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disabilities: Do they work?**

**Sergi Jimenez-Martín, Arnau Juanmarti Mestres,
Judit Vall Castelló**

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Hiring subsidies for people with disabilities: Do they work?*

Sergi Jiménez-Martín[†] Arnau Juanmarti Mestres[‡]

Judit Vall Castelló[§]

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Abstract

This article evaluates the effectiveness of hiring subsidies targeted to people with disabilities. By exploiting the timing of implementation among the different Spanish regions of a subsidy scheme implemented in Spain during the period 1990-2014, we employ a differences-in-differences approach to estimate the impact of the scheme on the probability of DI beneficiaries of transiting to employment and on the propensity of individuals of entering the DI program. Our results show that the introduction of the subsidy scheme is in general ineffective at incentivizing transitions to employment, and in some cases it is associated with an increased propensity of transiting to DI. Furthermore, we show that an employment protection component incorporated to the subsidy scheme, consisting in the obligation for the employer to maintain the subsidized worker in employment, is associated with less transitions to permanent employment, more transitions to temporary employment and more transitions to DI, suggesting that these type of employment protection measures can have undesired effects for people with disabilities.

JEL classification: H24; H55; J08; J14.

Keywords: Disability; Employment subsidies; Labor market transitions; Disability insurance; Differences-in-differences.

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[†]Universitat Pompeu Fabra, Barcelona GSE and FEDEA. E-mail: sergi.jimenez@upf.edu

[‡]Universitat Pompeu Fabra and CRES. E-mail: arnau.juanmarti@upf.edu

[§]Universitat Pompeu Fabra, CRES and IZA. E-mail: judit.vall@upf.edu

I. Introduction

The proportion of working-age individuals relying on Disability Insurance (DI) benefits has increased in the last decades in many OECD countries, reaching high and sometimes unsustainable levels. At the same time, the labor market integration of people with disabilities is very low in many of these countries. In 2008, the DI beneficiary rate among working-age individuals for the mean of OECD countries was 5.8% (OECD 2010), and the employment rate of disabled people for the same countries in the late-2000s was 43% (compared with an employment rate of 75% for their non-disabled counterparts). In Spain, about the same year, the corresponding figures are relatively smaller: a beneficiary rate of 3.8% and an employment rate for those with a disability of 36% (compared with an overall employment rate of about 68%).¹ These figures may underscore a high number of partially disabled individuals that can and want to work but who are unable to find a job. For those individuals, DI benefits are their unique source of income and, if they do not manage to find a job, will probably continue to rely exclusively in income support programs until they enter the retirement system. This high level of dependence of disabled individuals on the DI program and their exclusion from the labor market puts an unnecessary financial pressure on the public accounts. Furthermore, it also undermines the role of work as a source of income and a route to a further integration into the society.

In view of these developments, an international agreement has emerged on the need to transform a disability policy that relies too much on the role of disability benefits into an activation policy able to facilitate and promote the labor market integration of partially disabled individuals. In this line, many countries are increasingly implementing policy measures aimed at promoting the employment of disabled people (OECD 2003). One of these measures, which has gained increasing importance in several countries, are employment subsidies. Employment subsidies are direct payments from the government to the employer that hires a disabled individual. In theory, these subsidies, by reducing the labor costs associated with the employment of disabled workers, increase the labor demand for these workers and, thus, their employment outcomes. The empirical evidence evaluating the effectiveness of these subsidy schemes, however, is scarce and inconclusive.

In this paper, we fill in this gap in the literature by evaluating the effectiveness of an

¹See Jiménez-Martín, Juanmarti and Vall (2016) for a review of DI participation trends in Spain in the last four decades.

employment subsidy scheme targeted towards the disabled implemented in Spain during the last decades, consisting in a one-time lump-sum payment granted to the employer that hires a disabled individual. In Spain, the introduction of this subsidy scheme targeting the disabled has followed a staggered implementation over time among the different Spanish regions (Autonomous Communities²). We exploit this staggered implementation at the regional level to develop a differences-in-differences strategy in order to estimate the effect of the subsidy scheme on the employment outcomes of the targeted disabled population. We use rich administrative data provided by the Spanish Social Security Administration to model employment transitions of all DI beneficiaries over the period 1990-2014. We then estimate the effect of the introduction of the subsidy scheme on the probability of DI beneficiaries of finding a job under each the subsidized employment types.

Our results show that, in general, the subsidy scheme is ineffective at incentivizing transitions to each of the types of employment subsidized (temporary employment, permanent employment and conversions from temporary to permanent employment), although we find significant effects of some of the subsidies in specific population subgroups. In particular, subsidies promoting permanent employment for unemployed individuals are effective at increasing transitions to both temporary and permanent employment for older individuals, and subsidies incentivizing conversions from temporary to permanent employment are effective at promoting that type of conversions for women. We also show that some types of subsidies may be counterproductive in some cases. Specifically, conversion subsidies have a negative effect on the transition rate from temporary to permanent employment for men and for individuals between 36 and 50 years old.

The subsidy scheme incorporates an element of employment protection, consisting in the obligation for the employer to maintain the subsidized worker in employment during a certain amount of time if hired under a permanent contract. Although we show that this measure is effective at protecting subsidized workers against unemployment once they are hired, our results show that, for unemployed individuals, a higher degree of employment protection is associated with a decrease in the probability of being hired under a permanent contract and an increase in the probability of being hired in a tempo-

²Autonomous Communities are the 17 regions that conform the first level of administrative decentralization in Spain

rary basis. These results suggest that employment protection measures of this type may harm the chances of disabled individuals of finding permanent employment in the first place and are indicative that incorporating employment protection measures to subsidy schemes may undermine the effectiveness of the subsidies at incentivizing transitions to employment.

Because hiring subsidies have in theory a direct incidence on the employment prospects of the targeted population, they may affect the decision of partially disabled individuals that are considering the possibilities of whether to work or to turn to Disability Insurance (or both). Because reducing the dependence of the disabled on DI is a policy aim in most countries and an indirect objective of employment measures targeted to people with disabilities, in this paper we also investigate the effect of the subsidy scheme on the propensity of individuals of entering the DI program. Our results show that both the introduction of the subsidy scheme and a higher degree of employment protection are associated with an increase in the transition rate to DI in some cases. Most importantly, we see that these disincentive effects of the employment protection component are concentrated in younger individuals and men, groups for whom a higher degree of employment protection is associated with higher transitions to temporary employment, suggesting that this protection measure may be inducing individuals that are looking for a permanent employment position to turn to DI instead.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the literature on employment subsidies with special focus on subsidies targeted to the disabled. Section 3 describes the structure of the hiring subsidies analyzed in this paper. Section 4 outlines the empirical strategy used to evaluate the effect of the subsidy scheme. Section 5 describes the data and samples used in the analysis and provides descriptive evidence on employment transitions of DI beneficiaries. Section 6 reports the results of the estimation and Section 7 concludes.

II. Literature on Employment Subsidies

Employment subsidies targeted towards disabled individuals can be classified as part of a more general type of employment subsidies aimed at promoting employment of specific disadvantaged groups (low-skilled youth, women, older individuals, welfare recipients, etc.), usually known as targeted or categorical employment subsidies. This type of subsidy has been widely used in the US, and became popular in many OECD countries in the 1980s and 1990s. Several studies have examined its theoretical effects on employment. In a simple model of labor supply and demand, the effective reduction in

the wages employers pay to the targeted group shifts out the demand for those workers, consequently increasing the employment rate of the targeted population³. In practice, however, there are several dimensions related with the design and implementation of these subsidy schemes that could undermine their effectiveness. Low utilization rates due to lack of awareness on the subsidy scheme, high administrative costs, the presence of deadweight-losses (employers using the subsidies to hire individuals they would have hired anyway in the absence of the subsidies) or substitution of subsidized workers by non subsidized ones may be important elements undermining the effectiveness of subsidy schemes in practice. For this reason, it is important to provide reliable empirical evidence on the impact of actual subsidy schemes on the employment of the targeted group. In this line, there is a growing literature evaluating particular subsidy schemes (see Katz (1996) or Neumark (2013) for a review of evaluations of targeted subsidy schemes in the US). Although sometimes these studies find modest employment effects of the subsidy schemes on the targeted population, their results are inconclusive. Most of those studies also often report important deadweight-losses or low utilization rates.

Another potential problem with subsidies targeted to specific disadvantaged groups is the presence of signaling effects. Targeting subsidies to specific groups with certain characteristics often regarded as negative by employers may act as a signal of a lower productivity of the subsidized applicant. This negative signaling effect may be counter-productive and may result in subsidies harming the employment chances of the targeted population. This could become especially relevant in the case of subsidies targeted to disabled individuals. The direct incidence of disabling conditions on the productivity of the worker is probably an important determinant affecting hiring decisions. In this context, disclosure of the disabling condition (induced by the presence of the subsidy scheme) may harm the chances of the disabled applicant of finding a job.

The existence of many potential elements undermining the theoretical positive employment effects of subsidy schemes targeted to the disabled, therefore, makes it specially important to provide empirical evaluations of actual subsidy schemes. These type of evaluations are, however, very scarce in the economic literature. Furthermore, the few studies that exist are inconclusive, finding opposing results. To the best of our knowledge, there are only five studies evaluating particular subsidy schemes targeted to disabled in-

³Some studies analyzing the theoretical impacts of wage subsidies are Kaldor (1936), Hamermesh (1978), Phelps (1994) and Snower (1994).

dividuals. Two of them use experimental approaches to evaluate the effect of disclosing entitlement to a subsidy scheme on the probability of receiving a call-back. Deuchert and Kauer (2013) report the results of a field experiment in which disabled participants write real applications to job interviews. For a group of adolescents at the end of a vocational education and training program and for a group of clients of job coaching services, the authors randomize among applications the disclosure of entitlement to an employment subsidy provided by the Swiss Disability Insurance program. Their results show that disclosing entitlement to the subsidy scheme has no significant effect on the proportion of call-backs received. However, the authors are able to separate the total effect into an incentive effect (the effect of the subsidy given that the individual is disabled) and a signaling effect (the effect of disclosing the disability). When doing so, they find a statistically significant positive incentive effect and a nonsignificant (negative) signaling effect. These results provide evidence about the potentially strong importance of signaling effects in undermining the effectiveness of employment subsidies for disabled individuals. However, the low number of participants in the study (39 participants writing 233 job applications in one sample, 13 participants writing 151 job applications in the other sample) casts doubts on the statistical power of the results.

