TAKE-UP AND LABOR SUPPLY RESPONSES TO DISABILITY INSURANCE EARNINGS LIMITS

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Abstract

In most disability insurance programs, beneficiaries lose some or all of their benefits if they earn above an earnings threshold. While intended to screen out applicants with high remaining working capacity, earnings limits can also distort the labor supply of beneficiaries. We develop a simple framework to evaluate this trade-off.

We use a reduction in the earnings limit in Hungary to examine screening and labor supply responses and analyze administrative panel data that brings together information on earnings, occupations, benefit receipt, healthcare spending, and other domains for half of the Hungarian population over the 2003-2017 period.

To study how the reform impacted the selection of beneficiaries into the Regular Social Assistance (RSA) program and their labor supply conditional on participation, we compare beneficiaries who entered in 2007, the year before the reform ("old entrants"), and beneficiaries who entered in 2008, the year after the reform ("new entrants"). We follow these two groups of beneficiaries for four years before and three years after they enter disability insurance. We start our empirical analysis by comparing selection into the RSA program between old and new entrants. In particular, we compare program inflow, observed characteristics of entrants and their labor market outcomes in the years before entry. This analysis should give us a good sense of the overall selection effect due to the reform. Next, we compare labor market outcomes of old and new entrants after disability entry. To interpret these differences as labor supply effects from the change in the earnings limit, we have to control for the selection effects, which we do in regression and reweighting analyses.

We find that the policy changed selection into the program modestly but reduced labor supply significantly. Viewed through the lens of our model, these findings suggest that the earnings threshold could be higher.

A limitation of our analysis lies in its comparability with other disability programs, given that the Hungarian RSA program offers a very low, flat-rate benefit specifically designed for moderately disabled individuals. However, our results lead to a general conclusion that the low earnings limit discourages beneficiaries from fully utilizing their remaining working capacity.

The paper found that:

- The decrease in the earnings limit had a small impact on selection into the program. First, we do not find evidence of decreased program entry rates. Second, consistent with the screening mechanism, we show that individuals who entered the program after the reform (new entrants) had worse pre-entry labor market outcomes than beneficiaries who had entered earlier (old entrants). Though new entrants were slightly less likely to work and earned somewhat less on average pre-entry than old entrants, old and new entrants were similar on a variety of dimensions, such as age, occupation, geographical location, and sick leave use prior to entering disability.

- Individuals who entered the program after the earnings limit was reduced had meaningfully lower labor supply post-entry. New entrants were as likely to be employed as old entrants, but conditional on being employed, they worked less. On average, new entrants worked 7 percent fewer hours, and had 18 percent lower earnings (conditional on working) after taking up benefits.

- This result is driven by the beneficiaries with higher pre-disability earnings, who were most affected by the change in the earnings limit.

The policy implications of the findings are:

- We show conceptually that with the choice of the earnings limit, policymakers must trade off selection and labor supply effects.

- Our results suggest that decreasing the earnings limit only led to a moderate improvement in screening efficiency. This evidence is consistent with a scenario where the earnings limit and benefit level before the reform were already sufficiently low to deter potential entrants who are well-positioned to find higher-paying jobs in the labor market.

- At the same time, the reform substantially distorted the labor supply of program participants, indicating that individuals with moderate disabilities react sensitively to the financial incentives embedded in disability benefits.

- Too-strict earnings limits fail to yield sizable cost savings from benefit expenditures for the government but leave moderately disabled individuals with lower earnings, resulting in lower tax revenues.

1 Introduction

The share of working-age adults receiving long-term disability insurance (DI) benefits has increased rapidly over the past few decades and DI programs account for over 10% of social spending in OECD countries (OECD, 2010). The trend in disability rolls raises concerns about the fiscal sustainability of DI programs and has prompted policy makers to examine program designs that encourage potential beneficiaries to remain employed and those already receiving benefits to return to work (Autor and Duggan, 2010; Autor, 2011; Burkhauser and Daly, 2011; Liebman, 2015).

One way that policy makers try to limit DI take-up and incentivize work is setting earnings limits: if a beneficiary earns above a certain level, she loses part or all of her benefits. The rationale behind earnings limits is the presence of asymmetric information: the government cannot observe applicants' true health status or work capacity, so it must rely on a screening mechanism.[1] The screening mechanism is supposed to ensure that only workers who are unable to earn above a certain level will apply for benefits, while potential applicants with higher working capacity will find it advantageous to forgo benefits and remain employed instead. In the United States, the earnings limit applicable to beneficiaries in the Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs is called Substantial Gainful Activity (SGA). It is designed as a "cash-cliff", which means that if a beneficiary earns even $1 above the SGA, she loses all benefits. The SGA thus creates a notch in the benefit schedule such that a higher total income (wages plus benefits) can be obtained by working less and keeping earnings below the SGA (Maestas and Yin, 2008; Weathers and Hemmeter, 2011). In 2023, the SGA is $1,470 per month for non-blind applicants. Someone working full-time at the federal minimum wage would make approximately $1,260. In the 30 states with minimum wages set above the federal level, a full-time minimum-wage worker would make considerably more than the SGA.

The benefit design based on a cash-cliff assumes that if applicants can earn more than the limit in the labor market they do not need to receive any DI benefits. Policy makers and researchers have recognized that earnings limits like the SGA create strong work disincentives and have potentially negative welfare impacts. Alternative policy approaches avoid a notch in the benefit schedule by introducing a gradual phaseout of benefits above an earnings threshold. But under these policy designs the implicit tax rate may still inefficiently distort labor supply (Kostøl and Mogstad, 2014; Deuchert and Eugster, 2019; Ruh and Staubli, 2019; Zaresani and Olivo-Villabrille, 2022).

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[1]Other screening mechanisms include medical screening (de Jong, Lindeboom and van der Klaauw, 2011; Liebert, 2019; Godard, Koning and Lindeboom, 2023), benefit amounts (Mullen and Staubli, 2016), hassle costs (Deshpande and Li, 2019), and wait times (Kearney, Price and Wilson, 2021).

The usefulness of earnings limits as a screening mechanism and their distortionary effect on labor supply decisions create a trade-off for policy makers. When setting earnings limits, they need to take into account the impact on who takes up benefits and how much beneficiaries work. In this paper, we develop a framework to understand this trade-off in the context of a "cash cliff" design where beneficiaries lose all benefits if they earn above the limit. When the government increases the earnings limit, the set of workers who apply for benefits widens: receiving benefits while working becomes appealing to higher-productivity workers. On the flip side, a decrease in the earnings limit means that the set of workers applying for benefits shrinks as only less-productive workers will prefer benefit receipt and limited work. At the same time, another effect is at play: conditional on receiving benefits, a higher earnings limit means that beneficiaries who can work will increase their labor supply as they still remain eligible for benefits. And a lower earnings limit has the opposite effect: some beneficiaries will set their labor supply lower in order to remain eligible for benefits. We call these two effects of changing the earnings limit the selection and labor supply effects. At the optimal earnings limit, the marginal selection effect and the marginal labor supply effect of moving the earnings limit will balance each other out. Therefore, to characterize the welfare impact of changing the earnings limit these two effects should be estimated.

To empirically estimate the selection and labor supply effects of changing the earnings limit, we study a policy reform in Hungary that reduced the earnings limit for some beneficiaries but not others, while leaving benefit amounts unchanged. In 2008, the cash-cliff style earnings limit in Hungary's Regular Social Assistance (RSA) program for moderately disabled individuals was reduced from 80% of the individual's last wage before entering disability to 80% of the monthly minimum wage for new entrants, while it remained the same for beneficiaries who were already approved. We exploit this policy change to understand how selection into the program and labor supply once in the program changed. To this end, we compare the evolution of various extensive and intensive margin measures of labor supply relative to the start of benefit receipt among beneficiaries who enter before ("old entrants") and after ("new entrants") the reform.

We find that the decrease in the earnings limit had a small impact on selection into the program. First, we do not find evidence of decreased program entry rates. Second, consistent with the screening mechanism, we show that individuals who entered the program after the reform had worse pre-entry labor market outcomes than beneficiaries who entered earlier. New entrants were 3 percentage points (4%) less likely to work and earned 8% less on average (conditional on working) pre-entry than old entrants. Old and new entrants were similar on a variety of other dimensions, such as age, occupation, geographical location, and sick leave use prior to entering disability. As a summary measure of the change in selection on observable

2

characteristics, we show that the distribution of predicted program entry, based on a rich set of individual characteristics, is almost identical across years. This suggests that RSA entrants remain similar in terms of observable characteristics over time. Examining benefit persistence, we find no evidence that new entrants were more likely to exit the program than old entrants. Overall, the moderate selection effects are consistent with a world where the earnings limit and the benefit level were already sufficiently low to deter most potential entrants who were well-positioned to find higher-paying jobs in the labor market.

At the same time, we find that individuals who entered the program after the earnings limit was reduced had meaningfully lower intensive margin measures of labor supply post-entry. New entrants were as likely to be employed as old entrants, but conditional on being employed, they worked less. On average, new entrants worked 7% fewer hours and had 16% lower earnings (conditional on working) after taking up benefits. This result is driven by beneficiaries with higher pre-disability earnings, who were most affected by the change in the earnings limit.

To examine the impact of the lowered earnings limit on beneficiary health, we consider mortality, an imperfect proxy for health. Our results suggest no change in mortality, which means that the primary effect of the reduction of the earnings limit on beneficiaries was through reduced work intensity.

Since we study a change in the DI earnings limit in 2008, it is important to rule out the role of the recession in explaining our results. We address this concern in several ways. We start by showing that the overall labor market impacts of the recession were not really present in Hungary until 2009 when the unemployment rate started rising rapidly. This means that inflow into RSA should not yet have been affected by the economic downturn in 2008. But labor market outcomes in the years after entry might be differentially affected for old and new entrants. Our first strategy to confront this concern involves comparisons across regions that were more and less severely hit by the recession and showing outcomes relative to their national or regional average to account for overall trends. Second, we perform placebo analyses based on entrants around non-reform cutoff dates. Third, we compare outcomes of old and new entrants into the accident insurance program, which did not see a change in the earnings limit. This set of robustness checks confirms that the change in labor market outcomes of new entrants is due to the change in the earnings limit rather than the change in the economic environment.

