The labour effect of a Disability Act. Longitudinal evidence from Chile

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ABSTRACT

In February of 2010 a *Law on Equal Opportunities and Social Inclusion of Persons with Disabilities*, the *Law N. 20.422*, was enacted in Chile. One of the aims of this reform was to improve the labour inclusion for the people from this group, but until now there is still no evidence that supports the fulfillment of that objective. In that line, by analyzing longitudinal data from the Chilean *Social Protection Survey* we find that the *Law N. 20.422* had no significant labour effects in the short term and that it implied mid term negative impacts on the labour force participation and the employment rate of the working age persons with disabilities in the country. The latter holds even after controlling for the increasing trend of individuals receiving disability benefits, for individuals' unobserved heterogeneity and for the potential dynamic effects of labour state dependence.

JEL classification: J2; J78; I18.
Keywords: Disabilities; Disability Act; Labour market; Labour outcomes.

Contents

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1   Introduction and research framework

The 3rd of February of 2010 a Disability Act, the *Law N. 20.422*, was enacted in Chile in order to ensure equal opportunities and social inclusion for persons with disabilities. Among the different areas considered by this law there were various changes aimed to improve their employment prospects. Several years have passed since then, but the actual efficacy of this reform is an empirical question that hasn't been solved yet. In that line, the main focus of this paper is to assess from a longitudinal perspective the effects of the *Law N. 20.422* on the labour outcomes of people with disabilities in Chile.

According to World Health Organization (WHO) disability is a complex social phenomenon present all around the world related to the interaction between contextual factors and individual health conditions and impairments, which result in some difficulties in spheres as education, health and work, among others. More than a billion people (about 15% of world's population) live with some disability and, for that reason, they face worse educational outcomes, lower economic and civic participation and more barriers to health care and to other services (WHO, 2011). The case of Chile isn't exempt of this reality. The last *National Study on Disability* shows that in 2015 around 20% of the adult population (about 2.6 million people) faced some disability: 11.7% with a mild to moderate one and 8.3% with a severe one (Ministry of Social Development, 2016).

These conditions result in individuals poorer health status and this situation has direct links with the economy in different ways. From a macroeconomic perspective, for example, they may be related with lower levels of labour force productivity and result in production and income losses at the national level (Haveman & Wolfe, 2000). Also, the *cost-of-illness* approach posits that the treatment of these conditions implies huge costs related to health care resources and non medical goods and services (Rice et al., 1985). This can be understood as a significant opportunity cost in terms of resources not being spent in other needed areas of public policy such as poverty or education.

From a microeconomic perspective, disabilities may be directly related to the well being of individuals through their labour market performance. Specifically, they can diminish their ability to earn income by limiting human capital accumulation and productivity (Currie & Madrian, 1999). Furthermore, they can increase access barriers and opportunity costs and modify the individual relative preferences between consumption and leisure, increasing the disutility of working and the reservation wage, thus discouraging their participation in the labour market (Jones, 2008). In this way, in a context of low incomes, disabilities could act as a severe poverty trap for the people.

The literature has widely documented the existence of negative and significant effects of disabilities on certain labour outcomes such as employment, labour force participation and wages (Jones, 2008; Currie & Madrian, 1999). Campolieti (2002), for instance, finds that these conditions have a strong negative impact on Canadian older men's labour participation and Kidd et al. (2000) find that in the United Kingdom (UK) workers with disabilities receive significantly less income than workers without these conditions.

Due to these disadvantages, in recent decades the pursuit of greater equality of opportunities and labour inclusion for people with disabilities has become a relevant issue in public policy. In this regard, several countries have enacted anti-discrimination laws and quota laws in favour of this group. Some of these cases are the *Americans with Disabilities Act* (ADA) in the United States (US) in 1990 and the *Disability Discrimination Act* (DDA) in the UK in 1995. More recently in 2006, the United Nations (UN) General Assembly adopted the *Convention on the Rights of Persons with Disabilities* (CRPD) which in terms of labour inclusion establishes that *"States Parties recognize the right of persons with disabilities to work, on an equal basis with others; this includes the right to the opportunity to gain a living by work freely chosen or accepted in a labour market and work environment that is open, inclusive and accessible to persons with disabilities"* (UN, 2006). It's important to mention that since the adoption of the CRPD, disability has been understood from a social and human rights dimension and not simply from a medical or physical perspective, as it was previously (ILO, 2014).

1.1 The case of Chile

Chile has also advanced towards a social framework that seeks to address this problem as human rights matter in order to achieve more social inclusion. In that sense, in 2008 the country adopted the UN CRPD and in 2010 a *Law on Equal Opportunities and Social Inclusion of Persons with Disabilities*, the *Law N. 20.422*, was enacted. This in order to ensure the full enjoyment of their rights and to eliminate any form of discrimination based on their condition, under the principles of independent living, universal accessibility, universal design, intersectorality and social participation. It's worth pointing that this law defines a person with disability as someone who presents one or more physical, mental or sensory deficiency (transitory or permanent) and who sees restricted his or her full and effective participation in society, on equal terms with others, when interacting with various barriers present in the environment (Law N. 20.422, 2010).

In the labour sphere, the *Law N. 20.422* (2010) imposes various changes to aim at the labour inclusion of the people from this group. In the first place, it establishes that the State has to promote and apply positive action measures against discrimination, such as requesting accessibility requirements, the realization of the needed job accommodations and the prevention of harassment behaviours (Art. 8). On the other hand, it seeks to promote and spread labour inclusion practices, establishing the State obligation to create and implement employment access programs for persons with disabilities. In terms of accessibility, the law demands access improvements in public buildings and public transport (Art. 28) and it promotes the creation and design of procedures, technologies, products and labour services that are accessible, looking for the spread of their usage (Art. 43). Moreover, the law facilitates the realization of the necessary adjustments by the companies eliminating the customs tariffs for equipment, machinery, work tools and equipment of information technology and communication, specially designed or adapted for people with disabilities (Art. 49).

