Do partial disability pensions close the earnings gap?

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Abstract:

In this article, we estimate the total earnings losses of male workers with a partial disability, i.e., they are able to work in a different occupation after disability onset. We use a Spanish administrative dataset (*Muestra Continua de Vidas Laborales*) from a specific partial disability pension scheme (*Incapacidad Permanente Total*). Using propensity score estimators combined with difference-in-differences, the estimation of the causal effect of the disability onset shows earnings losses to be approximately €400 per month for the first two years. For male workers over 54, total earnings losses are greater even though they receive greater benefits.

Keywords: disability pensions; earnings losses; older workers.
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1 Introduction

There is vast international literature regarding the participation in the labour market of people with disabilities. The literature is mainly focused on the adverse effects of income transfers on the participation of older workers in the labour force. The seminal article in this literature is Parsons (1980). His study finds that disability pensions may account for the decrease in labour force participation of older men registered in the US. Later, Bound and Burkhauser (1999) review a number of studies and conclude that disincentive effects to work exist and that it is highly likely that Parsons's estimates are overestimated.

However, much less information is available about the effect of disability pensions on subsequent earnings (Charles, 2003; Mok et al., 2008). With respect to the US case, Stapleton et al. (2009) show that workers' economic well-being declines after disability onset, as the disability pension system does not maintain the disabled household's pre-onset income. The reasons for this are twofold. One, disabled persons have lower labour market participation rates, and two, benefits partially replace lost earnings. A similar conclusion emerges from a German case. In a broader analysis of the effects of health shocks on income, Riphahn (1999) finds that benefits do not fully insulate against the negative consequences of the potential loss in earnings.

The scarce literature on earnings losses does not tackle the specific case of partial disability. By partial disability, we mean that the severity of the disability does not prevent the worker from working, but it usually requires a drastic change in occupation, industry, or both. This article evaluates the causal impact of partial disability on total earnings by assessing the disability earnings gap faced by individuals entitled to a partial disability

pension. We use data from a Spanish contributory pension scheme for partially disabled workers[1]. According to the Spanish Social Security, the *total permanent disability for usual occupation* (henceforth, TPD) is a disability that limits the worker from performing all of the main tasks in their profession, although they may still be able to pursue a different occupation. We focus on this disability benefit because it is fully compatible with performing another job in a different occupation after the onset of the disability. There are other disability pensions, but they almost completely restrict the ability to work. Accordingly, these other disability pensions are designed for much more severe disabilities[2]. In Spain, over 500,000 people were entitled to a partial disability pension (TPD) in 2013, while over 400,000 people were beneficiaries of other types of disability pensions as their disabilities severely restricted compatibility with work.

The TPD explicitly attempts to compensate the negative welfare impact of the disability onset by providing a pension even though these individuals can perform a job (albeit different from their previous job due to a negative health shock). Our analysis adds to the international literature evaluating whether this partial disability pension closes the earnings gap. To our knowledge, this is a novel study in the international literature, as previous evidence analysing the TPD scheme has strictly focused on the impact of TPD on labour market participation. Benitez-Silva et al. (2010) note that during recession periods, all disability benefits (including TPD) have been used as an excuse for early retirement of low-skilled older workers. Marie and Vall Castello (2012) studied the effects of an increase in the partial disability pension of workers over 54 years of age and obtained a decrease in the

[1] A brief summary of the Spanish legislation on permanent disability is provided in the Appendix.
[2] For a description of these disability pensions, see the Appendix.

likelihood of employment of 8%, which is mainly the result of income effects[3]. Regardless, the impact of the partial disability scheme on total earnings remains unknown.

Our empirical methodology follows the recent literature on the earnings losses of displaced workers. For example, Couch and Placzeck (2010) use propensity score matching techniques to estimate, as usual, the average treatment effect on the treated (ATT), but in addition, they also apply differences-in-differences (DID) so that unobserved heterogeneity may be controlled. Accordingly, the combination of both types of estimations allows for the control of observed and unobserved heterogeneity.

2 Database: total earnings and career trajectory

Our dataset is the *Muestra Continua de Vidas Laborales* (MCVL), i.e., Continuous Sample of Working Lives, an administrative database provided by the Spanish Social Security that is freely available for independent researchers[4]. It includes information about contributory pensions and social security records for people who either hold a job or receive benefits in a given year as well as their entire career trajectory.

As summarised in Figure A.1, we focus on male workers entitled to a TPD in either 2005 or 2006[5]. We have obtained information about their previous employment spells and their contributory bases, which are a good proxy for monthly wages[6]. Our sample consists of

[3]Autor and Duggan (2007) explain how substitution and income effects can discourage the return to work. The substitution effect means that the return to work leads to a benefit reduction, while the income effect means that some beneficiaries may prefer leisure to work, even though work is not taxed by the program. The authors found that income effects may account for a significant part of the reduction in labour force participation after the award of disability benefits in the US.

[4] Interested researchers can apply for this dataset at the following address: http://www.seg-social.es/Internet_1/Estadistica/Est/Muestra_Continua_de_Vidas_Laborales/index.htm

[5] We focus on workers registered with the general social security system. Self-employed workers, agricultural workers and seamen have their own specific disability pension schemes.

[6] Wages and contributory bases do not correspond exactly because there is a minimum and a maximum base. Nevertheless, minimum and maximum base workers are approximately 5% of the total.