Our work contributes to three strands of the literature. We most directly contribute to the literature on earnings limits in disability insurance (e.g., Maestas and Yin, 2008; Schimmel, Stapleton and Song, 2011; Weathers and Hemmeter, 2011; Kostøl and Mogstad, 2014; Greenberg et al., 2018; Deuchert and Eugster, 2019; Ruh and Staubli, 2019; Zaresani,

2020).This literature finds mixed evidence on labor supply responses to earnings limits. A number of papers find that DI beneficiaries are responsive to the financial incentives induced by earnings limits, and easing the the program's implicit high marginal tax rate would increase labor supply of beneficiaries (Zaresani and Olivo-Villabrille (2022) in Canada, Kostøl and Mogstad (2014) in Norway, and Ruh and Staubli (2019) in Austria). Others suggest little response to earnings limits. For example, Schimmel, Stapleton and Song (2011) and Gelber, Moore and Strand (2017) find that only a minor portion of disability beneficiaries earn near the SGA limit in the U.S., suggesting that it is not a binding constraint on labor supply. Similarly, studies by Weathers and Hemmeter (2011) and Greenberg et al. (2018) find no evidence that a benefit offset policy increases employment rate or average earnings. We contribute to this literature in several ways. First, unlike much prior work focusing on existing DI beneficiaries, we are able to study both who takes up DI benefits (the selection effect) and how beneficiaries behave when they start receiving benefits (the labor supply effect). Second, we focus on moderately disabled individuals who have relatively high employment rates after entering the program and should thus be responsive to the change in the earnings limit. More severely disabled and longer-term beneficiaries considered in some previous work are more likely to be unable to significantly change their labor supply. Third, to the best of our knowledge, this is the first paper to study a *decrease* in the earnings limit, which is important as the responses to positive and negative changes in the earnings limit are not necessarily symmetric. Our results suggest that a low earnings limit impedes moderately disabled individuals from fully utilizing their remaining work capacity. Fourth, we develop a simple model that clarifies the role of the two key effects of changing the earnings limit, its impact on selection and on labor supply.

More broadly, this work contributes to the literature on the work disincentives of DI programs and the literature that studies the labor supply impacts of DI receipt (e.g., Bound, 1989; Gruber, 2000; Chen and van der Klaauw, 2008; Maestas, Mullen and Strand, 2013; Low and Pistaferri, 2015; Mullen and Staubli, 2016; Haller, Staubli and Zweimüller, 2023). This literature has focused on understanding the effects of disability programs on labor supply taking into account all features of the programs as implemented. It broadly finds that DI receipt discourages work. For example, Maestas, Mullen and Strand (2013) find that for applicants on the margin of program entry, employment would be a third higher **on average** if they didn't receive benefits. Earnings limits and other features (e.g., benefit generosity) jointly determine the effects of DI programs. We examine one feature of disability programs that policy makers can use to influence the incentive effects of DI programs.

Finally, this work also speaks to the academic and policy literature that has tried to address the fiscal sustainability of DI programs, partly by suggesting that work disincentives

in these programs should be decreased (e.g., Autor and Duggan, 2006, 2007; Autor, 2011; Bipartisan Policy Center, 2015; Liebman, 2015). For example, several policy proposals in the U.S. included moving from a "cash cliff" to a gradual phase-out. We show that among moderately disabled workers a higher earnings limit can increase labor supply while only moderately changing selection into the program.

The rest of this paper proceeds as follows. In Section 2, we introduce our conceptual framework to capture the key trade-offs of earnings limits. Section 3 provides background on the Regular Social Allowance program and the 2008 reform. Section 4 describes our administrative data and empirical approach. We present our results in Section 5. Section 6 concludes.

2 Conceptual Framework

In this section, we propose a simple conceptual framework to capture the key trade-offs related to the setting of earnings limits in disability insurance programs. We focus on the case of notches, earnings limits above which beneficiaries lose their benefits completely.[2]

Individuals are characterized by their productivity types $\theta \in [0, 1]$. Types are distributed according to CDF $F(\theta)$ (PDF $f(\theta)$). Individuals work h hours and have after-tax income $y = h\theta - \tau(h\theta)$ where τ is the income tax rate. Type θ is unobserved and therefore the government cannot use it to condition benefits. Disability benefits are B and there is an income threshold $\bar{y}$ for receiving benefits. Individuals have utility

$$V_\theta^{NB} = u\left(y_\theta^{NB}\right) - v(h_\theta^{NB}) \tag{1}$$

if not receiving benefits, and utility

$$V_\theta^B = u\left(y_\theta^B + B\right) - v(h_\theta^B) \tag{2}$$

if receiving benefits where $v(h)$ is the disutility of work. Eligible individuals (i.e., individuals who qualify on the basis of medical diagnoses and other criteria) decide to participate in the disability program if the value of participation is higher than the value of non-participation: $V_\theta^B \geq V_\theta^{NB}$. This decision rule determines in turn a cutoff type $\bar{\theta}$, who is indifferent between participating and not participating. Here we consider the program entry decision in a static

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[2]Our notation follows the framework in Finkelstein and Notowidigdo (2019) who study the take-up of welfare programs in the presence of potential behavioral biases. See also Nichols and Zeckhauser (1982), Kleven and Kopczuk (2011), and Anders and Rafkin (2021) for more general models of welfare eligibility and take-up.

framework and disregard any dynamics of repeated entry and exit. In our empirical analysis we show that program participation is highly persistent and even the reform-driven change in the earnings threshold did not lead to increased exits.

Social welfare is

$$W = \underbrace{\int_0^{\bar\theta} u\left(y_\theta^B + B\right) - v(h_\theta^B)d\theta}_{\text{Receiving Benefit}} + \underbrace{\int_{\bar\theta}^1 u\left(y_\theta^{NB}\right) - v(h_\theta^{NB})d\theta}_{\text{Not Receiving Benefit}} - \underbrace{\bar\theta B}_{\text{Program Cost}} \tag{3}$$

$$+ \underbrace{\int_0^{\bar\theta} G_\theta^B d\theta}_{\substack{\text{Fiscal Externality,} \\ \text{Benefit}}} + \underbrace{\int_{\bar\theta}^1 G_\theta^{NB} d\theta}_{\substack{\text{Fiscal Externality,} \\ \text{No Benefit}}} \tag{4}$$

where $\bar\theta$ is the highest productivity type worker who receives the benefit. The standard fiscal externality is the tax revenue the government realizes on a type θ worker: $G_\theta^B = \tau\left(h^B\theta\right)$ and $G_\theta^{NB} = \tau\left(h^{NB}\theta\right)$. However, other types of fiscal externalities can also fit into this framework. For example, time out of the labor force while receiving benefits may reduce working capacity (Autor, Maestas, Mullen and Strand, 2015; Garcia-Mandicó, García-Gómez, Gielen and O'Donnell, 2020; Bíró et al., 2023) which imposes an additional negative fiscal externality.

The government can vary the earnings limit $\bar y$ while leaving B fixed. This has an impact on what types of workers choose to receive benefits, as the cutoff type $\bar\theta$ changes. This in turn impacts total program costs (how many workers receive benefits) and the fiscal externality of the program. If the government lowers (increases) $\bar y$ the set of workers opting for benefits shrinks (widens). In response to a lower earnings limit, the labor supply of some workers receiving benefits also decreases because they will lower their labor supply in order to remain eligible for benefits. In contrast, in response to a higher earnings limit, the labor supply of some workers may increase as they can work more and still meet the earnings limit. In particular, a marginal change in $\bar y$ has the following effect on social welfare:

$$\frac{dW}{d\bar y} = \underbrace{\frac{d\bar\theta}{d\bar y}\left(G_{\bar\theta}^B - G_{\bar\theta}^{NB} - B\right)}_{\text{Change in Selection}} + \underbrace{\int_0^{\bar\theta} \frac{dG_\theta^B}{d\bar y}d\theta + \int_{\bar\theta}^1 \frac{dG_\theta^{NB}}{d\bar y}d\theta}_{\text{Change in the Fiscal Externality}}. \tag{5}$$

The welfare impact consists of two parts. First, the change in selection into benefit take up $\left(\frac{d\bar\theta}{d\bar y}\right)$ has an impact through the program cost (B) and the fiscal externality $(G_{\bar\theta}^B - G_{\bar\theta}^{NB})$. Second, among beneficiaries (types 0 to $\bar\theta$) and potentially non-beneficiaries (types $\bar\theta$ to 1), the fiscal externality can change too $(\frac{dG_\theta^B}{d\bar y}$ and $\frac{dG_\theta^{NB}}{d\bar y}$ respectively). In the standard case, the fiscal externality is the tax revenue the government realizes and it changes because beneficiaries may adjust their labor supply to remain eligible for benefits. Note that assuming

that individuals were already optimizing, applying the envelope theorem, there is no welfare effect through individuals' utilities. This is the case displayed in equation (5). If individuals are unable to fully optimize due to the notch in their budget constraint, changing the earnings limit can also have a welfare impact through the utilities of individuals who bunch at the earnings threshold rather than setting their labor supply fully optimally. Assuming that the set of individuals affected is $\theta \in \left(\theta^*, \bar{\theta}\right]$, the direct welfare impact would be $\int_{\theta^*}^{\bar{\theta}} u'(y_{\theta}^B + B) - v'(h_{\theta}^B)d\theta$, which would be an additional term on the right hand side of equation (5). Welfare is maximized with respect to the earnings limit if the derivative $\frac{dW}{d\bar{y}}$ is zero. This is realized when the selection and labor supply responses balance each other out.

3 Background

Preceding the 2008 reform, Hungary had the highest disability benefit receipt rate in the OECD at 12%, over twice the OECD average (OECD, 2009). Unlike the U.S. system, but similar to other European countries, Hungary's disability insurance programs are tiered based on the severity of the impairment beneficiaries have. The Regular Social Allowance (RSA) program, the focus of this paper, was available to individuals with sufficient work histories and with an at least 40% health impairment who could not work in their pre-disability job or any other job commensurate with their level of education without rehabilitation or fur-ther education. Health impairments are assessed by a panel of physicians and rehabilitation experts. The most common qualifying diagnoses for RSA recipients were musculoskeletal conditions. Different programs were available to more severely disabled individuals (disability pension), as well as those close to the retirement age when becoming disabled (temporary allowance), those who became disabled before age 25, and blind individuals (disability al-lowance). The benefit level of the RSA was low compared to the disability pension: 36 to 38% of the statutory minimum wage throughout the years of our analysis.

RSA recipients are allowed to work up to an earnings limit and at the time of the reform about 26% did work. As a comparison, only 12% of beneficiaries with more severe disabilities (disability pensioners) were employed in 2007. Until December 2007, the earnings limit was linked to the previous earnings of the applicants. A person with an at least 40% of health impairment was allowed to apply for RSA if her average earnings over four consecutive months did not exceed 80% of her pre-disability earnings.[3] The same rule applied to benefit continuation: beneficiaries whose average earnings over four consecutive months exceeded

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[3]The calculation of pre-disability earnings is complex. It takes into account earnings during several years before applying for benefits. Previous earnings are adjusted for economy-wide changes in average earnings. Because of this complex calculation and the four-month rule, earnings can exceed the earnings limit in some months without removal from the program.

