for the time trend and individual characteristics. This is formalised in Eq. 1:

$$Y_{it} = \alpha + \theta Year_t + X' \beta + \delta D + \varepsilon_{it} \quad (1)$$

where  $Y_{it}$  represents the recidivism rate for an individual  $i$  at time  $t$ ;  $\alpha$  is a constant;  $Year_t$  captures yearly time-invariant effects between 2008 and 2015;  $X$  represents a vector of an individual's covariates strongly associated with recidivism (sex, the type of crime and the length of the sanction);  $D$  is a dummy which equals one in the post-treatment period (from 2013 onwards) and zero otherwise and  $\varepsilon_{ist}$  captures a random error.

Under this setup,  $\gamma$ , the parameter that accompanies  $D$ , produces the estimator of the causal effect. Although this estimation method seems appropriate, there are unobservable environmental factors that may influence the recidivism rate over time.

To handle them, we estimate a second counterfactual scenario through a Difference-in-Difference (DiD) approach. This method is suitable since the dataset contains both data before and after the reform along with data on non-custodial and custodial sanction regimes. The custodial regime is used as a control group since it is exposed to the same environmental conditions over time as the treatment group but without being directly affected by the reform. Additionally, we include yearly fixed effects and a set of time-variant covariates on the criminal profile, since the recidivism might be affected by changes in the composition of custodial and non-custodial groups over time.

Considering  $i = \{1, \dots, N\}$  as the individuals in the sample, the sanction regimes  $s = \{\text{treatment, control}\}$ ; and the year of the sanction  $t = \{2008, \dots, 2015\}$ , the DiD approach is formally implemented as follows:

$$Y_{ist} = \alpha + \theta t + \rho Treatment_s + \gamma d_{t \geq 2013} + \delta DID_{st} + X' \beta + \varepsilon_{ist} \quad (2)$$

The  $\alpha$  parameter captures a group-level time-invariant constant;  $t$  represents yearly time-invariant effects and takes values from 2008 to 2015 and is also used as a subindex;  $Treatment_s$  is a dummy which equals one for treatment units and zero for control units;

$d_{t \geq 2013}$  is a dummy variable which equals one in the post treatment period (from 2013 onwards) and zero otherwise;  $X$  is a set of covariates to control for an individual's criminal profile (sex, type of crime and sanction length);  $DID_{st}$  is a dummy variable which equals one for treatment units ( $Treatment_s = 1$ ) in the post-treatment period (from 2013 onwards), and zero otherwise; the  $\delta$  parameter is the difference-in-difference coefficient to be estimated and  $\varepsilon_{ist}$  captures a random error.

Now, it is relevant to consider that the DiD identification strategy relies heavily on the parallel trend assumption between both non-custodial and custodial series. To test this assumption, analogous to Autor (2003), we compare whether there are statistically significant differences in the time trends of the outcomes between treatment and control groups before the reform had taken place. Restricting  $t = \{2008, \dots, 2012\}$ , this test could be implemented through the following equation:

$$Y_{ist} = \alpha + \theta t + \rho Treatment_s + \omega(t \cdot Treatment_s) + X' \beta + \varepsilon_{ist} \quad (3)$$

Under the specification of Eq. (3), the  $\omega$  parameter must be non-statistically significant from zero, meaning that differences in the time trend of recidivism between treatment and control groups are non-statistically significant.

Finally, it is important to note that although Law N°20,603 was officially enacted in June 2012, the new non-custodial sanctions regime was gradually implemented. The administrative regulation (*reglamento*)<sup>5</sup> of this law was published in December 2013, and electronic monitoring was only operative by September 2014 (Gendarmería de Chile 2016). Thus, it is safe to claim that the regime was not fully operational before 2015.