The *Law N. 20.422* also creates the *National Disability Service* (SENADIS, for its Spanish name: *Servicio Nacional de la Discapacidad*) in order to promote from an

institutional perspective the right of equal opportunities for persons with disabilities through the intersectoral coordination and public policy execution. Within the functions of this institution are to develop and implement the national policy plan for the people from this group (SENADIS, 2013) and to ensure compliance with the legal provisions and regulations that are directly related to the protection of their rights (Law N. 20,422, 2010).

As stated before, all of these changes have been made in the pursuit of improvements on the labour outcomes of this group in Chile. The effectiveness on doing so and the true labour effect of *Law N. 20.422*, however, is an empirical issue that hasn't been taken into account until now and that is going to be addressed here.

1.2   Literature review

The economic and labour impact of these kind of laws may be uncertain for various reasons. On one side, by ensuring greater rights, equal opportunities and universal accessibility, the employment barriers and the opportunity costs for individuals with disabilities are reduced. This implies a reduction in their reservation wage and facilitates the conditions for them to offer a greater labour supply, which would result in an increase in the employment of this group (Bell & Heitmueller, 2009). On the other side, there are factors on the demand of labour that can be deteriorated due to the new costs associated to hiring and firing people with disabilities, mainly related to the need to implement job accommodations and to the potential threat of lawsuits for discrimination (Acemoglu & Angrist, 2001). The latter would imply a decrease in their employment rates. Additionally, there could be other policy changes happening aside, such as the enactment of other laws or changes in the tax system structure, that may also affect the labour outcomes of the people from this group. Therefore, the effects of these type of reforms is an important empirical question to solve.

In that line, a body of literature has come up seeking to analyze the employment impact of Disability Acts. For the case of the US ADA, using data from 1986 to 1995 of the *Survey of Income and Program Participation* (SIIP) DeLeire (2000) estimates that after the law enactment the employment rate of men with disabilities decreased in 7.2% and they salary didn't change. In a similar way, using data from 1988 to 1997 from the *March Current Population Survey* (CPS) Acemoglu & Angrist (2001) document a similar negative effect of the ADA in weeks worked by individuals with disabilities. Thus, both studies suggest that the law didn't meet its objective and that the channel of a lower demand of labour due to higher costs prevailed. However, they fail to account for individual unobserved heterogeneity and for the potential effect of other conditions that could also deteriorate individuals' health status and labour outcomes, such as *Non Communicable Diseases* (NCDs) or the presence of another household member with disabilities (Pacheco, 2018). We are able to account for both of these factors in the following analysis.

For the case of the UK, Bell & Heitmueller (2009) study the employment effect of the DDA on English people with disabilities using the Acemoglu & Angrist (2001)

difference-in-difference approach. Besides the pooled analysis they estimate a fixed effects model in order to control for time-invariant unobservables and they find that the DDA implied a reduction, or at least no effect, on the employment rate of individuals with disabilities in the short term after the law enactment. They propose that the low levels of financial support and the lack of awareness about the law and its benefits to people with disabilities are some of the plausible explanations of their results.

There are also some studies examining the impact of quota laws on the employment rates of persons with disabilities. Lalive et al. (2013), for example, analyze the impact of the Austrian *Disabled Person Employment Act* (DPEA), which states that employers are obligated to hire at least one person with disability every 25 workers without disability and that firms should pay a tax if they fail in doing so. They follow a regression discontinuity approach to compare the hiring behaviours above and below the threshold and, using information from 1999 and 2000, they find that the DPEA implies 12% more employment of people with disabilities in the firms subject to the quota. In the same line, Mori & Sakamoto (2017) use Japanese administrative data from 2008 to study the impact of the country's quota system, which imposes penalties for firms with more than 300 employees non fulfilling a share of 1.8% workers with disability. Through a fuzzy regression discontinuity design they find that the quota scheme raises the employment of individuals with disabilities in the country's manufacturing industry and that this doesn't necessarily imply a decrease on firms' profits.

The majority of these studies, however, only look at the employment rates and don't explore what's happening with other labour outcomes, such as the labour force participation and the unemployment rate, in order to have a more complete perspective of the situation. Additionally, they don't include in the explanatory variables individuals' previous work characteristics, such as their employment or unemployment history. This is also important to take into account as it has been shown that there is a potential dependence from individuals' past labour status and this factor could be even more relevant for people with disabilities (Gannon, 2005). Therefore, we will extend the analysis beyond the employment rate dimension and we will use an estimation strategy that allows us to account for the potential dynamic dependence of labour state.

It's worth considering that when studying the impact of Disability Acts it's also necessary to complement the analysis considering the potential effects of the receipt of disability benefits or pensions. Specifically, these kind of transfers may reduce the labour supply of the working age population with disabilities by increasing their non labour income or by the presence of moral hazard problems. In effect, the literature has documented a negative relationship between both variables and this is even more relevant when there is an increasing trend in the number of persons claiming for these benefits across time, as in the case of the US in the 90s (Bound & Burkhauser, 1999). Chen & van der Klaauw (2008), indeed, report a labour force participation disincentive effect of 20% related to the increase of the disability insurance program for that decade in the country.

Finally, it's important to mention that most of the empirical research regarding disabilities and Disability Acts use data and contexts prior to 2006, which prevents us from a more recent and accurate insight regarding these phenomena in the current context of

disability as a human right issue. In addition, for the case of Chile, considered a high-income country since some years ago, despite the fact that disabilities are currently a relevant public policy priority, the evidence about this topic is scarce. In this line, Zitko and Cabieses (2011) study the socioeconomic determinants of disability for year 2006 and find that lower levels of income and education and the fact of being unemployed were strongly correlated with the probability of suffering a disability. In a more recent study, Rotarou and Sakellariou (2017) analyze cross-sectional data from year 2013 and find that people with disabilities face greater barriers accessing health care, which translates in higher difficulties to move to health facilities, to obtain an appointment with a doctor and to pay the necessary treatments and medicines. However, there is still no evidence on how the *Law N. 20.422* may have affected the labour outcomes of the persons with disabilities in the country, which makes it necessary to extend the research to that area.