A similar exercise is undertaken by Baert (2016). The author reports on the results of a field experiment in which pairs of identical fictitious applications of male graduates (identical except that one of the applicants discloses a disabling condition) are sent to employers. Additionally, the author randomize among the pairs of applications the disclosure of entitlement to the Flemish Supporting subsidy for the disabled applicant, a wage subsidy amounting to between 20% and 40% of the total wage cost. The results show that call-back rates were significantly lower for the disabled applicant, but this difference in call back rates between disabled and non-disabled applicants was not affected by the disclosure of entitlement to the subsidy scheme. Although the author does not provide specific evidence, he argues that the lack of effect of the subsidy scheme could be attributed to a signaling effect as well as to red tape costs in which the employer has to incur when applying for the subsidy.

The other three existing studies evaluating the effectiveness of employment subsidies targeted to disabled individuals exploit natural experiments in which the introduction or the reform of a particular subsidy scheme affects only a particular group of individuals. Datta Gupta and Larsen (2010) exploit plausibly exogenous variation arising from the introduction of the Danish *Flexjob* Scheme in Denmark. This program provides a wage subsidy amounting to $1/3$, $1/2$ or $2/3$ of the wage depending on the degree of working capacity lost. The authors take advantage of the specific targeting of the subsidy

scheme to long-term disabled individuals without a loss in working capacity to design a triple differences strategy and find a large increase in the employment probability of 33 percentage points for treated disabled individuals as a result of the introduction of the subsidy scheme.

In a more recent paper, Datta Gupta, Larsen and Thomsen (2015) evaluate the effect of a reduction in the amount of the subsidy of the same program (the Danish *Flexjob* Scheme) on the composition of the new subsidized hires. The authors take advantage of the specific targeting of the reform to governmental companies to develop a differences-in-differences strategy using governmental companies as the treated group and other types of companies in the public sector as a control group. They find that the reduction in the subsidy amount increased the proportion of new hires that came from within the same firm (relative to those that came from unemployment). They argue that under the uncertainty associated with the hiring of disabled individuals, a decrease in the financial incentives makes employers less willing to take the risk of hiring individuals from unemployment, and more prone to resort to employees for whom their productivity is already known.

Finally, Vall Castelló (2012) evaluates a reform in a Spanish program that provides deductions to the Social Security contributions for employers that hire disabled individuals. The reform increased the amount of the deductions available when hiring disabled women. The author develops a differences-in-differences strategy using women as the treated group and controlling for differential pre-existing employment trends between women and men. She finds that the rise in the deductions to the Social Security contributions for disabled women resulted in a significant increase in their employment rate. Specifically, she estimates an average elasticity of employment with respect to Social Security contributions of 0.08 for totally disabled women and 0.14 for partially disabled

women⁴.

A problem with these previous studies evaluating subsidy schemes targeted to the disabled is the existence of large opposing results, with the experimental studies finding no effects of the subsidy schemes on the employment outcomes of the disabled targeted populations, and the observational studies using differences-in-differences approaches finding significant and sometimes very large effects. In our understanding, several issues potentially affecting the internal and external validity of those studies may be contributing to those large differences. First, most of the studies are limited to specific and sometimes narrow groups of disabled individuals (a group of adolescents at the end of a vocational education and training program, a group of clients of job coaching services, long-term disabled without loss in working capacity and women). Second, the experimental studies are only able to evaluate the effects on the first stage of the recruitment process (call-back rates). Finally, the observational studies using differences-in-differences strategies use demographic characteristics of the disabled populations (length of the disability, degree of working capacity reduction and gender) to construct the treatment and control groups. The influence of those characteristics on the employment outcomes of the disabled populations may invalidate the identification assumptions required in classical differences-in-differences strategies.

In this paper, we contribute to this literature on several dimensions. First, by using a large administrative dataset provided by the Social Security Administration, we are not limited to specific population subgroups and are able to evaluate the effect of the subsidy scheme on (on a representative sample of) all the population of DI beneficiaries. This is important given the potential presence of substitution effects of subsidy schemes between subsidized and non subsidized individuals (or between different subgroups of subsidized

⁴There are other studies that evaluate the effect of employment subsidies implemented also in Spain, but they are focused on subsidies targeted to the general population. García-Pérez and Rebollo (2009) evaluate the effectiveness of regional hiring subsidies directed at incentivizing permanent employment in the general population. Using the same data and a similar differences-in-differences approach to the one we use in this paper, the authors find that the subsidies have a positive but small effect on the probability of transiting to permanent employment. Relatedly, Hernanz, Jimeno and Kugler (2003) and Arellano (2005) evaluate the employment effects of the 1997 and 2001 Spanish labor market reforms, which reduced payroll taxes and dismissal costs for permanent contracts. However, given the special characteristics of the disabled population, we should be cautious in extending to this particular subgroup the conclusions of studies analyzing subsidy schemes targeted to the general population.

individuals). Covering all DI beneficiaries also contributes to the generalization of our results. Second, the use of panel data allows us to estimate the effect of the subsidies on transition rates to employment (the probability of being hired), which is the direct outcome that this type of subsidies are trying to incentivize. Third, by using regional variation arising from the differential implementation of the subsidy scheme over the different Spanish regions, we are able to exploit a plausibly more exogenous source of variation than those used in the previous observational studies that relied on differences in demographic characteristics.

Fourth, we examine the effects of a component of employment protection that characterizes the hiring subsidy scheme in Spain, namely, the obligation for the employer to maintain the subsidized worker in employment for a certain amount of time if hired under a permanent basis. Previous studies have shown that employment protection legislation that imposes firing costs on the employer may harm the employment outcomes of the protected populations, specially in the case of the youth or disadvantaged groups (see Skedinger (2011) for a review of studies). In the case of the disabled, a set of papers have shown that the Americans with Disabilities Act (ADA) in the US, a law that requires employers to provide accommodations for disabled workers and prohibits employment discrimination on the grounds of disability, has indeed decreased the employment rates of the disabled, with some authors pointing to the employment protection component of the law playing an important role in causing the negative employment effects (De Leire 2000; Acemoglu and Angrist 2001). In this paper, we contribute to previous literature by analyzing the consequences of incorporating employment protection measures in subsidy schemes intended to improve employment outcomes.

Finally, to the best of our knowledge, this is the first study that analyzes the effect of employment subsidies for the disabled on the propensity of individuals to participate in DI. Concerns about the financial sustainability of DI programs and a very low attachment to the labour market of disabled individuals has driven disability policy towards efforts to disincentivize or reduce participation in DI in many developed countries in the last decades. In this line, there is a growing literature that investigates the effect on DI (and employment) participation of particular characteristics of the DI system such as the eligibility criteria or the degree of screening stringency (Gruber and Kubik 1997; Autor and Duggan 2003; De Jong, Lindeboom and van der Klaauw 2011; Staubli 2011; Johansson, Laun and Laun 2014), the generosity of the system (Marie and Vall Castelló 2012), or particular policies providing financial or in-kind work incentives to DI beneficiaries (Moffit and Hoynes 1999; Autor and Duggan 2006; Adam, Bozio and Emmerson 2010; Benítez-Silva, Buchinsky and Rust 2010; Kostol and Mogstad 2014). Much less research

exists, however, on the DI participation effects of policies more specifically and directly targeted towards increasing the employment of disabled individuals, and we know of no study investigating this issue in the case of employment subsidies. In this paper, we further contribute to this literature by estimating the effect of the subsidy scheme on the propensity of individuals of entering the DI system in Spain.

III. Employment Subsidies for People with Disabilities in Spain

Employment subsidies specifically targeted to disabled individuals were established in Spain at the national level in 1981 with the implementation of the Royal Decree 1327/1981⁵. Two types of subsidies were implemented. First, the decree established deductions to the Social Security contributions that employers had to pay for the employment of a disabled individual, consisting in a deduction of 70% for disabled individuals less than 45 years old and 80% for disabled individuals 45 years old or more. Second, the decree established a lump-sum one-time subsidy (hereafter, hiring subsidy) of 1803 euros granted to the employer at the time that he/she hires the disabled individual. Both subsidies were entitled to individuals that had a disability certificate⁶ with a degree of disability of 33% or more and who were hired under a permanent contract. From that point onwards, all disabled individuals in Spain were eligible for those subsidy schemes.

In Spain, beginning in the late 1990's, there has been a process of progressive decentralization to the different regions of the institutions in charge of implementing active labor market policies. While there is still a central authority in charge of designing labor market policies applying to all the Spanish territory, the decentralization has given regions competences (ie. ability to regulate) to design and implement their own policies that apply only to their territory. In terms of employment subsidies for disabled individuals, the different regions have taken advantage of this gain of legal power to modify or extend the subsidy scheme that was implemented at the national level. Importantly, because regions cannot legally modify the structure of Social Security programs, this mod-

⁵In this paper, we focus on employment subsidies incentivizing employment in the ordinary private market. We do not analyze employment subsidies targeted to disabled individuals that are employed in companies of sheltered employment.

⁶The disability certificate is the main administrative recognition of a disability in Spain, and provides access to several rights and services. Individuals are assessed by a technical team, which determines the condition of disability and assigns a degree of severity ranging from 33% to 100%.

ifications have been limited to the hiring subsidies. The scheme providing deductions to Social Security contributions has been identical in all regions since its first national implementation in 1981. Paralleling the decentralization in competences, regions have progressively made two major modifications to the national scheme of hiring subsidies. First, they have extended the hiring subsidies to foster two other forms of employment (temporary employment and conversions from temporary to permanent employment) besides the permanent employment contracts incentivized at the national level. Second, they have increased the amount of each type of subsidy, often making it conditional on the gender and/or the degree of disability of the individual.