1,443 males, who were mostly low- and medium-skilled workers with a mean age of 52 (see Table A.1). They entered the workforce at age 22, worked for 22.4 years on average and were unemployed for 2.5 years during their former working lives.

Finally, we followed them in 2007, 2008 and 2009. Therefore, we know whether they returned to work or not, and if they did, we have their contributory bases. As we also have information on the TPD amount, we calculate the total income of those both earning a wage and receiving simultaneously a partial disability pension. Henceforth, we will refer to earnings as the total income (wages and/or TPD pensions).

Figure 1 shows the average monthly earnings of TPD workers from 36 months prior to pension entitlement to 24 months after entitlement. Three years before entitlement, the average monthly wage is €1,500. There is a decline in monthly wages as early as 18 to 20 months before pension entitlement, and they decline sharply, by approximately 3 to 6 months before receiving their pension. When the worker obtains the TPD pension, their earnings are approximately 25% of their wages 2 years prior. These results are quite similar to those shown in Bound et al. (2003) for the US case[7].

The reasons for the earnings decline before the pension entitlement are likely related to health status, adaptation to disability, long administrative procedures[8] and the effectiveness of medical treatment.

<<Figure 1>>

[7] They analyse labour earnings of SSDI and SSA applicants before and after the application and show that labour earnings decline 12 to 24 months prior to application and fall severely 6 months before application.

[8] When an individual applies for a TPD pension, the entire application process may take months to be completed. In addition, medical assessment may be delayed, and sometimes, it may even be best to wait before the reduction in the ability to work to be considered as permanent. Regardless, we only have information in our database about the entitlement date, not their application dates.

Figure 1 shows that, on average, once workers are entitled to the TPD, their earnings remain stable at a lower level than their pre-decline wages, i.e., approximately €1,000.

Although the majority of participants in the program are older workers, age remains a significant variable for our analysis because it affects the amount of the benefit. As we explain in the Appendix, the size of the pension depends both on the years of work experience and on the age of the beneficiary (notice that there is a threshold of 55 years of age). Obviously, labour trajectory is different for older workers than for younger workers. Figure 2 shows the average monthly earnings of TPD workers by age group. Before entitlement, workers under 50 years of age have the lowest earnings, while those between 55 and 60 have the highest earnings. With respect to earnings after TPD, there are small differences among groups. Presumably, this is the result of two opposite effects. On the one hand, there are differences in wages before the disability onset leading to differences in the pension amounts. Therefore, older workers obtain higher pensions because of the positive correlation of age, labour market experience and wages. On the other hand, the likelihood of re-employment after the onset of the disability is higher for younger workers, increasing total earnings, although they receive a relatively lower pension because of their shorter labour market experience.

<<Figure 2>>

3 Empirical methodology

We aim to estimate the earnings losses due to TPD. Accordingly, we have defined a random sample of male workers aged 30 to 64 years as the control group. This control

group does not include persons receiving at any time early retirement pensions or any type of disability pension. As in the treatment group, male workers of the control group are included in the general regime of the Spanish Social Security. Therefore, we are not considering self-employed workers, agricultural workers, domestic workers, seamen, miners or civil servants.

Even though the database contains very detailed information on working lives, there is no direct information on health status, and hence, unobserved heterogeneity may bias our estimations. We have capitalised on the longitudinal nature of the data to combine propensity score matching (PSM) and difference-in-differences estimation techniques. This identification strategy allows us to control for observable and unobservable factors. According to Smith and Todd (2005), "a difference-in-differences (DID) matching strategy allows for temporally invariant differences in outcomes between participants and nonparticipants", and therefore, this type of estimator is more robust. On the other hand, PSM relies on a conditional independence assumption (CIA), which means that once the propensity score has been estimated, participation in the program is independent of outcome in the non-participation status. This requires that all variables affecting participation and outcome in the non-participation status be matching (Smith, 2000).

Considering the outcome of the treated (Y_D) and non-treated people (Y_D), a set of observable variables (X) and the treatment status (d), Rosenbaum and Rubin (1983, 1984) prove that if $(Y_C, Y_D) \perp d \big| X$ and $0 < P(X) < 1$, given $P(X) = \Pr(d = 1 \big| X)$, then $(Y_C, Y_D) \perp d \big| P(X)$. The outcome is similar for treated and non-treated individuals conditional on the X variables or the propensity score P(X).

The conditional independence assumption (CIA) $Y_D, Y_C \perp X$ means that once the propensity score has been estimated, participation in the program is independent of outcome in the non-participation status (Y_C). If the CIA holds conditional on X, it will also hold conditional on the propensity score, $Y_D, Y_C \perp p(X)$.

Under these assumptions, the matching estimator takes the following form (Blundell and Costa Dias, 2002):

$$\hat{\alpha}_M = \sum_{i \epsilon T} \left(Y_i - \sum_{j \epsilon C} W_{ij} Y_j \right) w_i$$

where W_{ij} is the weight placed on comparison observation j for individual i and w_i accounts for the reweighting that reconstructs the outcome distribution for the treated sample.