1.3 Research question and hypothesis

Due to all the mentioned above, the research question to be addressed is the following: What are the impacts of *Law N. 20.422* on the labour outcomes (namely labour force participation, employment and unemployment) of people with disabilities in Chile? The hypothesis that arises a priori is that one should expect a positive effect of this law on the labour outcomes of the group, this is an increase on labour force participation and employment and a decrease on unemployment, mainly for two reasons. First, unlike the other Disability Acts previously discussed, the *Law N. 20.422* was enacted in a context of a social and human rights framework of disability, thus one may expect a greater internalization by people and companies about the rights and equal opportunities of individuals with disabilities. This suggests that the channel of a greater labour supply should prevail over the channel of a reduced labour demand for workers with disabilities. Second, *Law N. 20.422* establishes tariff exemptions to facilitate the acquisition of certain needed job accommodations by companies, thus promoting their implementation and reducing in that way one of the hindering impacts of the labour demand channel.

Contrary to this hypothesis, we find negative mid term effects of the law on the labour force participation and employment of people with disabilities in the country. After checking the robustness of these findings by accounting for the presence of disability benefits receipt, for individuals' time-invariant unobserved characteristics and for the potential labour state dependence, we give some plausible reasons to explain this situation.

The remainder of this paper is as following: Section 2 describes the data to be used for the subsequent analysis and illustrates different patterns related to disability prevalence and to the labour market trends of people with disabilities in Chile. Section 3 explains the empirical strategy to be addressed in order to identify correctly the impact of *Law N. 20.422* on the labour market outcomes of the individuals from the group and, then, Section 4 shows the results and discusses their relevance and plausible explanations. Finally, Section 5 concludes proposing some policy implications and challenges for future research.

2 Data and descriptive statistics

2.1 Data description

To carry out this analysis it's necessary to count with longitudinal data that contain at least information about individuals' disability status and their performance in the labour market. One of the advantage of these kind of data is that it allows us to use past information and certain estimation strategies to account for potential dynamic effects and to control for the unobservable individual heterogeneity.

For the purpose of this research, we will use the data from the Chilean *Social Protection Survey* (EPS, for its Spanish name: *Encuesta de Protección Social*), a panel survey representative of the adult population nationwide. The EPS was performed for first in 2002 and since then there have been five waves in the years 2004, 2006, 2009, 2012 and 2015. In general terms, these datasets count with a large variety of socio-demographic information (such as age, gender and educational attainment) and also with information about labour characteristics (such as income, labour status and previous work history, among others). They also count with a health module containing information about the prevalence of disabilities. Specifically, people are asked to answer in a binary way if they have any type of disability or invalidity (related to hearing, talking, seeing, mental, physical or psychiatric deficiencies).

For all the subsequent analysis the last five waves of the survey will be considered in order to count with information from different moments across time in a similar window before and after the *Law N. 20.422* was enacted.[1] It's important to mention that EPS 2012 wasn't a successful survey due to poor results of the field work and low response rates, so in order to avoid problems of representativeness all the possible information for that survey year will be retrieved retrospectively from EPS 2015.[2]

Moreover, it should be considered that the *Law N. 20.422* (2010) also imposed changes in matter of educational inclusion, establishing that the State must ensure people with disabilities access to the public or private educational system (Art. 34) and that tertiary education institutions must count with mechanisms and with learning adaptations that facilitate the access to the persons from this group and permit their correct development (Art. 39). Therefore, in order to avoid confounding effects of this dimension the analysis will be restricted to the working age population from 25 to 65 years old assuming that on that age all major educational decisions have already been made. In a complementary way, people who are currently studying in each survey year will be excluded of the analysis, suggesting that their job needs and interests could be different in comparison to people who are not studying.

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[1]The EPS 2004 was conducted between November 2004 and May 2005 meanwhile the EPS 2015 was conducted between April and July 2016, leaving a window with relatively similar length at both sides of the law enactment.

[2]In more detail, this is possible only for individuals from EPS 2012 that were also surveyed in EPS 2015. Additionally, to show that this issue isn't driving the main findings, we will show in the Appendix the results from the econometric analysis excluding the information from that survey year.

Excluding also the observations with missing information on the relevant variables and pooling the data from the different survey years, we obtain a sample with a total of 55,630 observations of which 42,477 are in the labour force. In particular, we are able to distinguish 20,059 different individuals through the five survey years, with some of them present just in one of the waves and the majority of them present in two or more waves.[3] Summary stats of the sample's different variables of interest are presented in Table 1 according to each survey year.

Table 1: **Summary statistics**

Variables	2004 Mean	2006 Mean	2009 Mean	2012 Mean	2015 Mean
Female	.50	.50	.51	.56	.53
Age	43.8	44.2	45.4	46.2	44.5
Aged between 25-44	.54	.52	.47	.44	.47
Aged between 45-65	.46	.48	.53	.56	.53
Completed primary education	.39	.36	.35	.36	.28
Completed secondary education	.44	.46	.48	.47	.50
Completed tertiary education	.17	.18	.17	.17	.22
Received previous training	.14	.13	.07	.07	.10
Head of household	.56	.56	.60	.58	.59
Married	.67	.66	.65	.60	.56
Number of other household members working	.95	1.02	.95	.78	.85
Number of children from 0-4 years	.17	.17	.14	.14	.14
Number of children from 5-12 years	.45	.42	.38	.30	.28
Number of children from 13-18 years	.34	.34	.31	.25	.19
Disability	.070	.074	.073	.071	.062
Presence of disability in household	.11	.13	.11	.11	.11
Presence of individual NCDs	.30	.32	.32	.35	.37
Labour force	.77	.79	.77	.71	.76
Employed	.66	.67	.66	.67	.68
Unemployed	.14	.15	.15	.06	.10
Total observations (N=55,630)	12,536	12,831	11,484	9,428	9,351
Labour force observations (N=42,477)	9,627	10,168	8,898	6,668	7,116

Notes: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. The labour outcomes information in each survey year are from the last working status reported on the respective survey. Due to implementation problems in EPS 2012, all the possible information for that survey year is retrieved retrospectively from EPS 2015.