80% of their pre-disability earnings were removed from the program. Starting January 2008, the earnings limit was lowered: irrespective of prior earnings, new entrants were only allowed to earn up to 80% of the monthly minimum wage while receiving benefits. This effectively meant that new entrants could only work part-time. The decision about the new earnings threshold was made at the end of 2007. The first internal proposal was written in November 2007 and passed on December 23, 2007, becoming effective on January 1, 2008. Hence the legislation was unexpected, making anticipatory effects unlikely. The earnings limit remained unchanged for those already approved for benefits.

To understand the bite of the reform, it is useful to consider the distribution of earnings among RSA beneficiaries prior to taking up benefits. Their average pre-disability earnings were 126% of the monthly minimum wage; 60% earned more than the monthly minimum wage and among those who earned more, the average pre-disability earnings were 169%of the monthly minimum wage. This suggests that the policy change affected a substantial share of potential beneficiaries. Because the earnings limit was 80% of pre-disability earnings before the reform, the change in the earnings limit varied across beneficiaries. This created additional variation across beneficiaries in the bite of the policy which we exploit in our empirical analysis below: those with higher potential earnings were more impacted by the reform than those with pre-disability earnings close to the monthly minimum wage.

Due to declining benefit generosity and increased stringency of health requirements (Duman and Scharle, 2011), the inflow into all types disability programs in Hungary had been continuously declining since the early 2000s. This has been also the case for the RSA program where the monthly inflow declined by a factor of five between 2003 and 2007. This downward trend came to an end in 2008 when the inflow stabilized (Appendix Figure A1).

4   Data and Empirical Framework

We use administrative panel data that brings together information on earnings, occupations, benefit receipt, healthcare spending, and other domains for half of the Hungarian population over years 2003–2017. The data is based on a random 50% sample (for privacy reasons) of the population aged 5–74 in 2003 who are followed until 2017. Since our focus is on the working age population, we restrict the sample to individuals aged 20-60 in 2007.[4]

In addition to employment status, wages, and working hours, we can observe disability benefit take-up (regular social assistance, disability pension, and other types of disability benefits), unemployment insurance, and other social program (e.g., maternity leave) participation. We use monthly data, which allows us to precisely identify the timing of benefit

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[4]For a detailed introduction to the data, see Sebők (2019).

take-up. The annual microregion level unemployment data are from the T-STAR database.

To study how the reform impacted the selection of beneficiaries into the RSA program and their labor supply conditional on participation, we compare beneficiaries who enter in 2007, the year before the reform ("old entrants") and beneficiaries who enter in 2008, the year after the reform ("new entrants").[5] We follow these two groups of beneficiaries for four years (48 months) before and three years (36 months) after they enter disability insurance.

We start our empirical analysis by comparing selection into the RSA program between old and new entrants. In particular, we compare program inflow, observed characteristics of entrants and their labor market outcomes in the years before entry. This should give us a sense of the overall selection effect due to the reform. To systematically examine possible compositional changes, we also estimate the change in the distribution of the predicted propensity to take up benefits. To calculate propensity scores, we estimate a logit regression of program entry on indicators for age categories and gender, as well as employment and earnings history preceding program entry on pre-reform data from 2005.

Next, we compare labor market outcomes of old and new entrants after disability entry. To interpret these differences as labor supply effects of the change in the earnings limit we have to control for the selection effects. We apply propensity score reweighting to control for the compositional differences between "old entrants" and "new entrants". Specifically, we estimate the propensity score of RSA entry in 2008 versus 2007 in a logit model controlling for gender, age category, microregion, best job in the pre-disability period (based on broad occupational categories), the number of months spent in employment, the number of months with at least one day on sick leave, and cumulative earnings relative to the minimum wage in the second and third year (months -36 to -13) prior to entering the RSA. We then construct inverse probability weights based on the predicted propensity score.

A potential concern about our identification strategy is the role of aggregate labor market trends and, in particular, the onset of the Great Recession in 2008/2009. We apply the following strategies to confront this concern. First, we note that main impact of the recession on the Hungarian labor market occurred in 2009. This is reflected in the unemployment rate, which only started to increase dramatically at the end of 2008 (Appendix Figure A2). The inflow into RSA in the treatment and control groups should thus not be affected by the recession.[6] But one may still be concerned that labor market outcomes after entry into RSA are affected by the economic downturn, which would imply different time patterns for old and new entrants. Our second strategy exploits large regional variation in the increase

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[5]Program entry is defined based on the original date of application for RSA. Benefits are dated back to the application date.

[6]Prior work has suggested that recessions push more individuals into DI (Autor and Duggan, 2003; Maestas, Mullen and Strand, 2015). We find little evidence of such an effect.

of the unemployment rate during the recession. This variation allows us to test whether the magnitude of the economic shock is related to inflow or selection into RSA, or to labor market outcomes after RSA entry. We find that there is no meaningful association between the size of the local economic shock and selection into RSA or labor market outcomes after program entry (Appendix Figure A3). Finally, we also examine outcomes of entrants around placebo reform years and entrants into the Work Accident Allowance, another disability program which was not subject to a change in the earnings limit. All of these analyses suggest that the effects of the recession are unlikely to confound our estimates of the impact of the decrease in the RSA earnings limit on selection into the program and labor supply once in the program.

5 Results

5.1 Selection and Benefit Take-Up

Following our conceptual framework in Section 2, we start by analyzing how selection into regular social assistance (RSA) receipt changes with the reform. The framework predicts two sources of selection effects due to the change in the earnings limit. First, the lower cutoff type $\bar{\theta}$ should lead to a drop in program take-up. Second, due to the change in the average type who takes up benefits, the composition of observable characteristics of beneficiaries might change. Appendix Figure A1 plotting the monthly inflow into the RSA program does not provide evidence of a drop in program entry after the reform date in January 2008. In fact, the figure shows that in 2008 program inflow stabilizes after a long period of decline.

The kernel density functions of the propensity scores for program entry, predicted for each year using the 2005, pre-reform relationship between observable characteristics, labor market history, and benefit take up, are almost identical (Figure 1). This also indicates that that RSA entrants remain relatively similar in terms of observable characteristics over time. Aggregate data from the annual reports of the National Rehabilitation and Social Office show that the ratio of accepted/rejected applications for all DI programs was similar in 2007 and 2008 (around 55%), suggesting that the stringency of the assessment process remained unchanged.

To understand possible differences in particular attributes, we compare the observed characteristics of "old entrants" (beneficiaries who enter RSA during 2007, the year before the reform) and "new entrants" (beneficiaries who enter RSA during 2008, the year after the reform) in Table 1. We focus on differences in entrant characteristics three years before benefit take-up, because earnings decline rapidly in the year before entry due to deteriorat-

10

ing health and some restrictions embedded in the design of eligibility criteria further reduce labor supply immediately prior to program entry. It appears that the new and old entrants are similar along many dimensions, including age, occupation, and geographic location. But three characteristics show statistically significant differences: gender, employment and average wage. New entrants are 3 percentage points more likely to be male, 2 percentage points (3%) less likely to have been working three years prior to entry and earned 8% less on average (conditional on working). In particular, differences in labor supply prior to program entry deserve some attention to understand selection into the program.

Appendix Figure A4 provides more detail on the evolution of labor market outcomes by year of entry, including share working and conditional on working, hours worked, earnings relative to the monthly minimum wage, and share with earnings above 80% of the monthly minimum wage from four years before benefit take up to three years after. Looking at the period before entering RSA, the results suggest that old entrants were slightly more attached to the labor market. New entrants were 3 percentage points (4%) less likely to work and conditional on working earned 8% less on average pre-entry than old entrants. As a proxy for health status, we show in Panel (a) of Figure 2 that there is no difference between old and new entrants in sick leave use before taking up disability benefits.

Selection could also be driven by benefit persistence. Especially, if there is uncertainty about changes in eligibility rules after the reform, new entrants might be more likely to leave the program after they learn about the restrictions from the new earnings limit. Panel (b) of Figure 2 suggests that program participation is as persistent for new entrants as for old entrants, especially in the first two years after entry. Approximately 94% of initial beneficiaries still receive RSA two years after program entry in both groups followed by a slight divergence in the third year. This result suggests that the lower earnings threshold did not lead to significantly increased program exits.

These findings suggest that the earnings limit had a moderate impact on selection and benefit take-up. Next, we turn to labor supply responses conditional on program entry.

5.2 Labor Supply After Program Entry

Our conceptual framework in Section 2 predicts that some DI benefit recipients restrict their labor supply to remain eligible for benefits. At the same time, it also predicts that lowering the earnings threshold has an impact on who selects into taking up benefits. In particular, we expect a lower earnings limit to result in increased selection toward lower-productivity or less-employable individuals. Our empirical findings above suggest that the selection effect is relatively small. Nevertheless we apply propensity score reweighting as

11

explained in Section 4. Figure 3 displays reweighted monthly sample means of the outcome variables around benefit entry for "old entrants" (in blue) and "new entrants" (in red) to show how labor market outcomes of beneficiaries change with the reform. In this figure, we also report average outcomes in the pre-entry and post-entry periods of old and new entrants. When computing these averages we leave out the last year before entry because of the sharp decline in work during the last pre-entry year as beneficiary health declines and also due to some incentives to reduce work to qualify for benefits and the first year after entry to examine longer-term differences beyond the first post-entry year where short-term adjustment responses may play a role in determining labor supply.

Panel (a) of Figure 3 shows that less than 20% of entrants work right after entering RSA. Subsequently, the employment rate increases a bit more quickly for old entrants to about 30% during the first year, but it equalizes again by the second year of benefit receipt and the share of employment does not significantly differ thereafter. Differences in intensive margin labor supply are more substantial: while earnings and working hours of old entrants and new entrants move closely together in the pre-disability period, these outcomes diverge after program entry. Panel (b) shows that, conditional on working, new entrants work on average 29 hours per week during the second and third year of benefit receipt, compared to the 31 hours per week of old entrants. New entrants earn on average 80%, whereas old entrants earn 95% of the monthly minimum wage in the post-entry period, while the pre-entry difference is negligible (Panel (c)). There is also a significant gap in the share of beneficiaries with earnings above 80% of the monthly minimum wage (Panel (d)): while 61% of old entrants earn above 80% of the minimum wage in the post-entry period, only 38% of new entrants do. Because the earnings limit applied to the average of earnings over six consecutive months, some new entrants can still earn above this limit in some months.

The patterns of the evolution of labor supply measures after RSA displayed in Figure 3 measured on a reweighted sample to adjust for selection are very similar to those measured on the unweighted sample in Appendix Figure A4. This suggests that observable differences between old and new entrants prior to taking up benefits (i.e. the change in selection) do not explain the decrease in labor supply after taking up benefits.

