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DISCUSSION PAPER SERIES

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Generosity**

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APRIL 2018

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ABSTRACT

Immigrant Responses to Social Insurance Generosity*

Immigrants from low-income source countries tend to be underrepresented in employment and overrepresented in social insurance programs. Based on administrative data from Norway, we examine how these gaps reflect systematic differences in the impacts of social insurance benefits on work incentives. Drawing on a benefit formula reform of the temporary disability insurance program, we identify behavioral employment and earnings responses to changes in benefits, and find that responses are significantly larger for immigrants. Among female immigrant program participants, earnings of the male spouse also drop in response to more generous benefits. We uncover stronger behavioral responses among natives with characteristics similar to those of immigrants.

JEL Classification: H53, J15, J22

Keywords: immigrants, labor supply, social insurance

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1 Introduction

In many European welfare states, immigrants from low-income source countries are overrepresented in social insurance (SI) programs and underrepresented in employment; see, e.g., Bratsberg et al. (2010; 2017), Sarvimäki (2011), Hansen and Lofstrom (2011), Riphahn and Wunder (2013), OECD (2013, Table 3.6), and Schultz-Nielsen (2017). Generous social insurance weakens the economic incentives to search for jobs and take up work. This paper examines whether immigrant-native participation gaps can be attributed to disincentive effects embedded in SI programs.¹ We study the impacts of SI generosity among participants in one of the largest social insurance programs in Norway, the temporary disability insurance (TDI) program. A major benefit formula reform in 2002 generated random-assignment-like variation in benefits across eligible participants, enabling us to identify the causal effects of TDI benefits on transitions to employment and future earnings.

Why would we expect that social insurance generosity impacts immigrants from low-income countries differently from natives? In our analyses, we explore three potential mechanisms. First, immigrants tend to enjoy less consumption gain from employment, due to a combination of relatively low labor earnings prospects and a progressive social insurance benefit schedule. If social insurance claims rise with the replacement ratio due to moral hazard, as indicated by the literature (see, e.g., Krueger and Meyer, 2002; Johansson and Palme, 2002; Røed and Zhang, 2003; Henrekson and Persson, 2004), this would yield higher social insurance take-up (and lower employment) rates among immigrants. Second, non-pecuniary costs of working may be higher for immigrants if they face less attractive employment opportunities and have a higher valuation of non-employment. More valuable time outside paid work relates to family structure and larger households in particular, and also to attachments to a foreign country with lower living expenses. Together with the higher social insurance replacement ratios, this implies that the utility difference between employment and non-employment may be systematically smaller for immigrants than for

¹ This perspective complements existing evidence on employment gaps. Immigrants are more exposed to precarious employment relationships and job loss caused by adverse shocks to the employer (Bratsberg et al., 2018). There is also evidence on economic downturns in general and involuntary job loss in particular, showing that consequences are more adverse for immigrants than for natives, in part because of their poorer general labor market and majority language skills (Røed and Zhang, 2003; Barth et al., 2004; Bratsberg et al., 2010; Dustmann et al., 2010).

natives. Based on a simple theoretical framework – where individuals are allowed to choose freely between employment and social-insurance-supported non-employment in a frictionless labor market – we point out that marginal changes in benefits will affect the realized state only for individuals who initially were on the fence between the alternatives of employment and social insurance. Consequently, we expect the behavioral responses to marginal benefit variations to be heterogeneous, with particularly large effects for individuals who are close to indifference between employment and non-employment.

The third mechanism relates to the value of joint leisure within households and the impact that benefit generosity may have on the labor supply of the spouse of the claimant. Provided that higher benefits raise the total income of the claimant him/herself – also taking any negative labor supply responses into account – we expect the effect on the spouse's labor supply to be negative, both through a direct income effect and through a substitution effect caused by leisure complementarities. If the responses of immigrant SI claimants to changes in benefits exceed those of natives, the cross effects on spouses are likely to be larger as well.

Our choice of the temporary disability insurance program as the foundation for our empirical analysis is motivated by importance as well as feasibility. TDI is by far the largest among the Norwegian programs compensating for temporary income loss, with a caseload more than twice as large as the unemployment insurance program. And even though participants in this program have health impairments that undermine their current work capacity, they are still considered to have a possibility of returning to regular work in the (near) future. The second reason for focusing on the TDI program relates to a major reform in 2002, which generated random-assignment-like variation in benefit generosity across participants. Under normal operation, the benefit level is likely to correlate with work opportunities in a way that makes it impossible to disentangle selection from causality. Random-assignment-like variation in benefits is therefore crucial for identification of causality. We exploit the quasi-experimental features of the reform to examine the effects of the benefit level on various outcomes of program participants, including the transition rate to employment and subsequent earnings for up to 10 years after program entry. The analysis allows for differential responses by immigrant status and individual characteristics that convey information about potential

earnings capacity (such as the highest earnings obtained in prior years) and the value of leisure (as captured by the family situation).

In a recent study of the Norwegian TDI program, Fevang et al. (2017) used the reform to identify average impacts of TDI benefits on the duration and outcome of TDI spells. When we extend the analysis to incorporate heterogeneous behavioral responses, we confirm that the TDI benefit level on average has a negative influence on the transition rate to regular employment. In addition, we identify a considerable negative influence on subsequent labor earnings. Equally important in our context, our results show that the behavioral responses are much larger for immigrants from low-income countries than they are for natives. For example, while a 10% increase in the benefit level is predicted to reduce the hazard rate from TDI to regular employment by 3.1% for native men and 0.8% for native women, it reduces the hazard rate for immigrant men and women by 6.5% and 4.2%, respectively. And while a one Euro increase in the (annualized) benefit level reduces the average annual labor earnings over the next 3-4 years by 20 cents for native men and 5 cents for native women, it reduces earnings of immigrant men and women by 40 cents and 20 cents, respectively. Moreover, while the adverse impacts on labor earnings are purely temporary for natives – with the earnings effects returning to zero approximately 4-5 years after TDI entry – the effects appear to be permanent for immigrants, with statistically significant negative impacts estimated as long as 10 years after entry. Moving on to cross-effects on the labor supply of spouses, our results point to small and statistically insignificant effects for natives as well as for immigrant men. For immigrant women, however, we identify large negative spousal responses. Our point estimates actually indicate that for female immigrants, the TDI benefit level has a larger negative impact on their husbands' earnings than on their own earnings.

Looking more closely at the response patterns among natives, we find that claimants with a predicted earnings capacity and/or a family situation similar to that of the immigrant group also have a response pattern more similar to that of immigrants. Hence, our empirical analysis confirms that a marginal change in social insurance benefits primarily affects the behavior of individuals who are close to indifference between the states of employment and non-employment – for natives as well as for immigrants. The larger behavioral impacts identified for immigrants is thus, at least partially, a consequence of the much smaller utility difference between the states of employment and non-employment applying to this group.

The paper proceeds as follows. In the next section, we start out with an overview of relevant literatures. Section 3 presents a descriptive overview of the income distributions of immigrants and natives in self-supporting employment and social-insurance-supported non-employment, respectively. Section 4 then presents our theoretical considerations, while Section 5 describes the temporary disability insurance program that forms the basis for our empirical analysis. Section 6 presents our data and our identification strategy. Section 7 examines – separately for immigrants and natives – the impacts of the benefit level on transition rates out of TDI and annual labor earnings and total incomes over a 10-year period after TDI entry. Section 8 examines the corresponding impacts on the claimant’s partner and on net household income. Section 9 then moves on to examine the sources behind differential behavioral responses in terms of future earnings prospects and the family situation, and evaluates the role that these factors have in accounting for the immigrant-native response differential. Section 10 concludes.

We emphasize that when we use the term “immigrant” in the remainder of this paper, we refer to immigrants from low-income source countries.² Immigrants from other (high-income) countries are dropped from our empirical analysis. The reasons for this are, first, that immigrants from high-income countries have a much higher probability of leaving the country, implying that it is difficult to follow them over time in our data, and second, that their tendency to enter and leave the country is highly dependent on their employment status. Moreover, our data indicate that the labor market behavior of immigrants from high-income countries is very similar to that of natives (Bratsberg et al, 2017).

2 Related literature

For those on social insurance programs, more generous benefits reduce the economic gains from exiting the program for employment. As such, our study relates closely to the literature examining the effects of the unemployment insurance (UI) on moral hazard, which shows that the duration of UI receipt tends to rise in response to higher replacement ratios (see, e.g., Krueger and Meyer, 2002; Johansson and Palme, 2002; Røed and Zhang, 2003;

² In our samples, immigrants from Iran, Iraq, Pakistan, Somalia and Vietnam form the largest source country groups. The vast majority were admitted as refugees or through family immigration.

Henrekson and Persson, 2004). Our paper is also linked to the broader literature on labor supply effects of disability insurance (DI) (e.g., Bound and Burkhauser, 1999) and, in particular, the studies indicating that there is substantial work capacity among marginal DI claimants (Autor and Duggan, 2003; Maestas et al., 2013; Kostøl and Mogstad, 2014; Borghans et al., 2014; French and Song, 2014). There is a considerable grey area between the roles of the UI and DI programs (for Norwegian evidence, see Rege et al., 2009 and Bratsberg et al., 2013). Studies of labor supply effects of DI fall into two main categories. One branch estimates the effects of receiving (or being denied) DI (e.g., French and Song, 2014), while others identify effects of benefit generosity (e.g., Marie and Castello, 2012) or effective taxes on wage income for those on the program (Kostøl and Mogstad, 2014). Responses among claimants to changes in generosity are likely to differ from the effects of benefit changes on program participation.

A related strand of the literature shows that labor supply tends to be particularly elastic at the bottom of the wage distribution (e.g., Aaberge et al., 2000; Bargain et al., 2014). High labor supply elasticities in this group have indeed been shown to stem from responses at the extensive margin, where the alternative state of claiming social insurance benefits may appear attractive as the economic gain from labor force participation can be low.

While studies of intra household labor supply typically examine the effects of partner's wage or non-wage income (e.g., Blundell and MaCurdy, 1999; Devereux, 2004; Blau and Kahn, 2007), recent analyses of social insurance effects also address the impacts of the claimant's social insurance benefits on the labor supply of the partner. Evidence suggests that unemployment insurance crowds out spousal labor supply (Cullen and Gruber, 2000). Spouses of Norwegian DI applicants who were (randomly) turned down increased their labor supply (Autor et al., 2017), and a reform-induced increase in DI benefits for Vietnam era veterans caused their spouses to reduce their labor supply (Duggan et al., 2010). We estimate the labor supply response of the partner to changes in benefits, adding to the literature on the effects of social insurance generosity that extends beyond the behavioral responses of the claimant.

Our study contributes to the scarce evidence on heterogeneous effects of SI. A study of particular relevance for our paper is Mullen and Staubli (2016), who, based on Austrian

benefit reforms, evaluate the elasticity of disability program participation with respect to the prospective benefit level. For the population at large, the authors estimate an elasticity of about 1.2. However, in contrast to the present study, the Austrian study finds that the responsiveness with respect to the benefit level tends to be greater for persons generally considered to be more resourceful, i.e., white-collar workers are more responsive than blue-collar workers, and individuals with high lifetime earnings are more responsive than poorer individuals. The authors interpret these findings as reflecting the better labor market opportunities of the former groups. In line with this, Kostøl and Mogstad (2014) report larger effects of a return-to-work program among DI claimants for those with more education, more labor market experience, and higher pre-program earnings. Other studies uncover no evidence of greater responses among the highly skilled. French and Song (2014) find that DI receipt reduces labor force participation less among college graduates than non-graduates. Maestas et al (2013) report employment effects of DI program admission that are stable across the earnings history distribution, but find heterogeneous effects according to the health condition of the applicant — from zero effect among those with severe impairments to a 50 percentage points reduction in employment for entrants with the least severe health problems.