In terms of demographic characteristics, women account on average for 52% of the sample, the age mean is 44.7 years old and the age groups of 25 to 44 years and 45 to 65 years are relatively balanced with 49% of the sample in the former and 51% in the latter. Nevertheless, we can observe across time a steady decrease in the share of

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[3]The detail of the panel composition is shown in Table A1 of the Appendix.

the first age group and a steady increase in the share of the second, consistent with an aging pattern of the sample. Relative to human capital characteristics, on average for the whole period 35% of the sample have completed primary education, 47% secondary education and just 18% tertiary education. Furthermore, the mean of people that have received some type of training during the recent years prior the surveys is 10%.

Regarding to household characteristics, on average 58% of the individuals report being the household head and 63% are married, with a sharp drop of the latter group for the years after the law enactment. Moreover, the mean number of other household members working and the mean number of children from different age groups in the household are also reported and considered in the analysis as both factors can be relevant determinants of labour decisions (Borjas, 2008).

In the health sphere, 7% of the individuals report the presence of disabilities, ranging from a top of 7.4% in 2006 to a bottom of 6.2% in 2015. Additionally, on average 11% have some other member of the household with disability, situation which can also interfere with the use of time and with labour market choices due to the need of caring activities, for instance (Pacheco, 2018). Health can also be deteriorated for the presence of other chronic conditions such as arthritis, asthma, depression, heart problems or hypertension, among others (Currie & Madrian, 1999). In this line, it's important to point that on average 33% of the sample have some kind of NCD affecting them and that this situation is more pronounced for the years after the law enactment.

Finally, in the labour dimension on average for the whole period 76% of the individuals are in the labour force, 67% are employed and, within the former group, 12% are unemployed. It's worth noting that, as same as disability status, both labour force participation and unemployment rate have experienced certain decreases between the period pre 2010 and the period post 2010. This is important to keep in mind when analyzing the subsequent results in relative terms.

2.2 Disability prevalence and labour market trends

Among the 7% of people with disabilities there are some interesting differences in prevalence according to socio-demographic characteristics, which are shown in panels (a), (b) and (c) of Figure 1. On one side, for the pooled sample disabilities are specially more prevalent among men than women, representing 7.6% of the former group and 6.6% of the latter and being this difference significant from a statistical point of view ($|t| = 5.4$). This prevalence gap between genders, however, seems to diminish across time, being greater in the period pre 2010 than in the post 2010 and not statistically different from zero in the second ($|t| = 1.5$).

On the other side, there is a notable positive gradient between disabilities and age, which is consistent with what have been found in the literature (Haveman & Wolfe, 2000). In effect, these conditions seem to be a phenomenon more recurrent for older than for younger people, with a prevalence of 3.4% in the group of people aged between 25 and 44 years old and a prevalence of 10.5% in the group of people aged between 45

and 65 years old. Unlike the gender case, this gap is maintained statistically significant through time and relatively constant around 7% ($|t| = 33.2$).

Figure 1: **Prevalence of disability by gender, age groups and educational level**

(a) According to gender

(b) According to age groups

(c) According to educational level
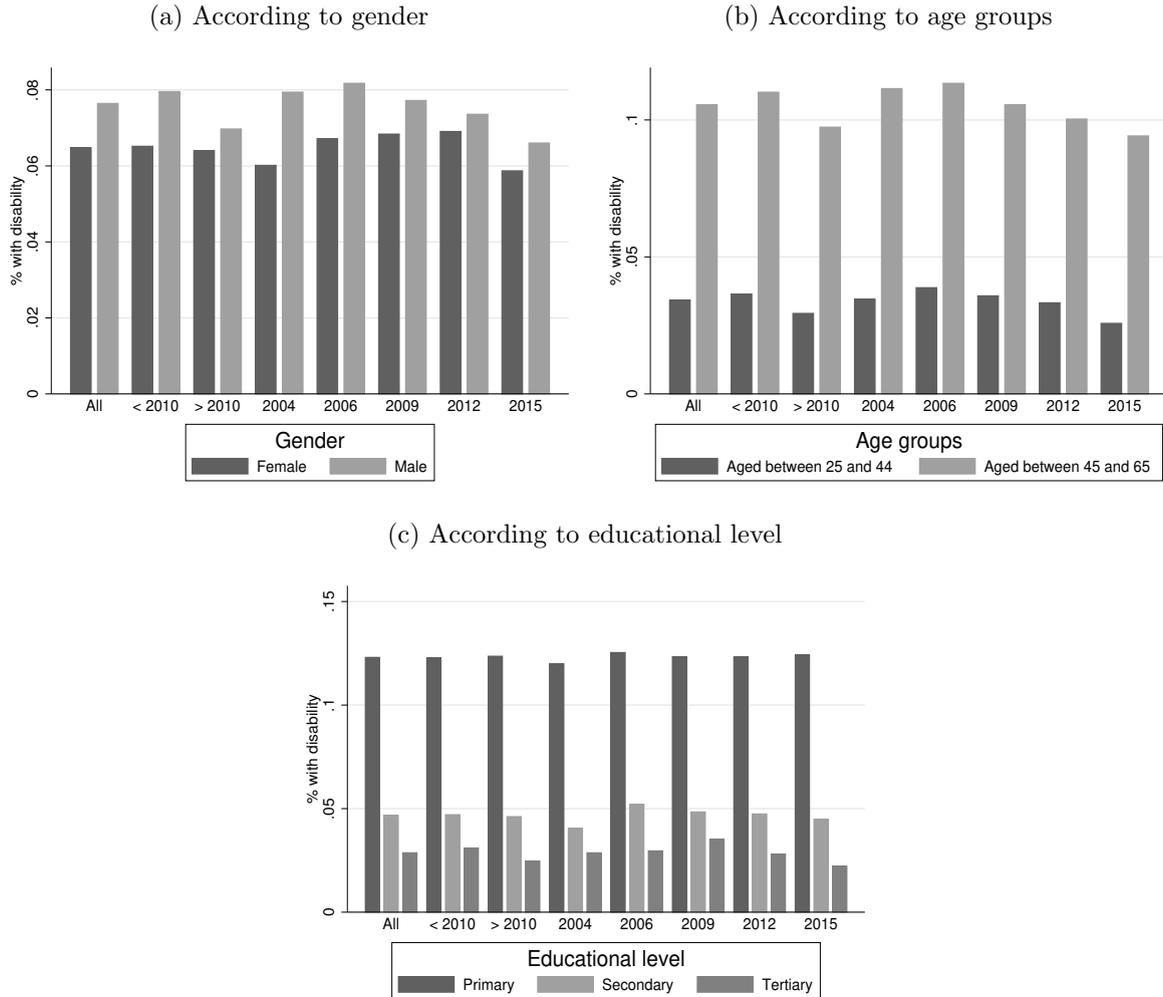
Note: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