To further demonstrate the labor supply impact of the reform, we display differences between old entrants and new entrants for all outcome variables separately for the pre- and post-entry periods around the 2008 reform and two placebo reform dates, 2007 and 2009 in Figure 4 and Table A1. These are estimated from a simple regression of the outcome variable on an indicator for being a new entrant, weighting by the inverse of the propensity score for program entry to adjust for potential selection. In these regressions, estimated separately for the pre-entry and the post-entry periods, we leave out the last year before

and the first year after entry, to abstract away from the decline in work just before benefit take-up and short-term adjustment after take-up. The middle panels suggest that for the actual reform (2008) period, pre-entry differences between old and new entrants are small. In contrast, post-entry intensive margin labor supply measures are significantly lower among new entrants, in line with the negative impact of the lower earnings limit on labor supply. In comparison to old entrants, new entrants work 2.4 hours (7%) less, their earnings relative to the minimum wage are 15 percentage points (16%) lower and they are 23 percentage points less likely to have earnings above 80% of the minimum wage after RSA entry.

To further support our results, we define placebo reform dates in non-reform years (2007 and 2009) and "placebo old entrants" and "placebo new entrants" taking up RSA in the years around the placebo reform dates. The left and right panels suggest that around placebo reforms (2007 and 2009), the difference between the outcomes of old entrants and new entrants is small both in the pre-entry and the post-entry period. While some outcomes in placebo reform years show differences, they are much smaller in magnitude than those in the actual reform period. These results confirm that the main differences in labor supply outcomes can be explained by the change in the earnings limit rather than by time trends or other confounding factors.

Figure 5 shows the post entry earnings distributions in 2009 of old and new entrants. The histograms provide further evidence that beneficiaries are indeed responding to the new earnings limit at 80% of the minimum wage by setting their earnings exactly at the threshold. While the distribution of monthly wages among old entrants is smooth through the threshold (Panel (a)), there is visible bunching among new entrants, as 5% of them earn within HUF 5,000 ($15) of the earnings limit (Panel (b)).

Panel (c) of Figure 2 examines the mortality of beneficiaries. It shows that over a three-year horizon after program entry, old and new beneficiaries have the same cumulative mortality (2%). Over a three year time horizon, lower income does not worsen beneficiary health sufficiently to result in higher mortality rates. While this is an imperfect measure of health, the result suggests that the change in the earnings limit primarily impacted beneficiaries through changes in labor supply rather than through worsening health.

In Figure 6, we examine heterogeneity by reform exposure, comparing beneficiaries for whom the decrease in the earnings limit was likely binding and those for whom it was likely not binding, because their earnings were too low to be affected by the new limit. Panel (a) shows earnings relative to the minimum wage for RSA beneficiaries who earned below the minimum wage three years before taking up RSA benefits. Among this lower-earning group, we find that the small pre-RSA-entry earnings gap of 6 percentage points between old and new entrants persists post-entry at about 9 percentage points. Panel (b) shows the

13

same comparison for beneficiaries who earned above the minimum wage three years before taking up RSA benefits. For this group, there is a sharp increase in the earnings gap relative to the minimum wage between old and new entrants from 4 percentage points pre-entry to 21 percentage points after taking up benefits. This confirms our prediction that workers with higher earnings potential reduce their labor supply in order to remain eligible for the disability benefit. It is also in line with our main results being driven by the change in the earnings limit rather than by other factors, such as the change in the macroeconomic environment.

5.3   Robustness

A potential threat to the interpretation of our results would be a differential impact of the recession on different cohorts of entrants. The placebo analysis and the heterogeneity results above suggest that labor supply changes arose in the reform year and among the affected group of beneficiaries, suggesting that they were driven by the decrease in the earnings limit, rather than by the recession. In addition, we present several pieces of evidence which suggest that the recession is unlikely to be the main driver of our results.

In Hungary, the unemployment rate only started increasing rapidly in 2009 (Appendix Figure A2). We exploit strong regional variation in this increase to test for responses in RSA entry and labor supply of entrants to macroeconomic conditions. Appendix Figure A3 plots changes in the unemployment rate at the beginning of the recession relative to changes RSA inflow rates across microregions. The absence of a clear relationship between the two variables indicates that the severity of the recession did not lead to a change in RSA inflow.

To absorb macroeconomic fluctuations in outcomes, we compare labor market outcomes of new and old entrants relative to their national or microregion counterparts. Appendix Figure A5 shows labor market outcomes before and after RSA entry relative to their local/national average in the given month. The dynamics of relative labor market outcomes in this figure are similar to absolute outcomes in Appendix Figure A4.

Next, we present results for two different subgroups: RSA entrants living in microregions with low (below-median) versus high (above-median) increase in the unemployment rate. Appendix Table A2 shows that reform responses are very similar for areas more and less impacted by the recession. Taken together, these results suggest that the recession is unlikely to drive our main results.

In addition to the placebo analysis discussed above (Figure 4 and Table A1), in a second placebo analysis, we examine an alternative health related benefit, the Work Accident Allowance (WAA), which was not affected by the reform. This program is available to indi-

14

viduals who suffer health impairments of more than 13% resulting from workplace accidents or occupational diseases. Importantly, the accident allowance has no earnings limit, reflecting that the health impairment does not necessary imply a loss in working capacity. Otherwise, the award procedure for WAA is similar to RSA and other disability benefits. Labor market outcomes for WAA entrants in the reform years are shown in Appendix Figures A8. Similar to the other placebo analyses, these figures show no difference in any outcomes between the two groups.

6   Discussion

Disability insurance earnings limits can serve as screening mechanisms, ensuring that disability benefits go to those who truly cannot work. At the same time, they may distort labor supply among workers with significant remaining working capacity. In this paper, we studied take-up and labor supply responses to changing earnings limits. We showed conceptually that with the choice of the earnings limit, policy makers must trade off selection and labor supply effects.

Empirically, we exploited a reform that lowered the earnings limit in a disability insurance program for the moderately disabled in Hungary. Since the lower earnings limit applied to all new disability entrants but remained unchanged for those already receiving benefits, we compared outcomes of entrants in the year before and after this cutoff date to evaluate the reform effects. Our empirical analysis provided three main findings. First, we documented that program entry and persistence in the program were not affected by the change in the earnings limit. Second, we found that the change in the composition of beneficiaries in response to the policy was small as individuals with slightly lower work capacity selected into the program after the reform date. Third, we showed that intensive margin labor supply among beneficiaries entering after the reform date decreased significantly relative to beneficiaries entering before, leading to fewer hours of work and lower earnings. In particular, the reform resulted in a sharp reduction of labor supply among previously higher-earning beneficiaries, who presumably have higher capacity to generate labor income and whose labor supply responded to fulfill the stricter benefit eligibility requirement.

Overall, our results suggest that decreasing the earnings limit led to only a moderate improvement in screening efficiency. This evidence is consistent with a scenario where the earnings limit and benefit level before the reform were already sufficiently low to deter potential entrants who are well-positioned to find higher-paying jobs in the labor market. At the same time, the reform substantially distorted the labor supply of program participants. Viewed through the lens of our model, the empirical findings suggest that the overall impact

of the reform on efficiency and welfare was negative. The reform failed to yield sizable cost savings from benefit expenditures for the government, but left moderately disabled individuals with lower earnings, resulting in lower tax revenues in turn. At the given benefit level, a higher earnings limit would therefore be optimal.

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Zaresani, Arezou, and Miguel Olivo-Villabrille. 2022. "Return-to-Work Policies' Clawback Regime and Labor Supply in Disability Insurance Programs." *Labour Economics*, 78: 102215.

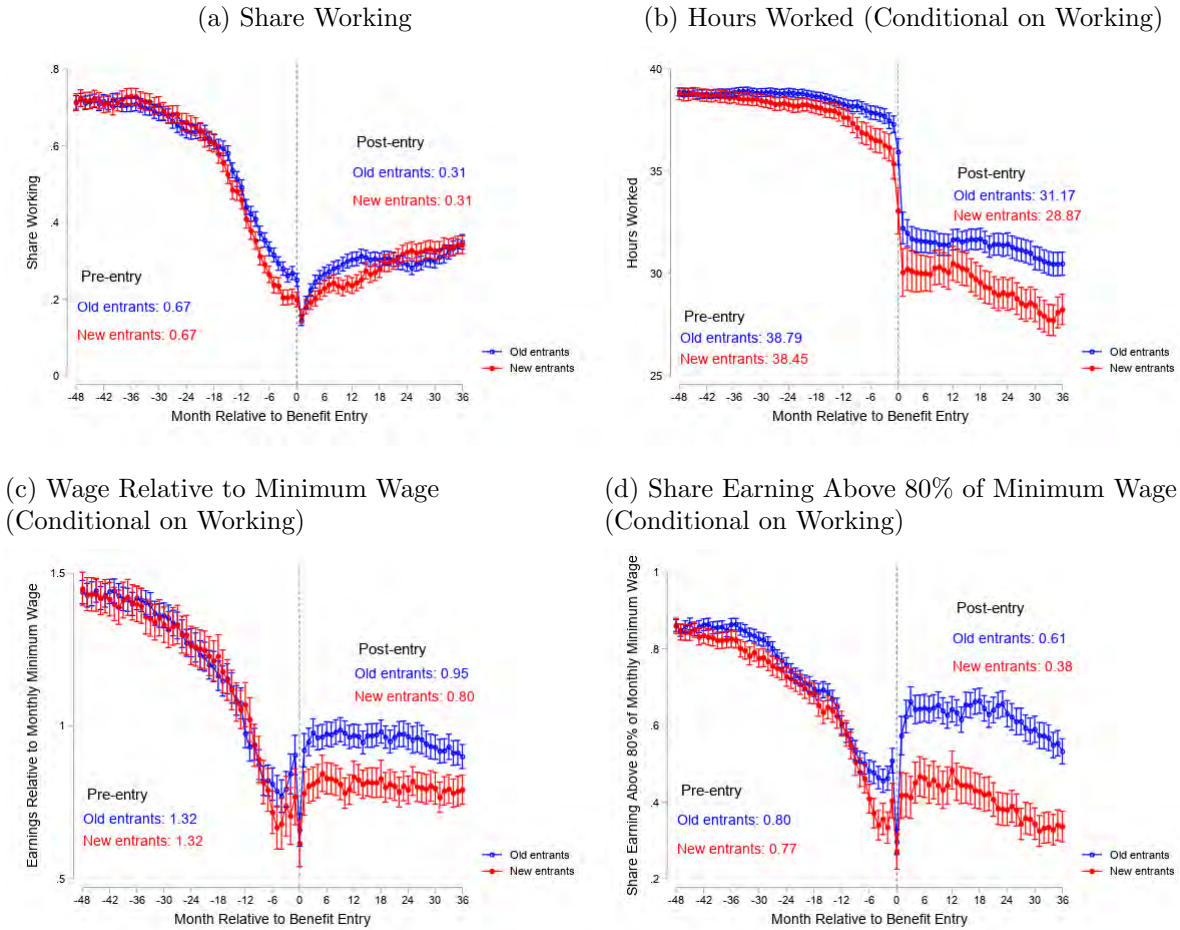Figure 1: Kernel Density of Propensity Scores of Entering RSA
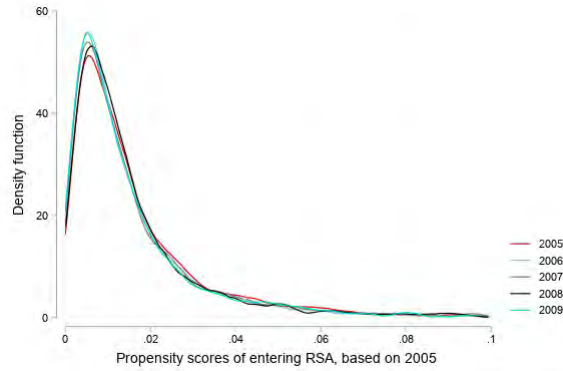
Notes: Figure shows the kernel densities of the propensity score for entering Regular Social Assistance (RSA). The propensity scores are estimated using a logit model on 2005 data. We estimate a logit model, regressing an indicator for entering RSA in month t on indicators for gender, age category (below 31, 31-40, 41-50, above 50 years), microregion, best job in the pre-disability period (based on broad occupational categories), number of months spent in employment, number of months with at least one day on sick leave, and cumulative earnings relative to the minimum wage. The sample consists of individuals aged 20-60 years who had not received any disability benefits in month $t - 1$.