Therefore, to analyse the progressive effect that the non-custodial reform may have had as its implementation was completed, we consider a slightly different specification from Eq. (3), where  $Year_t$  is a vector of dummies, one per year from 2009 to 2015.

$$Y_{ist} = \alpha + \sum_t \theta_t Year_t + \rho Treatment_s + \omega \left( \sum_t \theta_t Year_t \cdot Treatment_s \right) + \beta X + \varepsilon_{ist} \quad (4)$$

## Results

Table 1 presents the results for the before and after treatment model (Eq. 1) and the DiD model (Eq. 2) with and without covariates at the individual level. The before and after regression model exhibits a statistically significant increase in the recidivism in the non-custodial regime, between 1.79 and 2.09 percentage points, after its reform. On the other hand, the DiD model shows a considerably smaller but still statistically significant effect. An increase of 1.25 percentage points in the model without controls and an increase of 0.51 percentage points in the model with controls for the socio-criminal profile.

When comparing models with and without controls, a decrease in the effect on recidivism is observed. This is consistent with the hypothesis of different criminal profiles over time and a plausible transfer of more criminogenic prone individuals from the custodial to the non-custodial sanctions after the reform. With this, the inclusion of criminological variables at the individual level, such as the type of offence associated with the conviction,

<sup>5</sup> This regulation was implemented because more professionals, training and new technologies were required to provide the reform with a source of operational support.

**Table 1** The effect of the non-custodial reform on recidivism

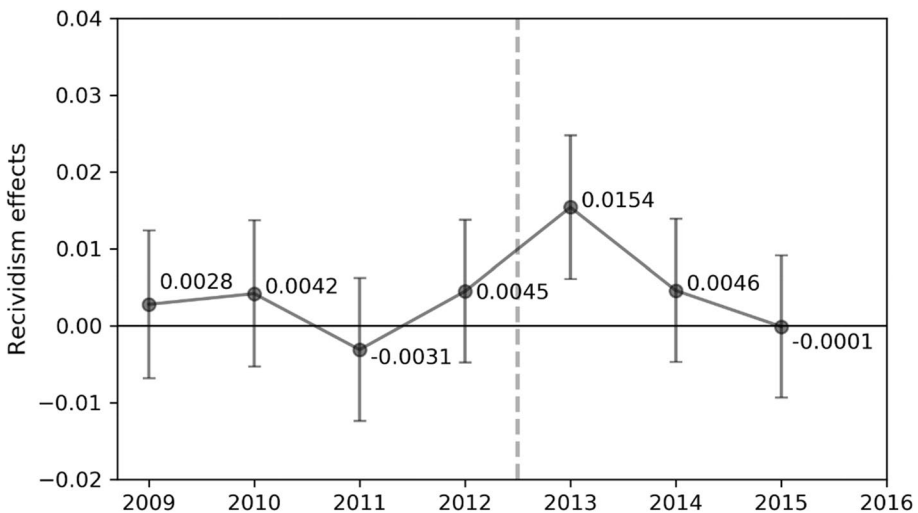
Variables	Equation 1 (Before and After)				Equation 2 (DiD)			
	Coef	P> t	Coef	P> t	Coef	P> t	Coef	P> t
Effect <sup>a</sup>	0.0209 (0.0033)	0.003	0.0179 (0.0031)	0.003	0.0125 (0.0024)	0.000	0.0051 (0.0023)	0.027
$d_{t \geq 2013}$	-		-		-0.1418 (0.0015)	0.000	-0.0977 (0.0016)	0.000
Treatment <sub>s</sub>	-		-		-0.0233 (0.0017)	0.000	0.0093 (0.0024)	0.000
Year <sub>t</sub>	-0.0079 (0.0007)	0.000	-0.0049 (0.0007)	0.000	-		-0.0049 (0.0005)	0.000
X (Covariates)	No		Yes		No		Yes	
Observations	300,296		300,296		664,585		664,585	
R-squared	0.0006		0.0946		0.0203		0.1013	

<sup>a</sup>This is the effect estimator for the before and after regression model (D) and the Difference-in-Difference model (DiD) with and without individual controls

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

the sentence length, as well as sex, allow for eventual changes in the criminogenic profile to be corrected.

