

Structure of Return-to-Work Policies and Labor Supply in Disability Insurance Programs

Arezou Zaresani*

August 2020

(Download the latest draft from <http://azaresani.com/work-in-progress>)

Abstract

Exploiting a quasi-natural experiment in a Disability Insurance (DI) program and using administrative data, I examine the effects on beneficiaries' labor supply decisions from the structure of return-to-work policies, which allows them to work while collecting reduced payments. I use a Difference-in-Difference model to compare two policies: one with a fixed payment reduction rate and another with a gradual payment reduction rate, where a reform further decreased its reduction rate. Pre-reform labor supply is higher in the program with gradual reduction, and further increases post-reform. Findings suggest an important role for the structure of return-to-work policies to increase labor supply in DI programs.

JEL classification: H53; H55; D14; J14; J22; J28.

Keywords: disability insurance; structure of return to work policy, financial incentives; labor supply.

*University of Manitoba, IZA and Tax and Transfer Policy Institute (TTPI) at the Australian National University (ANU), Email: Arezou.Zaresani@umanitoba.ca. I am grateful to Pamela Campa, Herb Emery, Arvind Magesan, and Stefan Staubli for their wisdom and guidance throughout this project. I thank Robert Breunig, Patrick Button, Kenneth James McKenzie, Timothy J. Moore, Miguel Olivo-Villabrille, Luigi Pistaferri, Joanne Roberts, Mehdi Shadmehr, Jeffrey Smith, Trevor Tombe, Jean-Francois Wen and Alexander Whalley for their helpful comments and advice. I have benefited from discussion with the seminar participants at the Society of Labor Economist (SOLE 2018), American Economic Association (AEA 2018), Labor Economics Workshop (LEW 2018), IZA labor summer school (2017), Asian and Australasian Society of Labour Economics Inaugural Conference (AASLE 2017), Empirical Microeconomics Workshop (Banff 2016), Canadian Public Economics Group (CPEG 2016), Canadian Economics Association (CEA 2016) and International Health Economics Association (IHEA 2015), University of Calgary, University of Melbourne, University of Monash, Wellington University of Victoria. This study uses data from Alberta Human Services and Statistics Canada. It is conducted at the University of Calgary Research Data Center, part of the Canadian Research Data Centre Network (CRDCN). I thank Cheryl Raddis and Angela Forman from Alberta Human Services, and Charlie Victorino from Statistics Canada for their help with accessing the data sources. This research is supported by research grants from the University of Calgary and the University of Melbourne. The services and activities provided by the CRDCN are made possible by the financial or in-kind support of the SSHRC, the CIHR, the CFI, Statistics Canada, and participating universities whose support is gratefully acknowledged. The interpretation and conclusions contained herein are mine and do not necessarily represent the Government of Alberta, Ontario, or Statistics Canada. All the results are reviewed to ensure that no confidential information is disclosed.

1 Introduction

Return-to-work policies in Disability Insurance (DI) programs allow beneficiaries to work and collect reduced DI payments. These policies intend to provide financial incentives to beneficiaries to return to the labor force to potentially improve their economic well-being, ensure their broader integration into society, and decrease the programs' cost. Previous studies examine the effects of financial incentives on beneficiaries' labor supply decisions from the introduction of return-to-work policies, change in DI payments, and tightening the eligibility criteria, and the empirical findings are not conclusive (Garcia Mandico et al., 2020; Zaresani, 2020; Ruh and Staubli, 2019; Zaresani, 2018; Gelber et al., 2017; Vall Castelló, 2017; Büttler et al., 2015; Moore, 2015; Borghans et al., 2014; Kostol and Mogstad, 2014; Marie and Vall Castello, 2012; Campolieti and Riddell, 2012; Staubli, 2011; Autor and Duggan, 2006; Gruber, 2000).¹ However, little is known about the effects of the structure of return-to-work policies on beneficiaries' labor supply decisions, which is important for understanding labor supply policies' ramifications and better design of such policies.

In this paper, I examine the effects on DI beneficiaries' labor supply decisions from the structure of return-to-work policies through the induced financial incentives. I use a Difference-in-Differences (DD) model to compare two Canadian provincial DI programs with similar eligibility criteria, beneficiary characteristics, and DI payments, but different structures of return-to-work policies. The control group is "Ontario Disability Support Program" (ODSP), which does not have an earnings exemption threshold and DI pay-

¹Zaresani (2018), Kostol and Mogstad (2014) and Campolieti and Riddell (2012) examine the effects from return-to-work policies in Norway and Canada and find positive impacts on beneficiaries' labor supply. Vall Castelló (2017) find positive effects on labor force participation from a Spanish reform that entirely eliminated work disincentives. Ruh and Staubli (2019) show that an earnings threshold creates work disincentive in the Austrian DI program, and Zaresani (2020) find that beneficiaries can not change their labor supply freely, since they face adjustment costs. Gelber et al. (2017), Maestas et al. (2013) and Marie and Vall Castello (2012) find that increase in DI benefits decreases beneficiaries' labor supply in the US and Spain. Autor and Duggan (2006) show that medical reassessment of DI recipients and trial work periods in the US do not affect the labor supply. Moore (2015) finds that losing benefits due to the removal of drug and alcohol addictions as qualifying conditions for DI benefits increase the labor supply. Büttler et al. (2015) find a very low take-up from a conditional cash program in Switzerland offering US\$77,000 if the DI recipients started to work or increased their earnings. Garcia Mandico et al. (2020), Borghans et al. (2014), and Staubli (2011) examine the effects of terminating benefits and stricter eligibility criteria in the Netherlands and Austria, and find that individuals substitute DI benefits by collecting more from other social assistance programs.

ments are reduced at a fixed rate for every earned dollar: C\$1 of the monthly DI payments for every C\$2 of employment earnings (i.e., %50 marginal tax rate, see Figure 1).² DI payments in ODSP are in the range of C\$1,086 to C\$1,999 (determined by individual circumstances). The treatment group is “Assured Income for the Severely Handicapped” (AISH) in Alberta, which has an earnings exemption threshold, and payments are gradually reduced. The April 2012 reform further increased the exemption threshold to C\$800 from C\$400 for beneficiaries with no dependent, and from C\$975 to C\$1,95 for those with dependent (see Figure 2). The reform also increased the monthly DI payments by C\$400 from C\$1,188 to C\$1,588 –a %35 increase– for all AISH beneficiaries. Earnings below the exemption threshold do not affect the DI payments (i.e., %0 marginal tax rate), but for every C\$2 of earnings accumulated above the threshold up to the second threshold –C\$1,500 and C\$2,500 for AISH beneficiaries without and with dependent– C\$1 of their monthly payments is reduced (i.e., %50 marginal tax rate). DI payments are reduced by C\$1 for every C\$1 of earnings accumulated above the second threshold (i.e., %100 marginal tax rate). AISH’s reform provides financial incentives to work by decreasing the DI payments reduction rate. I estimate the causal effects of AISH’s reform on its beneficiaries’ labor supply decisions in intensive and extensive margins. I then explore the distributional effects to provide suggestive evidence on the relative magnitude of the substitution versus income effects of the reform, which has important welfare implications. To compare the labor supply responses to the financial incentives induced by the reform, I estimate the elasticity of earnings below the exemption threshold with respect to the DI payments reduction rate.

I use administrative data on the monthly earnings of AISH and ODSP beneficiaries spanning two years of pre- and two years of post-reform –April 2010 to March 2014– obtained from the Alberta and Ontario’s governments, respectively. Observing monthly earnings is essential since the earnings thresholds are monthly based. The data also has information on beneficiaries’ characteristics, including gender, age, marital status, family size, age, date and age at entry into the program, type of disability, and residence

²The earnings exemption threshold in Canadian DI program is equivalent to the Substantial Gainful Activity (SGA) threshold in the US program.

location. My study sample includes 18–64-years old individuals in AISH and ODSP. My data includes only beneficiaries with non-physical disabilities, but studying this group of beneficiaries is informative. Most of the beneficiaries with non-physical disabilities (i.e., hard to verify conditions such as depression) are the marginal entrants into the DI programs (Autor and Duggan, 2006; Liebman, 2015), who might have at least some ability to work (Bastani and Waldenström, 2020; Maestas et al., 2013), if they can find a job that accommodates their disability. I also exclude beneficiaries who entered AISH after the reform was announced.³ This is because the new entrants might be healthier and potentially could work more. AISH’s post-reform return-to-work policy, which allows beneficiaries to work more while collecting DI payments, provides an incentive to healthier individuals to apply to the program. Also, there might be anticipatory effects, since the reform was announced in February 2012, two months before its implementation in April 2012.⁴

My analysis provides four main conclusions. First, there are strong behavioral responses to the financial incentives induced by return-to-work policies in DI programs. The eligibility criteria, beneficiary characteristics, and pre-reform DI payments in AISH are similar to ODSP (see Table 1), but AISH’s return-to-work policy –with a gradual payment reduction– provides larger financial incentives to work. The labor force participation and the average monthly earnings in AISH in the pre-reform period are five times those in the ODSP (%48.1 versus %9.9, and C\$ 255 versus C\$50).

Second, the reform in AISH causes an increase in the labor supply of the beneficiaries in intensive and extensive margins. The estimated effects using the DD model, controlling for individual fixed effects, are %11.87 increase in the average inflation-adjusted monthly earnings, and %0.79 point increase in the labor force participation rate, despite the %35 increase in the monthly DI payments. The estimates are heterogeneous by beneficiaries’

³Marie and Vall Castello (2012) exclude new entrants from exploring a reform in Spanish DI program which increased DI benefits.

⁴I also estimate my models, including the new entrants into my study sample. The estimates are quite similar to the estimates excluding the new entrants, suggesting that the new entrants do not drive the increase in the labor supply post-reform. This could be because the number of new entries in AISH at post-reform period decreased by about %50 (see Table 1), and it seems that there is no anticipatory effects (see Figure 3 and Figure 4).

family status, age, gender, type of disability, and residence location. The estimates are larger for men, younger beneficiaries, those with dependent, those with Psychotic disabilities, and beneficiaries who reside in metropolitan areas. This finding suggests that targeted policies may work better to encourage DI beneficiaries to return to work.

Third, the post-reform decrease in the DI payment reduction rate for the earnings above the exemption threshold decreases the portion of the beneficiaries with earnings below the exemption threshold. The estimated elasticities suggest that a %10 decrease in the DI payment reduction rate decreases the portion of beneficiaries below the exemption threshold by %11.4 and %3.3 for the beneficiaries without and with dependent, respectively.

Fourth, examining the distributional effects of the reform suggests that the substitution effects of the reform might dominate the income effects; and the reform might be welfare improving ([Autor and Duggan, 2007](#)).

My estimates provide a lower bound on the increase in beneficiaries' labor supply, since they face adjustment cost when changing their labor supply in response to the reform, which attenuates their responses ([Zaresani, 2020](#)).⁵ Adjustment cost involves money and time required for finding a new job, negotiating increased or reduced hours with an employer, and adjusting non-work schedules. The size of the induced financial incentives from the return-to-work policies affects beneficiaries' labor supply decisions. Individuals will increase their labor supply if the financial incentives are large enough to offset the adjustment cost they face.