To our knowledge, no prior study has explicitly examined the differences between immigrants and natives in their labor supply responses to social insurance generosity.³ The paper that comes closest to ours in this respect is that of Kaestner and Kaushal (2005), who compared the influences of the US Temporary Assistance to Needy Families (TANF) program on the labor supply of foreign-born and native-born low-skilled women, but without finding evidence of significant response differences. There are also a few papers addressing responses within the immigrant population. These include studies of US welfare reforms during the mid-1990s that placed limitations on the welfare eligibility of immigrant households. Drawing on variation in compensating state-funded programs, Borjas (2003) finds that immigrants responded to welfare cutbacks by increasing their labor supply. Kaushal (2010) shows that banning Supplemental Security Income increased employment

³ For example, none of the DI studies described above include immigrant status as a characteristic when they discuss heterogeneous responses.

among elderly foreign-born men, but not among women. In a recent study of immigrant responses to Food Stamp eligibility, East (2018) shows that access to the program reduced the employment rate of single women by 6% and married men by 5%.

Identification strategies to get at the causal effects of social insurance vary across studies. A few recent studies exploit random rejections of DI applications through DI examiner heterogeneity (e.g., French and Song, 2014; Autor et al, 2017), while others rely on discontinuities (e.g., Borghans et al., 2014) or kinks (e.g., Maestas et al., 2013) in benefits formulas, as well as benefit system reforms (e.g., Marie and Castello. 2012). Our identification is based on a reform that involved random variation across individuals in their actual SI benefits. Because we can calculate the exact pre and post-reform benefits for each individual, even for the counterfactual state, we extend a standard comparison of pre and post-reform cohorts. A similar identification strategy has been used in studies of the impacts of unemployment benefits on unemployment duration in Norway and Sweden (Røed et al., 2008); the impact of student aid on college enrolment in Denmark (Nielsen et al., 2010); and the impact of disability insurance benefits on labor supply in Norway (Fevang et al., 2017) and Austria (Mullen and Staubli, 2016).

3 Income sources of immigrants and natives

To motivate our analysis, we begin by showing that social insurance is a considerably more important source of income for immigrants than for natives. Based on complete population data for 2013, Table 1 reports the fraction of working-age male and female immigrants and natives with employment (E) or social insurance (SI) as their main source of income (defined as the higher of the two), as well as the average total pre and post-tax incomes of each group. The table reveals that SI is particularly important for immigrants along two dimensions. First, take-up rates are much higher than for natives and more immigrants have SI as their main source of income. Fully 22.0 percent of immigrant men receive the majority of their income from social insurance compared to 11.0 percent of native men. For immigrant women, 22.7 percent have social insurance as their main income source,

compared to 14.4 percent for native women.⁴ Second, the income differential between those with employment and social insurance as their respective main source of income is much smaller for immigrants than for natives. For example, while employed native men on average have a disposable (after tax) income that is almost NOK 219 000 higher than those on social insurance (92 percent higher), the corresponding differential for immigrants is only 131 000 (60 percent).⁵ These figures point to high SI replacement ratios, although the numbers in Table 1 are not individual replacement ratios. Those observed in employment are likely positively selected from the underlying population in terms of earnings potential, which means that actual replacement ratios are even higher than those implied by Table 1. Even if selection into employment differs for immigrants and natives, the observed patterns of employment and social insurance incomes clearly indicate that the economic rewards for being employed are much larger for natives than for immigrants.

Table 1. Incomes within and outside employment, 2013.

Main income source	Men		Women	
	Immigrants	Natives	Immigrants	Natives
Employment (E)				
Share (%)	71.1	87.6	64.9	84.2
Income before tax	477 657	649 859	374 925	462 719
Income after tax	349 932	455 527	288 126	344 725
Social insurance/assistance (SI)				
Share (%)	22.0	11.0	22.7	14.4
Income before tax	252 999	280 571	242 408	272 234
Income after tax	218 582	236 652	218 734	238 148
Income ratio before tax (SI/E)	0.530	0.432	0.647	0.588
Income ratio after tax	0.625	0.520	0.759	0.691
Income difference after tax	131 350	218 875	69 392	106 577

Note: Populations are restricted to ages 25-62, with the immigrant population further restricted to those at least three years in the country. Native population is reweighted to have the same age distribution as immigrants. The main income source is defined as the higher of the two (labor earnings and social insurance transfers) during the calendar year.

⁴ Note that the shares in the two income groups do not sum to 100, as a residual group have zero income from both sources; the latter is the case for fully 12.5 percent of immigrant women.

⁵ The average Euro/NOK exchange rate in 2013 was € 1=NOK 7.81.

Figure 1 displays the distributions of after-tax income for each population group. For both immigrants and natives, the income distribution of those employed is located considerably to the right of the distribution of social insurance claimants. The degree of overlap is much larger for immigrants than for natives, however. For immigrant men, it is not uncommon that employed persons have lower earnings than persons with social insurance as the main income source.

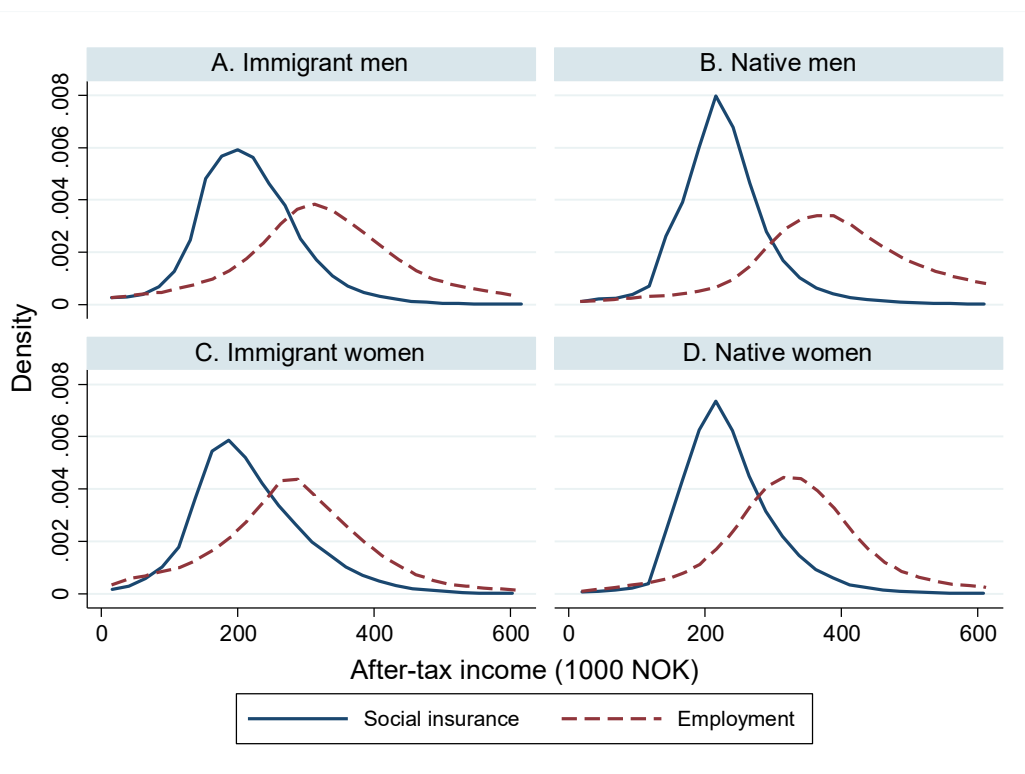


Figure 1. Distribution of after-tax income for immigrants and natives, by gender and main income source, 2013

Note: The graphs show the distributions of total income, including earnings from employment and social insurance transfers. Employment indicates that labor earnings exceed sum of transfers, while the opposite holds for the social insurance group (Table 1). Population is restricted to ages 25-62, with immigrant population further restricted to those in the country at least three years. Native population is reweighted to have the same age distribution as immigrants.

4 Theoretical considerations

Even if SI programs typically specify a set of eligibility criteria related to involuntary unemployment or disability, there is significant scope for individuals to influence their program participation. Applying for social insurance is a matter of choice, and once admitted

to a program, the decision to exit is in practice often left to the claimant. In order to focus on the role of individual preferences, in this section we abstract completely from gatekeeping efforts. For ease of exposition, we also disregard endogenous search efforts, reservation wages, and human capital investments. As in Saez's model of labor supply at the extensive margin (Saez, 2002), we portray economic agents who rank the two alternatives of self-supporting employment and social insurance program participation, both associated with given utility levels. When employed, individuals receive a wage W and a non-pecuniary benefit α (which may be negative). As non-employed, they participate in the social insurance program and receive benefits B . With linear utility, an individual strictly prefers employment over program participation iff $W + \alpha > B$. The non-pecuniary component α is the net gain/cost arising from different aspects of employment, including the pleasure from work itself, the self-respect it entails, and the value of the social network that comes with it (Gill, 1999; Kieselbach, 2004). It also captures any lack of stigma associated with social insurance (Moffitt, 1983). Finally, it includes the (negative) values of the lost leisure and less home production due to hours at work. The size of the latter component likely depends on the family situation.

For persons with well-paid, decent, and even interesting jobs, utility derived from employment will typically by far exceed the value of social insurance program participation. These individuals have strong incentives to remain in, or return to, employment, and will seek to do so regardless of (minor) variations in the level of social insurance benefits. For persons with low wages and poor working conditions, the situation may be different. When utility from work vary substantially within and between groups – due to market opportunities (wages and working conditions) as well as preferences related to time use (leisure and home production), a reform with marginal adjustment of the benefit level B will only affect the behavior of a proportion of the population, namely those who prior to the reform were at the margin between employment and non-employment, i.e., workers for whom $W + \alpha \approx B$. All others will remain unaffected by the reform.

To discuss mechanisms more formally, let $(W + \alpha)$ vary across individuals within group g (where g denotes immigrants or natives), and let $F_g(\cdot)$ be cumulative distribution functions for the value of employment. Let B_g represent benefits, for simplicity assumed to be

common to all members of group g . Then, the fraction preferring program participation over employment is simply given by $F_g(B_g)$. Three predictions follow directly from this setup:

- (i) For given $F_g(\cdot)$, program participation is more frequent the larger is the benefit level B_g .
- (ii) For given B_g , program participation is more frequent the higher is $F_g(B_g)$, i.e., the higher is the fraction of individuals with labor market payoffs below B_g .
- (iii) The effect of a marginal change in benefits, B_g , on the program participation rate equals the derivative of F_g with respect to B_g , or $f_g(B_g) > 0$, where f_g is the density function for group g . Within a given population group, the sensitivity of labor supply with respect to change in B will be greater the larger is the fraction of group members that initially are on the fence between employment and non-employment.