Figure 2: Health and Benefit Persistence

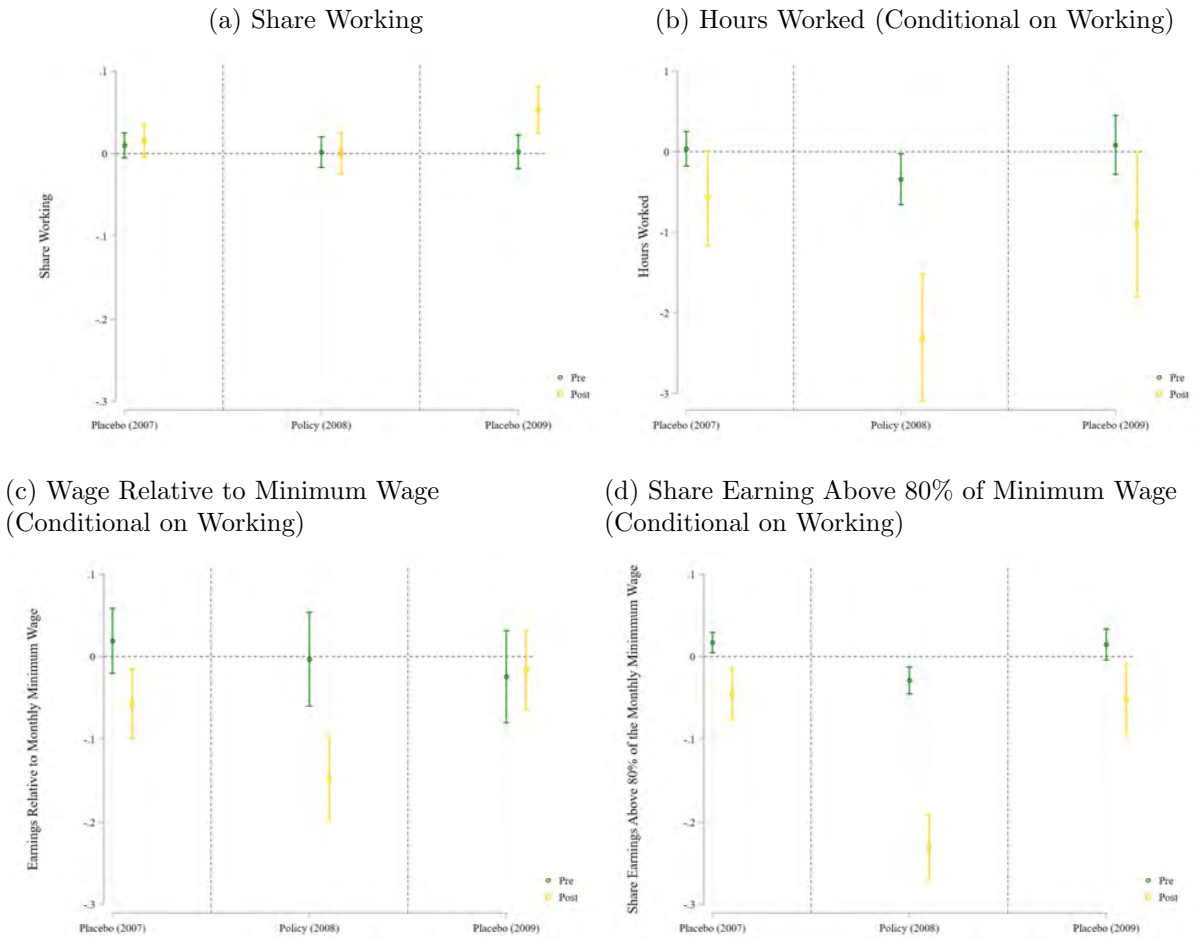(a) Sick Leave Use

(b) Benefit Persistence
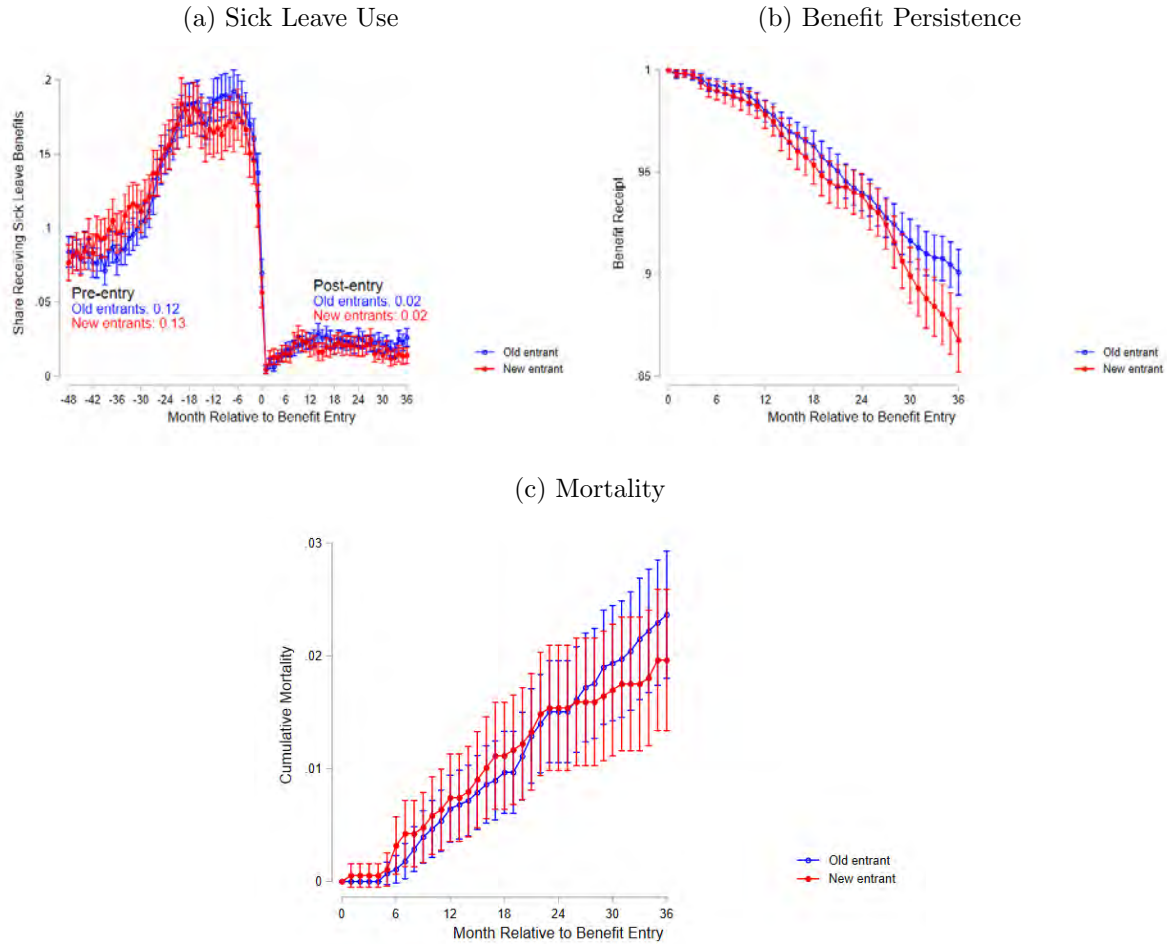
(c) Mortality

Notes: Figure shows sick leave in Panel (a), benefit persistence in Panel (b), and cumulative mortality in Panel (c) for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). In Panel (a), the pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering RSA.

Figure 3: Labor Market Outcomes of Regular Social Assistance Entrants

<table>
<tr><td>(a) Share Working</td><td>(b) Hours Worked (Conditional on Working)</td></tr>
</table>

(c) Wage Relative to Minimum Wage
(Conditional on Working)

(d) Share Earning Above 80% of Minimum Wage
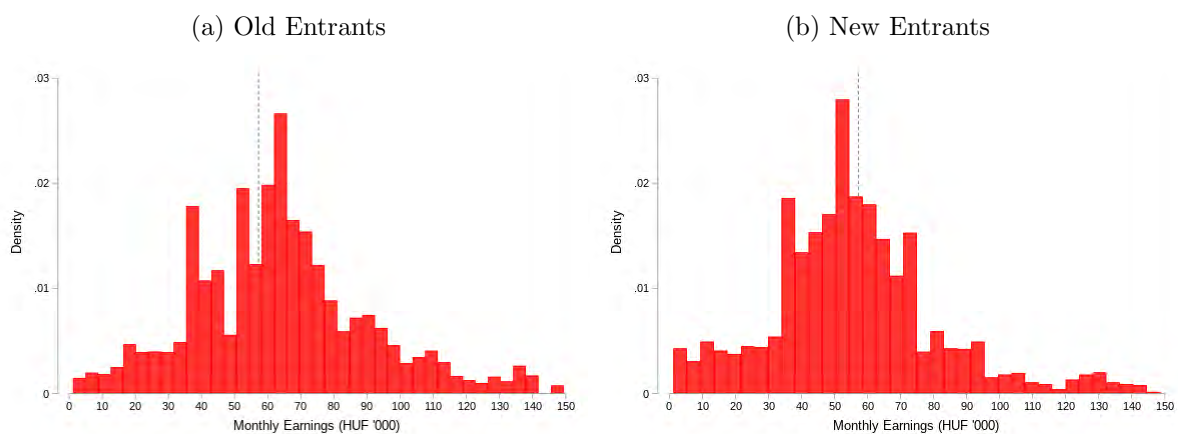(Conditional on Working)

Notes: Figure shows labor market outcomes for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). The pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering RSA. The sample is reweighted by the inverse of the propensity score of selection into the "treatment" group (i.e., being a new entrant). For details on the specification of the propensity score used for reweighting see Section 4.