My findings provide evidence on the labor supply responses to the structure of return-to-work policies in DI programs, an important policy domain. DI programs are among the largest social insurance programs in advanced countries where OECD countries, on average, spend more than %2.5 of their GDP on these programs ([OECD, 2010](#)). DI programs provide benefits to individuals with health conditions to compensate for their lost employment earnings due to their health issues, limiting the amount or type of paid work they can perform. These programs have been criticized for high governments' spending

⁵[Zaresani \(2020\)](#) explores the AISH's reform and finds that beneficiaries face adjustment cost when making labor supply decisions, which is more than %10 of their earnings.

and providing work disincentives to the beneficiaries. Many countries are considering or have recently implemented return-to-work policies in their DI program to encourage the benefit recipients to work.⁶

For instance, as part of the Ticket to Work and Work Incentives Improvement Act of 1999 in the US, the Social Security Disability Insurance (SSDI) program undertaken the Benefit Offset National Demonstration (BOND), a random assignment test of a \$1 for \$2 offset applied to annual earnings above the SSDI's Substantial Gainful Activity (SGA). BOND allows the beneficiaries in the treatment group to retain some of their monthly cash benefits while earning more than the SGA, whereas entirely suspending the benefits for the control group. Various evaluations find no confirmatory evidence of an impact of BOND on the average earnings (SSA, 2018; Weathers II and Hemmeter, 2011; Wittenburg et al., 2015).

While return-to-work policies aim to get DI beneficiaries into the labor force by providing financial incentives, empirical findings from the effectiveness of such policies are mixed. Hoynes and Moffitt (1999), Benitez-Silva et al. (2011), Weathers II and Hemmeter (2011) and Bütler et al. (2015) find no effects from financial incentives to work in the US and Switzerland, and Ruh and Staubli (2019) find earnings threshold provides work disincentive in Austrian DI program. Meanwhile Zaresani (2018), Kostol and Mogstad (2014) and Campolieti and Riddell (2012) find positive responses respectively in Norway and Canada. Gelber et al. (2017); Maestas et al. (2013); Marie and Vall Castello (2012); Lemieux and Milligan (2008); Fortin et al. (2004); Campolieti (2004) and Gruber (2000) find that providing more generous benefits has negative effects on labor supply in social assistance programs in Canada, the US, and Spain. Garcia Mandico et al. (2020); Borghans et al. (2014) and Staubli (2011) examine the effects of terminating benefits and stricter eligibility criteria in DI programs in the Netherlands and Austria. They find that individuals substitute DI benefits by collecting more from other social assistance

⁶The UK, Norway, and Switzerland are among the countries that recently implemented return-to-work policies in their DI programs to increase the beneficiaries' labor supply. UK's program allows beneficiaries to keep half of their benefits for up to a year if they work. In Norway's program, benefits are reduced by \$0.6 for every \$1 earned above an exemption threshold (Kostol and Mogstad, 2014). Switzerland tested a program which offered a conditional cash payment if DI recipients started to work or increased their earnings (Bütler et al., 2015).

programs. Beyond a change in financial incentives, medical reassessment of DI recipients and trial work periods in the US does not affect the labor supply ([Autor and Duggan, 2006](#)). [Moore \(2015\)](#) finds that losing benefits due to the removal of drug and alcohol addictions as qualifying conditions for DI benefits increase the labor supply. I contribute to this literature by examining the impacts of financial incentives induced by the structure of return-to-work policies on beneficiaries' labor supply decisions.

2 Institutional background and data

2.1 DI programs in Canada

The federal DI program in Canada provides benefits to individuals with medically verifiable physical or non-physical disabilities which limit the kind or amount of paid work they can do. The federal program provides short-term benefits, and the eligibility criteria are based on individuals' employment history. This program aims to enable benefit recipients (and their dependent) to live independently as much as possible in their communities. However, most of the individuals with lifelong and severe disabilities would not be eligible for the federal program –due to lack of employment history– and need long-term assistance. The provincial DI programs complement the federal program, providing long-term benefits to those not eligible for the federal program, or needing more assistance. Each province operates its DI program under different ministries, but they have similar eligibility criteria and provide similar benefits. However, the structure of return-to-work policies differs substantially across the provinces.

2.2 Alberta and Ontario's provincial DI programs

The “Assured Income for the Severely Handicapped” (AISH) is Alberta's provincial DI program. AISH is a means-tested program where eligible individuals are entitled to a prescribed amount of assistance. The eligibility to enter the program is determined by applicants' disability, age, income, and assets. Eligible individuals must be permanently disabled where there is no curative therapy to improve their condition materially ([SASR,](#)

2010). They must also be 18 years or older, live in the province, and be a Canadian citizen or a permanent resident. The total assets of an eligible benefit recipient and their partner –excluding their primary residence and the means of transportation– cannot be worth more than C\$100,000. The final decision on an application file is made by a social worker, after receiving all the relevant medical reports from a qualified health professional. Entitled individuals receive monthly payments of C\$1,188, in addition to supplemental assistance, such as health benefits and subsidized transport.

The “Ontario Disability Support Program” (ODSP) is the provincial DI program in Ontario. The eligibility criteria and the determination process are similar to the AISH. Beneficiaries receive monthly DI payments and similar supplementary assistance. The number and age of dependants, geographic location, and individual circumstances determine the monthly DI payments, which is in the range of C\$1,086 to C\$1,999 during my study period.⁷

Once an individual enters into the AISH or the ODSP, there are two main pathways out of it. First, a benefit recipient may die. Second, they may no longer be eligible to receive the benefits. For example, a benefit recipient may reach the retirement age of 65 and be eligible to receive the guaranteed income support or the old age security pensions. A benefit recipient may no longer meet the medical or income and asset criteria for receiving the benefits. Eligibility-based exits account for a tiny fraction of the exits from the program.

2.3 Return-to-work policy in AISH

Beneficiaries of AISH are allowed to work while collecting DI payments. There is an exemption threshold, the earnings below which do not affect the payments (0% marginal tax rate), but DI payments are gradually reduced for the earnings accumulated above the exemption threshold. Figure 2 plots the budget constraints of the beneficiaries where the horizontal axis denotes the monthly employment earnings, and the vertical axis denotes the total monthly disposable income, which is the earnings and the net DI payments added

⁷The ODSP’s DI payments range from C\$1,341 to C\$1,739, as of August 2020. For more details see Section 30.(1) in <https://www.ontario.ca/laws/regulation/980222#BK34>.

together. The exemption thresholds are C\$400 and C\$975 for beneficiaries without and with dependent, respectively. The DI payments are reduced by C\$1 for every C\$2 of earnings accumulated between the exemption threshold and the second threshold which is C\$1,500 and C\$2,500 for beneficiaries without and with dependent, respectively (%50 marginal tax rate). The DI payments are reduced by C\$1 for every C\$1 of earnings accumulated above the second threshold (%100 marginal tax rate). The gradual reduction in payments provides financial incentives to the beneficiaries to work.

2.3.1 Change in AISH's return-to-work policy and its expected effects

After Alberta's 2012 provincial election, the new premier decided to change the ministry responsible for the AISH and made changes in the benefits in April 2012, which had two components.⁸ First, the monthly exemption threshold increased to C\$800 from C\$400 for the beneficiaries with no dependent, and to C\$1,950 from C\$975 for those with dependent (see Figure 2). Second, the monthly DI payments increased by %35 to C\$1,588 from C\$1,188 for all the beneficiaries. This reform increases the financial incentives to work by further decreasing the payment reduction rate.

In a static labor supply model, beneficiaries choose their hours of work at a given offered wage, which let us assume is constant.⁹ Let us also assume that leisure and income are normal goods. Consider a beneficiary who before the reform locates at points on the budget segment *ab* in Figure 2. Depending on their preference, the increase in the monthly DI payments accompanied by the increase in the exemption threshold could lead to either of these three responses. First, they might exit the labor force and move to point *A* and collect the new higher DI payments. Second, they might increase their earnings and move to a point on the *AB* segment. Third, they may not change their earnings. In either of these cases, the disposable income rises, and the decision would be suggestive on the size of the income versus substitution effects of the reform. A decision to no change or increase the labor supply suggests that the reform's income effects are

⁸The change was announced in February 2012, two months before its implementation in April 2012.

⁹The education level of most of the AISH beneficiaries is less than high school, and most of the working beneficiaries work in low skilled, minimum wage jobs (Kneebone and Grynishak, 2011).

negligible, and the substitution effects are the dominant effects.

Consider next a beneficiary who before the reform locates at points on the budget segment bc but to the left of B . They might move to B or some point at the budget segment BC . The DI payments are gradually reduced while the total disposable income increases. For beneficiaries who before the reform locate on the budget constraint bc but to the right of B , or those located at points on the budget segment cd , the reform could lead to either of the two responses, depending on their preference. First, if the disutility of working is sufficiently high, they might reduce their earnings. Second, they might not change their earnings, suggesting that the reform's income effects are negligible.

The overall impact of the AISH's reform on the labor supply decisions of the beneficiaries is theoretically ambiguous. But this simple static labor supply model suggests that the reform will decrease the share of beneficiaries with earnings below the exemption threshold (see Figure 3 and Figure 4).¹⁰

2.4 Return-to-work policy in ODSP

The ODSP also has a return-to-work policy that allows its beneficiaries to work while collecting DI payments, reduced at a fixed rate of %50. Figure 1 plots the budget constraint of the beneficiaries. Unlike the AISH, there is no exemption threshold, and the DI payments are reduced by C\$1 for every C\$2 of earnings, starting from the first earned dollar.

2.5 Data and sample selection

I use administrative data on the monthly earnings of the AISH and ODSP beneficiaries obtained from Alberta and Ontario's governments. The data spans two years of pre- and two years of post-reform in AISH from April 2010 to March 2014. Observing monthly earnings is essential since the earnings thresholds are monthly based. The data includes

¹⁰Zaresani (2020) finds that there is a sharp bunching at the former exemption threshold in AISH, and after the reform the bunching shifts to the new threshold –but with a delay– suggesting that the beneficiaries face adjustment costs when changing their labor supply which can attenuate both short- and longer-term responses to the reform.

information on individuals' gender, age, marital status, family size, age, date of entry into the program, type of disability, and residence location. My study sample includes 18–64-year-old AISH and ODSP beneficiaries with non-physical disabilities, excluding those who entered AISH after the reform was announced in February 2012, two months before it came into effect in April 2012.

I do not have data on beneficiaries with physical disabilities. Studying beneficiaries with non-physical disabilities is still informative. Non-physical disabilities, such as depression, are hard-to-verify, and individuals with these conditions are the marginal entrants into the DI programs ([Autor and Duggan, 2006](#); [Liebman, 2015](#)) who might have at least some ability to work ([Bastani and Waldenström, 2020](#); [Maestas et al., 2013](#)). Their work decision might be more sensitive to financial incentives. They might decide to work if, for instance, they can find a suitable job that possibly accommodates their disability.

Those who enter the AISH post-reform might be relatively healthier than those entered before the reform, and they might be able to work more. This is because the new return-to-work policy allows the beneficiaries to work more while collecting DI payments. There might be anticipatory effects, since the reform was announced two months earlier than it came into effect in April 2012. These two effects could bias the estimates upward. To avoid this issue, I take a similar approach to [Marie and Vall Castello \(2012\)](#) and exclude the AISH beneficiaries who entered the program after February 2012 from my study sample. Therefore, my estimates provide a lower bound on the effects of the reform on all beneficiaries.

3 Empirical analysis

3.1 Descriptive evidence

Table 1 presents the summary statistics broken down into two years of pre- and two years of post-reform in AISH. The sample sizes in AISH and ODSP are 452,000 (10,000 individuals over four years) and 6.9 million (150,000 individuals over four years). These sample

sizes might look quite different, but they are comparable in terms of the percentage of the adult population in each province (about %0.5). The first panel of the table presents the labor market statistics. The average net monthly payments in both programs are quite similar before the reform (C\$1,160 versus C\$1,020), but it is higher in AISH after the reform, since AISH's DI payments increased by C\$400 (C\$1,530 versus C\$1,015). The labor supply in AISH is five times higher than ODSP, both pre- and post-reform. About half of the AISH beneficiaries participate in the labor market –have positive earnings– compared with less than %10 in the ODSP. The average inflation-adjusted monthly earnings, both before and after the reform, are higher in AISH (C\$255 and C\$285) than ODSP (C\$50 and C\$55).