As a result, one of the components of the employment subsidies for disabled individuals in Spain (the one-time lump-sum hiring subsidies) presents variation over the different regions that can be exploited to evaluate the effect of the scheme. Over the different regions, the hiring subsidies are differentiated according to the type of employment they incentivize. There are three types of subsidies: subsidies incentivizing temporary employment of unemployed individuals; subsidies incentivizing permanent employment of unemployed individuals; and subsidies incentivizing conversions from temporary to permanent employment. The subsidy schemes are published as laws in the respective Official Gazette of each region, which specify the structure and characteristics of the subsidies. The schemes are also usually publicized in the respective regional employment agencies. We have reviewed the Official Gazette of each region from 1990 to 2014 and registered whether each of the three types of subsidies was available in each region and time period. If the subsidy was available in a particular region and time period, we have also recoded the most important characteristics of the scheme (amount of the subsidy, length of employment protection, etc.). Most importantly for our purposes, the introduction of each of these three types of subsidies has been progressive over time in the different regions. For each type of subsidy, there are regions that have never implemented the scheme, while the other regions differ in the timing they first establish the subsidy scheme. To visualize the evolution in the timing of implementation over the different regions, Figure 1 shows, for each type of subsidy, a time series of the number of regions implementing the subsidy over the period 1990-2014. As can be seen, no region was implementing any of the types of subsidies in 1990. From that point onwards, for each type of subsidy, there is a gradual increase in the number of regions imple-

menting the scheme⁷. As will be explained in a later section, we take advantage of this staggered implementation of the subsidy scheme among the different regions to design a differences-in-differences approach in order to estimate the effect of the scheme on the employment outcomes of the targeted disabled population.

Because the subsidies implemented in each region are modifications or extensions to the scheme implemented at the national level, most characteristics of the scheme are identical in all regions. The subsidy is granted to the employer at the moment he/she hires an individual who is in a possession of a disability certificate with a recognized disability of at least a 33% degree. Subsidies are financed by the respective regional governments with their own regional government funds. The amount of the subsidy is different in each region, and sometimes it also differs depending on the gender and/or the degree of disability of the individual⁸. To gauge the importance of the subsidies, Figure 2 presents a time series of the mean amount of each type of subsidy for the regions that do implement the subsidies over the period 1990-2014, and Figure 3 presents a time series of the percentage that amount represents out of the disabled annual wages. The mean amount over our analysis period of the subsidies incentivizing permanent employment of unemployed individuals is 4597 euros, which represents a 28% out of the annual wages of disabled permanent employees. For the subsidies incentivizing temporary employment, the mean amount is 1555 euros, 11% of the annual wages of disabled temporary employees. For the subsidies incentivizing conversions from temporary to permanent employment, the mean amount is 3948 euros, 24% of the annual wages of disabled temporary employees.

The subsidy scheme incorporates an important element that provides employment protection to the individuals hired under the scheme. For the individuals that are hired in a permanent basis (either from unemployment or from temporary employment), the scheme obliges the employer to maintain the subsidized worker in employment during a certain amount of time. If the employer fires the worker, he/she has to reimburse the

⁷In the case of hiring subsidies incentivizing permanent employment for unemployed individuals, the subsidy is implemented at the national level during all of our study period. Therefore, in this case we consider that a region is implementing this type of subsidy only when the amount of the subsidy in the region is higher than the amount implemented at the national level

⁸Some regions differentiate the amount of the subsidy on the grounds of gender and degree of disability. All regions that make these distinctions differentiate between two degrees of disability: individuals with a physical disability with a degree of 33% or more; and individuals with a physical disability with a degree of a 66% or more or a mental disability with a degree of 33% or more.

subsidies received when the hiring took place. To evaluate the effect of this employment protection component of the subsidy scheme, we cannot exploit differential timing of implementation of the measure because it has been in place since the first introduction of the scheme at the national level in 1981. We can, however, exploit regional variation in the intensity of the protection. When it was established, the employment protection measure required employers that hired a disabled individual in a permanent basis to maintain the subsidized worker in employment during two years. However, possibly aware of the potential importance of the measure, some regions have changed the length of employment protection that applies in their territories. Figure 4 shows a time series of the different lengths of employment protection implemented by the different regions during the period 1990-2014. The range in the length of employment protection over the different regions and time periods in our study period ranges from 5 quarters to 20 quarters.

IV. Data, Samples and Descriptive Evidence

A. Data

We use the Continuous Sample of Working Lives (CSWL), which is an administrative dataset constructed by the Social Security Administration from its official contributory register data of individuals. In each wave from its design in 2004 until the current year, the dataset contains information for a 4% sample of all the individuals that in that year contributed to the Social Security Administration (either by working or by receiving unemployment benefits) or that were receiving contributory benefits (old age, survivor or disability benefits). For each of these individuals, it is possible to reconstruct his/her entire contributory history from his/her first day of contribution. The information provided contains the particular characteristics of the employment situation of the individual if he/she is working (type of employment contract, sector of employment, characteristics of the firm such as number of employees or type of legal status, contributory group, etc.), the particular characteristics of the unemployment situation if he/she is unemployed (type and amount of the unemployment benefit, etc.), the characteristics of his/her beneficiary status if he/she is receiving contributory benefits (type and amount of the benefit, etc.) and demographic characteristics such as age, gender and education level. Furthermore, because this information is available for each individual for his/her entire contributory history, it is possible to construct variables that can capture in a precise way the past labor market experience of that individual in any particular point in time.

For each year wave, therefore, the dataset contains information on a 4% sample of all the individuals that in that year have a relationship with the Social Security administra-

tion. We have taken all DI beneficiaries that can be found in year waves from 2007 to 2014 and have reconstructed their entire contributory histories from 1990. Then, on the basis of the observed as well the retrospective information we have constructed a panel of quarterly transitions from the first quarter of 1990 to the fourth quarter of 2014. The resulting panel contains periodic information on their employment situation, the characteristics of their DI status, and demographic characteristics, from which we will identify and model quarterly employment transitions⁹. From this panel, we construct two separate samples, according to the target population of each type of employment subsidy studied. On the one hand, for the subsidies incentivizing temporary or permanent employment of unemployed individuals, we construct a sample containing all unemployed DI beneficiaries in each time period, in which we will model transitions from unemployment to either temporary or permanent employment. On the other hand, for the subsidies aimed at promoting the conversion from temporary to permanent employment, we construct a sample of all the DI beneficiaries that are working under a temporary contract in each time period, from which we model the transitions from temporary employment to either permanent employment or to unemployment.

Finally, to evaluate the effect of the subsidy scheme on the propensity of individuals of transiting to DI, we use the CSWL to construct a representative sample of the population (both disabled and non-disabled individuals). To that end, we take a representative 5% of non-DI beneficiaries present in any of the year waves 2007-2014 and reconstruct their contributory histories from their first day of contribution. We then add these individuals to our panel of DI beneficiaries (but before getting the benefit) to form a quarterly panel consisting in a representative sample of the population from the first quarter of 1990 to the fourth quarter of 2014, from which we model transitions to DI. Regressions will be estimated using weights in order for the non-disabled individuals in the panel to represent their actual proportion in the original sample.

B. Samples

The sample of unemployed individuals consists of 1170894 observations distributed along the one-hundred quarters that form our study period (from the first quarter of 1990 to the fourth quarter of 2014). The sample of temporary employees consists of 66579 observations and the sample of non-disabled individuals consists of 5646966 observations.

⁹An individual enters the panel in the moment he/she starts receiving DI benefits

Each sample is restricted to working-aged individuals (individuals aged 16-64) and we have excluded from the samples of DI beneficiaries individuals classified as severely disabled by the Social Security¹⁰, because the degree of disability of these individuals strongly limits their employment possibilities. It is important to note that in the CSWL it is not possible to identify if an individual is actively looking for a job. We observe whether the individual is receiving unemployment benefits, but this is not sufficient to identify the condition of activity because there are individuals that are not receiving unemployment benefits but who are looking for a job. Therefore, our sample of unemployed individuals includes also inactive individuals who are not actively looking for a job. This observation is important, because in general, one of the conditions imposed by the different regions to be eligible for the subsidy schemes is to be registered as a job seeker in a public employment agency. However, this should not affect our results, because all individuals registered in an employment agency will be identified as unemployed in our sample, and it may be the case that inactive individuals are induced to register as job seekers because of the existence of the hiring subsidies.

It is also worth commenting on how the subsidy scheme specifies the eligibility criteria in terms of the disability condition of the individual. In general, regions specify that subsidies are granted to individuals with a disability certificate with a degree of disability of at least a 33% (see section III). Here, we evaluate if hiring subsidies are effective at incentivizing employment transitions of DI beneficiaries, and with our data we cannot identify if an individual is in possession of a disability certificate. However, this fact should not affect our results. First, in many of the cases, the subsidy schemes specifically indicate that individuals that are receiving disability benefits are also eligible. Second, in Spain DI beneficiaries are by law automatically entitled to have a disability certificate and receive all rights and services it entails, including therefore the right to be eligible for the hiring subsidies (even if this is not specifically indicated in the subsidy scheme).

C. Descriptive Evidence

In this section we review key facts about the transitions of unemployed DI beneficiaries to either temporary or permanent employment and the transitions of DI beneficiaries

¹⁰The Social Security establishes three degrees of disability according to the reduction in the working capacity lost by the individual as a result of the disability: partial disability, total disability and severe disability. These degrees, in turn, affect the amount of the benefit the individual receives.

in temporary employment to a permanent employment position, which are the transitions that the subsidy scheme is intended to incentivize. Although in this paper we evaluate the effectiveness of hiring subsidies targeted to disabled individuals on the transitions to employment of the targeted disabled population, for comparative purposes in this section we also provide descriptive statistics for a sample of non-disabled individuals. Figure 5.A presents the evolution over time of the transition rates from unemployment to both temporary and permanent employment for disabled and non-disabled individuals, and Figure 5.B shows the same transition rates in the year 2014 differentiated by region. A crucial observation is that there is substantial variation across regions in the transition rates to both temporary and permanent employment, variation that seems even more pronounced for disabled individuals. In this paper, we analyze if these regional differences can be accounted for by differences in hiring policies across regions.

Figure 6 explores the same dimensions than Figure 5 but in relation to the conversion rate from temporary to permanent employment. Figure 6.A presents the evolution over time of contract conversions for both disabled and non-disabled individuals. Note that the aggregate trends are almost identical for both populations, which may be an indication that the disabling condition plays no role in hiring decisions once the individual is employed, probably because of a reduction in the uncertainty faced by the employer regarding the productivity of the disabled worker. In turn, this may suggest that there is no necessity to provide incentives targeted to disabled workers once they are employed. In Figure 6.B we see that there are also large differences across Spanish regions in the conversion rate from temporary to permanent employment. Again, in this paper we analyze if these differences are the result of differences in hiring policies across regions.