However, a further robustness analysis must be done to support the previous claim. The results for the DiD model will be reliable as long as the existence of parallel trends in recidivism before the reform can be tested. When applying the regression from Eq. 3 (Table 2 in Appendix), it is observed that the interaction term (*Non-custodial#Year*) is not a statistically significant difference from zero 0.0003 ( $p$  value=0.774). Therefore, there is no evidence of differential time trends between groups during the pre-intervention period. It is interesting to point out that the parallel trend pseudo-test was only satisfied when the DiD included X covariates.



**Fig. 2** DID non-custodial reform effect on recidivism per year

Finally, given its gradual implementation after 2013, it is possible to estimate the reform impact on recidivism for each year by implementing Eq. 4. The results are presented in Fig. 2, and the detailed results are reported in Table 3 of the Appendix. When estimating differentiated effects by year from DiD specification, a small statistically significant increase of 1.54 percentage points ( $p$  value = 0.00126) in recidivism is observed in 2013—the year in which the reform was implemented in its initial stage. Then, the reform impact on recidivism begins to stabilise at zero.

Consequently, the results suggest that the aggregate effect of the reform, estimated in Eq. 2 (Table 1), has more to do with an early transition period of the reform, where an initial statistically significant increase is observed only for the year 2013, as is shown in Fig. 2 (Table 3 in Appendix).

### Sensitivity Analysis

The test on parallel trends in Sect. 5 did not rule out the null hypothesis of the absence of differences in trends; however, neither can it reject violation of such parallelism to some magnitude. Therefore, it is still possible that the violations exist and bias the estimates, even after rejecting the existence of differences in trends. Therefore, it is important to assess how robust the estimates of the causal effects are under violations of the assumption of parallel trends.

For that purpose, we performed a sensitivity analysis based on Rambachan and Roth (2022). This method consists of imposing restrictions on the possible values of the post-treatment difference in trends instead of assuming that parallel trends remain. The method relaxes the parallel trends assumption up to a maximum value determined by a sensitivity parameter  $M$ . The role of  $M$  is to show how the result changes as the assumption of parallel trends is gradually relaxed. Therefore, it is possible to establish the degree of violation of the parallel trend assumption (given by  $M$ ) in which the original results remain unchanged.

We implement two types of restrictions proposed by Rambachan and Roth (2022). The first restriction, denominated Relative Magnitude (RM), is based on the intuition that magnitude of the violation of parallel trends in the post-treatment period cannot be much larger than the worst-case violation over the pre-treatment periods. The second restriction, denominated Second Difference (SD), is based on the intuition that the underlying trend does not deviate “too much” from linearity (Rambachan and Roth 2022).

Formally, the RM restriction bounds the maximum post-treatment violation of parallel trends, between consecutive periods, by  $\bar{M}$  times the maximum pre-treatment violation of parallel trends as shown in Eq. 5:

$$RM(M) = \left\{ \delta : \forall t \geq 0, |\delta_{t+1} - \delta_t| \leq \bar{M} \cdot \max_{s < 0} |\delta_{s+1} - \delta_s| \right\} \quad (5)$$

where  $\delta$  states for differences in underlying trends and indexes  $t$  and  $s$  denoted post-treatment periods and pre-treatment periods respectively.

On the other hand, the SD imposes that the change in the slope of the underlying trend is no more than  $M$  between consecutive periods:

$$SD(M) = \left\{ \delta : \left| (\delta_t - \delta_{t-1}) - (\delta_{t-1} - \delta_{t-2}) \right| \leq M \right\} \quad (6)$$

Figure 3 shows the results of the sensitivity analysis for the effect of the non-custodial sanction reform in 2013. Panel (A) shows a sensitivity analysis for  $RM(M)$ , with a breakdown value of  $M=0.8$ , indicating that the estimated effect is significant up to a violation