The CIA is very difficult to assess, particularly in this case, as the data about health status are non-existent. Heckman et al. (1998) propose a combination of matching and difference-in-differences that allows us to control for selection from observed and unobserved variables. Using longitudinal data, we can estimate the effect of the treatment in the following way (Blundell and Costa Dias, 2002):

$$\hat{\alpha}_{MDID}^{LD} = \sum_{i \epsilon T} \left((Y_{it_1} - Y_{it_0}) - \sum_{j \epsilon C} W_{ij} (Y_{jt_1} - Y_{jt_0}) \right) w_i$$

The balancing property must be satisfied for PSM to be applicable, i.e., all of the variables in the estimation must be balanced between treated and control individuals[9]. The explanatory variables included in the propensity score estimation are age, age at the beginning of the first employment spell, skill level, years of working experience until the TPD, number of unemployment spells before the TPD, work experience in the industrial sector, employment 18 months prior to TPD, and region of residence. Table A.2 in the Appendix shows the results for the probit estimation of the propensity score. All of the estimates that satisfy the balancing property are obtained through nearest neighbour matching[10]. In addition, as we have exclusively used observations in the common support, only observations in the control group with the same range of propensity score in the treatment group are included in the estimations[11].

As previously explained, the CIA is very difficult to assess because direct information on health status is not included in our dataset. Nevertheless, as we have longitudinal data, we can overcome this shortcoming by combining matching (i.e., estimations of average effect of the treatment on the treated) and difference-in-differences with the 24th month before entitlement and then controlling by unobserved heterogeneity, for example, health status. Our assumption is that earnings trends would be the same in both groups in the absence of treatment. This treatment (the permanent disability) induces a deviation from the common trend that is captured by the difference-in-differences approach (Couch and Placzek, 2010).

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[9] We used the Stata commands developed by Becker and Ichino (2002) to calculate propensity score models and check the balancing properties.

[10] In any case, we also used other matching algorithms to estimate the effect of the treatment and the results remain. These estimations are available upon request.

[11] The common support assumption requires that, for each "treated" worker, there is another "non-treated" worker to be used as a matched comparison observation. Figure A.2 shows the distribution of the propensity score by treatment status. Although treatment observations are more concentrated at higher predicted scores and the opposite for non-treatment observations, there is a significant overlap between the two distributions and observations out of the common support are very few.

4 Empirical results and discussion

Table 1 shows the results of applying difference-in-differences on the average effect of the treatment on the treated. The estimated impact is negative, showing a permanent decrease in earnings with respect to two years before being entitled to the TPD (t_0), a period in which the disability has yet not had any effect on earnings, as explained in the descriptive analysis.

The size of the earnings losses is considerable and remains relatively stable over time. Earnings losses are approximately €450 per month for the first year after the TPD entitlement; there is then a small decrease at the beginning of the second year, and by the end of the second year after entitlement, losses are below €400.

<<Table 1>>

As explained in the Appendix, for workers over 54 years of age, the disability pension increases from 55% to 75% of the regulatory basis, which is closely tied to previous wages. Therefore, we also estimated the total earnings losses of male workers under and over the age threshold (see Table 1). For the first 6 months after the TPD entitlement, earnings losses are quite similar for both age groups, with a decrease in earnings of approximately €450 monthly. In the second year after the TPD entitlement, earnings losses for workers over 54 increase by up to €500 per month, while the losses for workers below 55 remain stable or even decrease slightly. As a consequence, there is a widening earnings gap for older workers, especially among the oldest, whose losses are 20% higher than for those

who are under 55. At the end of second year after the TPD entitlement, there is a slight increase in earnings losses for workers over 54 and a significant decrease in earnings losses for those under 55; the earnings losses are €407 and €308, respectively. Therefore, the earnings gap between both groups widens over time, mainly because earnings losses of workers under 55 decrease by as much as €300 per month.

Accordingly, there is a significant permanent earnings loss, on average, after the TPD entitlement. Presumably, these earnings losses are linked to three facts: the increasing trend in wages of the control group, the flat shape over time of the TPD pension (defined as a percentage of past wages) and the re-employment behaviour after receiving a TPD pension.

The first, the increasing trend in wages for the control group, suggests the relevance of the break in one's working career that is usually linked to a new disability (i.e., a negative health shock). Those not suffering such a negative health shock do not incur any loss of specific human capital, and on average, they follow an improving trend as they increase their work experience. This is not the case for people entitled to a TDP pension, however. Even when obtaining a job after entitlement, it is presumed that previous work experience will not be useful as the individual typically must change occupations.

The second fact, the flat shape over time of the TPD pension, indicates that earnings from the TPD pension remain stable. The amount of the pension is strictly linked with past wages (see Appendix for details) and does not increase over time (unless the individual attains the age of 55 and is still without employment).

The third fact, re-employment behaviour after receiving a TPD pension, is related to the re-employment probability of those entitled to a TPD pension. At a descriptive level, Malo et al. (2011) finds that, as of 2006, the rate of TPD workers who are employed is approximately 15.6%, and Vall Castello (2012) finds that the likelihood of employment for

workers with a disability is 11.6% in 2007 (using a slightly different calculation methodology). Therefore, the beneficiaries of a TDP pension exhibit a relatively low employment rate. Is this caused by the amount of the TDP pension? Marie and Vall Castelló (2012) use the increase in the amount of the TDP pension at 55 years of age as a natural experiment to estimate the causal impact of this increase on the probability of employment. Their results show that this change decreases employment probability of beneficiaries by 8%. Similarly, Malo et al. (2011) have shown that in Spain, the likelihood of returning to work for those receiving a TPD pension decreases as age increases.

The estimated earnings losses are large enough to assume that they will have a negative impact on the welfare of TPD beneficiaries. What are the policy options to close the earnings gap?