V. Empirical Strategy

A. Transitions to Employment Alternatives

Our aim is to estimate the effect of the hiring subsidies on the probability of the disabled targeted population of finding a job under each of the subsidized employment types (either temporary or permanent employment for unemployed individuals and conversions from temporary to permanent employment for temporary employees). We use a competing risk multinomial logit approach to model the transitions of DI beneficiaries to the different employment alternatives. Then, for each of the three types of subsidies, we exploit the staggered implementation of the scheme among regions to estimate differences-in-differences style regressions of the form:

$$P_{itr}^j = \beta_0^j + \beta_1^j \text{HiringSubsidies}_{itr} + \beta_2 \text{QuartersofProtection}_{tr} + \beta_3^j X_{itr} + \delta_t^j + \gamma_r^j + \sum_{r=1}^{17} \eta_r^j \text{Region}_r \text{Trend}_{tr} + \alpha^j UR_{tr} + v_{itr}^j$$

Where P_{itr} is the logarithm of the ratio of the probability of transiting to a particular employment alternative over the probability of remaining in the current state, and j refers to a particular employment alternative. Because the different types of subsidies apply to different populations, two different types of models are estimated. For the subsidies incentivizing temporary or permanent employment for unemployed disabled individuals, the model is estimated on our sample of unemployed disabled individuals, and in this case $j = (ut, up)$, where ut refers to the alternative in which the individual transits from unemployment to temporary employment and up to the alternative in which the individual transits from unemployment to permanent employment. In this case, the base category corresponds to the alternative in which the individual remains in unemployment. For the subsidies incentivizing conversions from temporary to permanent employment, the model is estimated on our sample of temporary employees, and in this case $j = (tp, tu)$, where tp refers to the alternative in which the individual transits from temporary employment to permanent employment and tu to the alternative in which the individual transits from temporary employment to unemployment. In this case, the base category corresponds to the alternative in which the individual remains in temporary employment.

In each model, subscript i refers to a particular individual, subscript t to a particular time period and subscript r to a particular region. $\text{HiringSubsidies}_{itr}$ is an indicator variable equal to 1 for regions and time periods in which the particular subsidy scheme is available. Therefore, β_1^j captures the effect of the introduction of the hiring subsidies on the transition rate to each of the employment alternatives. All models include year fixed effects (δ_t^j) to control for specific reforms of the subsidy schemes implemented at the national level as well as for other national policies. They also include region fixed effects (γ_r^t) to control for region specific factors such as other disability policies implemented at the regional level. To control for potential differential pre-trends over the different regions, regressions include region-specific linear time trends ($\text{Region}_r \text{Trend}_{tr}$ for each region). Regressions also include the unemployment rate in each region and time period (UR_{tr}) to control for differential business cycle shocks. Standard errors are clustered at the region level to deal with serial correlation (Bertrand, Duflo and Mullainathan 2004).

We additionally include in the models a set of individual time-varying predetermined covariates (X_{itr}) that control for demographic characteristics of the individuals, for char-

acteristics of their disability status, for characteristics of their unemployment or employment situation and for their degree of labor market experience. Table 1 provides a description of all the individual and aggregate controls included in the regressions and Table 2 provides descriptive statistics of these variables for our estimation samples.

Finally, $QuartersofProtection_{tr}$ is used to measure the effect of the employment protection component of the subsidy scheme. For each region and time period, the variable measures the number of quarters the individual must be maintained in employment if hired in a permanent basis. Therefore, β_3^j measures the effect of an additional quarter of employment protection on the transition rate to each of the employment alternatives.

B. Transitions to Disability Insurance

To evaluate the effect of the subsidy scheme on the probability of entering to the DI program, we estimate the same specification applied to the sample of non-disabled individuals. In this case, we are interested in estimating the effect of the hiring subsidies on the transition rate to DI, and therefore we estimate a linear probability model. That is, our model reduces to a binary discrete choice model, where the dependent variable is a dummy variable that takes the value one if the individual transits to the DI program between time periods $t-1$ and t . In this case, our differences-in-differences style specification is the following:

$$Q_{itr} = \varphi_0 + \varphi_1 HiringSubsidies_{tr} + \varphi_2 QuartersofProtection_{tr} + \varphi_3 X_{itr} + \delta_t + \gamma_r + \sum_{r=1}^{17} \eta_r Region_r Trend_{tr} + \alpha UR_{tr} + v_{itr}$$

In this context, we consider several specification alternatives varying the type of hiring subsidy included in the specification. As stated above, regressions will be estimated using weights in order for the non-disabled individuals in the panel to represent their actual proportion in the original sample.

VI. Results

A. Effect of Hiring Subsidies on Transitions to Employment

Table 3 shows the results of the estimation of the multinomial logit models evaluating the effect of hiring subsidies on the transitions to employment. The different columns show the model estimated for each type of subsidy (subsidies incentivizing temporary

employment of unemployed individuals, subsidies incentivizing permanent employment of unemployed individuals, and subsidies incentivizing conversions from temporary to permanent employment). We only show the coefficients on the policy variables of interest, that is, the dummy variable indicating the availability of hiring subsidies and the variable indicating the number of quarters the employer has to maintain the subsidized worker in employment if hired in a permanent basis (quarters of protection). We show the effects on the relative risk ratios (RRR) and the marginal effects on the predicted probabilities¹¹ The marginal effects are calculated at the means of all covariates and expressed as percentage increases in the respective transition probabilities. In particular, for the subsidy variable, the marginal effect refers to the percentage increase in the respective transition probability that results from the introduction of the corresponding type of subsidy. For the quarters of protection, the marginal effect refers to the percentage increase in the respective transition probability that results from one additional quarter of employment protection.

The coefficients on the subsidy variable for each type of subsidy are all not statistically different from 0, indicating that the introduction of each of the subsidy schemes has no impact on the transition rate to the types of employment they try to incentivize. We do find, however, a significant effect of the employment protection component of the subsidies. In particular, for unemployed individuals (columns 1 and 2), a longer period of obligation for the employer to maintain the subsidized worker in employment if hired in a permanent basis is associated with more transitions to temporary employment and less transitions to permanent employment. Controlling for the existence of subsidies incentivizing permanent employment (column 1), an additional quarter of protection is associated with a significant 1.07% increase in the probability of being hired under a temporary contract. Controlling for the existence of subsidies incentivizing temporary employment (column 2), an additional quarter of employment protection is associated with a significant 0.89% increase in the transition rate to temporary employment and with a significant 1.58% decrease in the probability of being hired with a permanent contract.

These results suggest that imposing difficulties for employers in their freedom to

¹¹Relative risk ratios are the ratios between the probability of transiting to each of the employment alternatives and the probability of remaining in the corresponding employment state (base category). Marginal effects refer to the direct effect on the predicted probability of transiting to the corresponding employment alternative.

terminate a permanent employment relationship induces them to hire less disabled individuals in a permanent basis in the first place, and makes them hire the individual in a temporary basis instead. Therefore, this type of employment protection measure reduces the chances of disabled individuals of achieving a permanent employment position and makes them work in a temporary basis, something probably less attractive for them due to the higher instability and often worse working conditions of this type of employment. Of course, the main objective of this measure is to protect disabled workers against unemployment and incentivize longer employment relationships, possibly offering protection against unfair dismissal or discrimination on the grounds of disability. To see if the measure is effective in this regard, we investigate if it actually protects already employed workers against unemployment. Using the CSWL, we construct a panel of permanent employees during our study period (1990-2014). Unfortunately, we cannot directly identify if the permanent employee is actually entitled to the employment protection offered by the subsidy scheme. We can, however, see if the employee has a contract that specifically recognizes that he/she is disabled (a disability contract). This type of contract is designed in order to recognize several rights and benefits the employee is entitled to because of his/her disability (including, but not limited to, hiring subsidies). Therefore, all disabled employees that were hired under the subsidy scheme will arguably have a disability contract. Using the sample of permanent disabled employees, we estimate the effect of having a disability contract on the probability of permanent disabled employees of transiting to unemployment. The results are presented in Table 4. Indeed, having a disability contract reduces the probability of transiting to unemployment by 3.537 percentage points, a reduction of 28.88% in the transition rate to unemployment with respect to employees without a disability contract (that have a 12.25 pp probability of transiting to unemployment).

These results suggest that the employment protection component of the subsidy scheme is actually effective at protecting workers against unemployment once they are hired. The net results of this measure are unclear, however, if it reduces the chances of unemployed individuals of being hired in the first place, as suggested by our results. In addition, it could be the case that tying this type of protection measure to the subsidy scheme is undermining its effectiveness at incentivizing transitions to employment, contributing to the lack of effect that we find. Unfortunately, because the employment protection component of the subsidy scheme is present in all regions and time periods of our analysis, we are unable to analyze the direct impact of the measure on the effectiveness of the subsidy scheme at incentivizing transitions to employment. However, the evidence we provide regarding the negative effect of a higher degree of employment protection on the prob-

ability of disabled individuals of finding a permanent employment position is indicative that the measure may indeed play an important role in explaining the ineffectiveness of the subsidy scheme.

B. Heterogenous Effects

Because the results for the general population of DI beneficiaries presented above may underscore differences among particular subgroups, we provide the results differentiated by age and gender. Table 5 presents the same models estimated for three age groups (ages 16-35, ages 36-50 and ages 51-64), and Table 6 for both genders. For younger individuals (ages 16-35), the hiring subsidies are ineffective at incentivizing transitions to employment. Notably, the disincentive effect of the employment protection component is significant for this age group, with additional quarters of protection incentivizing more transitions to temporary employment in the sample of unemployed (columns 1 and 2) and less transitions to permanent employment in the sample of temporary employees (column 3). Because, from the employer point of view, younger individuals present more uncertainty in their productivity and have longer future career lengths, it is reasonable that the disincentive effects of the employment protection measure are stronger for them.

For middle aged individuals (ages 36-50) subsidies are also not effective, and some types of subsidies even have a significant negative effect on the transition rate to the employment type they try to incentivize. In particular, the introduction of hiring subsidies encouraging transitions from temporary to permanent employment significantly reduces the probability of transiting from temporary to permanent employment by 15.96%. We do find a significant and positive effect of the introduction of the subsidy scheme for older individuals (ages 51-64). In particular, the introduction of the subsidies incentivizing permanent employment for unemployed individuals increases the probability of transiting from unemployment to temporary employment by 10.80% and the probability of transiting from unemployment to permanent employment by 35.50%. Notably, in this case in which the hiring subsidies seem to be effective at motivating transitions to employment, the employment protection component does not have a significant effect on the transition rates to the types of employment incentivized.