The income distributions shown in Figure 1 provide some empirical counterparts to these theory elements. A first observation is then that $F_g(B_g)$ appears to be higher for immigrants than for natives. While the typical annual income for those with social insurance as their main source of income lies between NOK 240 000 and 280 000 for both natives and immigrants, it is clear that a much higher fraction of employed immigrants than employed natives can expect to earn less than this amount in the labor market. This can potentially explain why a larger fraction of immigrants rely on social insurance benefits rather than labor earnings. A second observation based on Figure 1 is that $f_g(B_g)$ tends to be higher for immigrants; i.e., that a larger fraction of immigrants find themselves in the region where the monetary payoff from employment is close to the payoff from social insurance. To illustrate, the share of employed men with income below the 75th percentile income of the SI group is 26% for immigrants compared to 12% among natives. For women, the corresponding numbers are 42% for immigrants and 24% for natives. Moreover, among those employed the share with income between the median and the 90th percentile incomes of the SI distribution is 30% and 47% for immigrant men and women, respectively, but only 17% and

24% for native men and women. Based on these numbers, our simple theoretical framework predicts that immigrants have higher rates of SI dependency than natives and that they are more responsive than natives with respect to marginal adjustments of SI benefits.

The utility derived from employment also depends on a non-wage component α , which reflects the (dis)utility from work as well as the value of household production and leisure. As α is intrinsically unobservable, there is no empirical parallel like for pay. There are, however, several reasons to expect α to be smaller (or more negative) for immigrants than for natives. First, evidence indicates that immigrants to a larger extent than natives are mismatched in the labor market, and thus obtain jobs where tasks do not correspond with qualifications (e.g., OECD, 2015, section 6.4). They earn a lower return to schooling due to non-transferability of education from low-income countries, and are probably less effectively matched to jobs because of inferior networks and (potential) employer uncertainties about their qualifications. As a result, immigrants likely enjoy less pleasure from work. Second, immigrants disproportionately live in households with a homemaker spouse and dependent children, possibly adding to the value of leisure. Existing empirical evidence, largely based on retirement decisions, point toward considerable complementarities in spouses' leisure, and that this force for leisure coordination typically dominates the offsetting income effect on labor supply; see, e.g., Coile (2004), Gustman and Steinmeier (2004), and Schirle (2008). As many immigrants from low-income countries maintain an attachment to their origin country, the value of joint leisure may be of particular importance as it makes it easier to spend time with the spouse in an environment where living costs are much below those in Norway.⁶ Finally, as benefit entitlements – in contrast to labor earnings – depend positively on the number of dependents, persons with a low α tend to have a high B , implying a wider distribution of $B - \alpha$ and a higher probability that the value of program participation exceeds the value of employment.

⁶ To give a rough lower bound on such attachment figures, among married individuals age 40-50 who were granted a permanent disability pension between 1993 and 2006, the fraction that had moved abroad within one year was 2.4% among immigrants from low-income countries compared to 0.4% among natives (N= 2 842 immigrants and 31 859 natives). After 10 years, 6.4% of immigrants and 1.2% of natives had moved abroad. Receipt of permanent disability benefits are not tied to continued residency in Norway.

Our theoretical framework highlights group differences in work incentives and assumes that individuals are free to choose their preferred labor market state. In this, we ignore the fact that disabilities will limit employment opportunities. Indeed, previous studies link empirical evidence on heterogeneous responses to DI benefit generosity to differences in employment opportunities (Kostøl and Mogstad, 2014; Mullen and Staubli, 2016), explaining why the highly skilled seem to be more responsive to variation in benefits. If no employment opportunities exist – due to, e.g., disability, inferior qualifications, or discrimination – the incentives embedded in the social insurance system would hardly matter for the realized employment status. The contrast between our predictions based on work incentives and the implications of differential access to jobs emphasized by prior studies, illustrates that differential responsiveness with respect to economic incentives will be governed by two offsetting forces. On the one hand, individual resources provide better job opportunities and more scope for individual choice, making social insurance incentives more powerful. On the other hand, more resources raise market earnings and the distance between the utility of employment and non-employment, implying that marginal changes are less likely to alter the ranking of the two states. The combined influence of these two mechanisms is likely to vary across social insurance programs, depending on the precise incentive structure, the composition of program participants, and labor market conditions.

If immigrants on average are more restricted in their choice between employment and non-employment than natives, this would offset the source of benefit responsiveness discussed above. From this perspective, we expect immigrants to be *less* responsive to changes in benefits. Thus, the empirical relevance of our theoretical argument depends critically on the extent to which realistic job opportunities are available across the distribution of benefit entitlements, both for immigrants and natives.

5 The temporary disability insurance program

In order to compare the benefit responsiveness of immigrants and natives and to identify the underlying sources of any differences between the two groups, we examine the causal impacts of marginal benefit changes within the Norwegian temporary disability insurance (TDI) program. We focus on how benefit generosity affects the claimants' transitions rate to regular employment and their short and medium-term labor earnings. In this section, we

provide a brief description of the TDI program and its role in the overall social insurance system.

For working-age individuals with health-related problems, the Norwegian social insurance system offers three main programs. First, employees are entitled to sickness benefits that typically provide 100% wage compensation and protection against displacement on grounds related to their sickness for up to 12 months. Second, the temporary disability insurance program provides benefits to employees who have exhausted their sick pay as well as to some individuals who were not eligible for sick pay because they did not have a job at the time of disablement. To be eligible for TDI, a physician must certify that health impairment is the main cause of loss of at least 50% of the work capacity. However, as the law explicitly states that actual employment opportunities may be taken into account in the assessment of the health impairment, social insurance officers will consider labor market opportunities and other worker characteristics in their evaluation of program eligibility. As we show below, there is considerable variation in individual benefit entitlements. For persons with stable past earnings and no responsibility for children, the benefit level typically amounts to 60-70 percent of prior earnings, but the minimum and maximum thresholds as well as child allowances often generate large deviations from this level.

The TDI program offers activities to enhance employability through periods of medical and/or vocational rehabilitation. During our observation period, there was no definite limit on the overall length of TDI. Although we do not evaluate the effectiveness of TDI activities, it is clear that, if the benefit level affects program participation, the effectiveness of rehabilitation activities will influence the overall impacts of TDI benefits on future outcomes. Existing evaluations of the vocational rehabilitation program indicate considerable individual heterogeneity in treatment effects, yet relatively modest impacts on average; see Aakvik et al. (2005) and Markussen and Røed (2014).

The third insurance program is permanent disability insurance (DI). DI benefits are similar to those of the TDI program and amount to around two thirds of prior earnings.

One reason why we focus on the TDI program is illustrated in Figure 2. As shown in panel A, the TDI program has grown in size over the last 20 years, and its caseload is now more than twice as large as that of the unemployment insurance program. There has also been a

considerable growth in the number of immigrant TDI claimants relative to the number of native claimants; see panel B. This growth has been much larger than what can be accounted for by the rising share of immigrants in the working-age population.

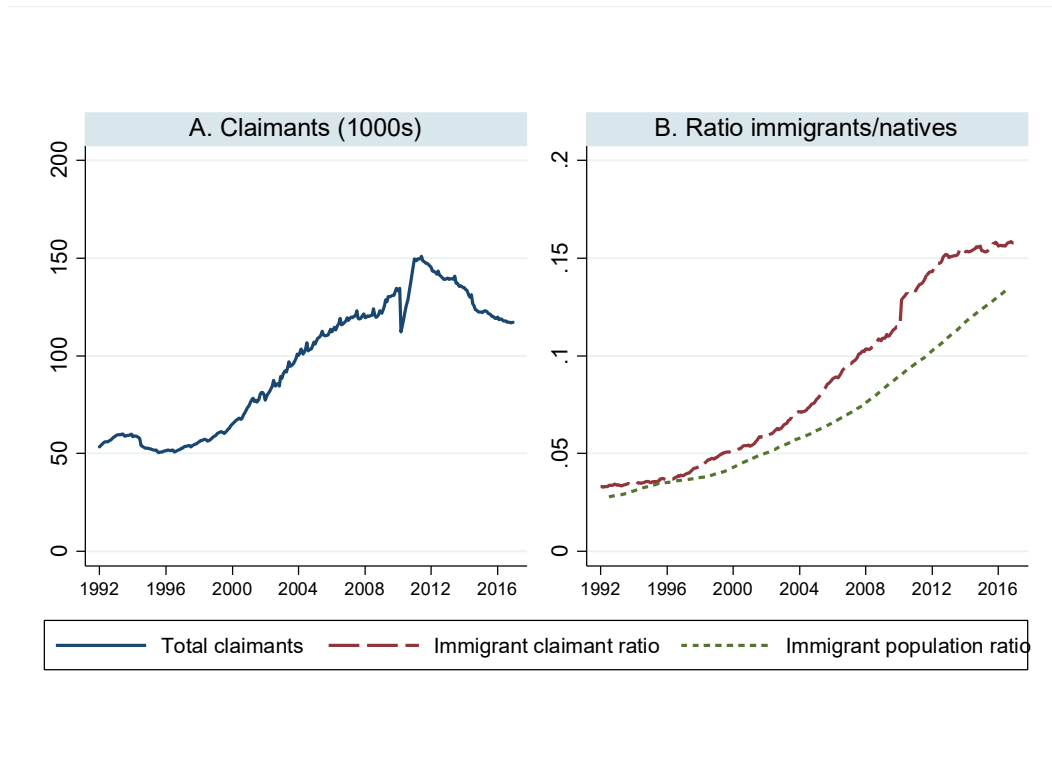


Figure 2. Temporary disability benefit claims, Jan 1992-Dec 2016

Note: Registered claimants on the 28th of each month. Samples consist of those aged 25-62 and in Norway the full year. Temporary disability insurance programs include “attføring” (1992-2010), “rehabilitering” (2002-2010), “foreløpig uførestønad” (1992-2010), “tidsbegrenset uførestønad” (2004-2010), and “arbeidsavklaringspenger” (2010-2016).

6 Identification strategy and data

In January 2002, the formula for computation of individual TDI benefits was completely renewed. As a consequence, two persons with identical labor market histories and the same demographic characteristics—and with the only difference that they entered the program before or after the reform—could be entitled to quite different TDI benefits. This changed the incentives for program participation, but differently for different workers depending on their earnings history. For some claimants, the new rules implied higher benefits, for others they implied lower benefits. The main changes in the benefit formula implied that i) benefits became based on earnings during the past three years only, instead of the complete earnings history; ii) the minimum benefit level was increased; iii) child allowances were

considerably reduced, but no longer means tested; and iv) immigrants obtained full entitlement after only three years of residence instead of partial entitlement determined by their age at immigration (see Fevang et al. (2017) for further details on the reform). With our access to detailed administrative register data, we are able to accurately compute hypothetical post-reform benefits also for individuals belonging to the pre-reform period and vice versa.