The higher labor supply in AISH than ODSP despite the higher DI payments in AISH – which can be a disincentive to work – might be related to differences in the structure of return-to-work policies. AISH has a relatively high exemption threshold that allows its beneficiaries to work without losing any DI payments. In contrast, ODSP does not have an exemption threshold, and DI payments are marginally taxed at a %50 rate, starting from the first dollar of the earnings, which could discourage work.

The second panel of Table 1 presents a summary of the beneficiaries' characteristics. The demographic characteristics in AISH and ODSP are quite similar and do not change post-reform. Half of the beneficiaries in each program are female. In both programs, about half of all beneficiaries have non-physical disabilities ([SASR, 2010](#)). I divide non-physical disabilities into three groups of Psychotic (i.e., Schizophrenia and Bipolar disorder), Neurological (i.e., Autism and Down Syndrome), and Mental conditions (i.e., Anxiety and Depression). The composition of disability types is quite similar in both programs, where the Psychotic and Mental disabilities are the largest and the smallest groups, and the composition does not change post-reform. The average age at the entry into the program and the average beneficiary age in AISH is lower than ODSP. A larger portion of AISH beneficiaries lives in metropolitan areas. In both programs, most of the benefit recipients do not have dependent.

3.2 Graphical evidence

To graphically assess the impact of the reform in AISH on the labor supply decisions, I plot the trends in the inflation-adjusted average monthly earnings and the labor force participation rates in AISH and ODSP two years of pre- and two years of post-reform in Figure 5. The labor force participation defined as a dummy variable that switches on for positive earnings. Panel (a) shows that the earnings in both AISH and ODSP are relatively stable before the reform. In the months following the reform, the earnings in AISH gradually rise. Panel (b) shows a similar trend for the labor force participation, where the post-reform increase in AISH is much smaller. This could be because adjusting hours of work for the already employed individuals might be easier than starting to work.

The reform in AISH came into effect in April 2012, but it was publicly announced two months earlier in February 2012. Figure 5 suggests that there is no observable evidence of anticipation effect in the earnings neither in the labor force participation, since individuals had little time to adjust their earnings or start to work.

3.3 Identification strategy

Estimating the causal effects of financial incentives from the structure of return-to-work policies on the labor supply decisions of DI recipients is challenging. Individuals' labor supply is endogenous since the selection process into a DI program strongly depends on having a low labor supply. I estimate the causal effects of the reform in AISH on the labor supply using a DD model. I use DI recipients of the ODSP as a control group. It is an appropriate control group since, except for the structure of its return-to-work policy, ODSP is similar to AISH in terms of the eligibility criteria, beneficiary characteristics and DI payments, and it did not undergo major reforms during the period of my study.¹¹

The first difference is over time, as financial incentives increased in AISH after April 2012.

¹¹The ODSP introduced an exemption threshold at C\$200 in September 2013, for every C\$2 of employment earnings accumulated above which payments are reduced by C\$1 (%50 marginal tax rate). To isolate the effects of this reform, I estimate my DD models, excluding the affected period. However, since the exemption threshold is quite low, it does not seem to affect the labor supply, providing evidence on the importance of the structure of return-to-work policies to increase the labor supply in DI programs. See Figure 6 and Table 2.

The second difference is across the programs; there was a reform in AISH but not in the ODSP. I implement a DD comparison by estimating a regression of the form:

$$y_{it} = \alpha + \beta(POST_t \times AISH_i) + X'_{it}\delta + \gamma_i + \lambda_t + \epsilon_{it} \quad (1)$$

where i and t respectively denote individuals and time, and y_{it} denotes the outcome variable. I use inflation-adjusted monthly earnings and labor force participation as outcome variables, examining the effects on the labor supply decisions in intensive and extensive margins, respectively. $AISH_i$ is a dummy variable for the treatment group, the AISH beneficiaries. This variable controls for program-specific trends and is equal to one for those in the AISH program and zero otherwise. $POST_t$ is another dummy variable that switches on for the post-reform periods. The vector X_{it} is a set of time-varying individual characteristics to control for any observable differences that might confound the analysis, including age, family structure, and the location of residence. I include a vector of individual fixed effect γ_i , capturing factors such as ability or taste for work (assuming that they are fixed). I also include a vector of time fixed effects λ_t to control for possible changes in macroeconomic conditions. ϵ_{it} captures any remaining unobserved factors affecting individuals' labor supply decisions. The coefficient of interest is β , which captures the effects of the reform on labor supply decisions of AISH's beneficiaries relative to ODSP's overtime.

The identification assumption of a DD model is that there are no unobserved program specific change that first, are correlated with the reform and second, are correlated with program specific changes in the outcome variable. To provide suggestive evidence on plausibility of this assumption, I generalize Equation (1) by replacing $POST_t \times AISH_i$ with a full set of treatment and quarterly time interaction terms and estimate a placebo regression of the form:

$$y_{it} = \alpha + \sum_{t=-8}^{t=7} \beta_t(q_t \times AISH_i) + X'_{it}\delta + \gamma_i + \lambda_t + \epsilon_{it} \quad (2)$$

where q_t denotes a set of dummies switching on for post-reform periods. The pre-reform

interaction terms provide a pre-treatment specification test.

4 Results

Table 2 presents the estimates from the DD model. Standard errors are clustered at individual levels. The estimated intensive margin effect is a %11.87 increase in the monthly earnings (C\$29.98 increase from a pre-reform average of C\$252.47). The table also shows a positive effect in the extensive margin, a %0.79 point increase in the labor force participation rate (from the average participation rate of %48.12).¹² This finding is consistent with recent evidence that extensive margin of labor supply is more sensitive to non-linear budget sets than commonly thought, and can have welfare implications (Gelber et al., 2020a; Eissa et al., 2008).¹³ Controlling for individual characteristics does not change the estimates. This might be because the estimates already include individual fixed effects, and other time-varying individual characteristics have small effects on the labor supply decisions.

The estimates presented in Table 2 would be biased if the treatment and control groups have different labor supply trends before the reform. I plot the estimated coefficients of the interaction terms β_t in Equation (2) for the earnings and labor force participation rate in Figure 6. Each point on the solid line indicates the estimated coefficient for the quarter relative to the reform, and the gray shade represents the corresponding %95 confidence intervals. In both panels, the estimated coefficients are almost zero before the reform, and then gradually increase in the quarters following the reform, and they are statistically significant.¹⁴

¹²Zaresani (2018) quantifies the effect of the reform in AISH on earnings and labor force participation using a Regression Discontinuity Design, exploring the sharp discontinuity in the increase in work incentives at the month of the reform, and findings are similar.

¹³Gelber et al. (2020a) examine the impact of the US Social Security Annual Earnings Test (AET) on older workers' labor supply. They estimate 0.49 for the extensive margin elasticity, which implies more than a %1 point increase in the participation rate in the absence of the AET. Eissa et al. (2008) develop a theoretical framework to show that labor force participation is more responsive to taxes and transfers than hours worked. They apply their framework to examine the welfare effects on single mothers in the US from tax acts passed in 1986, 1990, 1993, and 2001.

¹⁴However, the estimated coefficients for the labor force participation in the earlier two quarters are slightly larger than zero. This could be due to an earlier reform in AISH, where the second threshold increased by C\$500 to C\$1,500 for the beneficiaries with no dependent, and to C\$2,500 for the beneficiaries with dependent in July 2008. The responses to this change might be delayed since it might take

These estimates are a lower bound on the increase in beneficiaries' labor supply from the reform. This is because the adjustment cost beneficiaries face when changing their labor supply could attenuate their response to the work incentives (Zaresani, 2020; Gelber et al., 2020b; Chetty et al., 2011). The size of the induced financial incentives from the return-to-work policies –payment reduction rate– affect beneficiaries labor supply decisions. They will increase their labor supply if the financial incentives are large enough to offset the adjustment cost they face, providing evidence on the importance of sized of the financial incentives induced by the structure of the return-to-work policies.

4.1 Robustness analysis

The estimates using the data spanning two years of pre- and post-reform might be contaminated. First, the second earnings threshold in AISH increased to C\$1,500 from C\$1,000 for those with no dependent and to C\$2,500 from C\$2,000 for those with dependent, in July 2008. Second, an exemption threshold at C\$200 was introduced in the ODSP, in September 2013. The expected effects of these reforms are increased labor supply in both AISH and ODSP, although it does not seem to affect ODSP, as shown in Figure 5. To check the robustness of my estimates with these possible contaminations, I estimate the effects of the reform excluding the affected periods. The shorter pre-reform period spans October 2010 to March 2012, the and post-reform period spans April 2012 to September 2013. The last column of each block of Table 2 shows the estimates using the shorter panel. The estimated effects are quite similar to those using the full sample, suggesting that the contamination effects are negligible.

4.2 Heterogeneity analysis

Table 3 presents the estimated effects of the reform in AISH by beneficiaries' family structure, age, gender, type of disability, and residence location. It is instructive to examine the effects of the reform on beneficiaries with and without dependent separately

longer for individuals to find a new job than increase their hours of work if they are already employed. As a robustness check, I estimate my models excluding the affected periods, and the estimates are quite similar. See Table 2.

since the exemption threshold is higher for those with dependent. The estimated increases in the earnings and labor force participation are higher for those with dependent (%17.88 versus %12.77 increase in earnings and %4.31 points versus %0.62 points increase in the labor force participation).

There are sizeable differences in the effects of the reform across the age groups. The lower payment reduction rate increases the labor supply of the 18–34 years group in both extensive and intensive margins (%22.97 increase in earnings and %4.21 points increase in the labor force participation rate). The effect on the 35–49 years group is only in extensive margins where the earnings increase by %9.82, and the participation rate decreases by %0.79 points. The estimated effect on the beneficiaries over 50 years old is mostly a decrease in the extensive margin, a %4.07 point decrease in labor force participation rate, and a smaller %1.83 decrease in the earnings.

The estimated effects of the reform do not vary by beneficiaries' gender. The estimated effects for men and women are respectively %14.36 and %10.82 increase in the earnings and %0.80 and %0.79 point increase in the labor force participation.

Individuals' health condition plays an essential role in their labor supply decisions. Table 3 shows the estimated effects broken down by the disability types. The largest increase in the labor supply in intensive and extensive margins is for the beneficiaries with Psychotic disabilities (%15.07 increase in the earnings and %1.46 point increase in the participation rate). The increase in the labor supply of the beneficiaries with Neurological and Mental disabilities is only in intensive margins (respectively %11.84 and %7.58 increase in the earnings), and insignificant and small decreases in extensive margins (respectively %0.07 and %0.50 points decreases in the participation rates).

The last panel of the table shows the estimates by beneficiaries' location of residence: metropolitan versus non-metropolitan areas.¹⁵ The estimated effects on intensive margins are almost identical (%13.12 and %13.37 increase in the earnings), but the increase in extensive margin in the metropolitan area is larger (%1.83 point increase versus %0.18 point decrease in the participation rate).

¹⁵The metropolitan areas in Alberta are Calgary and Edmonton, and in Ontario are Toronto and Ottawa.

My estimates show that financial incentives induced through the structure of the return-to-work policies have heterogeneous effects on the beneficiaries' labor supply decisions. This finding suggests that targeted policies may be more effective in encouraging DI recipients to return to work.