Figure 4: Differences in Labor Market Outcomes Between Old Entrants and New Entrants in the Reform (2008) Period and Placebo Reforms (2007 and 2009)

(a) Share Working

(b) Hours Worked (Conditional on Working)

(c) Wage Relative to Minimum Wage (Conditional on Working)

(d) Share Earning Above 80% of Minimum Wage (Conditional on Working)

Notes: Figure shows differences in labor market outcomes between individuals who enter Regular Social Assistance (RSA) the year before and after the reform (2008) and placebo reforms (2007 and 2009). The dots show the differences between "new entrants" and "old entrants" in the pre-entry (in green) and post-entry (in yellow) periods, respectively. The differences are estimated from a simple regression of the outcome variable on an indicator for being a new entrant, estimated separately for the pre-entry and post-entry periods and weighted by the inverse of the propensity score for program entry to adjust for potential selection. "New entrants" are individuals who enter RSA between January 1 and December 31 of the year of the (placebo) reform. "Old entrants" are individuals who enter RSA between January 1 and December 31 of the year before the (placebo) reform. The pre-entry period is defined as years four to one year (months -48 to -13) before entering RSA and the post-entry period is defined as years one to three (months 13 to 36) after entering RSA. Standard errors are clustered at the individual level. For details on the specification of the propensity score used for reweighting see Section 4.

Figure 5: Wage Distribution in 2009 (Conditional on Working)

(a) Old Entrants   (b) New Entrants

Notes: Figure shows the distribution of monthly wages observed in 2009. Panel (a) shows wages for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants") and panel (b) shows wages for individuals who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants"). The dashed line shows the level of the minimum wage.

Figure 6: Heterogeneity By Pre-Disability Earnings

(a) Pre-Disability Earnings Below Monthly Minimum Wage

(b) Pre-Disability Earnings Above Monthly Minimum Wage
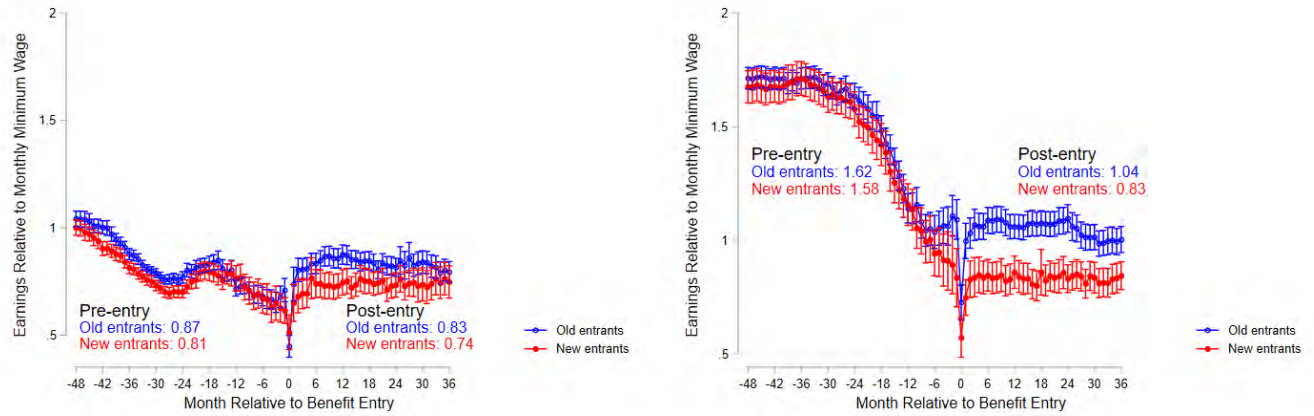
Notes: Figure shows earnings relative to the minimum wage for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). Panel (a) shows individuals whose average pre-disability wage (three years before entering RSA) was below the minimum wage. Panel (b) shows individuals whose average pre-disability wage (three years before entering RSA) was higher than the minimum wage. The pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering RSA.
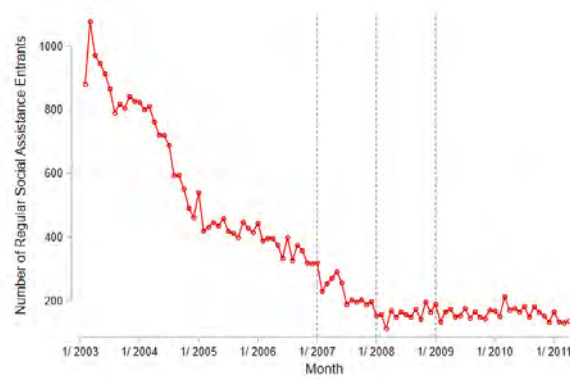
Table 1: Regular Social Assistance Entrants Before and After the Reform

	New Entrants	Old Entrants	p-value
Gender			
Male	0.414	0.383	0.034
Age			
35-44 years	0.186	0.195	0.429
45-55 years	0.734	0.741	0.597
Best job before disability			
Managers	0.050	0.040	0.113
Professionals	0.019	0.020	0.718
Technicians	0.082	0.087	0.584
Office and customer service	0.038	0.051	0.042
Commercial and services	0.166	0.157	0.428
Agriculture	0.038	0.045	0.232
Industry and construction	0.277	0.267	0.504
Machine operators and drivers	0.114	0.114	0.942
Elementary occupations	0.215	0.216	0.992
Region			
Budapest	0.064	0.056	0.293
Central Hungary	0.073	0.084	0.201
Central Transdanubia	0.099	0.099	0.999
Western Transdanubia	0.060	0.061	0.907
Southern Transdanubia	0.158	0.148	0.388
Northern Hungary	0.128	0.141	0.208
Northern Great Plain	0.209	0.205	0.761
Southern Great Plain	0.205	0.200	0.711
Working 3 years earlier	0.697	0.715	0.053
Earnings relative to monthly	1.254	1.364	0.001
minimum wage 3 years earlier			
(Conditional on Working)			
Number of observations	1,885	2,791	

Notes: Table shows summary statistics for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants") and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants"). The table contains disability beneficiaries aged 20-60 years. Occupation categories refer to the Hungarian standard classification of occupations (HCSO-08/FEOR-08). The number of persons displays observations in the database that includes about half of the disabled population.

Online Appendix

Appendix Figure A1: Number of Regular Social Assistance Entrants

Notes: Figure shows the number of beneficiaries entering Regular Social Assistance (RSA) by month between January 2011 and April 2011. The vertical lines mark our main sample period. Entrants between January and December 2007 are considered "old entrants" and entrants between January and December 2008 are considered "new entrants" in our analysis.

Appendix Figure A2: Seasonally-Adjusted Unemployment Rate
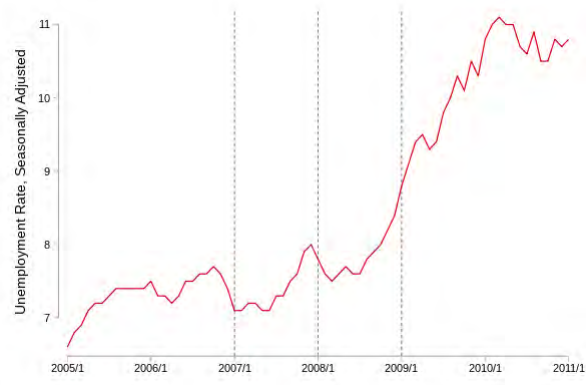
Notes: Figure shows the seasonally adjusted unemployment rate of the 15-64 year old population in Hungary from 2005 to 2011 in percent from the Central Statistical Office's Labour Force Survey.

Appendix Figure A3: Change in Regular Social Assistance Entry Rate vs Change in the Unemployment Rate

(a) 2007-2008
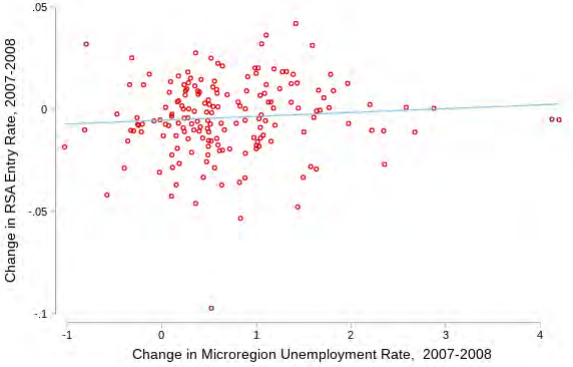
(b) 2007-2009

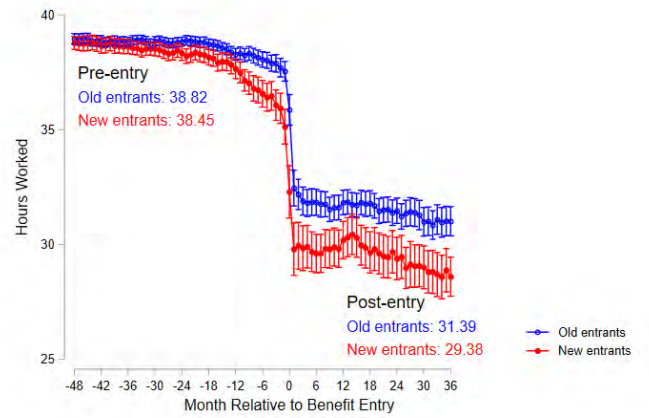**Notes:** Figure shows the relationship between the change in Regular Social Assistance (RSA) entry rates and the change in unemployment rates at the microregion level. Panel (a) shows the changes between 2007 and 2008 and Panel (b) shows the changes between 2008 and 2009 in percentage points.The annual microregion level unemployment data are from the T-STAR database of the Central Statistical Office.