The first fact suggests that it is important to implement an intervention at the same time, or just after, one becomes eligible to receive the TPD pension, as this would facilitate re-employment. Rehabilitation programmes and specific counselling regarding labour market integration for these workers would also be highly beneficial. Although these interventions do exist in Spain, the current earnings gap indicates that they are not sufficient as they have not alleviated the problem.

The second and third facts call for an increase in the amount of the TPD pension to close the earnings gap, especially for workers over 54 years of age. However, the income effects of such an increase, as found by other authors, emphasise the negative incentives to return to work. Therefore, policy interventions, such as specific rehabilitation programmes and specialised labour market intermediation, seem to be a preferable option. Furthermore, these policies should be especially intense and adapted for older workers above 54 because a worker close to retirement age finds it increasingly more difficult to return to work and

"the payoff for doing so is fairly minor. In most cases, the effort will yield only a few years of earnings and is not likely to make a major change in retirement income" (Yčas, 1996: 173).

Our analysis of the two age groups (see Table 1) is coherent with the above recommendations. Because workers over 54 years of age have seniority and receive higher wages, their benefits are also generally higher. Moreover, their benefits are calculated as 75% of the regulated base rather than the 55% that workers under 55 years of age receive. Despite these favourable conditions, earnings losses are clearly greater for older workers. On the other hand, while younger workers have a lower pension, they also experience a lower level of permanent earnings losses. For this group, specific policy interventions may also be essential, but the incentives still favour participation in the labour market as they have a longer horizon ahead to obtain wages and higher retirement pensions in the future. Thus, the most realistic option for closing the current permanent earnings gap is to facilitate re-employment after the TPD entitlement. Active measures seem to be the best candidates to accomplish this challenge.

Finally, as a robustness check, we estimated the same model using annual data from the salary payments rather than the contributory base. These data also come from the MCVL, which includes tax data from the National Revenue Agency. The advantage of this fiscal information is the inclusion of total personal earnings (with no minimum or maximum thresholds, as in the case of contributory bases). However, the weakness is that because we have only annual data, we lose the monthly evolution of contributory bases.

Figure 3 supports the same conclusions as those of the previous analysis. In other words, there is an earnings gap between the control and the treatment group that increases after the TPD entitlement.

The estimations with DiD-PSM are consistent with the above findings. There is a decrease in annual earnings of 3,000 euro during the first year after accessing the TPD pension, and this increases to 4,800 euro two years later and 4,300 euro three years later. Separately estimating the effect for workers over 54 and under 55 years of age, we again find that the decrease in total earnings is higher for older workers.

Therefore, the annual information confirms the results obtained using monthly data.

<<Figure 3>>

5 Conclusions

Disability pensions are income transfers programmes that attempt to alleviate the earnings decrease related to the difficulties of finding a suitable job after the onset of a disability. The majority of the previous literature has focused on the negative impact of these types of programmes on the incentive to return to work.

However, evaluating the main objective of such programmes, that is, whether they close the total earnings gap or not, remains unexplored. Thus, this has been the objective of this research. We have focused on a specific type of disability pension (TPD or total permanent disability, in Spanish, *Incapacidad Permanente Total*) of the Spanish Social Security. The TPD is for workers who have become partially disabled, but can still work, although the work would be in an occupation different from their pre-disability work. In other words, this type of disability pension is fully compatible with working.

We have used an administrative dataset that provides longitudinal information on wages and pensions as well as the full employment history of all individuals. We have defined a treatment and a control group. The treatment group consists of male workers entering the TPD pension in 2005 or 2006, while the control group corresponds to fully comparable male workers. The econometric strategy combines propensity score matching and difference-in-differences. The PSM estimates the impact of the programme conditioned on observable variables, while the DiD controls for unobserved heterogeneity, such as the health status of individuals, which is not directly observable in our dataset.

The descriptive analysis shows a decline of earnings even 18 months before the TPD pension entitlement and a sharp decrease approximately 6 months before the entitlement. On average, while there is a partial recovery of this decrease, a significant earnings gap remains up to two years following entitlement. The estimation of the causal effect of the TPD shows a significant earnings gap for male workers entitled to the TPD. This gap is approximately 400 euro per month two years after pension entitlement. When estimating separately for workers under and over 54 years of age, earnings losses for the oldest sub-group are greater, even though they receive greater benefits.

Therefore, the main objective of this policy is only partially satisfied. The TPD partially closes the earnings gap with respect to those not suffering this type of negative health shock. However, a significant earnings differential remains in the long-term.

The policy options to close this earnings gap and improve the well-being of these workers include increasing the amount of the TPD pension and developing additional interventions that are aligned with active labour market policies.

Previous empirical literature shows that increasing the amount of the TPD pension has a negative impact on employment probabilities, especially for those male workers above 54

years of age. Active policies, such as rehabilitation programmes and specialised labour market counselling, may increase the re-employment probabilities of these workers without introducing negative incentives to work. However, more intense and/or adapted programmes should be implemented for workers over 54 years of age, as they not only suffer a larger earnings gap even after receiving higher benefits, but they also face more challenges to return to work after becoming disabled.

On the other hand, if young workers with partial disability return to employment, they have the opportunity to increase their wages over their expected longer working life and thereby contribute to larger retirement pension. The higher employment rates of disabled workers under 55 years of age suggest that they may maintain their earnings (i.e., economic well-being) at a similar level as before the negative health shock.