4.3 Payment reduction rate and earnings

My DD estimates suggest that the decrease in AISH's payment reduction rate increased beneficiaries' labor supply in both intensive and extensive margins. To compare the labor supply responses with the changes in the financial incentives induced by the reform, I estimate the aggregate elasticity of earnings below the exemption threshold with respect to the DI payment reduction rate, defined as below:¹⁶

$$\epsilon = - \frac{\Delta EBT / EBT_{before}}{\Delta PRR / PRR_{before}} \quad (3)$$

where EBT and PRR denote Earnings Below Threshold and Payment Reduction Rate. Δ denotes the change in the corresponding variable after the reform relative to the before the reform. EBT_{before} and PRR_{before} denote the average EBT and the average PRR before the reform. The PRR for earning z is defined as:¹⁷

$$PRR^z = \begin{cases} 0 & \text{if } z \leq \text{exemption threshold} \\ 1 - \frac{I^z - I^0}{z} & \text{Otherwise} \end{cases} \quad (4)$$

where I^0 and I^z denote the average disposable income of beneficiaries with earnings below the exemption threshold and those with earning z above the threshold. The disposable income is defined as the earnings and net DI payments added together.¹⁸

Figure 8 plots the PRR for each earnings level, before and after the reform. PRR is

¹⁶This definition is similar to the elasticity of labor force non-participation with respect to participation tax rate defined in [Kostol and Mogstad \(2014\)](#).

¹⁷The annual earnings of most the beneficiaries fall below or slightly above the exemption threshold for the personal income taxes. I disregard the federal and provincial personal income taxation for simplicity and minimal loss of generality about the expected impacts of the return-to-work policy.

¹⁸This elasticity specification ignores the income effects of the reform. In Section 4.4, I provide suggestive evidence that the income effect of the reform on the labor supply is negligible.

zero for the earnings below the exemption threshold, but it increases gradually for the higher earnings. The reform decreases the PRR for all earnings levels, where the largest decrease is right above the former exemption threshold, where the PRR decreases to 0 from %50. Figure 3 and Figure 4 plot the earnings distribution of AISH beneficiaries before and after the reform for those without and with dependent, respectively. The figures suggest that a lower PRR is associated with a higher earnings density.

To estimate ϵ , I divide the monthly earnings into $[z - \delta/2, z + \delta/2]$ bins with width $\delta = \$10$. ΔPRR is the average change in PRR in each bin weighted with p_{before}^z which is the portion of the beneficiaries in bin z before the reform:

$$\Delta PRR = \mathbb{E}_z[p_{before}^z (PRR_{after}^z - PRR_{before}^z)] \quad (5)$$

where *before* and *after* refer to two years of pre- and two years of post-reform in AISH.

Table 5 presents the estimated elasticities. I estimate the standard errors using a non-parametric bootstrap by drawing 200 samples with replacement. For each bootstrapped sample, I then estimate the elasticities. The standard error of a parameter is the standard deviation of its bootstrapped parameters. The estimated elasticity for beneficiaries without and with dependent are 0.114 and 0.033, respectively. A %10 decrease in PRR decreases the portion of beneficiaries with earnings below the exemption threshold by %11.4 and %3.3 for those without and with dependent, respectively.¹⁹

4.4 Distributional effects

The reform in AISH has two components: an increase in the monthly payments and an increase in the exemption thresholds. The effect of these changes on beneficiaries' labor supply decisions could be a combination of substitution and income effects. Assuming that leisure and labor are normal goods, the DI payments increase should induce beneficiaries to work less or stop working, causing a negative income effect on the labor supply. The increase in the exemption thresholds is comparable to a decrease in the

¹⁹The size of these estimates is comparable to the estimates of [Kostol and Mogstad \(2014\)](#) in the range of 0.119 to 0.186.

implied marginal tax rate on the payments, making leisure more expensive, and increasing incentives to substitute leisure with work, a positive substitution effect on the labor supply. The relative size of the income versus substitution effects has important welfare implications. If the substitution effect is the dominant effect, then the reform is welfare improving and does not cause excess burden (Autor and Duggan, 2007).

Figure 2 shows the budget constraint of AISH’s beneficiaries before and after the reform. For all earnings levels –except for the earnings between the old and the new exemption thresholds– the budget constraints pre- and post-reform are parallel, suggesting a dominant income effect. I estimate the effects of the reform on the labor supply of the beneficiaries with earnings in the parallel ranges using a DD model. I use the ODSP’s beneficiaries in similar earnings ranges as control groups.

Panel (a) and (b) of Figure 7 plot the trends in the inflation-adjusted earnings for AISH and ODSP beneficiaries with no dependent whose monthly earnings is always below C\$300 within 6 and 12 months prior to the reform. Panel (c) and (d) plot the trends for the beneficiaries without dependent whose monthly earnings is always more than C\$900 within 6 and 12 months before the reform. Panel (e) plots the trends for the beneficiaries with dependent whose earnings 6 months before the reform is always less than C\$850.²⁰ These figures suggest that earnings trends in AISH are similar to ODSP, both before and after the AISH reform, suggesting that the effects of the reform on earnings are quite small.

Table 4 presents the estimated effects of the reform for each subgroup presented in Figure 7. Most of the estimated effects are either very small or negative and insignificant. These findings –in addition to the positive estimates from the reform on labor force participation rate– suggest that the income effect of the reform is negligible.²¹

If the income effects of the reform in AISH are negligible, then the reform might be welfare improving (Autor and Duggan, 2007). Haller et al. (2020) find that the welfare

²⁰There are very few beneficiaries with dependent whose earnings for 6 or 12 months is always above the new exemption threshold.

²¹Marie and Vall Castello (2012) finds that a %35 increase in the payments in Spanish DI program decreased the labor force participation rate. They conclude that the effects are mostly due to income effects since the DI benefits are not employment contingent.

loss from tightening eligibility criteria in social insurance programs is smaller than the loss from lowering the benefits' generosity. My findings suggest that a combined increase in the payments and decrease in payment reduction rate in return-to-work policies could also be welfare improving.²²

5 Conclusion

Many countries have recently implemented – or are considering to implement – return-to-work policies to provide financial incentives to DI beneficiaries to increase their labor supply. Most of the previous work investigates the effects on beneficiaries' labor supply from an increase in financial incentives, and the empirical findings are mixed. The structure of return-to-work policies is another important factor that could impact beneficiaries' labor supply decisions, but little is known about it mainly due to the scarcity of such policy variations. A better understanding of beneficiaries' labor supply responses to the financial incentives of the return-to-work policies is critical for designing such policies better.

I examine how the structure of return-to-work policies impacts benefit recipients' labor supply decisions through the induced financial incentives. I use longitudinal administrative data and compare the labor supply in two DI programs with similar eligibility criteria, beneficiary characteristics, and DI payments, but different return-to-work policies using a DD model. In one program, DI payments are reduced at a fixed rate of %50 for the all earnings, and in the other program, payments are reduced gradually with segments of %0, %50, and %100 rates, where a reform further increased the %0 segment and the DI payments. The pre-reform labor supply is higher in the program with a gradual payment reduction, and it further increases post-reform. Beneficiaries who already work, work more (%11.87), and those who did not work, start working (%0.79 point).

The estimated effects are heterogeneous by beneficiaries' family structure, age, gender, type of disability, and residence location, suggesting that targeted policies may encourage

²²A caveat of my study is that it does not estimate the size of the welfare gain, neither an optimal design of the policy.

DI beneficiaries to return to work. Examining the distributional effects of the reform suggests that the substitution effects dominate the income effects, and the reform might be welfare improving. The estimates suggest that a %10 reduction in DI payment reduction rate decreases the portion of beneficiaries below the exemption threshold by %11.4 and %3.3 for the beneficiaries without and with dependent, respectively. My findings suggest that return-to-work policies with a more gradual reduction in DI payments are more effective for increasing labor supply in DI programs.

My estimates provide a lower bound on the effect on beneficiaries' labor supply decisions from the financial incentives induced by the structure of return-to-work policies, due to the adjustment cost they face. Beneficiaries would adjust their labor supply in response to change in financial incentives only if they are large enough to offset the adjustment cost they face, suggesting an important role for the size of the financial incentives in beneficiaries labor supply decisions.

My findings provide evidence on the importance of the structure of return-to-work policies to increase labor supply in DI programs, an important policy domain, but it has caveats. The evidence on the distributional effects further suggests that the substitution effects of the reform might dominate the income effects, and the reform might be welfare improving. However, my study does not explore the welfare effects and the optimal structure of return-to-work policies.

References

- Autor, D. H. and Duggan, M. G. (2006). The growth in the social security disability rolls: A fiscal crisis unfolding. *The Journal of Economic Perspectives*, 20(3):71–96.
- Autor, D. H. and Duggan, M. G. (2007). Distinguishing income from substitution effects in disability insurance. *The American Economic Review*, (May).
- Bastani, S. and Waldenström, D. (2020). The ability gradient in Bunching. *Working Paper*.
- Benitez-Silva, H., Buchinsky, M., and Rust, J. (2011). Induced entry effects of a \$1 for \$2 offset in SSDI benefits.
- Borghans, L., Gielen, A. C., and Luttme, E. F. (2014). Social support substitution and the earnings rebound : Evidence from a regression discontinuity in disability insurance reform. *American Economic Journal: Economic Policy*, 6(4):34–70.

- Bütler, M., Deuchert, E., Lechner, M., Staubli, S., and Thiemann, P. (2015). Financial work incentives for disability benefit recipients: Lessons from a randomized field experiment. *IZA Journal of Labor Policy*, 4(18).
- Campolieti, M. (2004). Disability insurance benefits and labor supply: Some additional evidence. *Journal of Labor Economics*, 22(6):863–889.
- Campolieti, M. and Riddell, C. (2012). Disability policy and the labor market: Evidence from a natural experiment in Canada, 1998-2006. *Journal of Public Economics*, 96(3-4):306–316.
- Chetty, R., Friedman, J. N., Olsen, T., and Pistaferri, L. (2011). Adjustment costs, firm responses, and micro vs. macro labor supply elasticities: Evidence from Danish tax records. *The Quarterly Journal of Economics*, 126(2):749–804.
- Eissa, N., Kleven, H. J., and Kreiner, C. T. (2008). Evaluation of four tax reforms in the United States: Labor supply and welfare effects for single mothers. *Journal of Public Economics*, 92(3-4):795–816.
- Fortin, B., Lacroix, G., and Drolet, S. (2004). Welfare benefits and the duration of welfare spells: Evidence from a natural experiment in Canada. *Journal of Public Economics*, 88:1495–1520.
- Garcia Mandico, S., Garcia-Gomez, P., Gielen, A., and O’Donnell, O. (2020). Earnings responses to disability insurance stringency. *Labour Economics*, 66(101880).
- Gelber, A., Jones, D., Sacks, D. W., and Song, J. (2020a). Using non-linear budget sets to estimate extensive margin responses: Evidence and method from the earnings test. *American Economic Journal: Applied Economics*.
- Gelber, A., Moore, T. J., and Strand, A. (2017). The effect of disability insurance payments on beneficiaries’ earnings. *American Economic Journal: Economic Policy*, 9(3):229–261.
- Gelber, A. M., Jones, D., and Sacks, D. W. (2020b). Estimating earnings adjustment frictions: Method and evidence from the social security earnings test. *American Economic Journal: Applied Economics*, 12(1):1–31.
- Gruber, J. (2000). Disability insurance benefits and labor supply. *Journal of Political Economy*, 108(6):1162–1183.
- Haller, A., Staubli, S., and Zweimuller, J. (2020). Designing disability insurance reforms: Tightening eligibility rules or reducing benefits? *IZA Discussion Paper*, (13539).
- Hoynes, H. W. and Moffitt, R. (1999). Tax rates and work incentives in the social security disability insurance program: current law and alternative reforms. *National Tax Journal*, 52(4):623–654.
- Kneebone, R. and Grynishak, O. (2011). Income support for persons with disabilities. *School of Public Policy Reserach Papers*, 4(11).
- Kostol, A. R. and Mogstad, M. (2014). How financial incentives induce disability insurance recipients to return to work. *American Economic Review*, 104(2):624–655.