The gradient turns negative when analyzing disabilities according to educational level. As shown in the panel (c) of Figure 1, these conditions are much more prevalent between the less educated than between the more educated. This is reflected in that 12.3% of people with primary education have some disability while among people with secondary and tertiary education the prevalence is about 4.7% and 2.9%, respectively. The pattern remains virtually the same both in the period before and after 2010.

All these particular stylized facts reflect the importance of adequately controlling for the various socio-demographic characteristics recently mentioned and also suggest the possibility of potential heterogeneous effects of *Law N. 20.422* on the labour outcomes for the different groups of the population. The latter will also be briefly explored in the subsequent analysis.

When observing the labour outcomes according to disability status some evident characteristics and trends arise, as shown in the panels (a), (b) and (c) of Figure 2. First, across time people with disabilities in Chile significantly exhibit lower labour force participation, lower employment rates and higher unemployment rates than people without disabilities, with statistically significant average gaps of -36% ($|t| = 52.2$), -37% ($|t| = 48.7$) and 13% ($|t| = 15.8$), respectively. This confirms the fact that the labour market attachment is weaker for the group with disabilities in comparison to the one without these conditions (Haveman & Wolfe, 2000).

Figure 2: **Labour market outcomes evolution according to disability status**

(a) Labour force participation

(b) Employment rate

(c) Unemployment rate
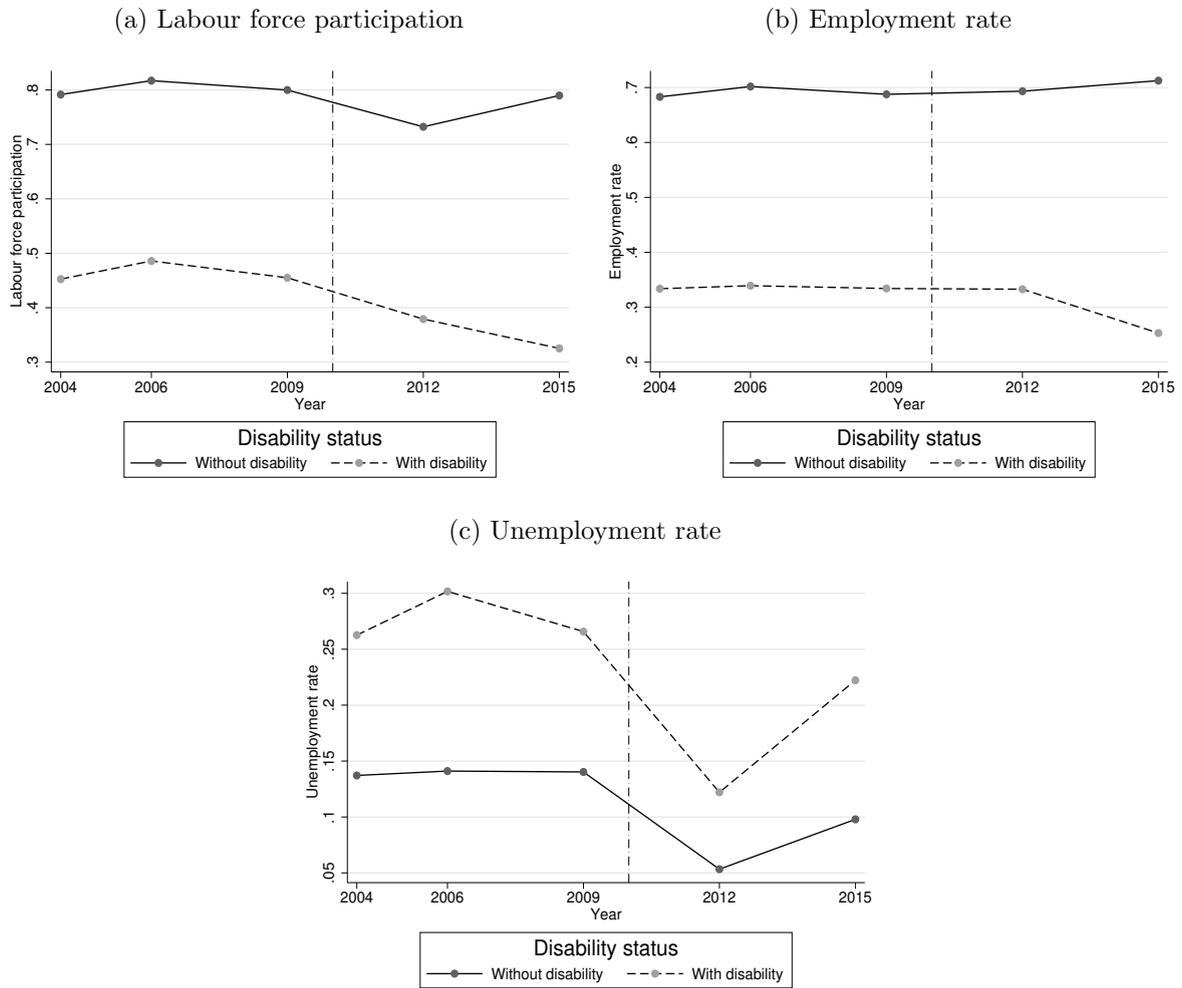
Notes: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. The vertical dashed line points the year 2010, when the *Law N. 20.422* was enacted.