There are also important gender differences in the results. The introduction of the hiring subsidies does not encourage transitions to employment for unemployed men and, coherently, in this case the employment protection measure incentivizes transitions from unemployment to temporary employment. For male temporary employees, the introduction of the subsidy scheme incentivizing conversions from temporary to permanent employment actually significantly reduces the conversion rate from temporary to perma-

ment employment by 16.64%. For female temporary employees, however, this type of conversion subsidy has a strong positive and significant effect, with the introduction of the subsidy increasing the conversion rate by 155.82%.

C. Effect of Hiring Subsidies on Transitions to DI

In theory, hiring subsidies, by affecting the employment possibilities of the disabled, may in turn affect their propensity to participate in DI. For a partially disabled individual that is dealing with the decision of either working or turning into DI, an improvement (or worsening) of their chances of finding employment may play an important role in his/her decision to participate in DI. For this reason, in this section we investigate the effect of the subsidy scheme on the propensity of individuals of entering the DI program. We estimate the same models as before in a sample of non-disabled individuals, looking at the effect of both the introduction of the hiring subsidies and the intensity of the employment protection component on the probability of non-disabled individuals of transiting to the DI program (on the transition rate to DI).

Table 7 presents the estimation results for the whole sample of non-disabled individuals, while Tables 8 and 9 present the results differentiated by age and gender, respectively. In the regressions, the transition rate to DI is expressed as the number of transitions to DI per 1000 individuals. For the whole sample (Table 7), we find that the introduction of the hiring subsidies incentivizing conversions from temporary to permanent employment increases the transition rate to DI by 0.065 for every 1000 individuals (which corresponds to an increase in the transition rate to DI of 5.34%). We also find that an increase in the intensity of the employment protection component is associated with more transitions to DI. In particular, when controlling for the existence of subsidies incentivizing conversions from temporary to permanent employment, an additional quarter of protection is associated with an increase in the transition rate to DI of 0.004 for every 1000 individuals (which corresponds to a 0.35% increase in the transition rate to DI).

We also find significant effects and important differences in the results when differentiating by age and gender (Tables 8 and 9). In particular, we find that the introduction of the hiring subsidies incentivizing permanent employment of unemployed individuals significantly increases the transition rate to DI for younger individuals (ages 16-35) as well as for men. In the case of younger individuals, the introduction of this type of subsidy increases the transition rate to DI by 0.02 for every 1000 individuals (which corresponds to an increase in the transition rate of 5.14%). In the case of men, the introduction of the scheme increases the transition rate to DI by 0.1 for every 1000 individuals (corresponding to an increase in the transition rate to DI of 7.74%). We also find a positive and

significant effect on the transition rate to DI of the introduction of the subsidies incentivizing conversions from temporary to permanent employment in the case of older individuals (ages 50-64). In this case, the introduction of the scheme significantly increases the transition rate to DI by 0.317 for every 1000 individuals (an increase of 13.86% in the transition rate).

Regarding the employment protection component of the subsidy scheme, the heterogeneous results show that the disincentive effects are concentrated in particular subgroups. Specifically, a longer time period of obligation for the employer to maintain the subsidized worker in employment if hired in a permanent basis is associated with a higher transition rate to DI for individuals aged 16-35 and for men. In the case of individuals aged 16-35, an additional quarter of employment protection results in a significant 1.12% increase in the transition rate to DI when controlling for the existence of subsidies incentivizing temporary employment and in a significant 1.1% increase in the transition rate to DI when controlling for the existence of subsidies incentivizing conversions from temporary to permanent employment. In the case of men, more quarters of protection are associated with an increase in the transition rate to DI in all cases. When controlling for the existence of subsidies incentivizing permanent employment of unemployed individuals, for example, an additional quarter of protection increases the transition rate to DI by 0.55%. Interestingly, we saw that for the same groups (younger individuals and men), more quarters of protection are associated with more transitions to temporary employment. These results, therefore, seem to suggest that the employment protection component is inducing disabled individuals that are looking for a permanent employment position to turn to DI instead.

VII. Conclusions

The high level of dependence of disabled individuals in the Disability Insurance program and their low attachment to the labour market is prompting many developed countries to design and implement policies specifically targeted to promote higher levels of employment among the disabled population. There are, however, few empirical studies evaluating the effectiveness of particular policies and, therefore, little information on which types of measures are effective at increasing employment participation among disabled people.

In this paper, we contribute to fill in this information gap by evaluating the effectiveness of an employment promotion measure targeted to disabled individuals implemented in Spain during the last decades, consisting in one-time lump-sum subsidies granted to the

employer that hires a disabled individual. We use rich administrative data to model employment transitions of DI beneficiaries. Then, we exploit the staggered implementation of the subsidy scheme among the different Spanish regions to design a differences-in-differences approach in order to estimate the effect of the hiring subsidies on the transition rate of DI beneficiaries to each of the types of employment subsidized (temporary employment, permanent employment and conversions from temporary to permanent employment).

Our results show that the subsidy scheme is in general ineffective at incentivizing transitions to employment, although we find positive and significant effects in some cases. In particular, the hiring subsidies are effective at incentivizing transitions to temporary and permanent employment for unemployed older individuals and at incentivizing conversions from temporary to permanent employment for women. We also find that in some cases the subsidy scheme disincentivizes transitions to employment. Specifically, subsidies targeted to incentivize conversions from temporary to permanent employment have a negative effect on the conversion rate for men and for individuals between 36 and 50 years old.

We also evaluate the effect of an employment protection component associated with the subsidy scheme, consisting in the obligation for the employer to maintain the subsidized worker in employment during a certain amount of time if hired in a permanent basis. By exploiting variation over the different regions in the length of time of employment protection required for the employer, we show that a higher degree of employment protection is associated with a decrease in the probability of being hired under a permanent contract and an increase in the probability of being hired in a temporary basis. Although we show that this measure is effective at protecting subsidized workers against unemployment once they are hired, the net results are unclear if it prevents unemployed individuals of being hired in the first place, or forces them to resort to temporary employment, with the higher instability and worse working conditions that often characterizes this type of employment. Furthermore, these results are indicative that tying these type of protection measures to subsidy schemes may undermine their effectiveness at incentivizing transitions to employment of unemployed individuals.

Finally, we investigate if the subsidy scheme has an effect on the propensity of non-disabled individuals of entering the DI program. Our results show that the introduction of the subsidy scheme increases the transition rate to DI for younger individuals (ages 16-35) and for men. Furthermore, we find that a higher degree of employment protection is also associated with a higher transition rate to DI for the same individuals, for whom the employment protection component is associated with higher transitions to temporary

employment, suggesting that some individuals may be induced to turn to DI because of difficulties to find permanent employment caused by the effects of the employment protection measure.

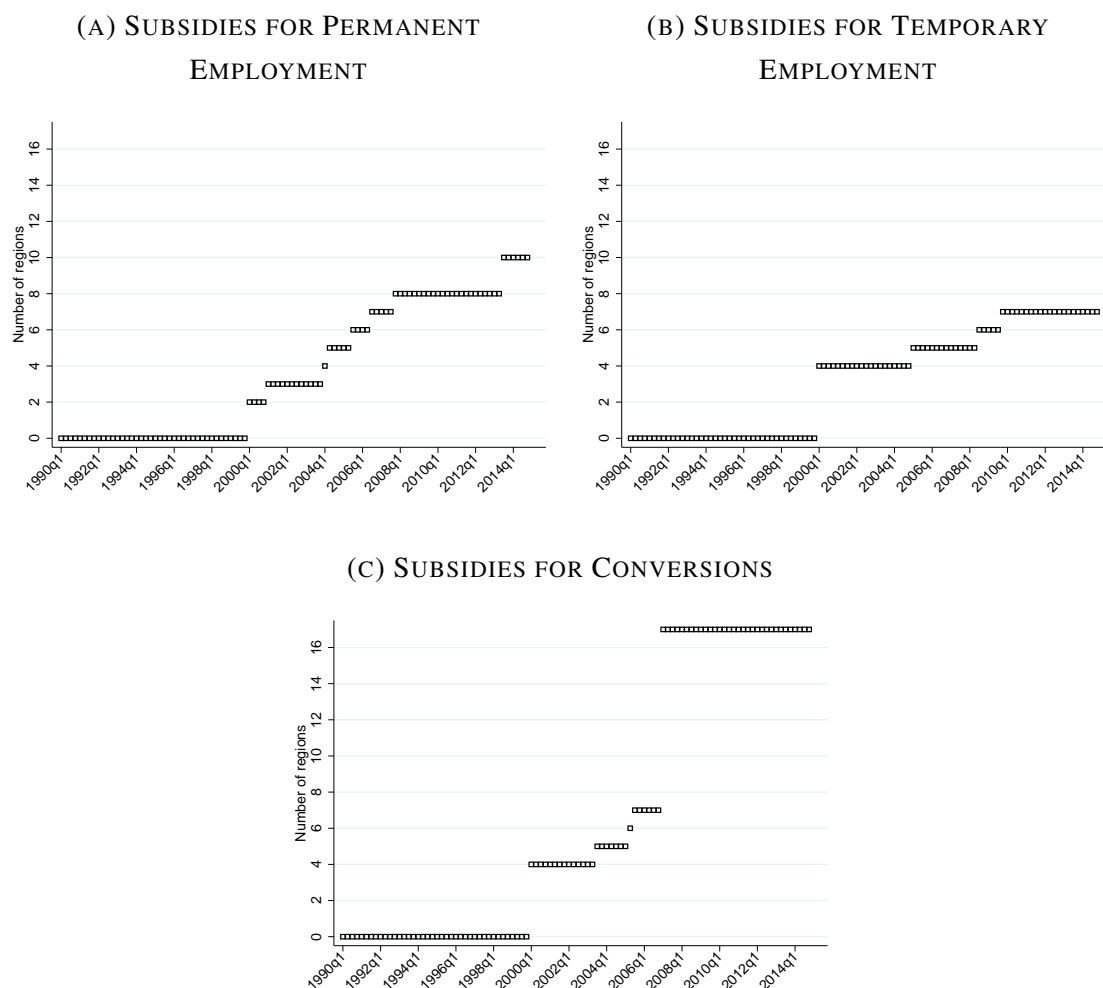
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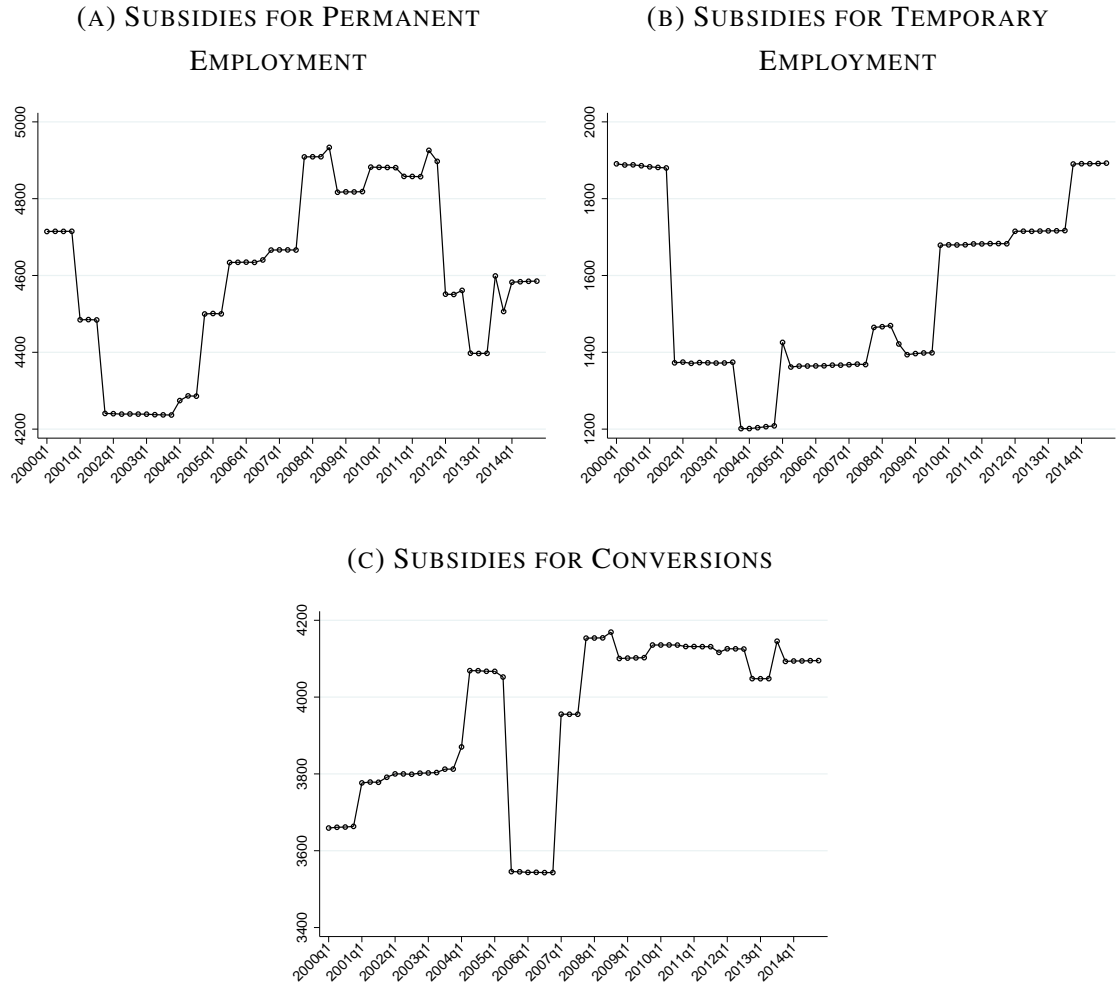
FIGURES AND TABLES