- Lemieux, T. and Milligan, K. (2008). Incentive effects of social assistance: A regression discontinuity approach. *Journal of Econometrics*, 142(2):807–828.
- Liebman, J. B. (2015). Understanding the Increase in disability insurance benefit receipt in the United States. *Journal of Economic Perspectives*, 29(2):123–150.
- Maestas, N., Mullen, K. J., and Strand, A. (2013). Does disability insurance receipt discourage work? Using examiner assignment to estimate causal effects of SSDI receipt. *American Economic Review*, 103(5):1797–1829.
- Marie, O. and Vall Castello, J. (2012). Measuring the (income) effect of disability insurance generosity on labour market participation. *Journal of Public Economics*, 96(1-2):198–210.
- Moore, T. J. (2015). The employment effects of terminating disability benefits. *Journal of Public Economics*, 124:30–43.
- OECD (2010). *Sickness, disability and work: Breaking the barriers*. Technical report.
- Ruh, P. and Staubli, S. (2019). Financial incentives and earnings of disability insurance recipients: Evidence from a notch design. *American Economic Journal: Microeconomics*, 11(2):269–300.
- SASR (2010). Social Assistance Statistical Report (SASR): 2008, Federal-Provincial-Territorial directors of income support. http://publications.gc.ca/collections/collection_2011/rhdcc-hrsdc/HS25-2-2008-eng.pdf.
- SSA (2018). BOND Implementation and Evaluation- Final Evaluation Report, Deliverable 24e.2. *Mathematica Policy Research*, 1.
- Staubli, S. (2011). The impact of stricter criteria for disability insurance on labor force participation. *Journal of Public Economics*, 95(9-10):1223–1235.
- Vall Castelló, J. (2017). What happens to the employment of disabled individuals when all financial disincentives to work are abolished? *Health Economics*, 26(S2):158–174.
- Weathers II, R. R. and Hemmeter, J. (2011). The impact of changing financial work incentives on the earnings of Social Security Disability Insurance (SSDI) beneficiaries. *Public Policy Analysis and Management*, 30(4):708–728.
- Wittenburg, D., Mann, D. R., Stapleton, D., Gubits, D., Judkins, D., McGuirk, A., and Others (2015). BOND implementation and evaluation: Third-Year snapshot of earnings and benefit impacts for stage 1. *Social Security Administration*.
- Zaresani, A. (2018). Return-to-work policies and labor supply in disability insurance programs. *American Economic Review Papers and Proceedings*, (108):272–276.
- Zaresani, A. (2020). Adjustment cost and incentives to work: Evidence from a disability insurance program. *Journal of Public Economics*, 188:104223.

Tables

Table 1: Summary statistics

	AISH		ODSP	
	Two years before	Two years after	Two years before	Two years after
<i>Labor market statistics</i>				
Labor force participation (%)	48.1	48.4	9.9	9.4
Average monthly employment earnings (2012 C\$)	255 (420)	285 (470)	50 (235)	55 (245)
Average net monthly DI payments (2012 C\$)	1,160 (120)	1,530 (150)	1,020 (470)	1,015 (460)
Number of new entries	1,215	636	8,440	9,965
<i>Individual characteristics</i>				
Male (%)	55.3	55.4	53.4	53.9
Average age (years)	38.5 (12.5)	39.8 (12.8)	43.0 (12.6)	42.9 (12.9)
Average age when entered program (years)	28.8 (11.1)	29.1 (11.4)	33.2 (11.8)	33.1 (11.9)
No dependent	91.3	90.8	82.1	82.2
Type of disability				
-Psychotic (%)	42.1	42.1	42.6	43.5
-Neurological (%)	50.1	51.0	36.3	36.4
-Mental (%)	7.3	6.9	21.1	20.2
Metropolitan area resident (%)	49.5	48.9	29.1	29.0
Average number of individuals	8,940	9,890	142,970	160,775
Total number of observations	214,595	237,285	3,431,300	3,385,615

Notes: This table provides summary statistics for the data from the AISH and ODSP. According to Statistics Canada's confidentiality guidelines, the average inflation-adjusted (2012 C\$) monthly earnings and DI payments are rounded to the closest five. The metropolitan area of Alberta are Calgary and Edmonton, and Ontario's are Toronto and Ottawa. The standard deviation of the continuous variables are provided in the parenthesis.

Table 2: Estimated effects from DD model

	Earnings (\$)			Labor Force Participation Rate (%)		
	(1)	(2)	(3)	(4)	(5)	(6)
AISH \times Post	29.98*** (1.34)	31.02*** (1.34)	29.87*** (1.53)	0.79*** (0.15)	0.79*** (0.15)	0.78*** (0.17)
Sample	Long panel	Long panel	Short panel	Long panel	Long panel	Short panel
Individual co-variates	No	Yes	Yes	No	Yes	Yes
Mean in AISH before policy change	252.47 (420.40)	250.18 (420.65)	250.89 (421.03)	48.12	48.12	47.60
R-Sq.	0.04	0.04	0.04	0.08	0.10	0.10
Num. of. Obs.	7,741,795	7,741,795	5,810,529	7,741,795	7,741,795	5,810,529

Notes: This table presents the estimated effects of the reform in AISH from the DD model specified in (1). The long panel spans April 2010 to March 2014. The shorter panel covers October 2010 to September 2014. The included individual co-variates are age, family structure, and the location of residence. The earnings are inflation-adjusted (2012\$). Standard errors clustered in individual levels and are presented in the parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Heterogeneity analysis from DD model

	Earnings (\$)		Labor Force Participation Rate (%)		Num. of. Obs.
	AISH \times Post	Mean	AISH \times Post	Mean	
<u>A. Family structure</u>					
No dependent	31.81*** (1.37)	249.06 (404.04)	0.62*** (0.16)	49.87	6,400,493
With dependent	42.39*** (5.37)	237.11 (498.67)	4.31*** (0.47)	29.76	1,341,302
<u>B. Age</u>					
18-34	57.29*** (2.19)	249.38 (425.70)	4.21*** (0.23)	45.27	2,323,720
35-49	25.82*** (2.39)	262.85 (420.75)	-0.79*** (0.26)	50.80	2,660,571
> 50	-4.11* (2.33)	224.29 (375.49)	-4.07*** (0.30)	49.63	2,757,504
<u>C. Gender</u>					
Male	37.79*** (1.88)	263.09 (428.66)	0.80*** (0.20)	49.02	4,162,168
Female	24.82*** (1.89)	229.36 (392.29)	0.79*** (0.22)	47.00	3,579,627
<u>D. Type of disability</u>					
Psychotic	32.65*** (2.02)	216.60 (403.23)	1.46*** (0.23)	39.22	3,329,884
Neurological	32.28*** (1.91)	272.41 (418.40)	-0.07 (0.21)	55.40	2,878,196
Mental	19.72*** (5.03)	260.00 (420.88)	-0.50 (0.56)	48.86	1,533,715
<u>E. Location of residence</u>					
Metropolitan area	34.34*** (1.97)	261.63 (428.07)	1.83*** (0.21)	46.82	2,338,947
Other	31.40*** (1.81)	234.69 (397.81)	-0.18 (0.21)	49.39	5,402,848

Notes: See notes to Table 2. Standard errors clustered in individual levels and are presented in the parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Estimated income effects

	No dependent				With dependent
	(1)	(2)	(3)	(4)	(5)
AISH \times Post	-1.61 (1.23)	4.74*** (1.22)	-4.99 (12.48)	18.97 (10.40)	-4.76 (11.12)
AISH	44.66*** (0.81)	37.36*** (0.83)	-133.79*** (8.23)	-81.01*** (7.19)	2.21 (6.67)
Sample	$0 < \text{earnings} \leq 300$ 12 months before policy change	$0 < \text{earnings} \leq 300$ 6 months before policy change	$\text{earnings} \geq 900$ 12 months before policy change	$\text{earnings} \geq 900$ 6 months before policy change	$0 < \text{earnings} \leq 850$ 6 months before policy change
Individual co-variates	Yes	Yes	Yes	Yes	Yes
Mean in AISH before policy change	138.76 (103.65)	135.59 (118.55)	1,248.98 (421.28)	1,140.49 (492.57)	307.25 (348.25)
R-Sq.	0.06	0.04	0.07	0.07	0.01
Num. of. Obs.	213,642	268,394	29,361	52,104	55,667

Notes: See notes to Table 2. Standard errors clustered in individual levels and are presented in the parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Estimates of elasticity of earnings below the threshold with respect to DI payment reduction rate

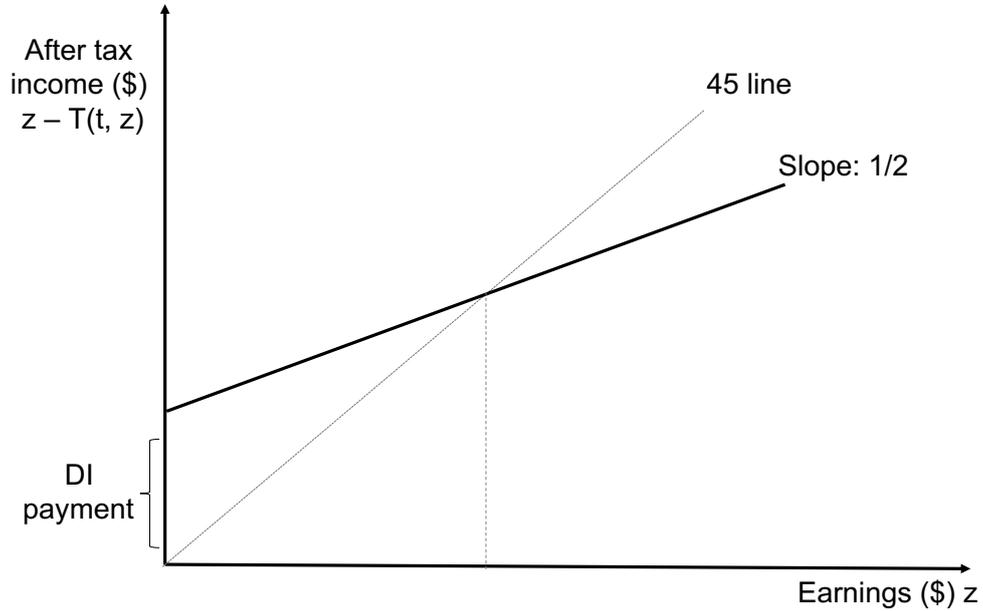
	No dependent	With dependent
ϵ	0.114*** (0.004)	0.033*** (0.003)
ΔEBT	-0.035 (0.001)	-0.030 (0.003)
EBT_{before}	0.747 (0.001)	0.879 (0.002)
ΔPRR	-0.190 (0.001)	-0.204 (0.002)
PRR_{before}	0.480 (0.007)	0.205 (0.004)
Num. of Obs.	411,373	40,507

Note: This table presents the estimates of the elasticity of Earnings Below Threshold (EBT) with respect to Payment Reduction Rate (PRR) from Equation (4). The bootstrapped standard deviations are in the parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figures

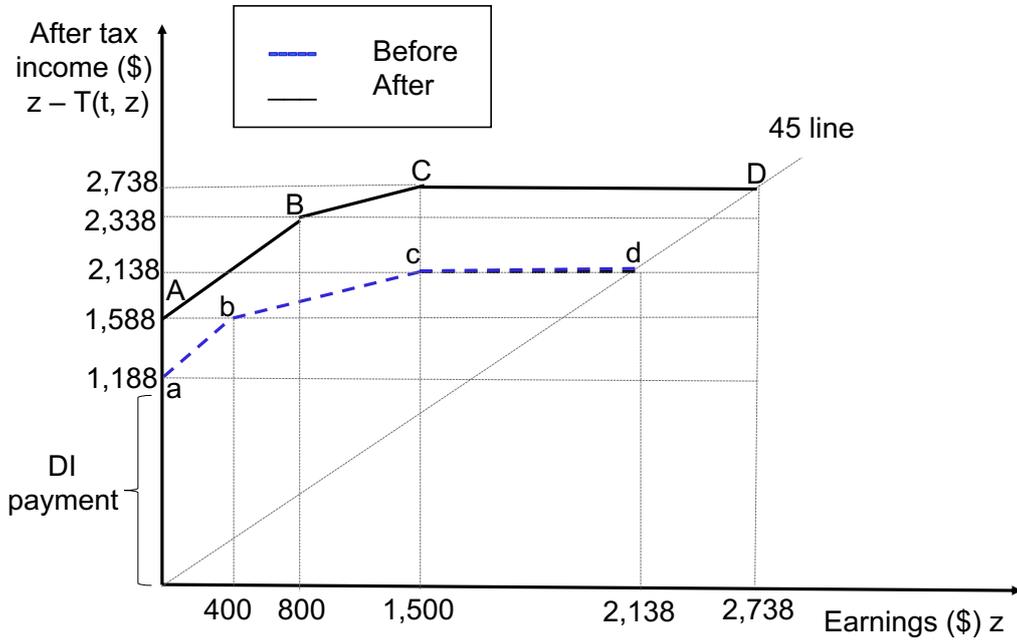
Figure 1: Budget constraint of ODSP beneficiaries