Second, in terms of labour force participation and employment there seems to be a divergence path happening after the law enactment, with the gaps between both groups increasing for the period post 2010 and more specifically for 2015. Third, and in a contrary way to the previous pattern, unemployment gap according to disability status seems to close, or at least to remain, for the same period. Even though we note that the decline in the unemployment rate for year 2012 is steeper for people with disabilities, it

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should be mentioned that this is not corresponding at all with an improvement in their employment, but rather with a decrease in their labour force participation.

In sum, the data reflect that disabilities are more prevalent between the older people and the less educated and that these conditions are related with worse performance in the labour market, even more for the period post 2010. Therefore, the above descriptive analysis makes necessary to establish a rigorous and well defined empirical framework to identify the true effect of the *Law N. 20.422* on the labour outcomes of people with disabilities in Chile, in order to assess if it's fulfilling or not its objectives.

3   Empirical strategy

3.1   Regression approaches

To answer the research question empirically, the impact of *Law N. 20.422* on the labour outcomes of people with disabilities will be estimated following a difference-in-difference approach. In this way, first we will use as base the econometric specification pointed in Equation (1).

$$y_{it} = \beta_0 + \beta_1 \times Dis_{it} + \beta_2 \times Post_{it} + \beta_3 \times Dis_{it} \times Post_{it} + X'_{it}\gamma + \upsilon_{it} \qquad (1)$$

Where y_{it} is a dummy variable representing the labour outcome of interest (labour force status, employment status and unemployment status[4]) of the individual i at time t, Dis_{it} is a dummy variable equal to one for people with disabilities at time t, $Post_{it}$ is a binary variable equal to one for the survey years after the law enactment (2012 and 2015) and υ_{it} is the error term.

The vector X_{it} controls for a series of individual observables like demographic characteristics (age, squared age and a binary variable for gender), human capital characteristics (dummy variables for educational levels and previous training), family characteristics (a binary variable for marital status, the number of children of different age groups and the number of other people working in the household) and the presence of other health conditions (dummy variables for NCDs and for the presence of another household member with disability). Thus, this specification allows the coefficient β_3 of the interaction term to capture the effect of *Law N. 20.422* on the different labour outcomes of people with disabilities in Chile.

Then, in order to identify potential dynamic effects of the law across time, the Bell & Heitmueller (2009) approach will be followed decomposing the interaction term in two interaction terms for each year after the law enactment and decomposing the before and after dummy ($Post_{it}$) in several time dummies for the different survey years in order to account for time fixed effects.[5] This lead us to the specification detailed in the

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[4]It should be noted that the unemployment rate is defined for people who are in the labour force. Therefore the unemployment regression analysis will be conditional on the latter.

[5]The dummy for year 2004 will be excluded, considering this period as base year.

Equation (2).

$$y_{it} = \beta_0 + \beta_1 \times Dis_{it} + \sum_{j=2006}^{2015} \delta_j \times Year_{ij} + \sum_{j=2012}^{2015} \theta_j \times Dis_{ij} \times Year_{ij} + X'_{it}\gamma + \varepsilon_{it} \quad (2)$$

Where $Year_{ij}$ is a dummy equal to one for the respective survey year j. In this way, the coefficients θ_{2012} and θ_{2015} will allow us to measure the impact of *Law N. 20.422* on the different labour outcomes for the different survey years after the law enactment. In addition, this approach allows us to include interaction terms for the survey years prior to 2010 in order to realize pre-treatment specification checks and to account for potential anticipation effects (Acemoglu & Angrist, 2001).

Finally, we address the possibility of labour state dependence estimating dynamic panel models. How to do this, however, is not straightforward because just adding a lagged dependent variable may imply problems of endogeneity and inconsistency. One way to overcome this issue is the Arellano & Bond (1991) *Generalized Method of Moments* (GMM), which is a fixed effects estimator that use the lagged levels of the variables as instruments of their current differences. A problem with this approach is that these kind of instruments are generally weak, even more when there is persistence in the dependent variable (Blundell & Bond, 1998) as in the case of labour outcomes. Furthermore, due to the unbalanced feature of our panel we don't count with the labour information and the observable characteristics for the previous survey year for the whole sample, thus following the Arellano-Bond GMM approach would imply a substantive reduction of our sample and wouldn't guarantee the same representativeness of the results.