Although the precise specification of our empirical model will vary with the particular outcome examined, we illustrate the identification argument within a simple regression setting where we have some outcome Y_{it} and a set of exogenous controls Z_{it} for individual i facing pre-reform ($t=0$) or post-reform ($t=1$) benefits. Let b_i^{PRE} and b_i^{POST} be the benefit levels (or their logs) calculated for person i based on the pre-reform and post-reform formula, respectively, and let R_t be an indicator variable set to unity for individuals facing post-reform incentives (and zero for those with pre-reform incentives). We can then write the model as

$$Y_{it} = Z_{it}\gamma + \beta_{PRE}b_i^{PRE} + \beta_{POST}b_i^{POST} + \alpha R_t + \delta \left[(1 - R_t)b_i^{PRE} + R_t b_i^{POST} \right] + u_{it} \quad (1)$$

Here, b_i^{PRE} and b_i^{POST} are included (for all observations) to capture the non-causal associations between benefits and the outcome variable. The post-reform indicator, R_t , captures time/period effects, whereas $\left[(1 - R_t)b_i^{PRE} + R_t b_i^{POST} \right]$ identifies the causal effect δ . We immediately see from Equation (1) that the identification of the behavioral impact the benefit level is obtained by exploiting the variation across individuals in the way their entitlements were affected by the reform. Without idiosyncratic variation in the way the reform affected benefits, the equation would be subject to perfect multicollinearity.

The intuition behind our identification strategy goes as follows. In the pre-reform period, we would expect the correlation between economic outcomes and b_i^{PRE} to represent a combination of causality and correlation with unobserved characteristics. However, after the reform, it can by construction no longer exert any causal influence (conditional on b_i^{POST}); hence any remaining association between b_i^{PRE} and outcomes identifies the spurious (non-causal) relationship. For b_i^{POST} the reverse argument holds: Post-reform benefits cannot a

have causal effect in the pre-reform period. Hence, the difference in correlation patterns between outcomes and benefits computed according to pre-reform and post-reform rules can be used to identify the causal effect of the benefit level. In the regression context, we achieve this by including both pre-reform and post-reform benefits as control variables, while using the interaction between the benefit measures and pre-reform and post-reform dummy variables to capture the causal effect of TDI benefits.

The key assumption behind the identification strategy is that the benefit gain (the difference between benefits computed according to post-reform and pre-reform rules) is uncorrelated with the *change* in the outcome variable other than through its causal effect. This is tantamount to the common trend assumption in standard difference-in-differences analyses. While Equation (1) effectively controls for all sources of stable non-causal correlation between pre and post-reform benefits and the outcome of interest as well as for common trends, it does not control for *differential trends* in outcomes that may be correlated with changes in benefit generosity. As we show in Appendix A, a placebo analysis where we reproduce our main results based on the imposition of falsely timed reforms within the pre and post-reform periods fails to indicate the presence of such correlated trends.

Our empirical analyses are based on complete administrative registers covering all entrants to the TDI program over a six-year period, from three years before to three years after the 2002 reform (1999-2004). Ongoing spells will be followed through 2009 but we also extract labor market outcomes such as earnings through 2014. We limit the analysis population to individuals 27 to 59 years of age at the time of TDI entry. The lower age limit is set because there are separate benefit rules for persons below 27 with particular serious sickness diagnoses, and our data do not allow us to identify this group. The higher age limit is set because rehabilitation attempts typically cease as claimants approach their 60ies, and because very few TDI claimants at this age return to work. Finally, we drop TDI claimants who were employed in the public sector just prior to entry, as public-sector workers were eligible for supplemental benefits and largely sheltered from the 2002 reform. Table 2 presents some descriptive statistics. A point to note is that the replacement rate – defined here as the annualized level of benefits divided by the average earnings obtained in the three-year period prior to TDI entry – is on average considerably higher for immigrants than

for natives, particularly when based on the post-reform benefit schedule. For example, while male immigrant TDI claimants on average received benefits corresponding to 80% of their pre-entry labor earnings, native men received “only” 65% on average. The reason for this is clearly not that average benefits are higher for immigrants (quite the opposite), but rather that their earnings over the last three years were much lower.

Table 2: Descriptive statistics, TDI program participants

	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
Age (year)	40.0	40.4	39.9	40.4
Educational attainment (%)				
Compulsory	40.5	42.0	46.7	40.5
Upper secondary	33.0	50.0	28.4	45.6
College	15.4	6.2	14.0	12.4
Post graduate	2.8	1.0	2.7	1.1
Unknown	8.2	0.8	8.3	0.4
Employed year before (%)	74.2	86.2	72.0	83.4
Avg. earnings 3 prior years (NOK)	264 695	380 300	204 891	267 696
TDI benefits (NOK):				
Pre-reform rules	158 881	227 417	125 113	172 352
Post-reform rules	210 578	250 443	179 469	199 768
Implied replacement (pre-tax):				
Pre-reform rules	0.620	0.593	0.606	0.642
Post-reform rules	0.798	0.654	0.878	0.744
Spell duration (months)	24.8	25.0	27.7	29.3
Spell outcome:				
Employment	32.9	49.9	26.8	42.7
Permanent disability	15.2	17.0	16.0	19.0
Unemployment	4.4	1.9	2.9	1.5
Non-participation	32.6	15.9	34.9	16.0
Spell in progress 48 months	14.9	15.4	19.4	20.9
Number of spells	7 128	64 346	5 267	67 909
Fraction post reform	59.0	54.4	63.2	54.8

Note: Samples consist of new temporary disability insurance spells of individuals age 27-59 that started between 1999 and 2004. Earnings and benefits are inflated to 2013 currency using the social insurance base amount (“G”) index.

To illustrate how the reform affected the benefits of native and immigrant TDI program participants, Figure 3 shows density plots, separately for each group, of the difference between benefits calculated with the new and old formula, $b_i^{POST} - b_i^{PRE}$, or the hypothetical

gains in benefits from the reform. It is clear that there were winners and losers in all groups considered, but that the majority of claimants came out with higher benefits if they entered the program after the reform. Immigrants gained more than natives, but the gains among immigrants were also more dispersed.

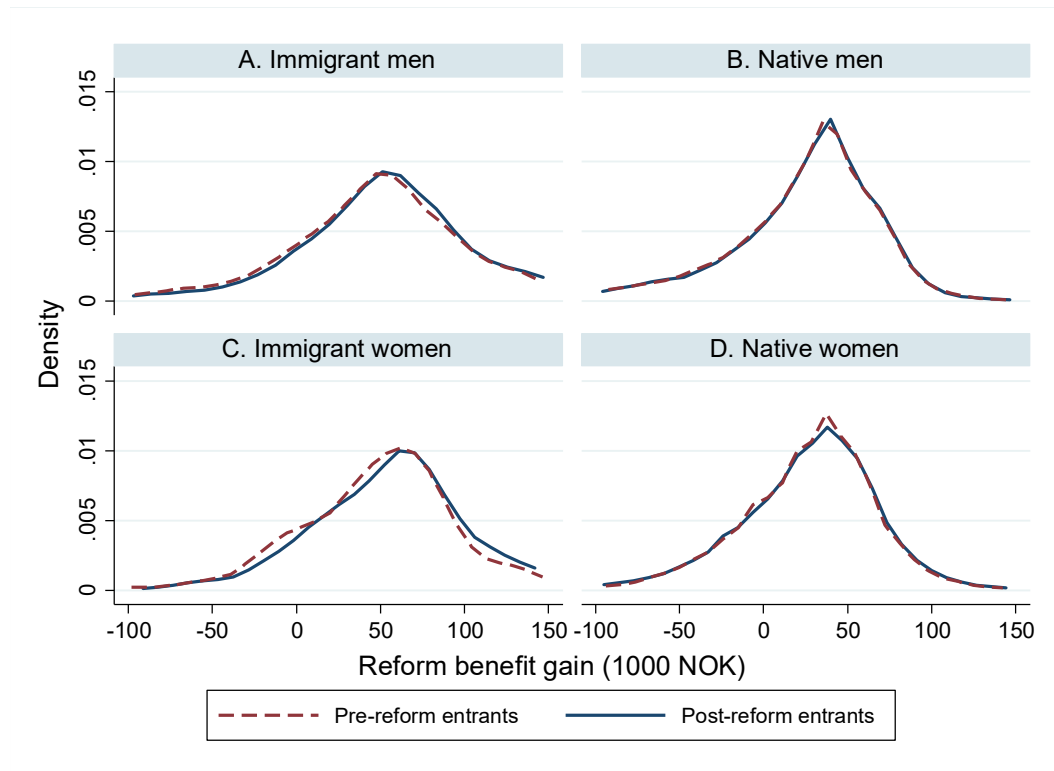


Figure 3. The distribution of hypothetical change in TDI benefits from the 2002 reform, by gender and immigrant status

Note: The TDI benefit gain is defined as the benefit level calculated according to the new rules minus the benefit level calculated according to the old rules ($b_i^{POST} - b_i^{PRE}$). TDI benefits are inflated to 2013 currency using the social insurance base amount (“G”) index.

It is notable that the gains distributions are similar for pre and post-reform entrants, suggesting that there was little room for strategic timing of program entry and also that the incentive structure had little effect on the composition of program entrants. This is potentially important for internal validity of our analysis, as large incentive effects on the inflow to TDI could potentially have altered the associations between unobserved characteristics and the two benefit variables, thus invalidating our identification strategy. In Appendix B, we show that the reform-initiated benefit changes had only small effects on the probability of entering the TDI program during the period covered by our analysis and the

effects are not significantly different by immigrant background. Small effects can be explained by imperfect information as potential claimants had little knowledge about their precise benefits prior to actual entry, especially during the initial period after the reform.

7 Effects on exit rates from TDI and future earnings and income

We start out the empirical analysis by estimating the effects of the TDI benefit on the exit rates from the program to regular employment and other destinations. More than four in five participants exit the program within four years, but far from all have a successful transition into employment; see Table 2. While about 50 (43) percent of native men (women) exit to employment, immigrants are even less likely to leave the program for employment (33 and 27 percent of immigrant men and women, respectively). The TDI program has no fixed duration. To account for alternative outcomes within a competing risk framework we specify a non-parametric mixed multivariate proportional hazard rate model (MMPH), with exits to employment, permanent disability insurance (PDI), unemployment, and non-participation as the modeled destination states.

We set up the hazard rate model based on monthly data, and use the estimation strategy and optimization algorithm described in Gaure et al. (2007). Given this setup, we include a number of time-varying covariates such as calendar time and spell duration dummy variables (on a quarterly basis), age dummy variables (yearly), educational attainment (5 dummy variables), family situation (5 dummy variables describing responsibility for children and marital status), and local labor market conditions.⁷ The model also accounts for time-invariant unobserved heterogeneity in the form of a discrete distribution of destination-specific intercepts with no restrictions on the correlation structure and with an a priori unknown number of support points (this number is determined through the estimation procedure based on the Akaike information criterion). In order to save space, we do not set up the equations and the likelihood function for this model here, but refer to Røed and Westlie (2012) who present in detail a model with the same technical structure.

⁷ The local labor market indicator is taken from a separate study of the observed transition rate from the unemployment register to employment in the TDI claimant's own commuting zone.

Estimated parameters of the hazard rate model are displayed in Table 3. Since the benefit variables enter in log form, the coefficients in Table 3 can be interpreted as elasticities; i.e., the percent change in the respective hazard rate caused by a one percent change in the benefit level. A first point to note here is that a higher TDI benefit affects all exits from TDI negatively, although not all of the coefficient estimates are statistically significant. Consequently, more generous benefits imply that participants stay longer in the program. The marginal benefit effect is particularly strong for transitions to employment. Benefit generosity has a much larger effect for immigrants than for natives. For immigrant men, the elasticity of the exit rate to employment with respect to benefits is -0.647, compared to -0.311 for native men. For women, the corresponding elasticities are -0.424 for immigrants and -0.084 for natives.