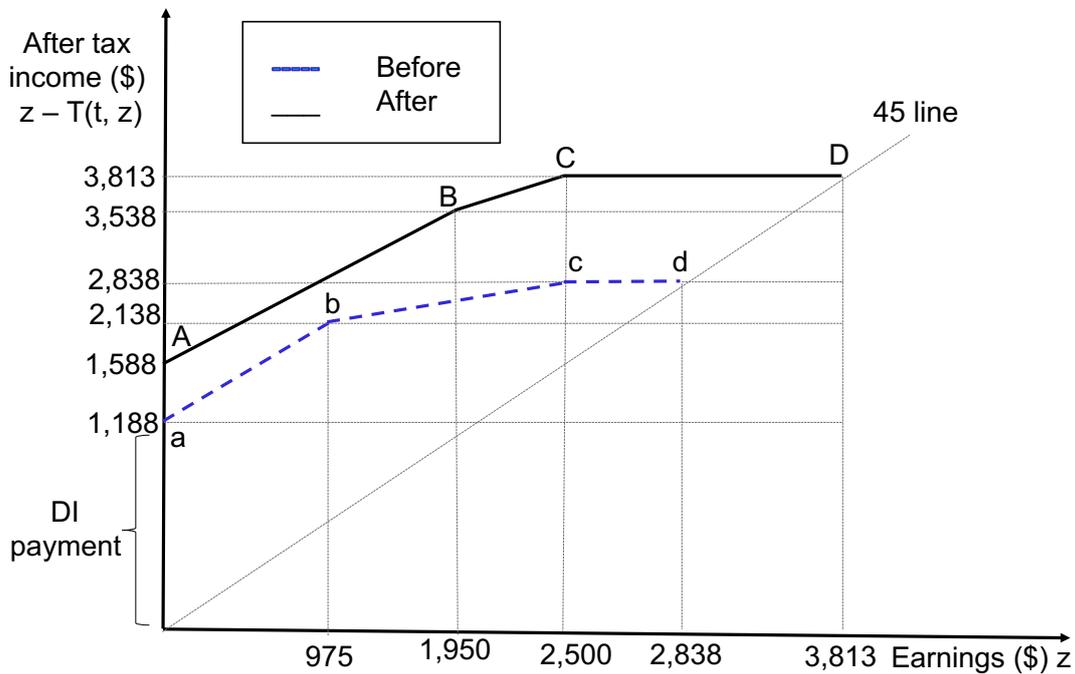
Note: This figure plots the budget constraint of ODSP beneficiaries. The horizontal axis represents the monthly earnings, and the vertical axis denotes the disposable income which is earnings and net DI payments added together. DI payments range from C\$1,086 to C\$1,999. The implicit marginal tax rate is 50%.

Figure 2: Budget constraints of AISH beneficiaries

(a) No dependent



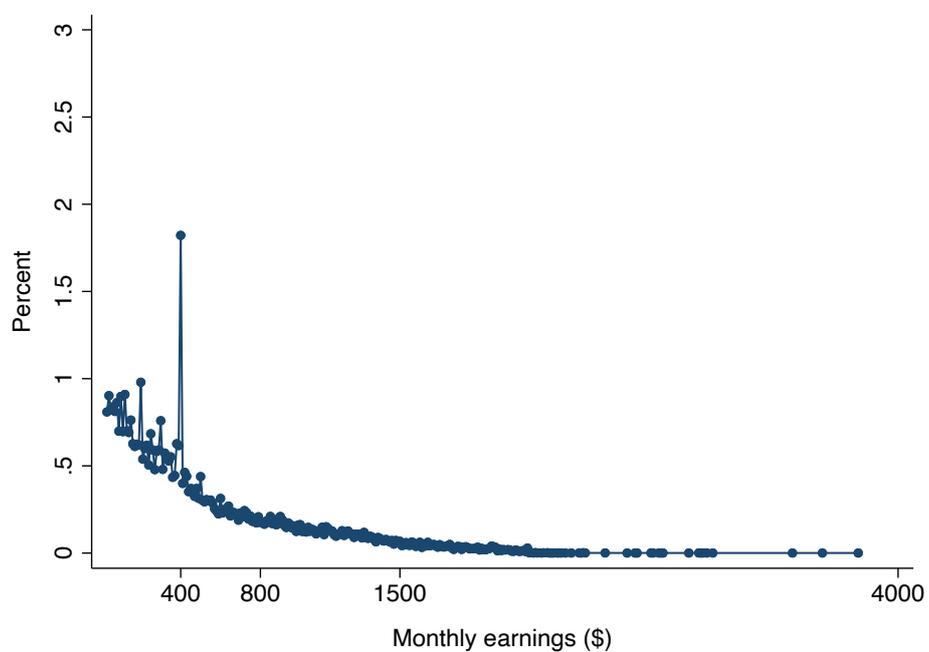
(b) With dependent



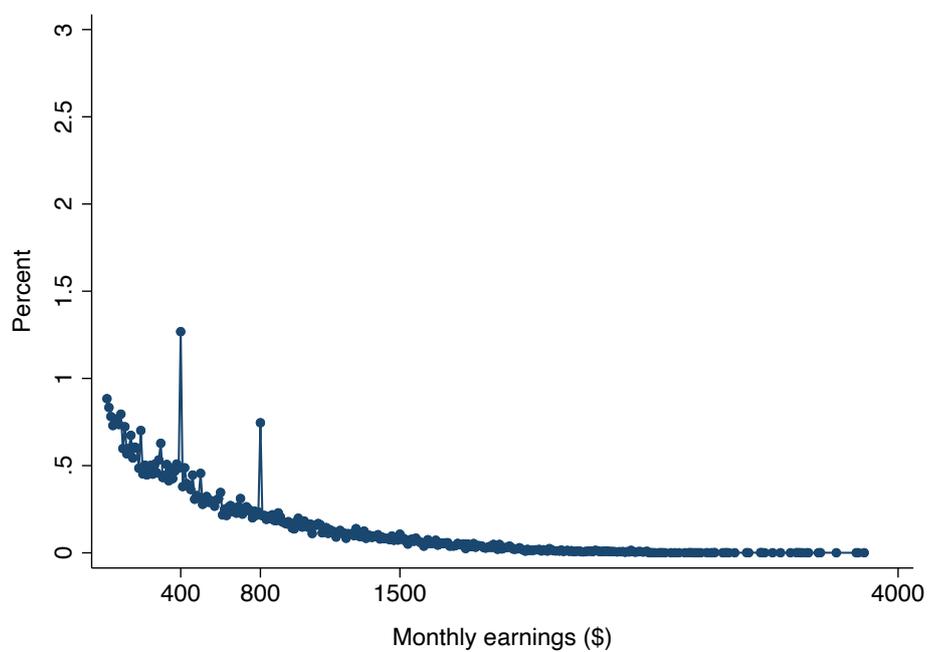
Note: This figure illustrates the budget constraints of AISH beneficiaries before and after the reform. The horizontal axis represents the monthly earnings, and the vertical axis denotes the disposable income which is earnings and net DI payments added together. The implicit marginal tax rates at each bracket are respectively zero, 50% and 100%.

Figure 3: Earnings distribution of AISH's beneficiaries with no dependent

(a) Two years before reform



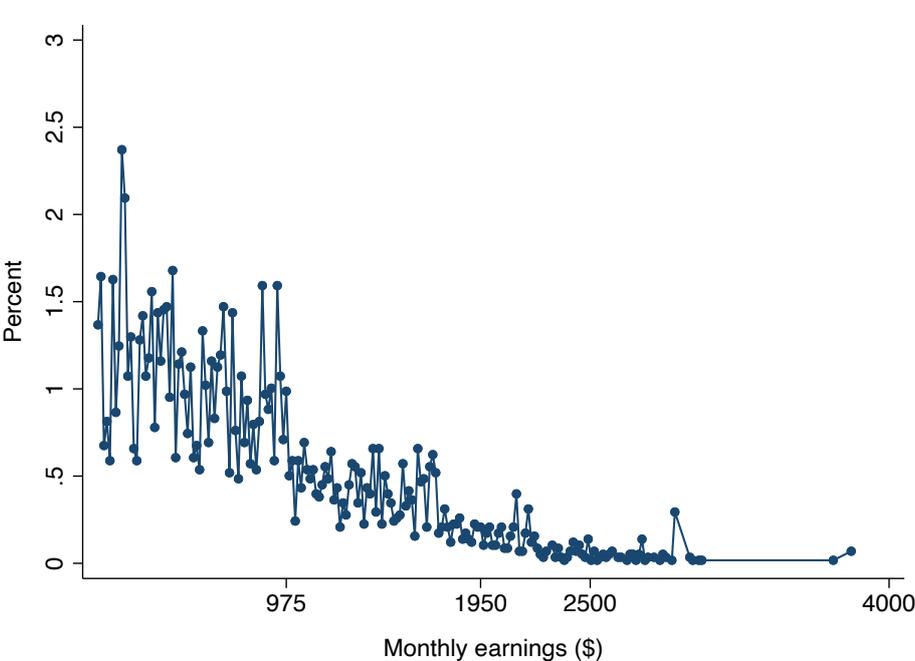
(b) Two years reform



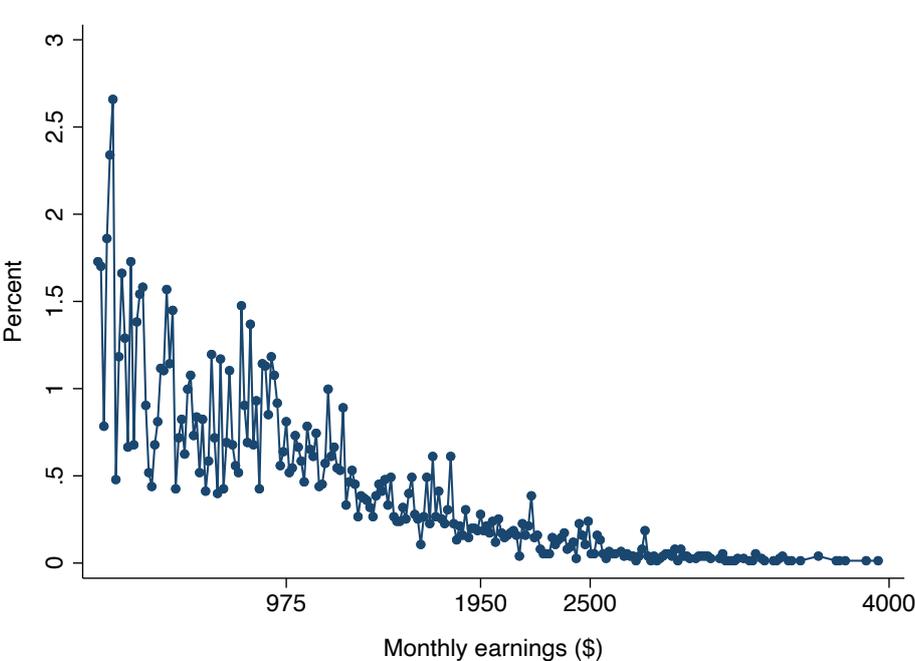
Note: The sample includes only beneficiaries with positive earnings. About half of all the beneficiaries have zero earnings (see Table 1).