Arellano & Bover (1995) and Blundell & Bond (1998) propose and formulate an augmented version of the model, which consist in a system GMM that incorporates also lagged differences of the variables as instruments for the equations in levels and they demonstrate substantive efficiency gains in doing so. Moreover, they suggest using the technique of forward orthogonal deviations as an alternative to first differencing. This method implies a transformation that subtracts from each observation (except for the last one) the average of all future observations available in the sample, preserving the orthogonality among the errors and allowing to maximize the sample size when there are gaps in the panel data (Arellano & Bover, 1995). Therefore, we will use the Arellano-Bover/Blundell-Bond system GMM approach to account for the potential dynamic feature of labour market outcomes.

3.2   Methodology shortcomings

Before analyzing the econometric results it's important to consider certain shortcomings that arise from these data and proposed methodology. On one side, the data don't allow us to control directly for individuals' unobserved characteristics such as ability, motivation or effort, for example. These kind of variables may have a negative correlation with disabilities (Prosen, 1965; Rose et al., 2010; Nosek et al., 2003) and it's plausible to assume that they could be positively correlated with labour force participation and employment and negatively correlated with unemployment. If so, this implies that we

would have an omitted variable problem implying a downward bias for the impact of the law on the former two labour status and an upward bias for its impact on the latter. However, if these omitted variables are independent from the law implementation then the estimation for the coefficient of the interaction term in our approach will still be consistent (Nizalova & Murtazashvili, 2014).

An alternative to face this unobserved heterogeneity is to estimate a fixed effects model assuming that these omitted characteristics remain invariant over the years, but the results of this approach will only be based on people changing disability status across time (Bell & Heitmueller, 2009). Nevertheless, we will estimate the fixed effects models in order to shed light at this issue and to count with a benchmark of comparison for the dynamic panel models.

Moreover, the use of self-reported measures of health could act as another source of biases. First, since disability status reported is based on own subjective perception there is a potential problem regarding lack of comparability among individuals that is related with a measurement error, which implies a downward bias on the disability impact (Campolieti, 2002). Besides, there could be economic or psychological incentives leading individuals to report a disability in order to justify or rationalize their labour status or in order to be eligible for disability associated benefits (Bound, 1991). The latter could be even more true for the period after the law enactment, leading to a *composition bias* that would imply an overestimation of the impacts of disabilities and the *Law N. 20.422* (Acemoglu & Angrist, 2001).

Due to both of these biases acting in opposite directions it becomes necessary to theorize about which of them predominates, for a correct interpretation of the results. Since EPS is an anonymous survey and it doesn't influence the eligibility for disability benefits, it's plausible to assume that the former source of bias is more relevant. Furthermore, if the justification hypothesis were more relevant we should expect an increase on disability reporting for the years after the law enactment, situation which is not observed in the data (see Table 1). It should be mentioned that despite the existence of mixed evidence concerning this issue in the literature, the use of self reported measures has prevailed in the analysis of people with disabilities' labour market outcomes and in the study of Disability Acts' effects (Jones, 2008)

4   Results and discussion

4.1   Base regression analysis

As a basis benchmark and first approximation to the estimation of the labour effects of the *Law N. 20.422*, panels (a), (b) and (c) of Table 2 report the unconditional difference-in-difference analysis for labour force participation, employment and unemployment, respectively.

Without controlling for individual characteristics, *Law N. 20.422* shows negative and statistically significant correlations of -6.9%, -5.2% and -5% with the labour force

participation, the employment rate and the unemployment rate of people with disabilities, respectively. However, and as explained before, there are many observables and unobservables dimensions that may be also related with labour choices and labour outcomes, so a more comprehensive regression analysis should be done to obtain a more precise estimation.

Table 2: **Unconditional difference-in-difference on labour market outcomes**

(a) Labour force participation

	Without disability	With disability	Difference	Observations
Pre 2010	.803	.465	-.338***	36,851
Post 2010	.761	.354	-.407***	18,779
Difference	-.042***	-.111***	**-.069*****	
Observations	51,714	3,916		55,630

(b) Employment rate

	Without disability	With disability	Difference	Observations
Pre 2010	.691	.336	-.355***	36,851
Post 2010	.703	.296	-.407***	18,779
Difference	.012***	-.040**	**-.052***	
Observations	51,714	3,916		55,630

(c) Unemployment rate

	Without disability	With disability	Difference	Observations
Pre 2010	.139	.278	.139***	28,693
Post 2010	.076	.165	.089***	13,784
Difference	-.063***	-.113***	**-.050**	
Observations	40,794	1,683		42,477

Note: *** p<=.01, ** p<=.05, * p<=.1. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

In that way, panels (a), (b) and (c) of Table 3 show the pooled OLS estimation of Equation (1) for each of the different outcome variables. Column (1) shows the same unconditional difference-in-difference estimations presented in Table 2 and then columns (2)-(5) add the different control categories, namely demographic, human capital, family and health characteristics, respectively. It's worth noting that disabilities show always a strong and significant negative correlation with labour force participation and employment, and a strong and significant positive correlation with unemployment.

Concerning the effect of *Law N. 20.422* on labour force participation it remains negative and statistical significant, but its magnitude is reduced from -6.9% to -4.8% when adding the different observable characteristics. In terms of the employment effect of the law, after controlling for all the relevant characteristics, it remains negative but reduces its statistical significance to 10% and its magnitude from -5.2% to -2.9%. Finally, the unemployment effect is maintained virtually the same, reaching a negative magnitude of -5.4% after accounting for all observables.