The OECD (2007) advises that people with a partially reduced work capacity should not leave the labour force permanently and that they should be supported as they seek to find an appropriate job or to remain in their current job so their social inclusion and living standards may be raised. Our results support that Social Security should both maintain income support to workers with a partial disability and should encourage their employment participation (for example, with specialised active labour market policies) to prevent the permanent deterioration of their economic well-being, even more so for older workers.

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Appendix. The permanent disability system in Spain

There are three levels of contributory pensions for permanent disability in Spain: total permanent disability for usual occupation, absolute permanent disability and serious disability[12].

A *serious disability* is the most severe form of disability. It is permanent, and the individual requires assistance from another person to perform daily activities, such as getting dressed, moving, eating, and so on.

An *absolute permanent disability* is a disability that absolutely limits the worker from performing the basic duties of any profession or trade.

A *total permanent disability for usual occupation* (TPD) is a disability that limits the worker from performing the main tasks of his profession, although the individual is capable of performing the tasks associated with a different profession. We focussed on the latter because no other disability is compatible with performing a different job at either the same or a different workplace[13].

The eligibility requirements for a total permanent disability pension in Spain are as follows[14]:

- The applicant must be either under 65 years of age at the time of the causal event or the disability must be the result of an ordinary disease or a non-work related injury and

[12] Here, we follow the translation into English of the Spanish legal terms included in the web page of the Spanish Social Security: http://www.seg-social.es/Internet_6/Trabajadores/PrestacionesPension10935/Incapacidadpermanen10960/RegimenGeneral/Grados/index.htm

[13] The other two pensions do not prevent profit or non-profit activities being carried out. However, these activities should be in accordance to the legally recognised level of disability and not related with a change in the capacity to work. Otherwise, the claimant could be reassessed and downgraded to the total permanent disability category.

[14] We refer to the General Social Security System. The other systems are specific schemes for self-employed workers, agricultural workers and seamen.

be unable to meet the admission requirements of the contributory retirement pension —i.e., 15 years of contributions.

- The applicant must be affiliated with the Social Security System or be associated with a similar legal program.

If the disability event is due to a work-related injury or an occupational illness, there are no requirements with respect to previous contributions. In other cases (i.e., ordinary diseases of life), a minimum contributory period applies depending on the age of the applicant.

In Spain, the Social Security administration is responsible for assessing, qualifying and reviewing eligibility for contributory benefits related to permanent disability[15].

The amount of the TPD benefit is calculated as 55% of the regulatory base (RB) with regard to the cause of the disability. This percentage may increase to 75% for beneficiaries over 55 years of age when they are unlikely to find employment in a different activity due to a lack of overall or specialised training and as a result of the economic and employment situations in the area of residence.

The calculation of the regulatory base varies depending on the cause of the permanent disability as follows:

[15] The Social Security webpage explains the process to obtain a permanent disability pension: http://www.seg-social.es/Internet_6/Masinformacion/TramitesyGestiones/PensiondeIncapacida45982/index.htm

cause of permanent disability	Regulatory base
ordinary disease	$$BR = \frac{\sum_{i=1}^{24} Bi + \sum_{i=25}^{96} Bi * \frac{I_{25}}{I_1}}{112}$$ B_i: Contributory base in the i-month before the negative health shock. I_i: Inflation rate in the i-month before the negative health shock (i= 1, 2, …, 96). Except if age < 52: RB= ΣB_i /(number of months *1,1666)
non-work related injury	BR= ΣB_i for 24-month continuous period (within the last seven years) /28 (if there is no 24-month continuous period, Σ minimum bases for the 24 months before the TDP)
work-related injury or occupational disease	BR = (1/12) * Σ (daily wage at the time of the entitlement *365) + (extra payments or employee benefits in the previous year) + ([(supplements + overtime in the previous year) / working days * 273)