Figure 4: Earnings distribution of AISH's beneficiaries with dependent

(a) Before reform

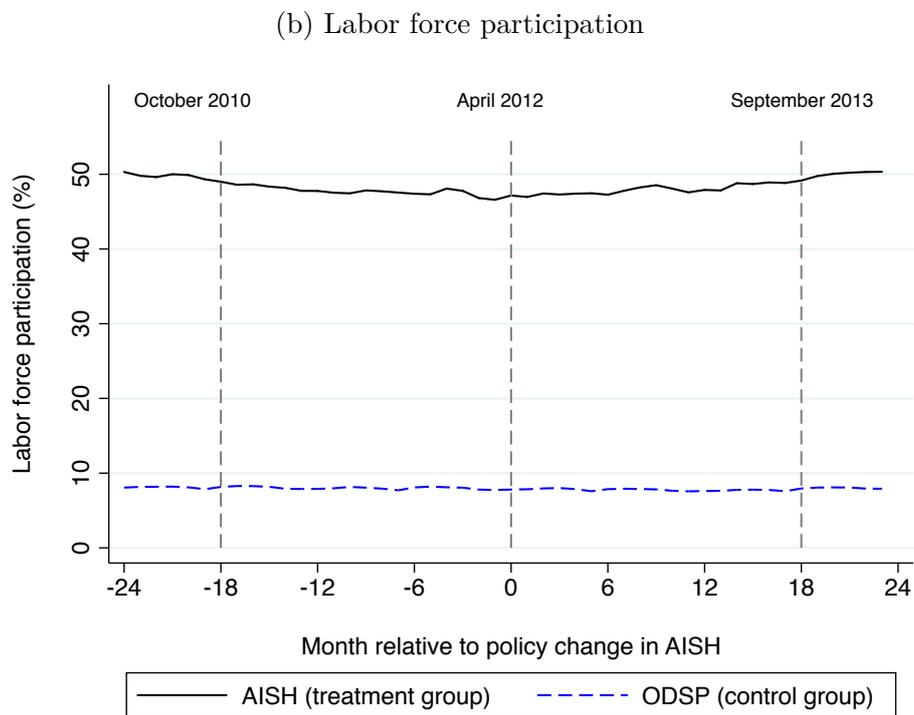
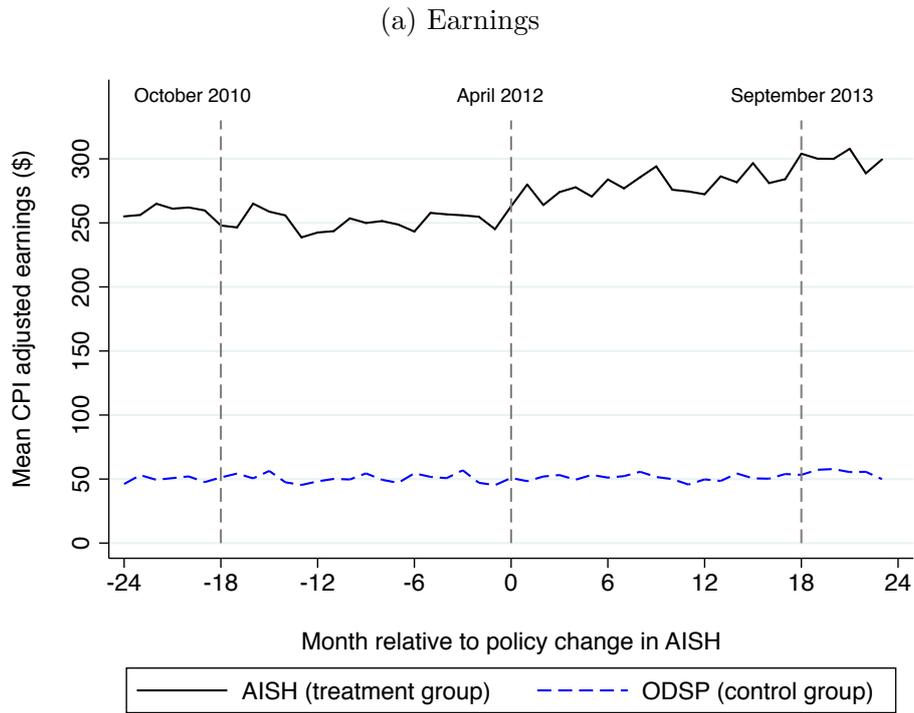


(b) After reform



Note: See notes to Figure 3.

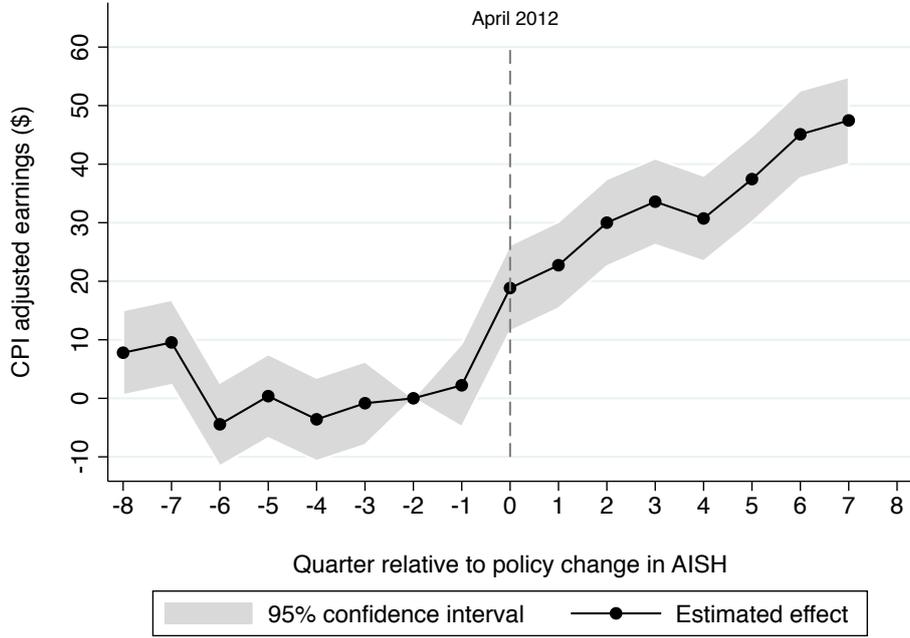
Figure 5: Trends in the labor supply in AISH and ODSP



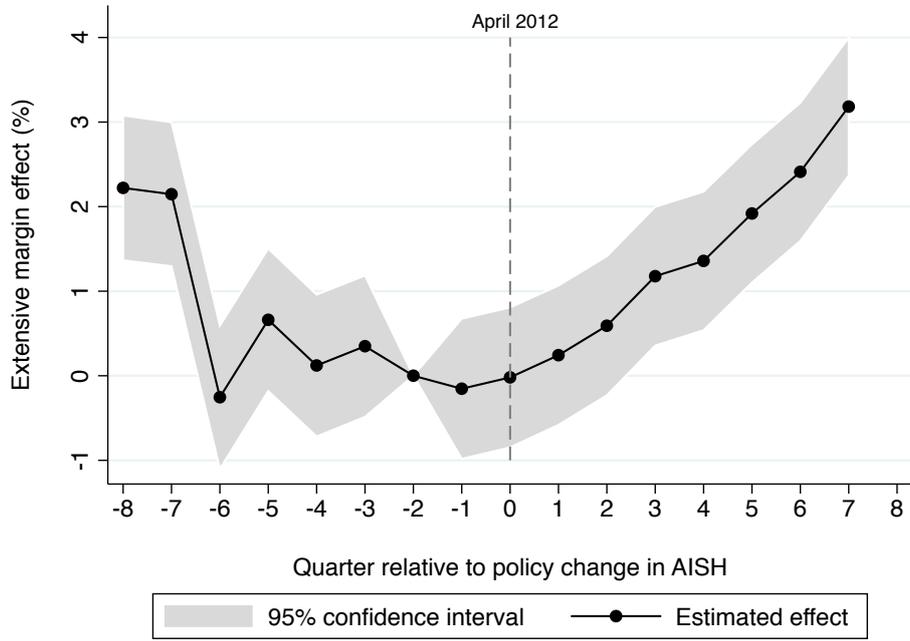
Notes: This figure plots the average monthly earnings and labor force participation rate in the AISH and ODSP. The x-axis represents the month relative to the reform in AISH. The labor force participation is defined as a dummy which switches on for positive earnings.