Table 3: Estimated hazard rate elasticities with respect to TDI benefit

	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
Log actual TDI benefit				
Effect on transition to:				
Employment	-0.647*** (0.143)	-0.311*** (0.068)	-0.424*** (0.127)	-0.084 (0.052)
PDI	-0.086 (0.180)	-0.136 (0.102)	0.028 (0.160)	-0.111 (0.086)
Unemployment	-0.538 (0.398)	-0.103 (0.250)	-0.466 (0.675)	0.156 (0.383)
Non-participation	-0.069 (0.127)	-0.137 (0.091)	0.128 (0.111)	-0.171** (0.084)
Number of spells	7 128	63 346	5 267	67 909
Number of support points in heterogeneity distribution	5	6	1	6

Note: In addition to the two hypothetical benefit variables, the vector of control variables include educational attainment (5 dummy variables), age (33 dummy variables), family characteristics (5 dummy variables), time-varying calendar quarter (40 dummy variables), county (19 dummy variables), spell duration by quarter (13 dummy variables), and local labor market conditions at entry and in current quarter. */**/* indicates statistical significance at the 10/5/1 percent levels; standard errors are reported in parentheses.

Benefit generosity is also likely to affect future labor market earnings through several channels. First, there is a direct impact of more generous benefits via postponement of the employment transition, unambiguously crowding out labor earnings. Second, the reasons

why hazard rates are affected, such as lower search intensity and higher reservation wages, are likely to also influence subsequent job match quality. Finally, the extended TDI duration may itself impact employment opportunities, either because the rehabilitation activities offered by the program affect human capital acquisition positively, or because extended participation implies depreciation of human capital and/or increased stigma. The net effect of these mechanisms depends on the effectiveness of the vocational rehabilitation program for marginal participants, i.e., the individuals whose TDI participation is most affected by changes in the TDI benefit schedule.

We examine labor earnings effects for up to 10 years after TDI entry by means of linear regressions, with annual earnings (measured in NOK and inflated to 2013 currency) as the outcome. Empirical earnings equations are typically in logs, but in our application that would leave out a large fraction with zero earnings that obviously represents a valid outcome. As an alternative, we have chosen to “de-log” benefits and regress annual labor earnings on the three benefit variables in their level form. Apart from that, we use the same list of control variables as in the hazard rate model of Table 3.

Given the large number of estimated coefficients, we present them graphically. Figure 4 shows the estimated marginal causal effects (with their 95 % confidence interval) from separate year-by-year regressions, where year zero indicates the year of TDI program entry. We uncover negative effects of benefits on future labor earnings for all groups, and again the negative effects are more severe for immigrants than for natives. The dynamic pattern is similar across groups and the effects are largest 2-3 years after TDI entry which corresponds to a typical program period. At that point, we estimate that a one Euro benefit increase reduces annual earnings by around 40 cents for immigrant men and 20 cents for native men. For women, the estimated effects are considerably smaller: 20 cents for immigrants and just a few cents for natives.

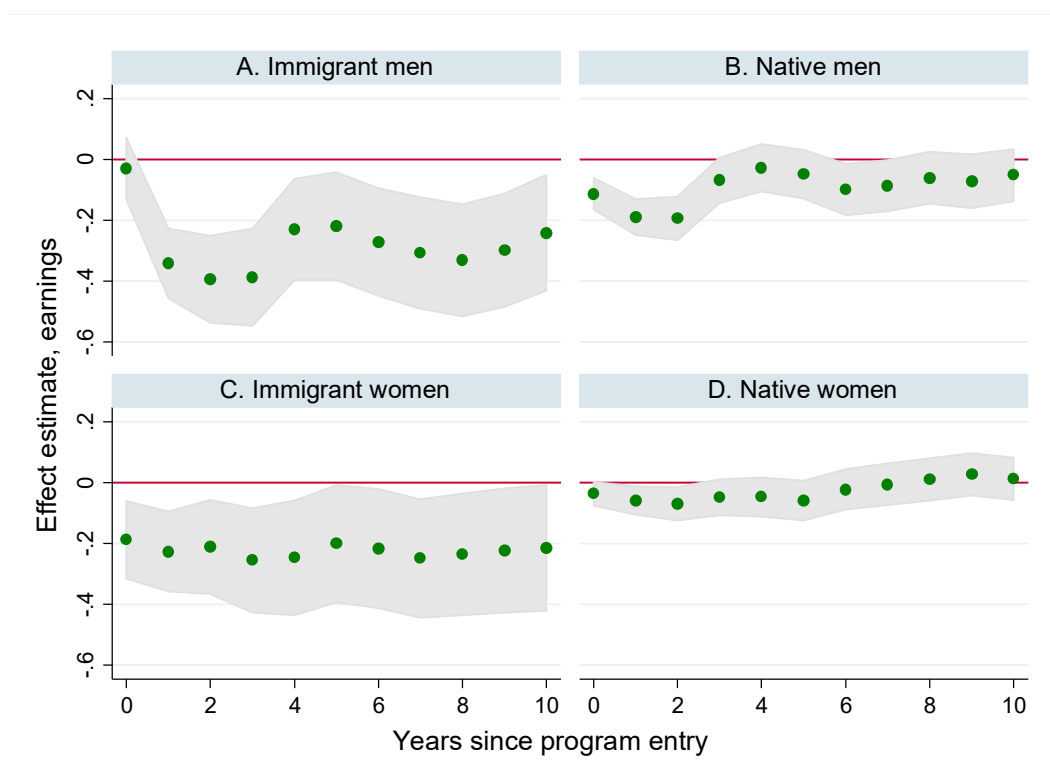


Figure 4. Estimated effects on annual labor earnings of a Euro increase in TDI benefit

Note: Shaded region depicts 95% confidence intervals around point estimates. In addition to the two hypothetical benefit variables, the vector of control variables include educational attainment (5 dummy variables), age (33 dummy variables), family characteristics (5 dummy variables), month of program entry (72 dummy variables), county (19 dummy variables), and local labor market conditions. Samples are restricted to those in Norway at the end of the calendar year; sample sizes in years 0 and 10 are 7 055 and 6 506 (Panel A), 63 290 and 58 251 (Panel B), 5 229 and 5 014 (Panel C), and 66 964 and 64 164 (Panel D).

While the negative effects on labor earnings tend to be washed out after around four years for native men and women, they are highly persistent for immigrants. This suggests that the implications of postponed employment transitions dominate for natives, while long-lasting scarring effects are found for immigrants. For both immigrant men and women, we find a permanent negative earnings effect amounting to around 20 cents per Euro increase in TDI benefits.

Higher benefits obviously raise income replacement, but since changes in TDI benefits also affect labor earnings, positive income effects will be mitigated. Benefit substitution will also dilute the income gain as more generous TDI benefits may crowd out other (means-tested) transfers such as social assistance. Thus, a natural question to ask is whether higher benefits make the TDI claimants economically better off at all. To answer this question, in Figure 5 we repeat the year-by-year regressions with total annual after-tax income (= labor earnings +

total benefits - direct taxes) as the dependent variable. The figure shows that higher TDI benefits indeed imply higher total net income over the first years after TDI entry. For natives, the effect approaches zero after around six years, roughly in line with the evolution of labor earnings. A similar pattern is observed for immigrants, although point estimates actually indicate a negative long-term effect. This is clearly related to the lasting negative impact on labor earnings shown in Figure 4, which is only partly offset by higher social insurance benefits.

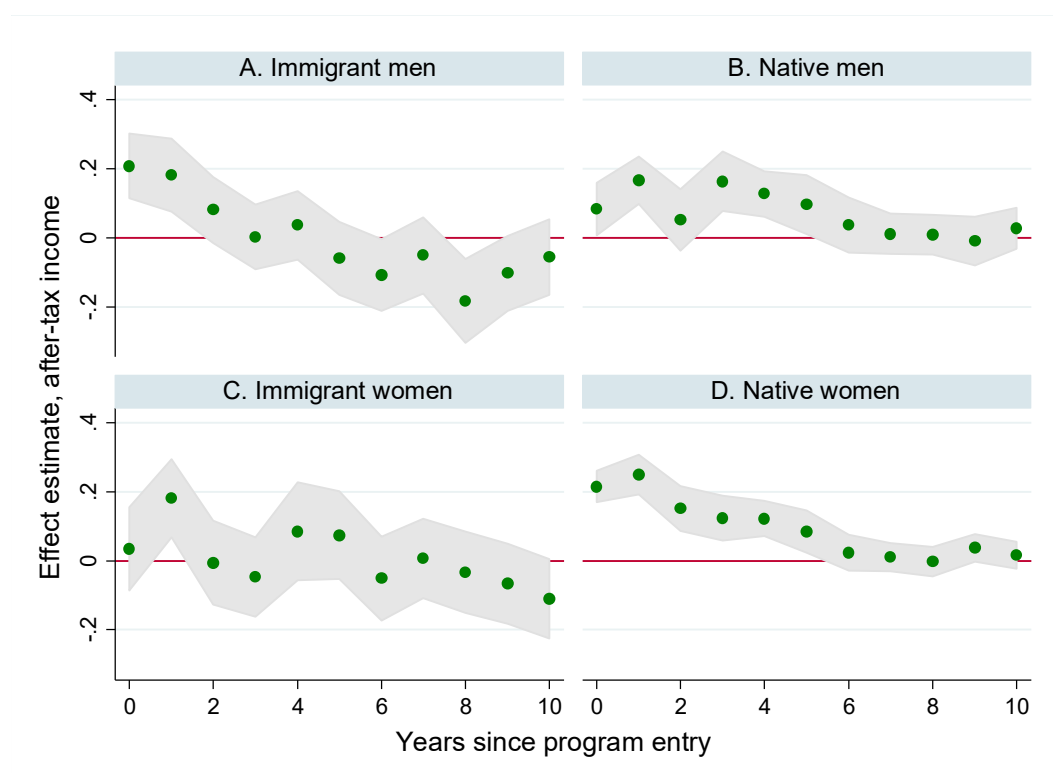


Figure 5. Estimated effects on after-tax income of a Euro increase in TDI benefit

Note: Shaded region depicts 95% confidence intervals around point estimates. See also note to Figure 4.

8 Effects on spouse's future earnings and household income

From a household perspective, the TDI benefit changes the budget constraint as well as preferences for market and non-market activities. Consequently, more generous benefits may also affect the labor supply of the claimant's partner. First, if the claimant's overall income level rises with the increase in TDI benefits (as indicated by Figure 5), there is a negative income effect on the spousal labor supply. Second, if the claimant's own labor supply declines with higher benefits (as indicated by Figure 4), there is a substitution effect

which is negative if hours spent at home enter the partner's utility as a complement (e.g., due to higher value of joint leisure), and positive if they enter as a substitute (e.g., due to decreasing returns in home production).

In order to examine partner responses, we limit the analysis to coupled claimants at the time of TDI program entry. This reduces the native sample by as much as 60%, but reduces the immigrant sample by "only" 35%, reflecting the much larger share of married persons in the immigrant claimant group. Table 4 reports some summary statistics for the coupled samples. It is notable that the vast majority of female claimants, whether immigrant or native, have employed partners, whereas the majority of male immigrant claimants have economically inactive partners.