FIGURE 1—TIMING OF IMPLEMENTATION OF HIRING SUBSIDIES AMONG REGIONS



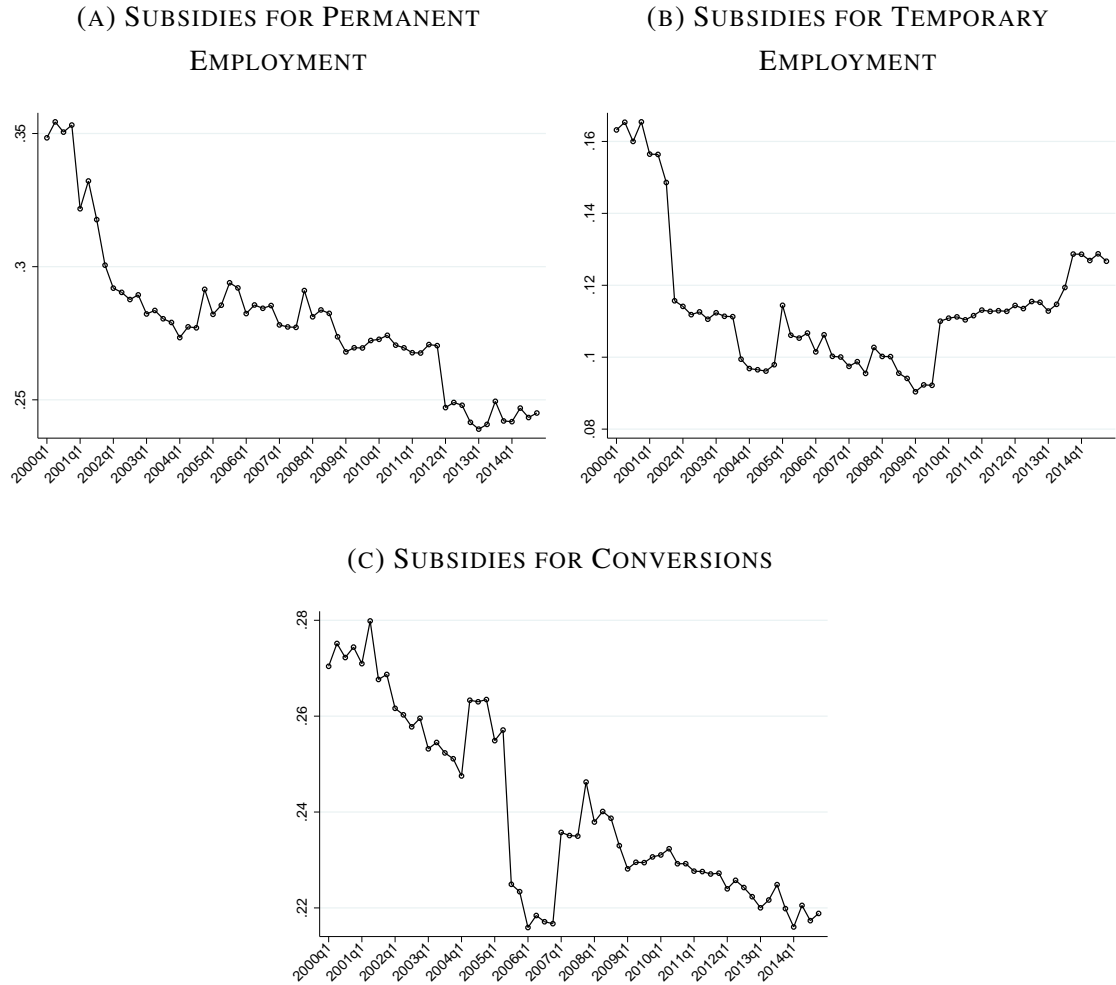
Notes: For each type of hiring subsidy, the figure shows a time series of the number of regions in which the subsidy scheme is available. In the case of hiring subsidies for permanent employment, because the subsidy is implemented at the national level during all of our study period, the figure shows the number of regions that implement a subsidy with a higher amount than the subsidy implemented at the national level.

FIGURE 2—AMOUNT OF HIRING SUBSIDIES



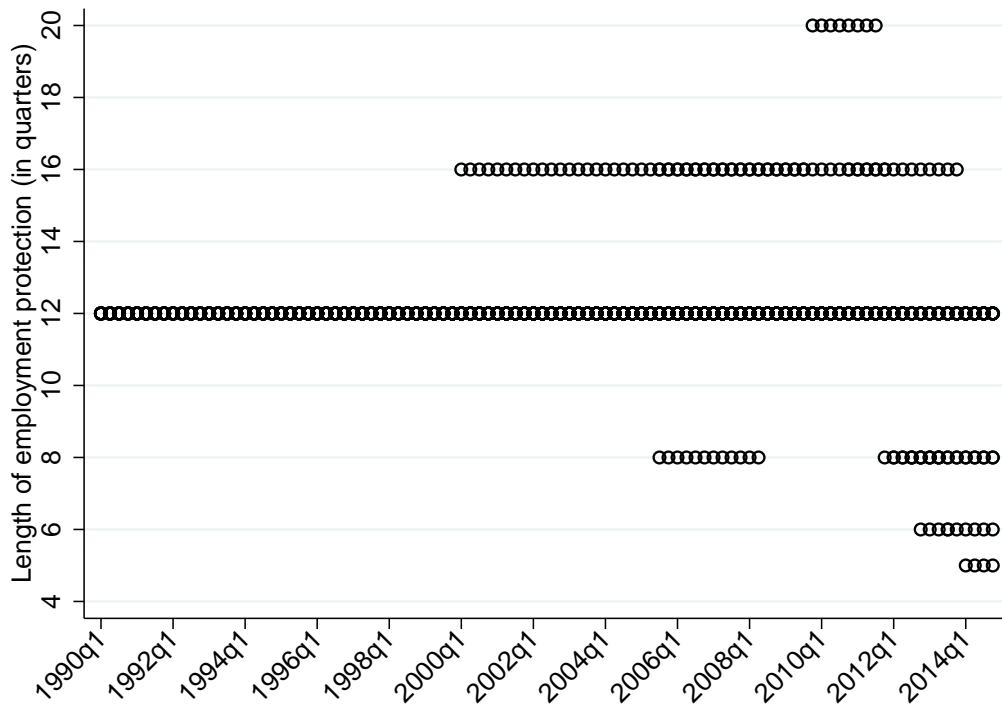
Notes: For each type of hiring subsidy, the figure shows the average amount of the subsidy scheme among the regions that implement the subsidy in each time period.