Figure A.1. Sample selection

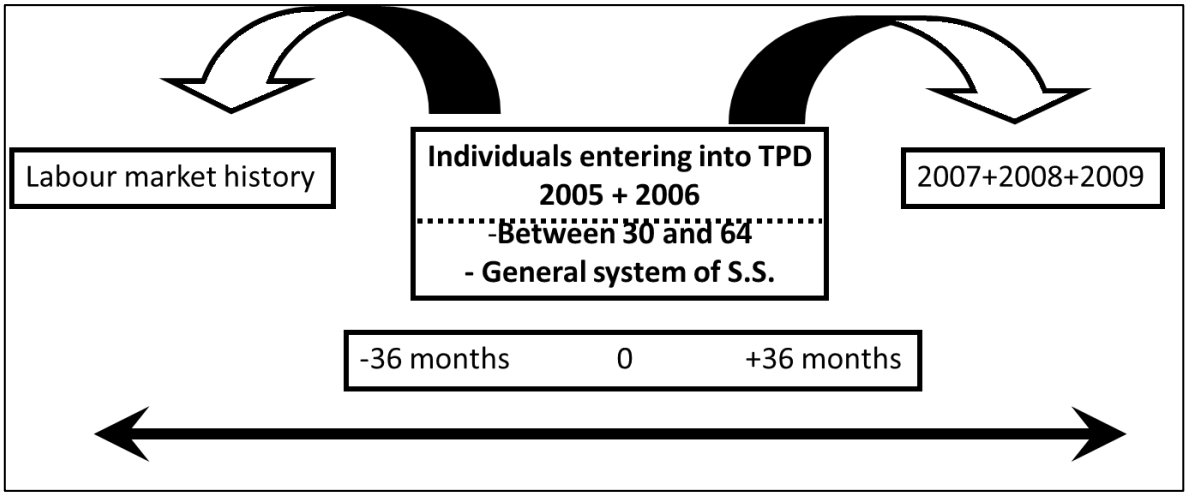


Figure A.2. Distribution of the propensity score by treatment and control group

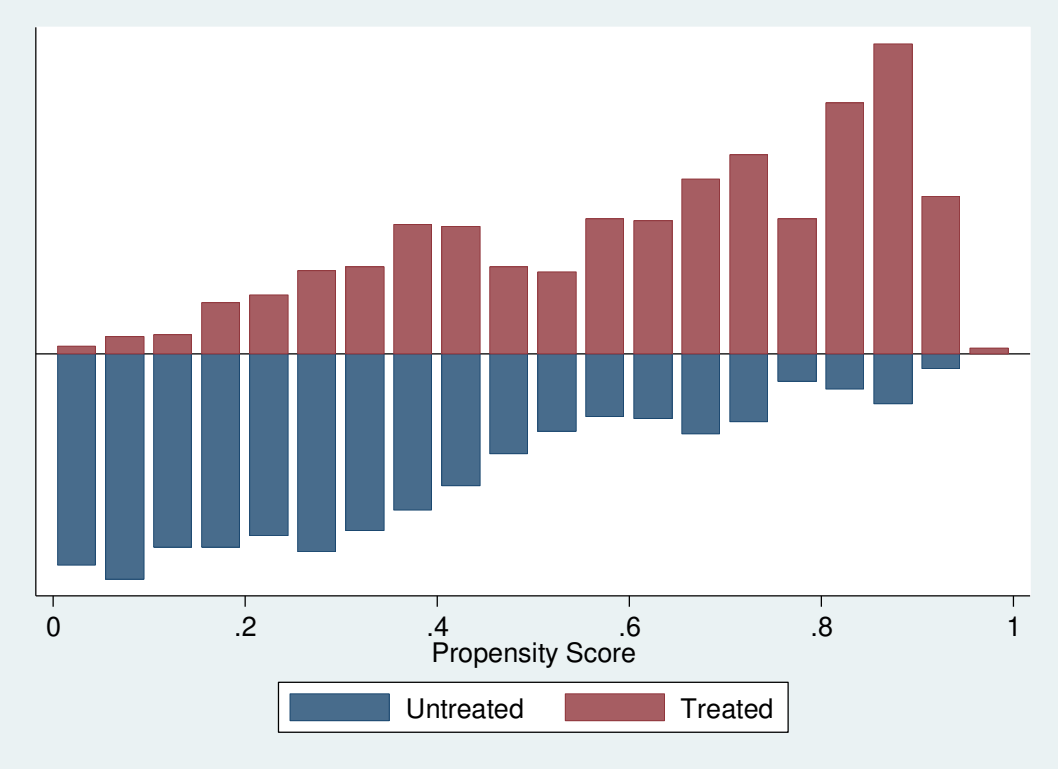


Table A.1. Descriptive statistics of the treatment and control groups

	Mean	S.D.	Mean	S.D.
	Treatment group		Control group	
Age at the time of TPD pension entitlement*	52.0	9.1	42,7	8,8
Qualification level				
Highly qualified workers	0.112	0.315	0.271	0.445
Semi-skilled and skilled clerks	0.156	0.363	0.207	0.405
Auxiliary workers	0.143	0.351	0.126	0.332
Semi-skilled and skilled labourers	0.556	0.497	0.359	0.480
Unskilled labourers	0.033	0.178	0.037	0.190
Non-nationals	0.048	0.214	0.078	0.268
Age at first employment spell	22.0	5.8	22.1	6.6
Working experience until TPD pension entitlement (years)				
Employment	22.4	9.5	15.4	10,1
Unemployment	2.5	3.0	1.8	2.0
# of spells before TPD pension entitlement				
Total	24.9	30.1	15.6	19.2
Employment	18.5	25.7	12.5	16.6
Unemployment	6.3	8.4	3.1	5.2
N (observations)	1,443		1,528	

* For the control group, the time reference is 2005.

Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives).