Table 4: Descriptive statistics, married TDI program participants and their spouses

	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
Age (years)	40.8	43.9	40.0	42.5
Partner age (years)	36.3	41.2	44.4	45.2
Partner immigrant (%)	88.6	4.0	82.9	1.4
Employed year before (%)	78.2	95.4	76.0	88.2
Partner employed year before (%)	45.7	75.1	70.5	90.3
Avg. earnings 3 prior years (NOK)	285 864	458 916	211 252	276 790
Partner's avg. earnings 3 prior years (NOK)	141 989	258 290	325 062	519 950
Number of observations (couples)	4 494	21 872	3 554	30 839

Note: Samples consist of married and cohabiting entrants to the TDI program between 1999 and 2004 and their partners. Samples restricted to claimants of age 27-59 at the time of entry and to partners with less than NOK 500,000 in capital income. The latter restriction is made to avoid huge (and irrelevant) outliers in the subsequent total household income analysis, and it reduces the sample by 2.5 %. Average earnings are inflated to 2013 currency using the social insurance base amount ("G") index.

Figure 6 repeats the year-by-year regression exercise of Figure 4 for these reduced samples and the estimated effects of higher TDI benefits are similar to those in the full samples. The point estimates indicate somewhat larger negative earnings effects among married/cohabiting claimants, but as the confidence intervals also are larger in these

reduced samples, it is difficult to draw firm conclusions regarding the statistical significance of these differences (we return to this question in the next section).

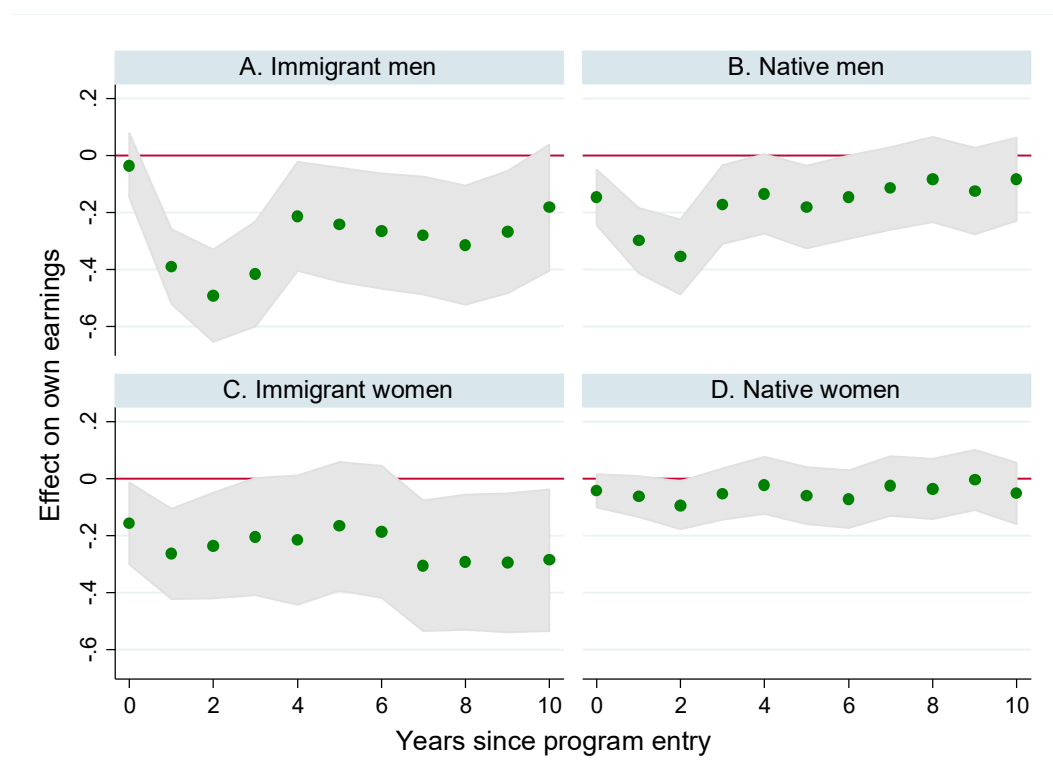


Figure 6. Estimated effects on annual labor earnings of a Euro increase in TDI benefit. Married and cohabiting claimants only

Note: Shaded region depicts 95% confidence intervals around point estimates. See also note to Figure 4.

Figure 7 then moves on to the estimated impacts of TDI benefits on the partners' annual labor earnings. Although many of the coefficients are individually insignificant, the overall pattern of point estimates paints a rather consistent picture: For both native and immigrant men, there is a small negative effect on the labor supply of the female partner, which appears to taper off in the longer run. For immigrant women, there is a large negative effect on their male partner's labor supply. Comparing Panel C to that in Figure 6, we note that for immigrant women, the estimated impacts on their husbands' labor supply are actually larger than the impacts on their own labor supply.

Together with the small (and in most cases insignificant) estimated impacts on the claimants' total income (Figure 5), this suggests that that the value of leisure of immigrant men increases quite substantially when their wives reduce their labor supply in response to higher benefits. This points to strong, but asymmetric, complementarities in leisure in

immigrant couples, such that the marginal valuation of *his* leisure increases when *she* is more at home, but not vice versa.

For native couples, the picture is very different. Here, we identify a small but *positive* labor supply response among male partners, consistent with decreasing returns to home production: *the* marginal value of his time off work decreases when *she* is more at home in response to higher benefits; hence he raises his labor supply.

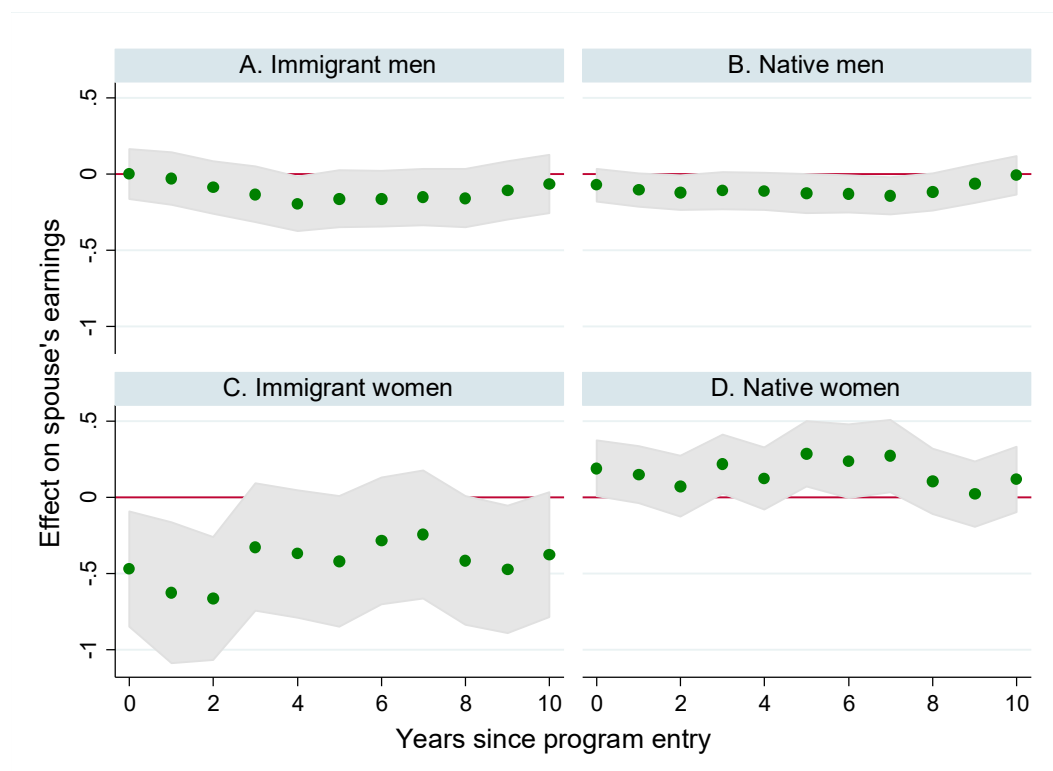


Figure 7. Estimated effects on partner's annual labor earnings of a Euro increase in TDI benefit

Note: Shaded region depicts 95% confidence intervals around point estimates. See also note to Figure 4.

To conclude this section, Figure 8 shows estimates of the TDI benefit effect on household post-tax annual income. It is clear that for both male and female natives, higher benefits make the affected households unambiguously better off economically in the first few years after TDI entry, but leave them largely unaffected over the long haul.

For immigrants, the responses are less clear. The households of male immigrant TDI participants receive higher income in the short run, but in the long run the persistent negative labor earnings effects dominate; hence 5-10 years after TDI entry, the households

are actually worse off economically the higher the level of TDI benefits. For the households of female immigrant claimants, the negative effect on income appears to apply even in the short run. And also for them, the driving force behind the negative income effect is the reduced labor supply immigrant men; i.e., their male partners.

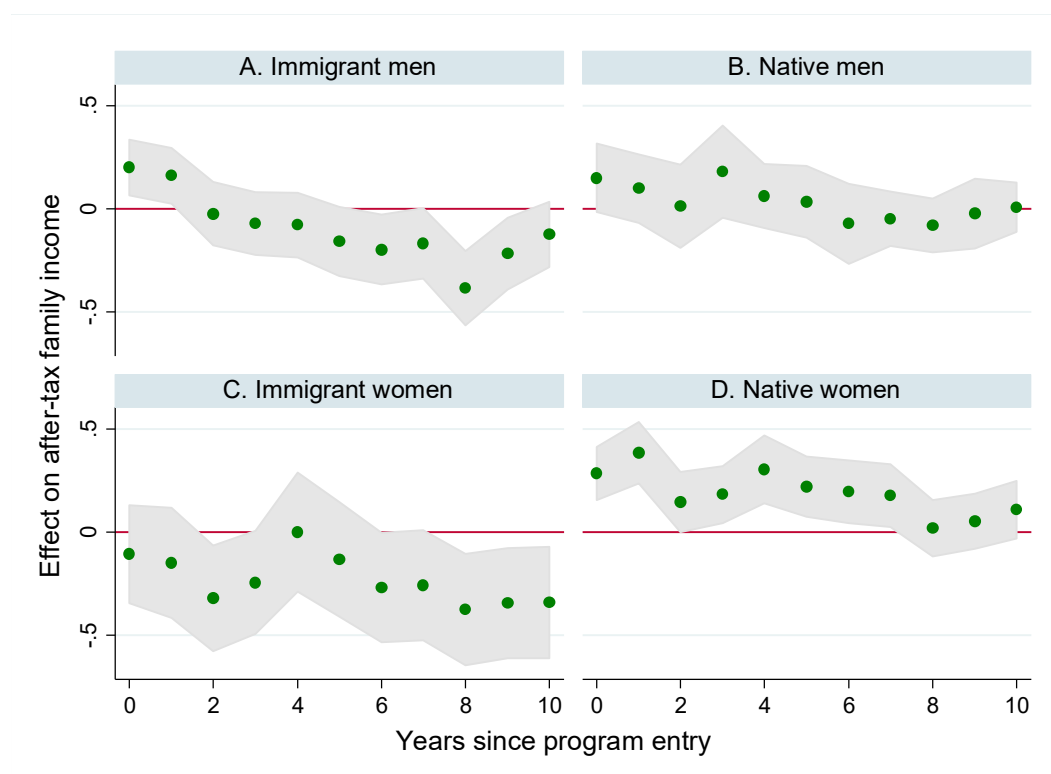


Figure 8. Estimated effects on household after-tax income of a Euro increase in TDI benefit

Note: Shaded region depicts 95% confidence intervals around point estimates. See also note to Figure 4.