FIGURE 3—AMOUNT OF HIRING SUBSIDIES AS A PERCENTAGE OF WAGES



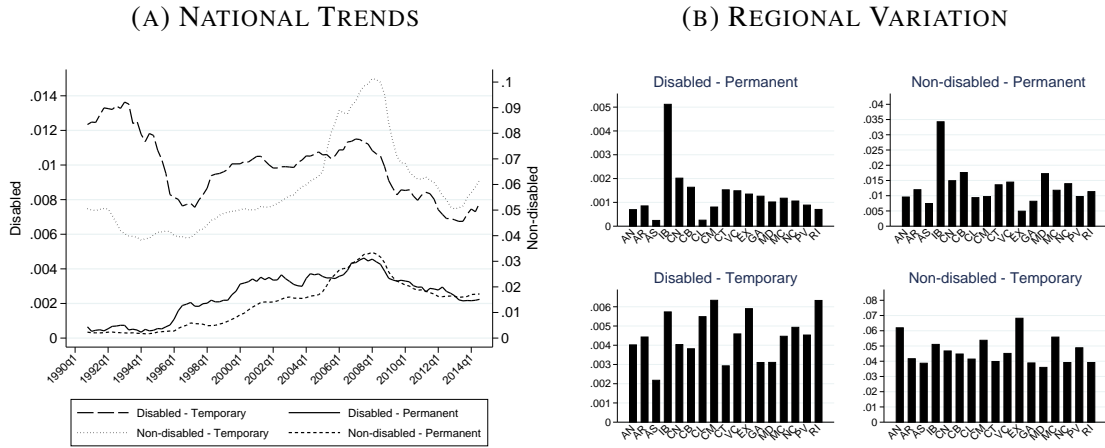
Notes: For each type of hiring subsidy, the figure shows the average amount of the subsidy among the regions that implement the subsidy in each time period, expressed as a percentage of the disabled’s mean annual wage in each time period. The mean annual wage is computed for permanent employees in subfigures (a) and (c) and for temporary employees in subfigure (b). Wages refer to the mean contributory bases of employees in our samples of study.

FIGURE 4—LENGTH OF EMPLOYMENT PROTECTION AMONG REGIONS



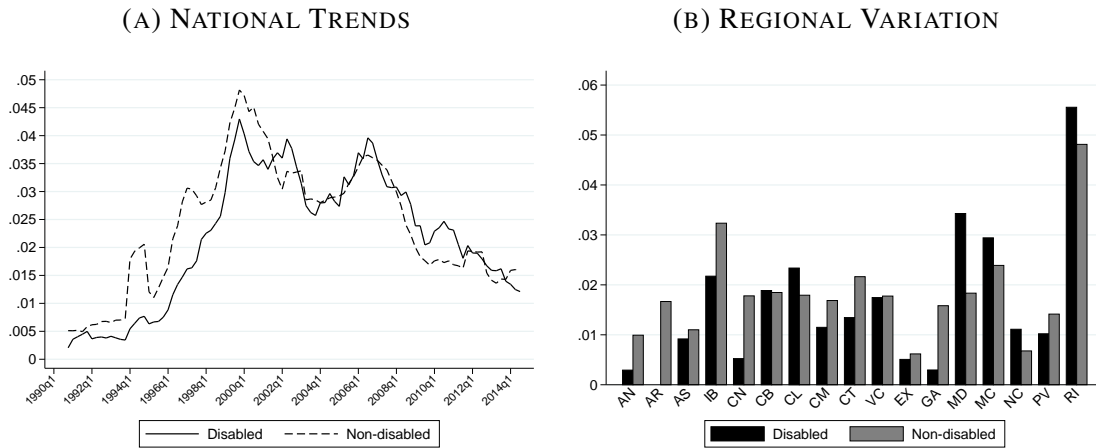
Notes: The figure shows, for each time period, the variation in the number of quarters of protection associated with the subsidy scheme over Spanish regions. Quarters of protection refer to the number of quarters the employer has to maintain the subsidized worker in employment if hired in a permanent basis.

FIGURE 5—OBSERVED TRANSITIONS FROM UNEMPLOYMENT TO EMPLOYMENT



Notes: Figure 5.A shows a time series of the transition rates from unemployment to both temporary and permanent employment for disabled and non-disabled individuals during our analysis period. Figure 5.B shows the same transition rates differentiated by Spanish regions in the year 2014.

FIGURE 6—OBSERVED CONVERSIONS FROM TEMPORARY TO PERMANENT EMPLOYMENT



Notes: Figure 6.A shows a time series of the conversion rate from temporary to permanent employment for disabled and non-disabled individuals during our analysis period. Figure 6.B shows the same conversion rate differentiated by Spanish regions in the year 2014.

TABLE 1—DESCRIPTION OF COVARIATES

Covariate	Description
Women	Indicator for women.
Total disability	Indicator for individuals with a degree of disability classified by the Social Security as "Total disability". The rest of individuals have a degree classified as "Partial Disability". Degrees are assigned by the Social Security depending on the reduction in working capacity caused by the disability.
Age 50-64	Indicator for older individuals (ages 50-64).
High skill	Indicator for high skilled individuals (constructed from Social Security contributory groups).
Services sector	Indicator for services sector.
Replacement Rate	Ratio between DI benefit and previous wage.
Quarters disabled	Number of quarters individual has been receiving DI benefits.
Labor market experience	Years the individual has been in the labor market.
Unemployment Rate	Unemployment rate for each region and time period.
Disability contract ^(a)	Indicator for the possession of a contract type that recognizes the disability condition.
Contract experience ^(a)	Years the individual has been in the current employment contract.
Company's size ^(a)	Dummy variables indicating the number of employees in the company (less than 50, between 50 and 199 and more than 199).

^(a) Variable is only included in the model estimated on the sample of temporary employees

Notes: In the sample of unemployed, variables that capture employment information (high skill, services, replacement rate) recover information from the most recent employment spell of the individual.

TABLE 2—DESCRIPTIVE STATISTICS

Variable	Sample of Unemployed		Sample of Temporary Employees		Sample of Non-disabled	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Women	0.33	0.47	0.17	0.38	0.40	0.49
Total disability	0.38	0.49	0.11	0.31		
Ages 50-64	0.69	0.46	0.38	0.49	0.22	0.42
High skill	0.76	0.43	0.72	0.45	0.70	0.46
Services sector	0.59	0.49	0.67	0.47	0.65	0.48
Replacement rate	7.19	500.25	2.54	285.79		
Quarters disabled	23.91	20.98	30.46	28.85		
Labor market experience	2.76	0.60	2.77	0.53	2.18	1.00
Unemployment Rate	17.92	8.19	17.43	7.96		
Disability contract ^(a)	0.09	0.29				
Contract experience ^(a)	2.24	3.87				
Less than 49 employees ^(a)	0.24	0.42				
Between 50 and 199 employees ^(a)	0.13	0.34				
More than 199 employees ^(a)	0.25	0.43				
Observations	1170894		66579		5646966	

^(a) Variable is only included in the model estimated on the sample of temporary employees

Notes: In the sample of unemployed, variables that capture employment information (high skill, services, replacement rate) recover information from the most recent employment spell of the individual.

TABLE 3—EFFECT OF HIRING SUBSIDIES ON TRANSITIONS TO EMPLOYMENT

	(1)		(2)		(3)	
	Subsidies for Permanent Employment		Subsidies for Temporary Employment		Subsidies for Conversions	
	To TE	To PE	To TE	To PE	To PE	To U
Hiring subsidies						
RRR	0.96911	1.00035	1.07374	1.16461	0.90088	0.93164
St. Error	(0.02682)	(0.10830)	(0.08638)	(0.17332)	(0.07306)	(0.09293)
Marginal Effect	-3.09%	0.05%	7.17%	15.68%	-8.38%	-5.27%
Quarters of protection						
RRR	1.01077***	0.98453	1.00898**	0.98429*	1.03081	1.00428
St. Error	(0.00414)	(0.01129)	(0.00431)	(0.00885)	(0.02389)	(0.00709)
Marginal Effect	1.07%***	-1.56%	0.89%**	-1.58%*	2.89%	0.28%
Constant						
RRR	0.03699***	0.00075***	0.03783***	0.00073***	0.00292***	0.40106***
St. Error	(0.00629)	(0.00027)	(0.00624)	(0.00026)	(0.00260)	(0.07280)
Observations	1,170,894	1,170,894	1,170,894	1,170,894	66,579	66,579

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

Notes: TE ≡ Temporary Employment; PE ≡ Permanent Employment; U ≡ Unemployment. Regressions are estimated using a multinomial logit approach, modeling the transition rate from the base category (unemployment in columns 1 and 2, temporary employment in column 3) to the indicated competing alternatives. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1. The table shows the effect on the relative risk ratio as well as the marginal effect. The relative risk ratio refers to the ratio between the indicated transition probability and the probability of remaining in the base category. The marginal effect shows the change in the actual predicted transition rate to each of the indicated alternatives, expressed as a percentage increase. In the case of the subsidy variable, the marginal effect refers to the percentage increase in the corresponding transition rate that results from the introduction of the subsidy scheme. In the case of the quarters of protection, the marginal effect refers to the percentage increase in the respective transition rate that results from an additional quarter of protection.

TABLE 4—EFFECT OF DISABILITY CONTRACT ON TRANSITION FROM PERMANENT EMPLOYMENT TO UNEMPLOYMENT

Disability contract	-0.03537*** (0.00444)
Constant	0.11626*** (0.01536)
Observations	117,415
R-squared	0.26262

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

Notes: Regression is estimated using a linear probability model, where the dependent variable is a dummy variable equal to 1 if the individual transits from permanent employment to unemployment. Standard errors (in parenthesis) are clustered at the region level. Regression includes fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. It also includes the same set of time-varying individual covariates as the ones for the model of temporary employees described in Table 1.