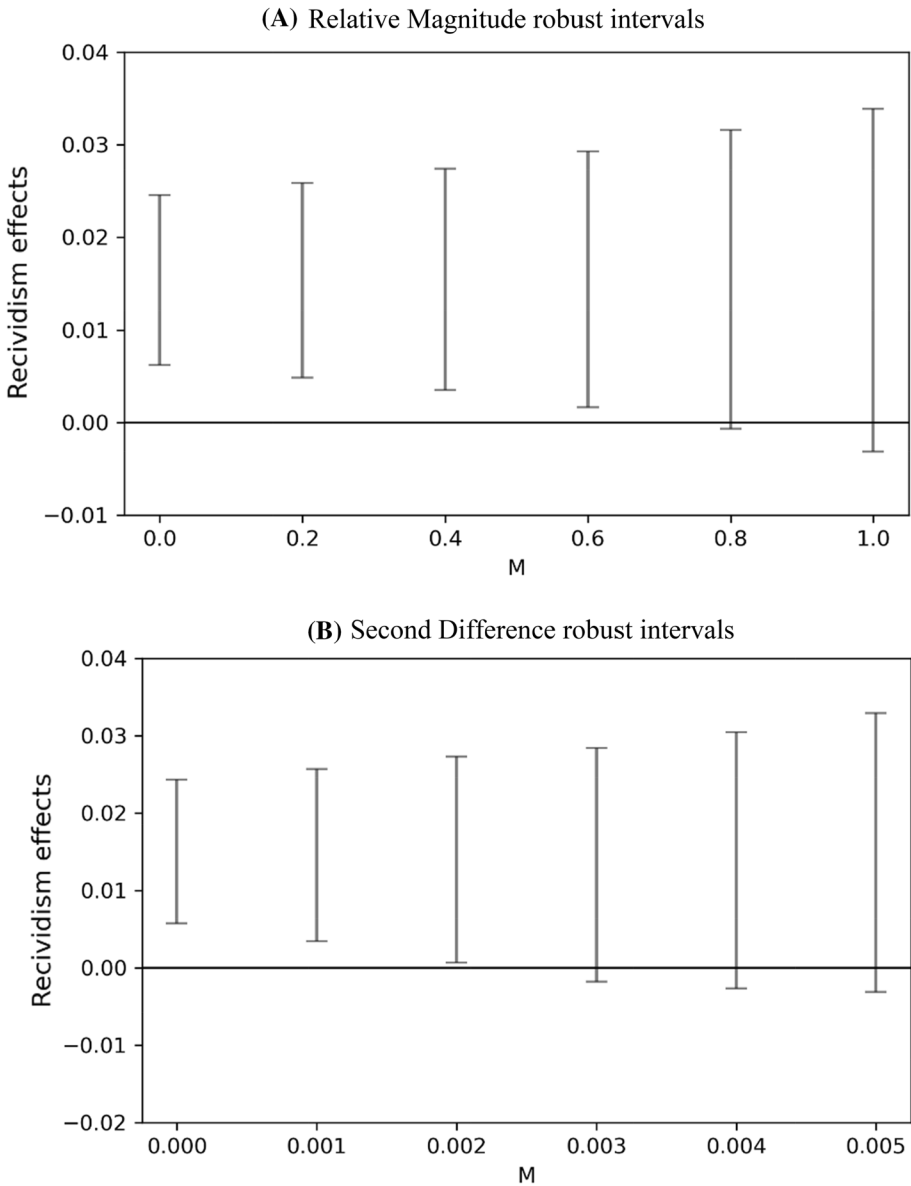


Fig. 3 Sensitivity analysis for effect on 2013

of parallel trends of 0.8 times the magnitude of the maximal possible pre-treatment violation. Panel (B) plots robust confidence sets for the treatment effect in 2013 using  $SD(M)$ . The confidence sets contain positive values unless  $M$  exceeds 0.003. Thus, the effect on recidivism in 2013 is significant for non-linearity associated to change in the slope of the differential trend by no more than 0.4 log points between periods.

In conclusion, the recidivism estimation for the 2013 effect seems to be different from zero under an important amount of parallel trend violations, but it does not seem to be equally immune to non-linearity.