9 Why are immigrants more responsive to benefit generosity?

Why is the behavior of immigrants more responsive with respect to TDI benefits than the behavior of natives? Our theoretical discussion in Section 3 highlights that, within a claimant group, the average responsiveness is greater the larger the fraction of its members that are close to indifference between employment and non-employment. Therefore, we expect to find particularly large effects for individuals with relatively low earnings prospects in the labor market and/or high valuation of leisure.

To examine the roles of poorer market opportunities as opposed to higher valuation of leisure, we define two sets of indicator variables grouping individuals according to their

earnings prospects and predicted valuation of non-employment, respectively. We then estimate the behavioral parameters separately for each category, common for immigrants and natives. Next, we examine the estimated immigrant-native response differential accounting for differential effects by earnings potential and preferences for off-work hours. In this exercise, we return to our full sample of TDI claimants, and investigate the direct effects on own labor supply only.

To characterize the claimants' earnings potential, we identify the three best earnings years prior to program entry and compute the average earnings level in these years.⁸ We then divide the immigrant population into quartiles based on these averages, and use the resultant earnings thresholds to categorize natives as well. We define "low earnings potential" as having had previous earnings at a level corresponding to the lowest quartile in the immigrant earnings distribution, while "medium earnings potential" refers to the second or third quartiles of this distribution, and "high earnings potential" to the upper quartile.

To characterize the claimants' predicted valuation of non-employment (NE), we use their marital status and employment status of their partner. We have already seen indications that labor supply responses are stronger for claimants who live with a partner (compare Figures 8 and 6). If such response differentials are related to leisure complementarities in couples, it is conceivable that they also vary with the employment status of the partner. Since employment of the partner is endogenous, we use information on the partner's labor market status at the time of TDI entry only. We define "high value of NE" as having a non-employed (homemaker) partner, "medium value of NE" as having an employed partner, and "low value of NE" as being single. This is of course an extremely crude and imprecise representation of the utility of leisure, yet we assume that it will capture some systematic differences in the valuation of non-employment.

Table 5 provides a description of how immigrants and natives are characterized along these dimensions. By construction, exactly 25% of the immigrant claimants are defined as having low earnings potential. Among natives, only 3.7% of men and 5.1% of women fall into this

⁸ In this exercise we include earnings years up to 12 years prior to entry, but exclude the very last two years; i.e., we use the three best earnings years in the period of [-12,-3] years of the year of entry.

group; see panel A. Hence, if past earnings predict future earnings potentials, native TDI participants have much more to gain from labor market participation than immigrants. Immigrant and native TDI claimants also differ considerably in their family situation, even beyond the partner/single distinction; see panel B. In particular, the fraction with a homemaker partner is more than four times as high for immigrants as for natives.

Table 5: Proxies for valuation of employment and non-employment

	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
A. Valuation of employment: Average of 3 best earnings years (%)				
Low (p1-p25 of immigrant distribution)	25.0	3.7	25.0	5.1
Medium (p26-p75 of immigrant distribution)	50.0	39.4	50.0	45.5
High (p76-p100 of immigrant distribution)	25.0	56.9	25.0	49.4
B. Valuation of non-employment: Family status (%)				
Low (single)	33.1	65.4	30.1	53.3
Medium (employed partner)	30.2	26.0	47.4	41.4
High (partner homemaker)	36.7	8.6	22.4	5.3

Note: Average of three best earnings years is computed from the three highest annual labor earnings obtained between 12 and 3 years prior to the year of TDI entry. The thresholds between low and medium earnings are NOK 79,920 for men and NOK 27,240 for women, and those between medium and high earnings potential NOK 431,078 for men and NOK 316,672 for women. Samples consist of new temporary disability insurance spells of individuals age 27-59 that started between 1999 and 2004.

In order to examine whether differential responses to benefit generosity by pre-earnings level and family structure explains the immigrant-native response differential, we extend the statistical models presented in Section 5. However, to facilitate statistical inferences regarding the difference between immigrants and natives, we estimate somewhat simplified joint models for immigrants and natives, with interaction terms allowing for differential responses. For the hazard rate model, we merge the three non-employment destination states such that the model has only two exit states: employment and non-employment. For the earnings model, we add up all labor earnings obtained during a five-year period after the year of TDI entry into a single average earnings variable. The list of control variables is exactly the same as that used in Section 5, with immigrant interactions included for all

variables except those capturing the differential responses by value of employment and non-employment.

Table 6: Estimated hazard rate elasticities with respect to TDI benefit, based on models with and without interactions with valuation of employment and non-employment

	Men		Women	
	Natives (1)	Immigrant interaction (2)	Natives (3)	Immigrant interaction (4)
A. Without interactions between benefits and value of employment and non-employment				
Transition to employment	-0.312*** (0.068)	-0.368*** (0.161)	-0.096* (0.051)	-0.404*** (0.149)
Transition to non-employment	-0.087 (0.063)	-0.074 (0.121)	-0.163*** (0.054)	0.216* (0.123)
Number of support points in het. dist.		5		4
B. With interactions between benefits and value of employment and non-employment				
Transition to employment				
Baseline (low value of employment/high value of non-employment)	-0.862*** (0.253)	-0.228 (0.162)	-0.305 (0.213)	-0.334** (0.152)
+ medium value of employment	0.198 (0.186)		0.124 (0.148)	
+ high value of employment	0.250 (0.199)		0.271 (0.155)	
+ medium value of non-employment	0.277 (0.189)		0.137 (0.172)	
+ low value of non-employment	0.431** (0.188)		0.001 (0.178)	
Transition to non-employment				
Baseline (low value of employment/high value of non-employment)	0.032 (0.183)	0.174 (0.133)	-0.266 (0.163)	0.190 (0.130)
+ medium value of employment	-0.165 (0.131)		-0.060 (0.110)	
+ high value of employment	-0.375** (0.156)		-0.314** (0.127)	
+ medium value of non-employment	0.055 (0.160)		0.219 (0.143)	
+ low value of non-employment	0.144 (0.151)		0.281* (0.151)	
Number of support points in het. dist.		5		3

*/**/*** indicates statistical significance at the 10/5/1 percent levels. Standard errors are reported in parentheses.

Results from the hazard rate models are displayed in Table 6. In panel A, without interactions, the results for the transition rate to employment are as expected very similar to those based on separate estimations and reported in Table 3. The setup also provides a direct test of differential TDI benefit effects and confirms that immigrant transitions to employment are significantly more responsive to the benefit level than are native transitions. Moving on to the estimates in panel B allowing for differential impacts by the value of employment and non-employment, we first note that there appears to be some important differences in behavioral responses along these dimensions. Although the individual coefficients are imprecisely estimated, their pattern suggests that the employment transition among participants with more favorable earnings prospects and less scope for joint leisure with a partner is less responsive to changes in TDI benefits. Even more important for the interpretation of immigrant responsiveness, when we allow for the employment transition sensitivity to vary with these factors, the estimated immigrant-native response differential drops considerably. For men, the point estimate falls from -0.37 to -0.23 (by 38%), and also becomes statistically insignificant. For women the differential goes from -0.40 to -0.33 (by 18%). These results suggest that the larger behavioral responses found for immigrant claimants to some extent arise from differences in earnings prospects and in the opportunity cost of employment.

For the transition rate to other non-employment states, the results in Table 6 indicate that the average behavioral responses (panel A) are small for all groups, perhaps with the exception for native women. Introducing interactions with employment prospects and valuation of non-employment reveals, however, that there are some behavioral responses for claimants with relatively high past earnings; see panel B. This likely reflects that claimants with high earnings in the past to a larger extent than others are eligible for alternative social insurance programs, such as unemployment and permanent disability insurance; i.e., that they are close to an indifference zone between TDI and other social insurance programs. When TDI benefits become more generous, transitions to other programs drop because they appear most attractive for those with high earnings in the past.

In Table 7, we report the results from the same extension of the linear regression model with average annual labor earnings over a five-year period after TDI entry as the dependent variable. Again, we find that persons predicted to have poor earnings prospects and/or high

valuation of leisure respond much more strongly to more generous TDI benefits. For natives belonging to this group, we estimate that a one Euro increase the TDI benefit reduces average labor earnings over the next five years by 40 cents for men and 32 cents for women. Conversely, for natives with both favorable earnings prospects and low value of non-employment, the estimated earnings responses to higher benefits is close to zero for both men and women (i.e., the sum of the relevant coefficients in Table 7, panel B). Hence, even if higher benefits postpone the transition rate to employment, there is no significant effect on five-year labor earnings for single TDI participants with favorable earnings potentials.

Table 7: Estimated impact TDI benefit on average earnings in the five-year period after program entry (OLS), with and without interactions with valuation of employment and non-employment

	Men		Women	
	Natives (1)	Immigrant interaction (2)	Natives (3)	Immigrant interaction (4)
A. Without interactions between benefits and value of employment and non-employment	-0.097*** (0.030)	-0.219*** (0.080)	-0.056** (0.024)	-0.164** (0.081)
B. With interactions between benefits and value of employment and non-employment				
Baseline (low value of employment/high value of non-employment)	-0.404*** (0.132)	-0.144* (0.086)	-0.317*** (0.112)	-0.103 (0.083)
+ medium value of employment	0.187* (0.107)		0.004 (0.085)	
+ high value of employment	0.310*** (0.110)		0.165* (0.085)	
+ medium value of non-employment	0.057 (0.088)		0.202** (0.084)	
+ low value of non-employment	0.065 (0.086)		0.142* (0.086)	

*/**/*** indicates statistical significance at the 10/5/1 percent levels. Standard errors are reported in parentheses.

Finally, the results in Table 7 again confirm that the immigrant-native response differential declines when we allow for differential responses along other dimensions unevenly distributed among immigrants and natives, such as earnings prospects and the family situation. The immigrant interaction coefficient drops by about 35% for both men and

women. It is important to bear in mind here that our proxy characterizations of earnings prospects and valuation of leisure are crude and subject to considerable measurement error. Were we able to make more precise and reliable characterizations, it is thus likely that the decline in the immigrant-native response differential would be even larger than that uncovered by our analyses.

10 Conclusion

The economic implications of migration are intimately related to host country labor market performance of the immigrants. In many welfare state economies, there has been a tendency for immigrants from low-income countries to perform poorly in the labor market, and thus become overrepresented in social insurance programs. When these programs are redistributive, replacement ratios are larger for individuals with bleak labor market opportunities, and the moral hazard affecting work incentives is potentially more important for immigrants. Since more immigrants face small economic gains from employment relative to receiving social insurance, ambitious welfare state institutions with comprehensive coverage against health and income shocks may enlarge rather than reduce immigrant-native employment gaps.

Using administrative data for Norway, we first compare the income distributions for those with labor market earnings and social insurance transfers, respectively, as their main source of income. Immigrants from low-income countries are more likely to receive transfers from the welfare state and 22.0 percent of immigrant men have social insurance as their main source of income, compared to 11.0 percent of native men. The immigrant-native income differential is much larger for those in employment than in the social insurance claimant group. While employed native men have a disposable (after tax) income that is almost 92 percent higher than those on social insurance, the corresponding differential for immigrants is only 60 percent, suggesting that the economic rewards for being employed are much larger for natives.