Appendix Figure A4: Labor Market Outcomes of Regular Social Assistance Entrants
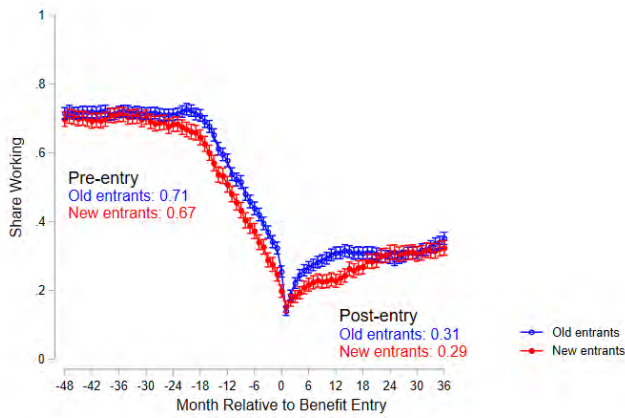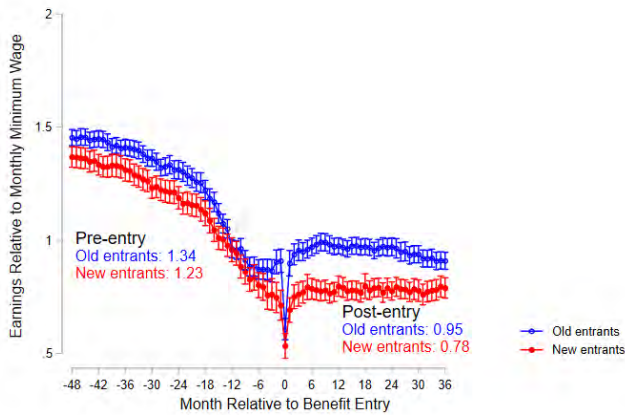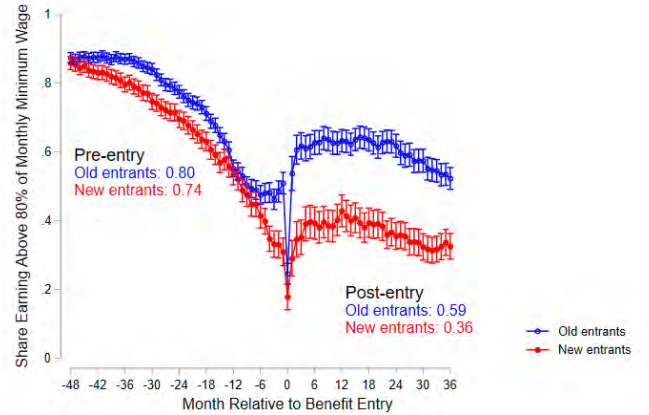
(a) Share Working

(b) Hours Worked (Conditional on Working)

(c) Earnings Relative to Monthly Minimum Wage (Conditional on Working)

(d) Share Earning Above 80% of Monthly Minimum Wage (Conditional on Working)

Notes: Figure shows labor market outcomes for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). The pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering RSA.

Appendix Figure A5: Labor Market Outcomes of Regular Social Assistance Entrants Relative to National and Microregion Averages

Share Working

(a) Relative to National Average (b) Relative to Microregion Average

Earnings

(c) Relative to National Average (d) Relative to Microregion Average

Earnings in Unskilled Jobs

(e) Relative to National Average (f) Relative to Microregion Average
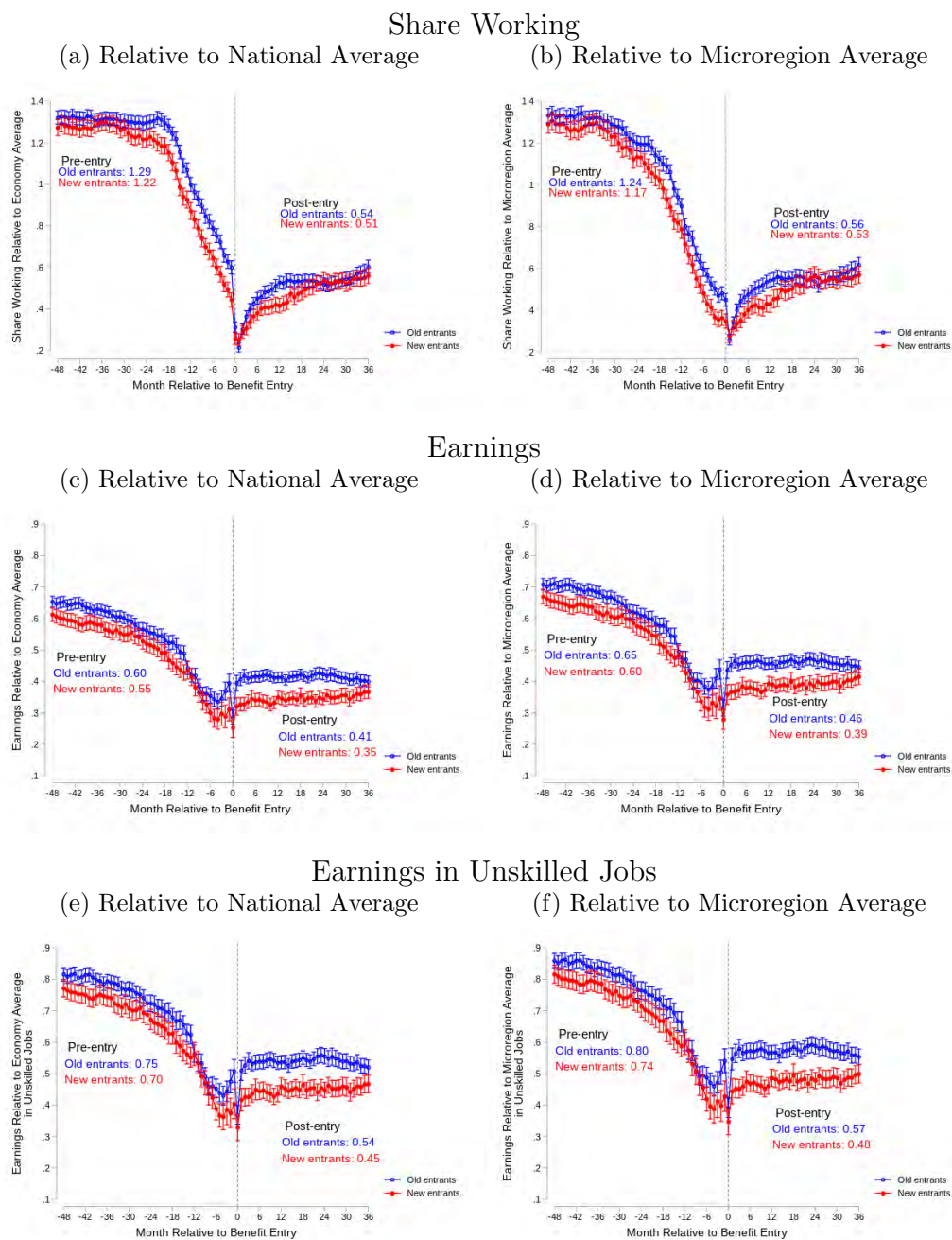
Notes: Figure shows labor market outcomes relative to national and microregion averages for individuals who enter Regular Social Assistance (RSA) the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). Earnings are conditional of being employed. The pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering RSA.

Appendix Figure A6: Placebo Analyses: Hours Worked

(a) 2006

(b) 2007

(c) 2009
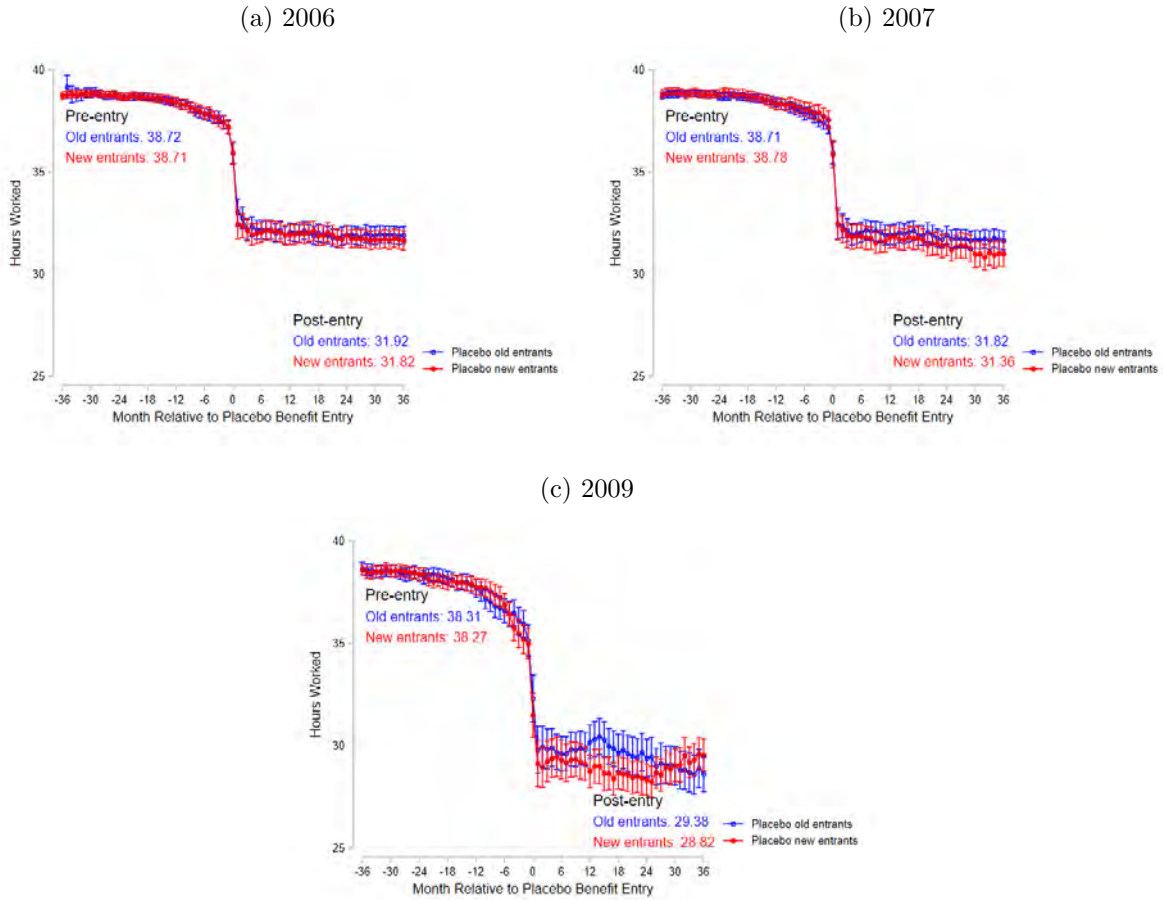
Notes: Figure shows hours worked for individuals who enter Regular Social Assistance (RSA) the year before and after three placebo reforms in 2006, 2007 and 2009. In each of the panels "old entrants" in blue are individuals who enter RSA between January 1 and December 31 of the year before the placebo reform year (2005, 2006, and 2008) and "new entrants" in red are individuals who enter RSA between January 1 and December 31 of the placebo reform year (2006, 2007, and 2009). The pre-entry labels show the mean of hours worked outcome during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of hours worked during the period between one and three years (months 13 to 36) after entering RSA.