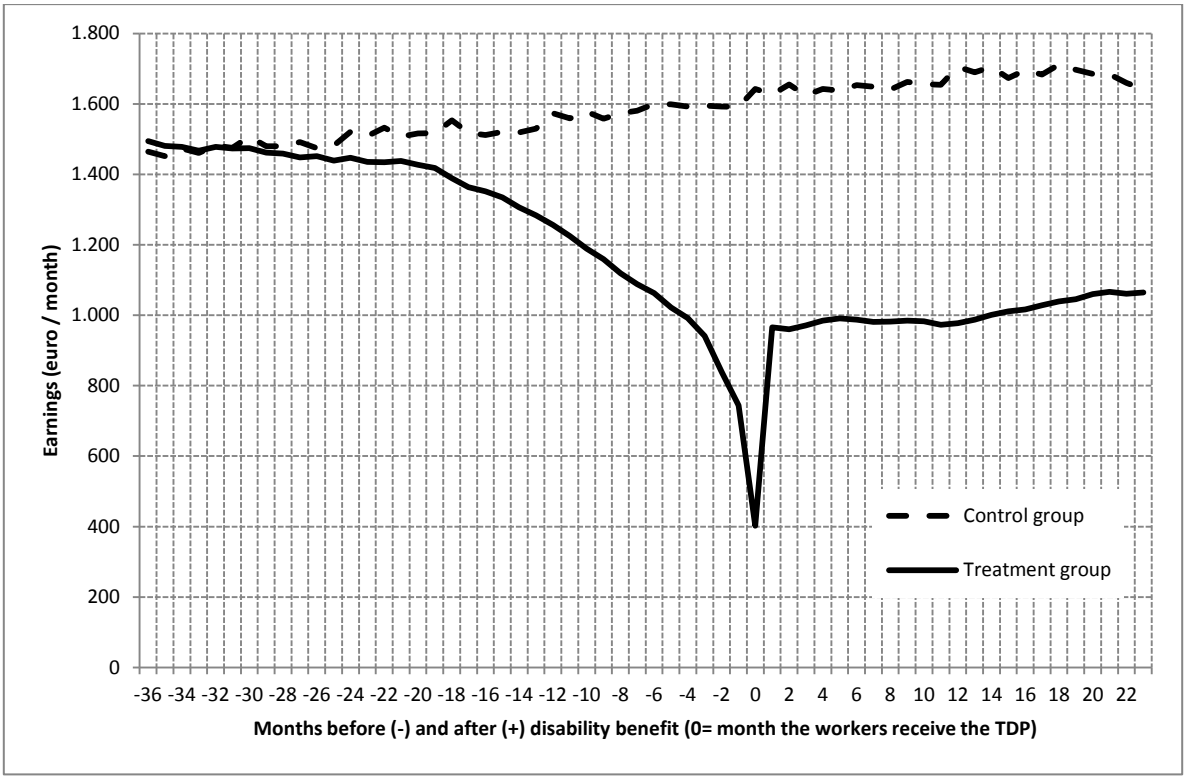
Table A.2. Propensity score estimation (total sample)

	Coef.	S.E.	
Age (ref: > 55)			
<35	-2.973	0.239	***
36-40	-2.524	0.216	***
41-45	-2.233	0.197	***
46-55	-1.473	0.150	***
Age at first employment spell (ref: 26-30)			
< 20	-0.014	0.175	
21-25	-0.101	0.163	
> 30	-0.952	0.253	***
Skill (ref: low)			
High	-1.055	0.114	***
Medium	-0.204	0.108	*
Working experience (ref: < 5 years)			
5-10	0.873	0.226	***
11-20	0.881	0.227	***
21-30	0.810	0.259	***
> 30	0.582	0.288	**
Unemployment spells (ref: > 1)			
0	-0.679	0.112	***
1	-0.260	0.139	*
Working experience in industrial sector (Yes=1)	0.196	0.094	**
Working 18 months before TPD (Yes=1)	-0.804	0.170	***

Level of significance: * 10%; ** 5%; *** 1%

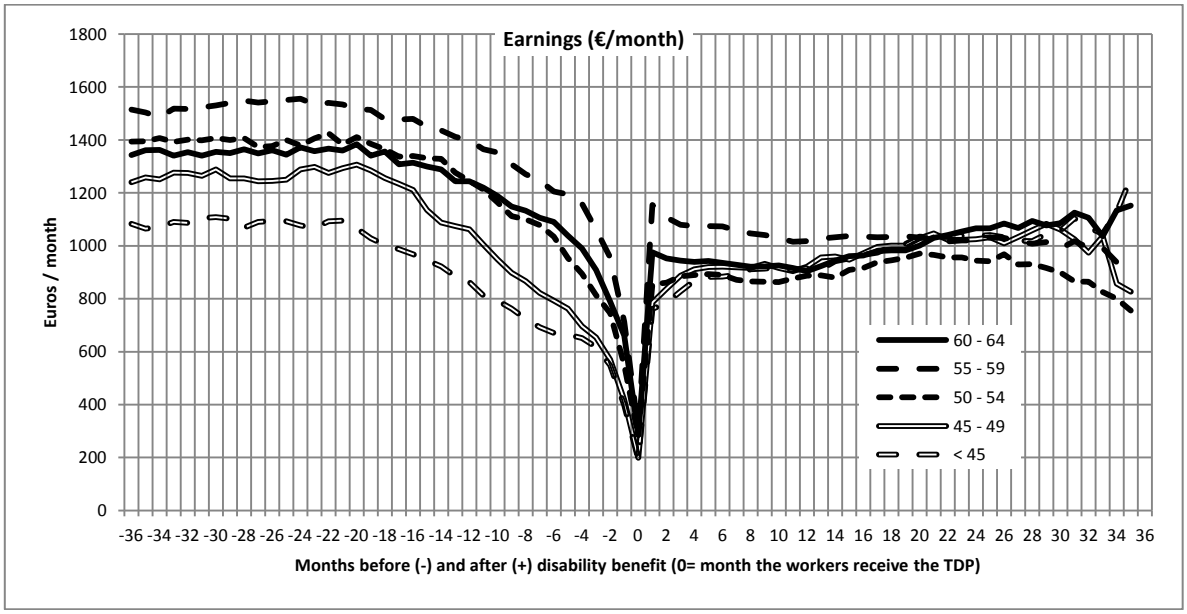
Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives).