## Discussion and Conclusions

This study applies DiD methods to assess the impact of public policy reforms on criminal justice systems by taking advantage of usually available but mostly neglected cohort data. The approach used here could help to assess the impact of a reform in the non-custodial regime over time when a complex scenario of changes in the profiles of marginal individuals and the underlying recidivism of the penal system is taken into account.

After controlling for individual observable characteristics and temporal non-observables, this study finds that the new regime of non-custodial sanctions implemented in Chile between the years 2013 and 2015 produced a temporal increase in recidivism consistent with a transfer of some more criminogenic profiles from prison to non-custodial sanctions, however, as the reforms moved towards a fully implemented stage in subsequent periods that effect disappeared.

The evidence associated with programmes that have sought to augment deterrence through more surveillance have shown poor results, as happens to be the case for ISP and HOPE. This study confirms those findings in the Latin American context showing no statistically significant impacts on recidivism rates in Chile when new tools are added to probation such as the introduction of follow-up hearings and closer supervision by probation officers. Indeed, although it may seem appealing to implement an increase in surveillance in order to satisfy the demands of policymakers and the general public who demand more intensive supervision, especially for serious offenders released back into the community (Hyatt and Barnes 2017), there is still little evidence of improved outcomes in recidivism that could be attributed to that strategy. Nevertheless, other benefits such as cost reduction in the penal system and the prevention of developing antisocial capital among offenders (by avoiding contacts with criminogenic peers in prison) should not be neglected.

On the other hand, as mentioned in the literature review, sanctions without a rehabilitative component have not been successful in reducing criminal recidivism. The results from deterrence-focused programmes, among others, have led to a call by criminologists to return to treatment-oriented strategies if the goal is to prevent crime (Lipsey and Cullen 2007; Mackenzie and Farrington 2015). This was also the road taken by the probation reform in Chile which seeks to complement deterrence with rehabilitation through introducing the RNR model to probation and implementing cognitive-behavioural programmes to address offending behaviour. However, empirical data from the Chilean Prison system has so far shown a gradual implementation with reduced coverage of these programmes in 2015, a situation that prevents us from testing those outcomes. Consequently, new studies should revisit this data in order to re-evaluate once several cohorts have been treated to see if the option of combining deterrence with rehabilitation approaches can lead to better results than those observed so far in ISP or HOPE programmes.

Moreover, it can also be argued that there is a design problem in the decision regarding which offenders should receive treatment. It is important to consider that the new Chilean non-custodial regime—beyond changes and new resources—has continued operating under the old normative framework where offenders are sentenced to each non-custodial sanction according to the crimes committed and the existence of

previous convictions rather than being sentenced to the most suitable sanction based on their needs and individual risk profiles.

Finally, even though there is no evidence in favour of a significant decrease in recidivism, the non-custodial sanction reform should be considered a favourable policy since it helped to decongest prisons without a foreseeable cost in terms of recidivism, which ultimately resulted in a net improvement of the entire Chilean penal system.

## Appendix

### General Exclusion Rules

Law N°20,603 contains an exclusion clause (Article N°1) which bans non-custodial sentences in the case of offenders sentenced as perpetrators for committing the following crimes established in the Chilean Criminal Code:

- Aggravated kidnapping (Article 141.3; 141.4, 141.5)
- Kidnapping of a minor (Article 142)
- Rape (Article 361)
- Aggravated rape (the victim was 13 years old or younger) (Article 362)
- Rape with homicide (Article 372 bis).
- Murder (Article 391 N°2).
- Aggravated murder (the victim was a relative) (Article 390)
- Aggravated murder (it was committed with malice; by reward or promise of remuneration; by means of poison; viciously, deliberately and inhumanly increasing the pain of the victim; with known premeditation) (Article 391, N° 1)

The law also contains an exclusion clause (Article N°1) which bans non-custodial sentences in the case of offenders sentenced as perpetrators of robbery (Criminal Code, Article 436.1) who had previous convictions for committing robbery, aggravated robbery (Criminal Code, Article 433), mugging (Criminal Code, Article 436.2) and burglary (Criminal Code, Article 442).