TABLE 5—EFFECT OF HIRING SUBSIDIES ON TRANSITIONS TO EMPLOYMENT, BY AGE GROUP

	(1)		(2)		(3)	
	Subsidies for Permanent Employment		Subsidies for Temporary Employment		Subsidies for Conversions	
	To TE	To PE	To TE	To PE	To PE	To U
PANEL A: AGES 16-35						
Hiring subsidies						
RRR	0.99630	0.88827	0.99903	1.14066	1.40571	1.14871
St. Error	(0.08293)	(0.15064)	(0.09995)	(0.25266)	(0.30784)	(0.18005)
Marginal Effect	-0.30%	-11.38%	-0.16%	13.45%	35.35%	10.80%
Quarters of protection						
RRR	1.02333*	1.00854	1.02311**	1.00231	0.90153*	0.98556
St. Error	(0.01252)	(0.01955)	(0.01163)	(0.01573)	(0.05066)	(0.02180)
Marginal Effect	2.26%**	0.80%	2.24%**	0.18%	-9.83%*	-0.92%
Constant						
RRR	0.01951***	0.00035***	0.01961***	0.00040***	0.00825***	0.60207
St. Error	(0.01029)	(0.00036)	(0.01066)	(0.00037)	(0.01315)	(0.36317)
Observations	64,528	64,528	64,528	64,528	10,363	10,363
PANEL B: AGES 36-50						
Hiring subsidies						
RRR	0.89233**	0.90013	1.08327	1.26933	0.80929*	0.84920
St. Error	(0.04560)	(0.13716)	(0.13451)	(0.29859)	(0.09372)	(0.11912)
Marginal Effect	-10.81%**	-10.01%	7.98%	24.93%	-15.96%	-11.91%
Quarters of protection						
RRR	1.01134*	0.98815	1.00522	0.98298	1.05918***	1.00696
St. Error	(0.00593)	(0.01042)	(0.00716)	(0.01222)	(0.02102)	(0.00701)
Marginal Effect	1.12%*	-1.20%	0.52%	-1.72%	5.49%***	0.43%
Constant						
RRR	0.01508***	0.00006***	0.01699***	0.00007***	0.00152***	0.74543
St. Error	(0.00342)	(0.00006)	(0.00401)	(0.00006)	(0.00149)	(0.17823)
Observations	333,346	333,346	333,346	333,346	33,844	33,844
PANEL C: AGES 51-64						
Hiring subsidies						
RRR	1.11028*	1.37488**	1.10920	0.91137	0.77851	0.93962
St. Error	(0.06337)	(0.19035)	(0.17375)	(0.32072)	(0.13957)	(0.08074)
Marginal Effect	10.80%*	35.50%**	10.57%	-9.13%	-20.59%	-4.51%
Quarters of protection						
RRR	1.00363	0.97109	1.00917	0.98448	1.04605	1.00992
St. Error	(0.01264)	(0.02125)	(0.01465)	(0.02483)	(0.05566)	(0.01233)
Marginal Effect	0.36%	-2.93%	0.91%	-1.57%	4.24%	0.73%
Constant						
RRR	0.00779***	0.00026***	0.00683***	0.00019***	0.00321***	0.85968
St. Error	(0.00348)	(0.00025)	(0.00340)	(0.00018)	(0.00491)	(0.58802)
Observations	773,020	773,020	773,020	773,020	22,372	22,372

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

Notes: TE ≡ Temporary Employment; PE ≡ Permanent Employment; U ≡ Unemployment. Regressions are estimated using a multinomial logit approach, modeling the transition rate from the base category (unemployment in columns 1 and 2, temporary employment in column 3) to the indicated competing alternatives. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1. The table shows the effect on the relative risk ratio as well as the marginal effect. The relative risk ratio refers to the ratio between the indicated transition probability and the probability of remaining in the base category. The marginal effect shows the change in the actual predicted transition rate to each of the indicated alternatives, expressed as a percentage increase. In the case of the subsidy variable, the marginal effect refers to the percentage increase in the corresponding transition rate that results from the introduction of the subsidy scheme. In the case of the quarters of protection, the marginal effect refers to the percentage increase in the respective transition rate that results from an additional quarter of protection.

TABLE 6—EFFECT OF HIRING SUBSIDIES ON TRANSITIONS TO EMPLOYMENT, BY GENDER

	(1)		(2)		(3)	
	Subsidies for Permanent Employment		Subsidies for Temporary Employment		Subsidies for Conversions	
	To TE	To PE	To TE	To PE	To PE	To U
PANEL A: MEN						
Hiring subsidies						
RRR	1.01533	0.98515	1.02168	1.06327	0.81688**	0.92399
St. Error	(0.03951)	(0.10726)	(0.06788)	(0.14599)	(0.08392)	(0.08308)
Marginal Effect	1.52%	-1.50%	2.14%	6.19%	-16.64%*	-5.81%
Quarters of protection						
RRR	1.00923**	0.98847	1.01011**	0.98768	1.04720	0.99933
St. Error	(0.00447)	(0.01315)	(0.00508)	(0.01093)	(0.02960)	(0.00637)
Marginal Effect	0.92%**	-1.16%	1.00%**	-1.24%	4.54%*	-0.14%
Constant						
RRR	0.03703***	0.00059***	0.03618***	0.00060***	0.00248***	0.46503***
St. Error	(0.00612)	(0.00026)	(0.00606)	(0.00027)	(0.00241)	(0.09466)
Observations	788,881	788,881	788,881	788,881	54,857	54,857
PANEL B: WOMEN						
Hiring subsidies						
RRR	0.81960*	1.05903	1.36660	1.62703	2.41766***	0.98675
St. Error	(0.09572)	(0.16265)	(0.29592)	(0.60358)	(0.71947)	(0.27712)
Marginal Effect	-18.59%*	5.88%	33.16%	53.62%	155.82%**	-1.32%
Quarters of protection						
RRR	1.01990	0.97511	1.01177	0.97591**	0.97017	1.01497
St. Error	(0.01249)	(0.01514)	(0.01051)	(0.01040)	(0.02658)	(0.01775)
Marginal Effect	1.97%*	-2.52%	1.17%	-2.44%**	-3.41%	1.10%
Constant						
RRR	0.00730***	0.00044***	0.00835***	0.00041***	0.00000***	0.26555***
St. Error	(0.00348)	(0.00051)	(0.00409)	(0.00046)	(0.00000)	(0.11940)
Observations	382,013	382,013	382,013	382,013	11,722	11,722

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

Notes: TE ≡ Temporary Employment; PE ≡ Permanent Employment; U ≡ Unemployment. Regressions are estimated using a multinomial logit approach, modeling the transition rate from the base category (unemployment in columns 1 and 2, temporary employment in column 3) to the indicated competing alternatives. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1. The table shows the effect on the relative risk ratio as well as the marginal effect. The relative risk ratio refers to the ratio between the indicated transition probability and the probability of remaining in the base category. The marginal effect shows the change in the actual predicted transition rate to each of the indicated alternatives, expressed as a percentage increase. In the case of the subsidy variable, the marginal effect refers to the percentage increase in the corresponding transition rate that results from the introduction of the subsidy scheme. In the case of the quarters of protection, the marginal effect refers to the percentage increase in the respective transition rate that results from an additional quarter of protection.

TABLE 7—EFFECT OF HIRING SUBSIDIES ON TRANSITION TO DISABILITY INSURANCE

	(1) Subsidies for Permanent Employment	(2) Subsidies for Temporary Employment	(3) Subsidies for Conversions
Hiring subsidies	0.04405 (0.03375)	0.06010 (0.05256)	0.06549** (0.02527)
Quarters of protection	0.00374 (0.00218)	0.00597 (0.00347)	0.00446* (0.00211)
Constant	0.10073 (0.10898)	0.03467 (0.12353)	0.06237 (0.11073)
Observations	5,646,966	5,646,966	5,646,966
R-squared	0.00114	0.00114	0.00114

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

Notes: Regressions are estimate using a linear probability model. Coefficients are scaled to represent the change in the number of transitions to DI per 1000 individuals. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1.

TABLE 8—EFFECT OF HIRING SUBSIDIES ON TRANSITION TO DISABILITY INSURANCE, BY AGE GROUP

	(1) Subsidies for Permanent Employment	(2) Subsidies for Temporary Employment	(3) Subsidies for Conversions
PANEL A: AGES 16-35			
Hiring subsidies	0.02096** (0.00782)	-0.00942 (0.02059)	0.00419 (0.01382)
Quarters of protection	0.00344 (0.00217)	0.00460* (0.00230)	0.00452* (0.00234)
Constant	-0.01040 (0.04784)	-0.03181 (0.05007)	-0.03386 (0.05033)
Observations	2,255,326	2,255,326	2,255,326
R-squared	0.00018	0.00018	0.00018
PANEL B: AGES 36-50			
Hiring subsidies	0.05618 (0.03509)	0.06722 (0.04154)	0.05506 (0.03471)
Quarters of protection	0.00192 (0.00309)	0.00443 (0.00418)	0.00338 (0.00310)
Constant	0.04191 (0.16177)	-0.03616 (0.17860)	-0.01126 (0.17289)
Observations	2,278,634	2,278,634	2,278,634
R-squared	0.00029	0.00029	0.00029
PANEL C: AGES 51-64			
Hiring subsidies	0.08460 (0.18405)	0.18931 (0.25458)	0.30863** (0.13454)
Quarters of protection	0.01277 (0.00794)	0.01640 (0.00958)	0.01109 (0.00663)
Constant	3.30469*** (0.49162)	3.15704*** (0.45591)	3.24582*** (0.47396)
Observations	1,113,006	1,113,006	1,113,006
R-squared	0.00062	0.00062	0.00062

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

Notes: Regressions are estimate using a linear probability model. Coefficients are scaled to represent the change in the number of transitions to DI per 1000 individuals. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1.

TABLE 9—EFFECT OF HIRING SUBSIDIES ON TRANSITION TO DISABILITY INSURANCE, BY GENDER

	(1) Subsidies for Permanent Employment	(2) Subsidies for Temporary Employment	(3) Subsidies for Conversions
PANEL A: MEN			
Hiring subsidies	0.09928** (0.04037)	0.00973 (0.04174)	0.04213 (0.04027)
Quarters of protection	0.00713** (0.00302)	0.01200** (0.00554)	0.01106** (0.00404)
Constant	-0.16330 (0.14601)	-0.27498 (0.18170)	-0.26597 (0.16501)
Observations	3,409,540	3,409,540	3,409,540
R-squared	0.00115	0.00115	0.00115
PANEL B: WOMEN			
Hiring subsidies	-0.02831 (0.03485)	0.13551 (0.08223)	0.08894 (0.05129)
Quarters of protection	-0.00074 (0.00328)	-0.00189 (0.00313)	-0.00401 (0.00275)
Constant	0.27275** (0.11985)	0.26293* (0.12883)	0.31777** (0.13293)
Observations	2,237,426	2,237,426	2,237,426
R-squared	0.00106	0.00106	0.00106

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

Notes: Regressions are estimate using a linear probability model. Coefficients are scaled to represent the change in the number of transitions to DI per 1000 individuals. Standard errors (in parenthesis) are clustered at the region level. Regressions include fixed effects at the year level, fixed effects at the region level, region specific linear time trends and a dummy for each quarter of the year. They also include the set of time-varying individual covariates described in Table 1.