Appendix Figure A7: Placebo Analyses: Earnings Relative to Monthly Minimum Wage

(a) 2006

(b) 2007

(c) 2009
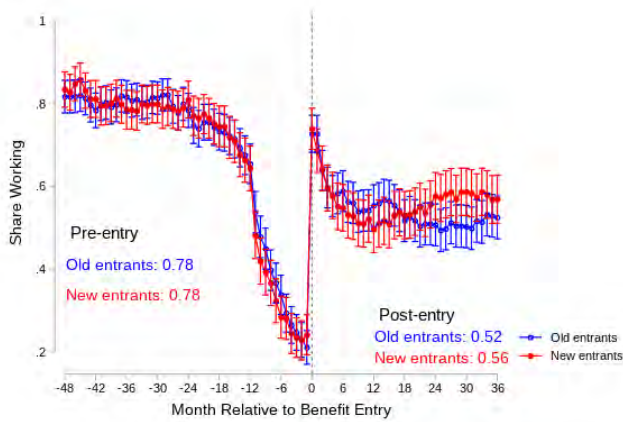

Notes: Figure shows earnings relative to the monthly minimum wage for individuals who enter Regular Social Assistance (RSA) the year before and after three placebo reforms in 2006, 2007 and 2009. In each of the panels "old entrants" in blue are individuals who enter RSA between January 1 and December 31 of the year before the placebo reform year (2005, 2006, and 2008) and "new entrants" in red are individuals who enter RSA between January 1 and December 31 of the placebo reform year (2006, 2007, and 2009). The pre-entry labels show the mean of earnings relative to the monthly minimum wage during the period between four years to one year (months -48 to -13) before entering RSA and the post-entry labels show the mean of earnings relative to the monthly minimum wage during the period between one and three years (months 13 to 36) after entering RSA.
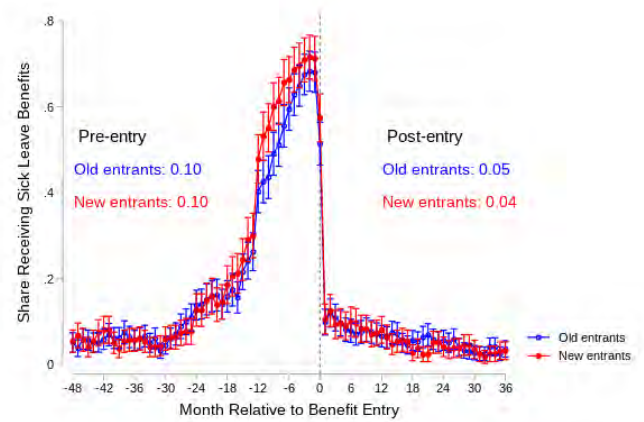
Appendix Figure A8: Placebo Analyses: Accident Allowance

(a) Share Working

(b) Sick Leave

(c) Earnings Relative to Monthly Minimum Wage
(Conditional on Working)
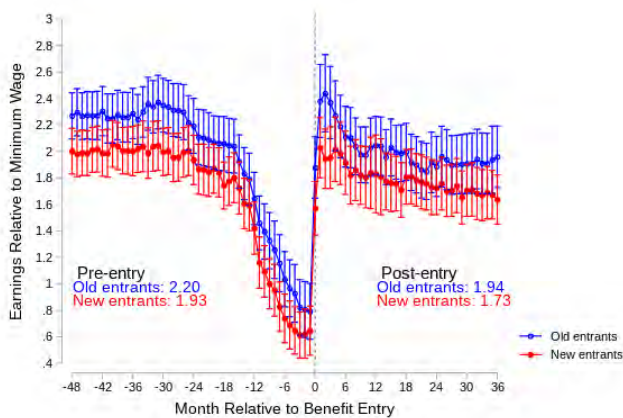
(d) Share Earning Above 80% of Monthly Minimum Wage
(Conditional on Working)
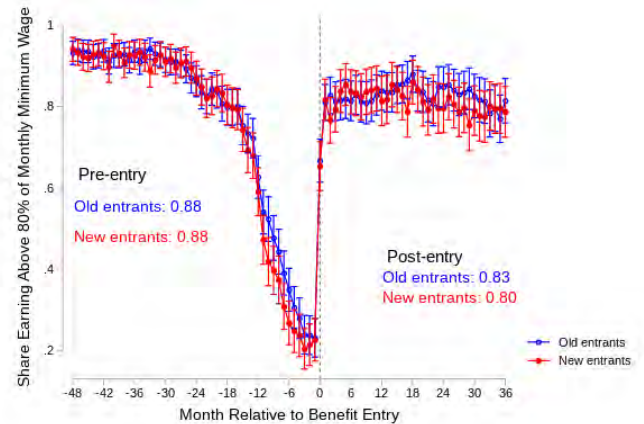
Notes: Figure shows labor market outcomes for individuals who enter Accident Allowance the year before the reform, between January 1 and December 31, 2007 ("old entrants" in blue) and those who enter the year after the reform, between January 1 and December 31, 2008 ("new entrants" in red). The pre-entry labels show the mean of each outcome during the period between four years to one year (months -48 to -13) before entering Accident Allowance and the post-entry labels show the mean of each outcome during the period between one and three years (months 13 to 36) after entering Accident Allowance.

8

Appendix Table A1: Differences in Labor Market Outcomes Between Old Entrants and New Entrants in the Reform (2008) Period and Placebo Reform Periods (2007 and 2009)

	Working					
	(1)	(2)	(3)	(4)	(5)	(6)
	2007		2008		2009	
	Pre	Post	Pre	Post	Pre	Post
Difference	0.0100	0.0149	0.0017	0.0009	0.00227	0.0538***
	(0.0077)	(0.0102)	(0.0095)	(0.0127)	(0.0104)	(0.0143)
Old Entrants	0.672	0.296	0.671	0.312	0.658	0.299
Observations	205,875	152,380	151,133	99,100	119,534	67,693

	Hours Worked (Conditional on Working)					
	2007		2008		2009	
	Pre	Post	Pre	Post	Pre	Post
Difference	0.0346	-0.577*	-0.344**	-2.308***	0.0842	-0.907**
	(0.110)	(0.298)	(0.162)	(0.404)	(0.187)	(0.457)
Old Entrants	38.76	31.74	38.79	31.17	38.32	28.67
Observations	145,775	44,032	103,658	28,104	79,249	19,546

	Earnings Relative to Monthly Minimum Wage (Conditional on Working)					
	2007		2008		2009	
	Pre	Post	Pre	Post	Pre	Post
Difference	0.0191	-0.0569***	-0.0031	-0.148***	-0.0244	-0.0164
	(0.0201)	(0.0213)	(0.0290)	(0.0259)	(0.0285)	(0.0246)
Old Entrants	1.320	1.001	1.320	0.949	1.296	0.785
Observations	152,874	47,584	110,744	31,341	86,379	22,471

	Earnings Above 80% of the Monthly Minimum Wage (Conditional on Working)					
	2007		2008		2009	
	Pre	Post	Pre	Post	Pre	Post
Difference	0.0170***	-0.0450***	-0.0290***	-0.231***	0.0147	-0.0512**
	(0.0063)	(0.0161)	(0.0083)	(0.0206)	(0.0096)	(0.0219)
Old Entrants	0.785	0.656	0.804	0.612	0.760	0.367
Observations	152,874	47,584	110,744	31,341	86,379	22,471

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

Notes: Table shows differences in labor market outcomes between individuals who enter Regular Social Assistance (RSA) the year before and after the reform (2008 in columns (3) and (4)) and placebo reforms (2007 and 2009 in columns (1), (2), (5), and (6)). The first row reports the difference between "new entrants" and "old entrants" in the pre-entry and post-entry period, respectively. The differences are estimated from a simple regression of the outcome variable on an indicator for being a new entrant, estimated separately for the pre-entry and post entry period, and weighting by the inverse of the propensity score for program entry to adjust for potential selection. "New entrants" are individuals who enter RSA between January 1 and December 31 of the year of the (placebo) reform. "Old entrants" are individuals who enter RSA between January 1 and December 31 of the year before the (placebo) reform. The pre-entry columns are defined as years four to one year (months -48 to -13) before entering RSA and the post-entry columns are defined as years one to three (months 13 to 36) after entering RSA. In each column, the third row reports the mean outcome for "old entrants". Standard errors (in parentheses) are clustered at the individual level. For details on the specification of the propensity score used for reweighting see Section 4.

Appendix Table A2: Labor Market Outcomes of Regular Social Assistance Entrants with Below and Above Median Change in Microregion Unemployment Rate between 2007-2009

	Working					
	(1)	(2)	(3)	(4)	(5)	(6)
	High Unemployment		Low Unemployment		Whole Sample	
	Pre	Post	Pre	Post	Pre	Post
Difference	-0.0373***	-0.0116	-0.0317**	-0.0138	-0.0314***	-0.0179
	(0.0130)	(0.0154)	(0.0138)	(0.0172)	(0.00997)	(0.0115)
Old Entrants	0.651	0.304	0.651	0.302	0.706	0.312
Observations	90,536	59,779	73,858	48,189	168,066	110,397

	Hours Worked (Conditional on Working)					
	High Unemployment		Low Unemployment		Whole Sample	
	Pre	Post	Pre	Post	Pre	Post
Difference	-0.598***	-2.193***	-0.195	-2.815***	-0.360**	-2.056***
	(0.200)	(0.489)	(0.219)	(0.594)	(0.148)	(0.423)
Old Entrants	38.93	31.32	38.66	30.88	38.82	31.39
Observations	57,306	16,060	47,133	13,312	107,070	30,034

	Earnings Relative to Monthly Minimum Wage (Conditional on Working)					
	High Unemployment		Low Unemployment		Whole Sample	
	Pre	Post	Pre	Post	Pre	Post
Difference	-0.0874***	-0.152***	-0.111***	-0.185***	-0.101***	-0.167***
	(0.0305)	(0.0277)	(0.0406)	(0.0409)	(0.0245)	(0.0237)
Old Entrants	1.31	0.92	1.37	0.97	1.34	0.949
Observations	62,320	18,249	52,539	14,972	117,566	33,973

	Earnings Above 80% of the Monthly Minimum Wage (Conditional on Working)					
	High Unemployment		Low Unemployment		Whole Sample	
	Pre	Post	Pre	Post	Pre	Post
Difference	-0.0639***	-0.250***	-0.0452***	-0.227***	-0.0618***	-0.237***
	(0.0109)	(0.0256)	(0.0115)	(0.0283)	(0.00911)	(0.0195)
Old Entrants	0.81	0.62	0.79	0.59	0.806	0.594
Observations	62,320	18,249	52,539	14,972	117,566	33,973

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

Notes: Table shows labor market outcomes for individuals who enter Regular Social Assistance (RSA) the year before and after the reform for the whole sample in columns (5) and (6), for a subsample of persons living in microregions with below median change in the microregion level unemployment rate from 2007 to 2009 (columns (1) and (2)), and above median change in the microregion level unemployment rate (columns (3) and (4)). The average increase in unemployment rate in microregions with low and high change is 4.6 and 13 percentage points, respectively. The first row reports the difference between "old entrants" and "new entrants". "New entrants" are individuals who enter RSA between January 1 and December 31 of 2008. In each column, the third row reports the mean for "old entrants". "Old entrants" are individuals who enter RSA between January 1 and December 31 in 2007. The pre-entry columns are defined over the period between four years to one year (months -48 to -13) before entering RSA and the post-entry columns are defined over the period between one and three years (months 13 to 36) after entering RSA. Standard errors (in parentheses) are clustered at the individual level.

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