### Exclusion Rules for Granting Conditional Remission

Law N°20,603 bans conditional remission in the case of offenders sentenced as perpetrators for committing the following crimes (in these cases, the court must impose probation, intensive probation or partial confinement):

- Petty drug dealing (Law N°20,000, Article 4) sentenced to at least 541 days but less than 3 years.
- Murder or causing injuries due to a traffic accident under the influence of alcohol or drugs (Law N°18,290, Article 196.2 and 196.3), sentenced to at least 541 days but less than 3 years.
- Domestic violence crimes (Law N°20,066 in relation to Criminal Code, Articles 296, 297, 390, 391, 395, 396, 397, 398 or 399), sentenced to at least 541 days but less than 5 years.

**Table 2** Parallel trend pseudo test

Recidivism	Coef	St. Err	t-value	p value	[95% Conf	Interval]	Sig
Year	-0.00617	0.00074	-8.36	0	-0.00761	-0.00472	***
Sample (non-custodial = 1)	-0.69704	2.10151	-0.33	0.74013	-4.81594	3.42185	
Non-custodial#Year	0.0003	0.00105	0.29	0.77423	-0.00175	0.00235	
<i>Sex</i>							
Male (Ref. Cat.)	0						
Female	0.06288	0.00615	10.22	0	0.05083	0.07494	***
No information	-0.02131	0.00157	-13.55	0	-0.02439	-0.01823	***
Sanction length	-0.00278	0.00008	-35	0	-0.00294	-0.00263	***
<i>Type of crime</i>							
Misdemeanours (Ref. Cat.)	0						
Accidental crimes	-0.24219	0.00641	-37.77	0	-0.25476	-0.22962	***
Against public faith	-0.01566	0.00547	-2.86	0.00424	-0.02639	-0.00493	***
Against freedom & privacy	0.03598	0.00428	8.4	0	0.02759	0.04437	***
Intellectual property crimes	0.06511	0.00631	10.32	0	0.05274	0.07748	***
Regulated in special laws	-0.05439	0.0054	-10.08	0	-0.06497	-0.04382	***
Economic and tax crimes	-0.10396	0.00631	-16.46	0	-0.11634	-0.09159	***
Offences by public servants	-0.1441	0.01626	-8.86	0	-0.17597	-0.11222	***
Drug law crimes	-0.11112	0.00354	-31.36	0	-0.11807	-0.10418	***
Traffic law crimes	-0.13516	0.00314	-43.08	0	-0.14131	-0.12901	***
Sex crimes	-0.22087	0.00448	-49.26	0	-0.22965	-0.21208	***
Injuries	-0.08583	0.00323	-26.54	0	-0.09217	-0.07949	***
Theft	0.21856	0.00324	67.4	0	0.2122	0.22491	***
Burglary	0.18983	0.00378	50.24	0	0.18243	0.19724	***
Robbery	0.06159	0.00428	14.41	0	0.05321	0.06997	***
Homicides	-0.11682	0.00853	-13.7	0	-0.13353	-0.10011	***
Other against property	0.13022	0.00415	31.41	0	0.12209	0.13834	***
Other crimes	0.07574	0.00464	16.32	0	0.06664	0.08484	***
Constant	12.82713	1.48296	8.65	0	9.92058	15.73369	***
Mean dependent var	0.38151					0.48576	
R-squared	0.10167				Number of obs	400,431	
F-test	2406.08415				Prob>F	0	
Akaike crit. (AIC)	515,230.33				Bayesian crit. (BIC)	515,491.937	