Figure 1. Total earnings



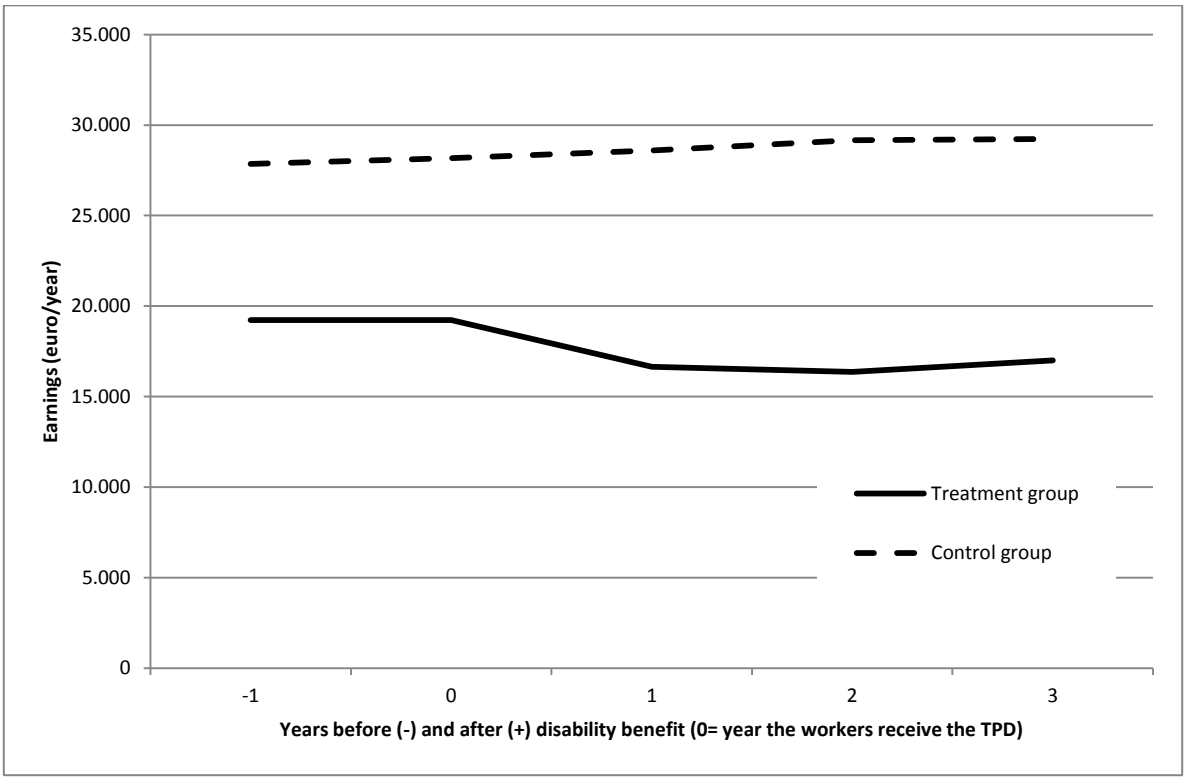
Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives) and authors' calculations.

Figure 2. Total earnings by age



Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives) and the authors' calculations.

Figure 3. Total annual earnings



Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives) and the authors' calculations.

Table 1. DID-PSM results: difference in monthly earnings (Euro)

	All		> 54		< 55	
Months after DI	**ATT**	**S.E.**	**ATT**	**S.E.**	**ATT**	**S.E.**
1	-459.793	35.241	-422.715	75.964	-495.121	41.940
2	-480.988	46.146	-512.455	70.347	-502.956	40.019
3	-449.705	37.228	-441.388	69.774	-471.264	42.667
4	-452.904	34.939	-436.975	74.425	-456.501	52.407
5	-448.487	39.429	-442.923	78.907	-431.758	45.714
6	-467.264	41.285	-474.225	79.481	-453.214	38.575
7	-472.066	39.595	-512.375	68.532	-462.979	44.225
8	-468.181	40.959	-518.255	65.567	-416.063	39.801
9	-481.338	37.826	-548.627	70.269	-422.382	39.076
10	-463.037	33.070	-540.408	75.270	-416.661	45.420
11	-463.090	35.477	-508.081	65.003	-423.156	43.047
12	-525.273	37.301	-573.693	66.471	-461.189	39.452
13	-459.539	38.512	-515.716	70.368	-413.383	43.500
14	-486.992	33.087	-548.767	71.465	-456.659	41.907
15	-438.669	38.502	-507.394	72.393	-411.428	45.634
16	-458.140	37.588	-535.916	71.793	-421.672	43.012
17	-420.530	40.517	-494.343	66.116	-394.405	41.840
18	-442.003	43.764	-520.581	60.089	-384.072	44.285
19	-432.870	41.452	-512.390	66.778	-359.026	46.901
20	-400.853	42.129	-477.761	77.718	-315.494	46.276
21	-405.621	34.054	-513.647	65.597	-338.216	40.400
22	-369.461	37.654	-446.756	61.697	-325.469	41.610
23	-355.659	34.501	-407.517	73.191	-308.167	50.336

Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives) and our own estimations.

Table 2. DID-PSM results: difference in annual earnings (Euro)

	All		> 54		< 55	
years after DI	**ATT**	**S.E.**	**ATT**	**S.E.**	**ATT**	**S.E.**
1	-2.947,5	610,5	-2.428,1	1.104,1	-3.408,7	628,1
2	-4.803,4	1.311,2	-8.438,7	3.393,9	-2.105,6	982,2
3	-4.269,8	1.228,1	-8.098,1	3.344,1	-1.360,5	929,8

Source: MCVL (*Muestra Continua de Vidas Laborales* / Longitudinal Sample of Working Lives) and our own estimations.