Figure 6: Placebo test

(a) Earnings



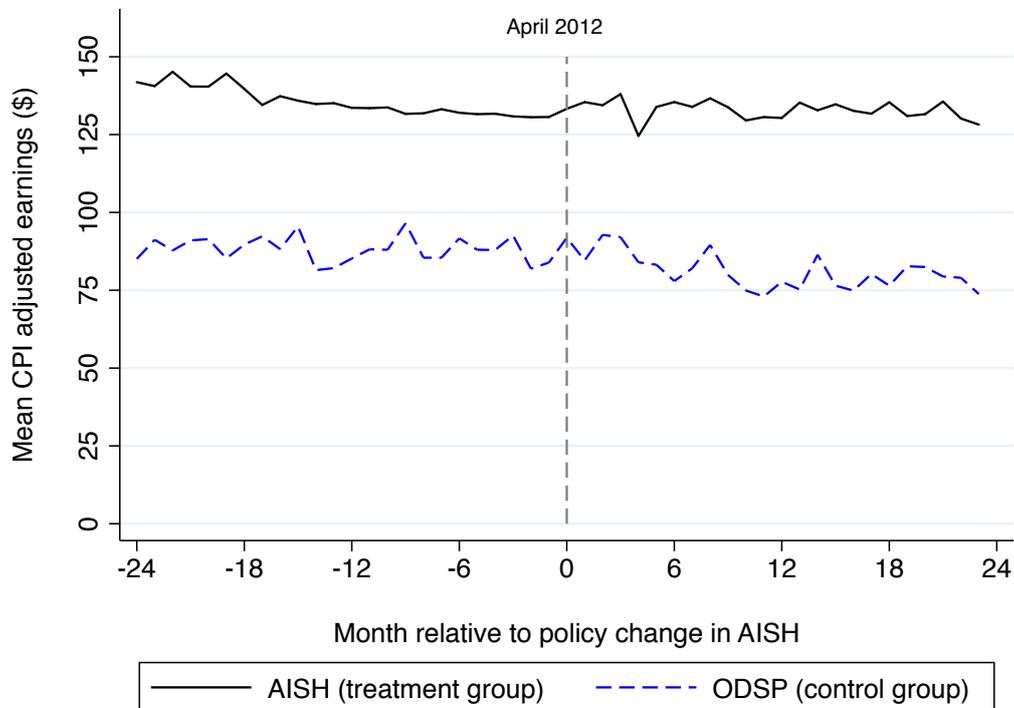
(b) Labor force participation



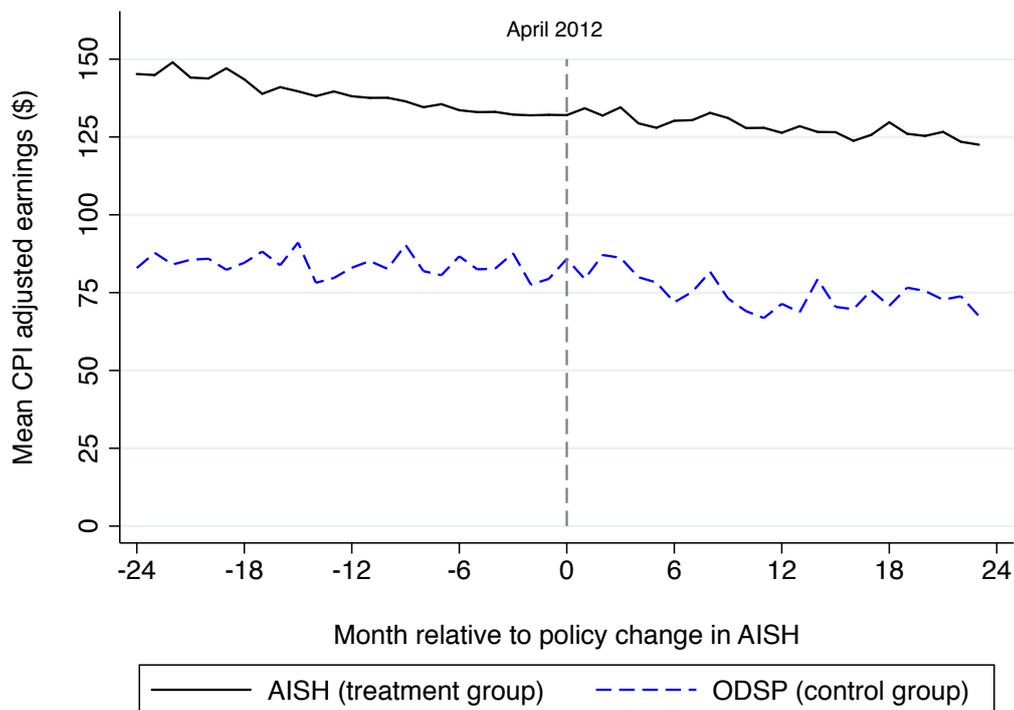
Notes: This figure plots the estimated time trend coefficients (β_t) from (2). The gray area denotes the 95% confidence intervals.

Figure 7: Trends in monthly earnings of AISH and ODSP beneficiaries with likely dominant income effects

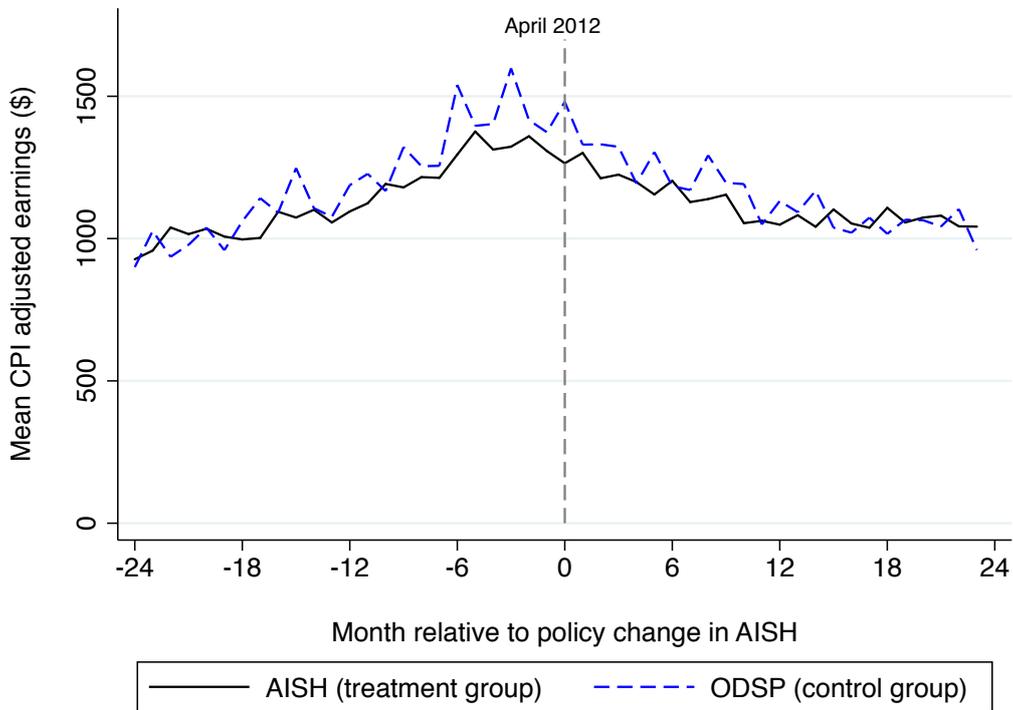
(a) Monthly earnings below \$300 for 6 months before the reform (no dependent)



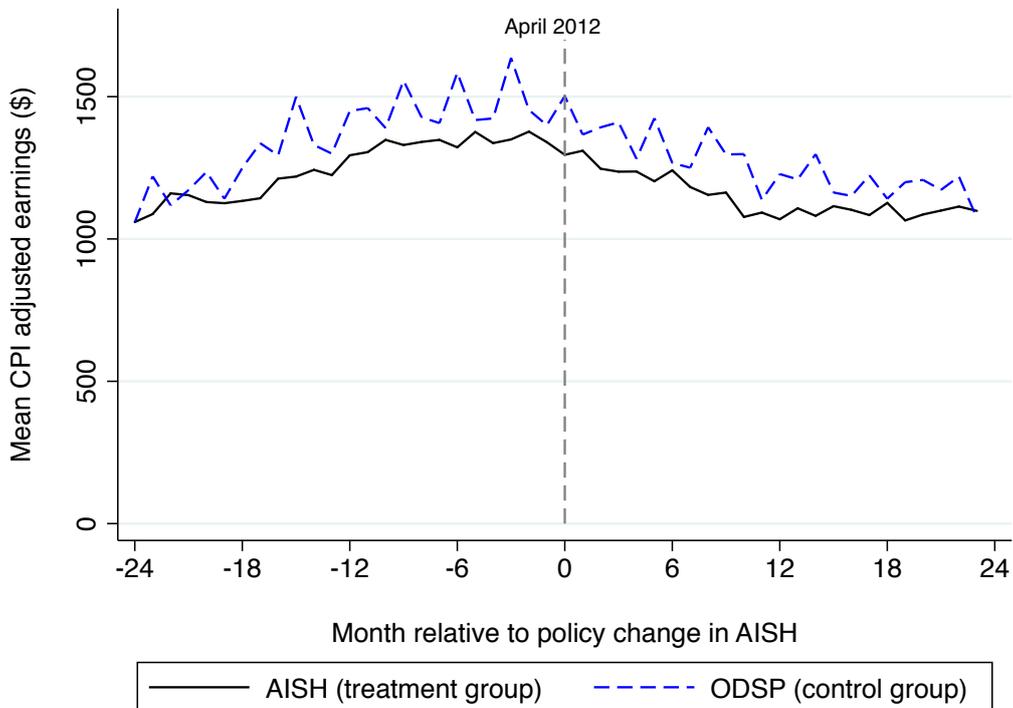
(b) Monthly earnings below \$300 for 12 months before the reform (no dependent)



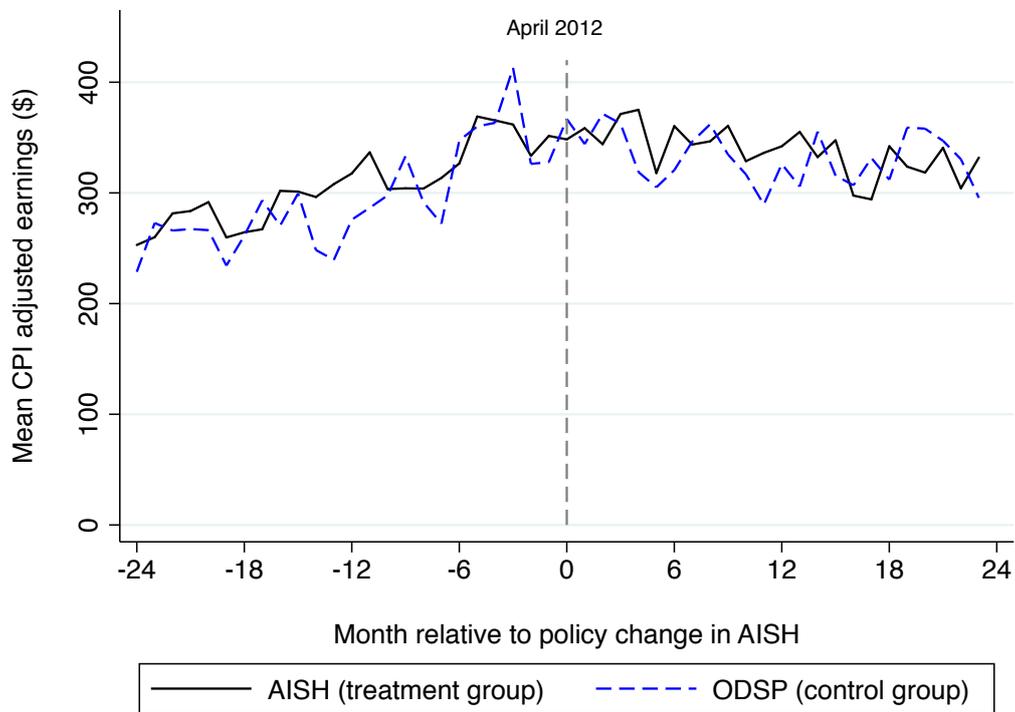
(c) Monthly earnings over \$900 for 6 months before the reform (no dependent)



(d) Monthly earning over \$900 for one year before the reform (no dependent)



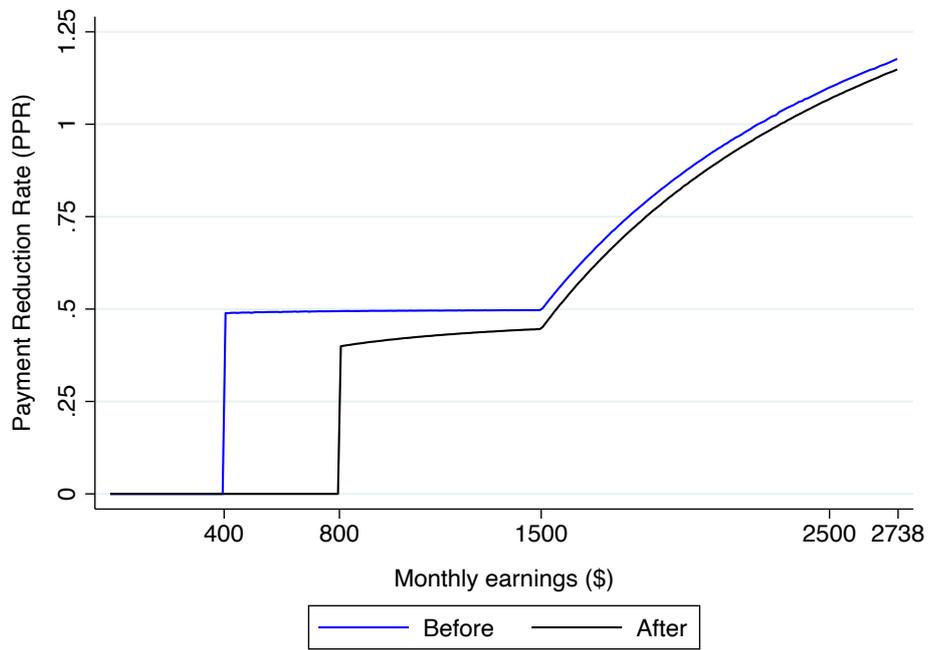
(e) Monthly earnings below \$850 for 6 months before the reform (with dependent)



Note: This figure plots the trends in the monthly earnings of AISH and ODSP beneficiaries with likely dominant income effects.

Figure 8: DI paymnet reduction rate in AISH

(a) No dependent



(b) With dependent



Note: This figure illustrates the DI Payment Reduction Tax Rate (PPR) by earnings in AISH’s return-to-work policy before and after the reform, defined in Equation (4).