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

**Table 3** DID yearly progression estimations

Recidivism	Coef	St. Err	t-value	p value	[95% Conf	Interval]	Sig
Sample (non-custodial = 1)	-0.09964	0.00366	-27.26	0	-0.1068	-0.09247	***
<i>Year</i>							
Year = 2008 (Ref. Cat.)	0						
Year = 2009	-0.00927	0.00354	-2.62	0.00879	-0.0162	-0.00233	***
Year = 2010	-0.01492	0.00343	-4.35	0.00001	-0.02164	-0.0082	***
Year = 2011	-0.01386	0.00338	-4.1	0.00004	-0.02049	-0.00724	***
Year = 2012	-0.02892	0.00335	-8.64	0	-0.03547	-0.02236	***
Year = 2013	-0.02988	0.00338	-8.83	0	-0.03651	-0.02325	***
Year = 2014	-0.01918	0.00345	-5.57	0	-0.02593	-0.01242	***
Year = 2015	-0.02154	0.00344	-6.26	0	-0.02828	-0.0148	***
<i>DID estimators</i>							
Non-custodial#2009	0.00277	0.0049	0.56	0.57244	-0.00684	0.01238	
Non-custodial#2010	0.00423	0.00484	0.87	0.38199	-0.00526	0.01373	
Non-custodial#2011	-0.00312	0.00475	-0.66	0.5108	-0.01243	0.00619	
Non-custodial#2012	0.00455	0.00473	0.96	0.33634	-0.00472	0.01381	
Non-custodial#2013	0.01536	0.00476	3.23	0.00126	0.00603	0.0247	***
Non-custodial#2014	0.00455	0.00475	0.96	0.3375	-0.00475	0.01386	
Non-custodial#2015	-0.00008	0.0047	-0.02	0.98622	-0.0093	0.00913	
<i>Sex</i>							
Male (Ref. Cat.)	0						
Female	0.07751	0.00503	15.4	0	0.06764	0.08737	***
No information	-0.02477	0.00121	-20.43	0	-0.02714	-0.02239	***
Sanction length	-0.00263	0.00006	-47.01	0	-0.00274	-0.00252	***
<i>Type of crime</i>							
Misdemeanours (Ref. Cat.)	0						
Accidental crimes	-0.23054	0.00501	-46	0	-0.24036	-0.22072	***
Against public faith	-0.01058	0.00425	-2.49	0.01275	-0.01891	-0.00225	**
Against freedom & privacy	0.03966	0.00337	11.76	0	0.03305	0.04627	***
Intellectual property crimes	0.06643	0.00541	12.28	0	0.05583	0.07704	***
Regulated in special laws	-0.0455	0.00431	-10.56	0	-0.05394	-0.03706	***
Economic and tax crimes	-0.09426	0.00495	-19.06	0	-0.10395	-0.08456	***
Offences by public servants	-0.13849	0.01203	-11.51	0	-0.16207	-0.11491	***
Drug law crimes	-0.10523	0.00282	-37.37	0	-0.11075	-0.09971	***

**Table 3** (continued)

Recidivism	Coef	St. Err	t-value	p value	[95% Conf Interval]	Sig
Traffic law crimes	-0.11936	0.00248	-48.16	0	-0.12422 -0.11451	***
Sex crimes	-0.20591	0.00355	-57.93	0	-0.21287 -0.19894	***
Injuries	-0.08184	0.00253	-32.36	0	-0.0868 -0.07688	***
Theft	0.22251	0.00256	86.85	0	0.21749 0.22753	***
Burglary	0.19988	0.00298	67.04	0	0.19403 0.20572	***
Robbery	0.06867	0.00343	20.05	0	0.06196 0.07539	***
Homicides	-0.09575	0.00663	-14.44	0	-0.10875 -0.08276	***
Other against property	0.12969	0.00326	39.82	0	0.12331 0.13608	***
Other crimes	0.08581	0.00358	23.99	0	0.0788 0.09282	***
Constant	0.4442	0.00324	137.03	0	0.43784 0.45055	***
Mean dependent var	0.37319			SD dependent var	0.48365	
R-squared	0.10134			Number of obs	664,585	
F-test	2559.07766			Prob > F	0	
Akaike crit. (AIC)	849,575.79			Bayesian crit. (BIC)	849,986.439	

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

- Sex crimes (Criminal Code, Articles 363, 365 bis, 366, 366 bis, 366 quáter, 366 quinques, 367, 367 ter or 411 ter), for at least 541 days but less than 5 years.

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