A reform of the benefit formula used by the temporary disability insurance (TDI) program enables us to exploit exogenous variation in benefits in order to identify and estimate the causal effect of benefits on employment and earnings. Identical individuals were entitled to different benefits, depending on the exact timing of program entry. We find that higher

benefits reduce the transition rate to employment and prolonged the program spell among participants, and also led to considerably lower labor earnings several years after entry to the TDI program. We find a distinct pattern of greater responses to benefit generosity among immigrants from low-income countries, when compared to natives, for both program exit and subsequent labor earnings. For immigrant women, we also identify a considerable negative labor supply effect on their male partners. According to our point estimates, the cross-effect on their spouses is even larger than the effect on the immigrant women themselves. Thus, employment of immigrant men is affected both directly and indirectly by the generosity of the TDI program. For total household income, the direct and indirect effects imply that whereas household income over the years after TDI entry rises with benefit generosity for natives, it is estimated to decline for immigrants.

Our findings are consistent with a simple theoretical framework in which behavioral responses at the extensive margin reflect heterogeneity in circumstances affecting the value of leisure and in labor market opportunities. Greater responses to benefit generosity are expected among groups (e.g., immigrants from low-income countries) who are located close to the threshold where there are small economic gains from being employed and/or have high utility of non-employment (e.g., due to their family structure). This interpretation of our results is corroborated by our finding that there are stronger behavioral responses also among natives with characteristics similar to those of immigrants.

If policy makers aim at eliminating or at least reducing the negative immigrant-native employment differential, it may thus be necessary to make employment more attractive relative to non-employment for persons with characteristics implying a small utility gain derived from employment. Relevant policies include human capital investment subsidies and in-work benefits. Lower social insurance benefits will reduce program participation and raise employment, but inevitably make insurance against adverse income or health shocks less effective. An activation strategy where social insurance dependency no longer necessarily implies more leisure may offset moral hazard problems without undermining the primary goal of social insurance programs.

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Appendix A: Placebo analysis

As explained in Section 6, the identification strategy used in this paper relies on the absence of systematic outcome trends that are causally unrelated to the level of TDI benefits, yet systematically correlated with the individual factors determining benefit gains/losses. Fevang et al. (2017) assessed the validity of this assumption by means of imposing falsely timed reforms in the middle of the pre and post-reform periods, and then re-estimating their competing risks hazard rate model separately for those entering before or after the true timing of the reform. None of the resultant “placebo” analyses indicated any violation of the identifying assumption. In this appendix, we perform a similar placebo analysis for our annual earnings outcome, yet to increase power we pool the pre and post-reform TDI entrants into a single dataset. The results are provided in Figure A1, which can be compared

directly to Figure 4 above.⁹ As expected, the significant effects identified when we use the correct timing of the reform are now absent. In particular, we see none of the significant and quite substantial negative effects identified for immigrants. This result speaks against the validity of the concern that the results in Figure 4 could have been driven by unaccounted-for differential trends.

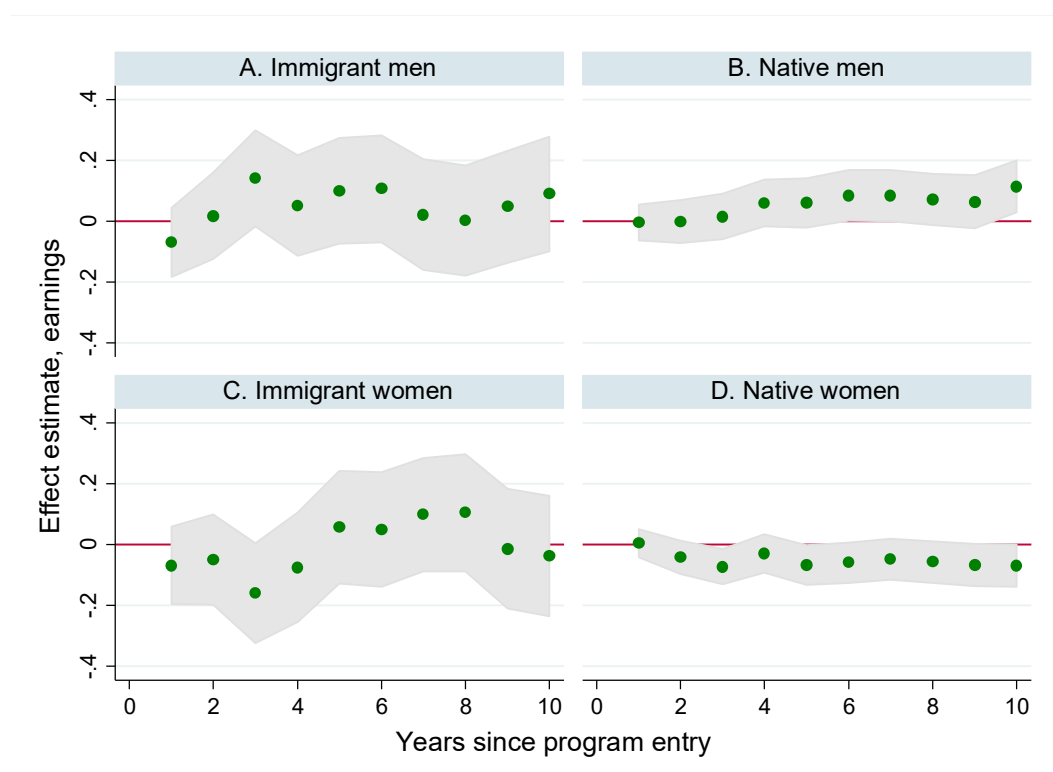


Figure A1. Placebo analyses of effects on annual labor earnings of a Euro increase in TDI benefit

Note: Shaded region depicts 95% confidence intervals around point estimates. See also note to Figure 4.

Appendix B: TDI program entry

As pointed out in Section 5, it is plausible that the reform-initiated changes in TDI benefits also triggered changes in the patterns of inflow into the TDI program. If the benefit level

⁹ Note that we have dropped “year 0” (the year of entry into the program) from Figure A1 as the counterfactual reforms (in contrast to the true reform) have been placed midyear (July 1) to ensure balanced durations of the pre and post-reform periods.

affects entry into social programs, this clearly adds a possible explanation for the immigrant-native employment differential that is of interest in itself. In addition, it may raise questions about the internal validity of the analysis performed in this paper, as effects on the inflow into the program potentially could change the correlation pattern between pre and post-reform benefit levels on the one hand, and unobserved heterogeneity on the other.

In this appendix, we examine empirically the extent to which entry into the TDI program was affected by benefit changes generated by the reform. This is not a straightforward exercise, however, as it is not clear how we should define the population at risk for this transition. Here, we exploit the fact that a considerable fraction of TDI claimants enter the program directly or shortly after having exhausted their 12-month period of sick-pay entitlements. Hence, workers who approach sick-pay exhaustion constitute a major risk population for TDI entry. To study the impact of the TDI benefit level on program entry, we therefore construct a data set consisting of all persons who had exhausted 9 months of their sick-pay entitlements in the period between January 1999 and December 2003, except those who reached this stage of sick pay in the period from July to September 2001.¹⁰ We then define as the dependent variable the incidence of participating in the temporary disability program six months thereafter.

Table A1 offers some descriptive statistics. In total, there are 186,252 sick-pay spells lasting at least nine months included in our analysis data and 47 percent were TDI program participants six months later. As the table shows, TDI benefits under both the old and new sets of computation rules are somewhat higher for natives than for immigrants from low-income countries. Relative to average earnings during the three years prior to the sick pay spell, the post-reform benefit levels are, however, considerably higher for immigrants.

¹⁰ We drop these observations because there is some ambiguity as to which benefit regime they would belong.

Table A1: Descriptive statistics, sick leave samples

	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
Age	40.2	44.3	39.4	43.3
Educational attainment:				
Compulsory	40.0	36.7	47.5	37.4
Upper secondary	34.3	55.2	28.2	50.3
College	15.0	6.2	13.1	10.4
Post graduate	2.3	1.4	2.7	1.5
Unknown	8.5	0.5	8.6	0.3
Employed year before	93.5	96.9	91.8	95.8
Average earnings 3 prior years	345 798	474 920	258 496	338 184
TDI benefits:				
Pre-reform rules	180 038	250 456	135 168	189 006
Post-reform rules	237 255	271 938	197 836	222 194
Implied replacement (pre-tax):				
Pre-reform rules	0.521	0.527	0.523	0.559
Post-reform rules	0.686	0.573	0.765	0.657
Outcomes:				
Temp disability 6 months later	46.2	46.1	45.6	47.7
Employed next year (w/o TDI)	35.9	42.8	35.6	41.1
Number of spells	7 198	99 215	4 208	79 631
Fraction post reform	55.1	51.0	56.9	51.1

Note: Samples consist of sick leave spells of private sector workers age 27-59 that have lasted 9 months, observation period is 1999-2003. Earnings and benefits are inflated to 2013 currency using the social insurance base amount ("G") index.

In order to assess the role that the TDI benefit level has on the propensity to enter the program, we estimate logit models with TDI participation after six months (i.e., three months after potential sick-pay exhaustion) as the dependent variable, and with the structure of explanatory variables as in Equation (1). In Table A2, panel A, we report the elasticities from separately estimated models for immigrants and natives by gender. In general, the point estimates suggest that more generous TDI benefits trigger a larger inflow from long-term sickness. The estimated impacts are small, however, and only one of the coefficients is marginally statistically significant at the 10% level; see panel A. This finding may reflect that the benefit calculation schedules are complicated and that many entrants do not have knowledge about the precise benefit level before they actually enter the program. The estimated negative impacts on employment status next year appear to be larger, and also more statistically significant. However, it is important to bear in mind that the estimates in

Panel B also capture the effects that operate through the influence on exit rates already identified for actual participants.

Viewed as a whole, our interpretation of the findings in Table A2 is that they suggest that entry effects of TDI benefits are small. Paired with the evidence presented in Section 5, Figure 3, where we showed that the distributions of benefit gains (the difference between the benefit levels calculated according to the post-reform and pre-reform schedules) were almost identical for pre-reform and post-reform entrants, the indication is that the potential for disturbing changes in the spurious correlation patterns between the two benefit variables and relevant unobserved characteristics of TDI program participants is unlikely to invalidate our analysis.

Table A2: Benefit effects on TDI entry and employment (logit models)

Outcome:	Men		Women	
	Immigrants (1)	Natives (2)	Immigrants (3)	Natives (4)
A. TDI after 6 months				
Elasticity estimate	0.108 (0.071)	0.046 (0.034)	0.166* (0.099)	0.044 (0.035)
B. Job next year				
Elasticity estimate	-0.154* (0.092)	-0.074* (0.038)	-0.122 (0.124)	-0.083** (0.042)
Number of spells	7 198	95 215	4 208	79 631

Note: In addition to the log post- and pre-reform benefits, the vector of control variables includes log(regional job rate), indicators for children 0-3, 4-6, and 7-12, marital status (2 dummy variables), age (32 dummy variables), county of residence (19 dummy variables), and calendar month (59 dummy variables). */**/** indicates statistical significance at the 10/5/1 percent levels.