Table 3: **OLS regression analysis**

	(1)	(2)	(3)	(4)	(5)
	(a) Labour force participation				
Disability	-0.338***	-0.297***	-0.275***	-0.282***	-0.273***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Post	-0.042***	-0.015***	-0.019***	-0.032***	-0.033***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Disability×Post	-0.069***	-0.061***	-0.060***	-0.050***	-0.048***
	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)
R-squared	0.050	0.213	0.234	0.266	0.267
Observations	55,630	55,630	55,630	55,630	55,630
	(b) Employment				
Disability	-0.355***	-0.326***	-0.297***	-0.300***	-0.286***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Post	0.012***	0.039***	0.033***	0.021***	0.020***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Disability×Post	-0.052***	-0.043***	-0.042***	-0.030*	-0.029*
	(0.017)	(0.016)	(0.016)	(0.016)	(0.016)
R-squared	0.041	0.185	0.215	0.244	0.246
Observations	55,630	55,630	55,630	55,630	55,630
	(c) Unemployment				
Disability	0.139***	0.148***	0.137***	0.137***	0.127***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Post	-0.063***	-0.067***	-0.064***	-0.061***	-0.061***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Disability×Post	-0.050**	-0.050**	-0.049**	-0.054**	-0.054**
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
R-squared	0.015	0.033	0.047	0.054	0.056
Observations	42,477	42,477	42,477	42,477	42,477
	Controls				
Demographics	✗	✓	✓	✓	✓
Human capital	✗	✗	✓	✓	✓
Family	✗	✗	✗	✓	✓
Health	✗	✗	✗	✗	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

At a first glance, the results for labour force participation and employment seem to be opposite to what was previously hypothesized. It should be noted, however, that the approach established in Equation (1) only allows us to observe an average estimate of the labour impacts of the *Law N. 20.422*, ignoring potential dynamic effects over time after its enactment. So, in order to get a more complete perspective of the situation, panels (a), (b) and (c) of Table 4 show the pooled OLS estimation of Equation (2) for

labour force participation, employment and unemployment, decomposing the interaction term in two interaction terms for years 2012 and 2015 and the before and after dummy ($Post_{it}$) in various survey year dummies. As previously, column (1) shows the unconditional estimations and columns (2)-(5) add the different control variables.

Table 4: **OLS regression analysis decomposing interaction term**

	(1)	(2)	(3)	(4)	(5)
	(a) Labour force participation				
Disability	-0.338***	-0.298***	-0.276***	-0.282***	-0.273***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Disability×2012	-0.015	-0.010	-0.011	-0.003	-0.002
	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)
Disability×2015	-0.126***	-0.116***	-0.113***	-0.100***	-0.099***
	(0.022)	(0.021)	(0.021)	(0.020)	(0.020)
R-squared	0.052	0.215	0.235	0.267	0.269
Observations	55,630	55,630	55,630	55,630	55,630
	(b) Employment				
Disability	-0.355***	-0.327***	-0.297***	-0.300***	-0.287***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Disability×2012	-0.005	0.003	0.002	0.009	0.011
	(0.021)	(0.020)	(0.019)	(0.019)	(0.019)
Disability×2015	-0.104***	-0.094***	-0.091***	-0.075***	-0.075***
	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)
R-squared	0.042	0.185	0.216	0.244	0.246
Observations	55,630	55,630	55,630	55,630	55,630
	(c) Unemployment				
Disability	0.139***	0.148***	0.137***	0.136***	0.127***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Disability×2012	-0.070***	-0.072***	-0.070***	-0.075***	-0.076***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Disability×2015	-0.014	-0.012	-0.009	-0.015	-0.015
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)
R-squared	0.016	0.034	0.049	0.056	0.058
Observations	42,477	42,477	42,477	42,477	42,477
	Controls				
Year dummies	✓	✓	✓	✓	✓
Demographics	✗	✓	✓	✓	✓
Human capital	✗	✗	✓	✓	✓
Family	✗	✗	✗	✓	✓
Health	✗	✗	✗	✗	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Both for labour force participation and employment, *Law N. 20.422* have a negligible impact in the immediate short run for year 2012. The negative effects seem to appear for the mid run in year 2015, being statistically significant at 1% and ranging between −12.6% and −9.9% for labour force participation and between −10.4% and −7.5% for employment, when including the different control variables. For the case of unemployment, contrarily, the main effect seems to be concentrated only for the short term in year 2012, ranging between −7.0% and −7.6% when controlling for the observable characteristics.

In sum, and contrary as expected, after accounting for a large set of individual and household characteristics, the *Law N. 20.422* seems to have implied a significant reduction on individuals with disabilities' unemployment rate in the short term, but without a corresponding increase in their employment rate. Then, in the mid term the unemployment effect seems to disappear and there is a prevalence of negative impacts on labour force participation and employment of people with disabilities. The validity of these first findings, however, should be complemented analyzing other factors that could also be driving the results.

4.2 Disability benefits

The first of these additional dimensions to consider is the one related to the receipt of disability benefits or pensions, as they can discourage the labour supply of the individuals by increasing their non labour income or by producing moral hazard problems (Bound & Burkhauser, 1999).

In Chile there are two main type of pensions related to individuals of working age with disabilities. First, there is the *Invalidity Pension* (PI, for its Spanish name: *Pensión de Invalidez*) which is a money transfer that can be claimed by individuals physically or mentally unable to do their jobs and that are affiliated to the private pension system of *Pension Funds Administrators*. This pension can be total or partial, depending on the amount of work capacity lost. Second, there is the *Basic Solidarity Pension of Invalidity* (PBSI, for its Spanish name: *Pensión Básica Solidaria de Invalidez*) which is a money transfer that can be claimed by people with disabilities that aren't affiliated to the pension system and that belong to the poorest 60% of the population. This benefit was created by the *Law N. 20.255* (2008) as a replace of the *Assistance Pension Program* (PASIS, for its Spanish name: *Pensiones Asistenciales*) that used to give money transfers to people with physical and mental deficiencies that weren't receiving money from the private pension system.

One of the main focus of the EPS survey is the study of the Chilean pension system, allowing us to identify for the different survey years the people in our sample receiving either PI, PBSI or PASIS. Therefore, Figure 3 shows the evolution across time of the share of individuals with disabilities receiving any of the above mentioned disability benefits. It can be noted that this proportion has increased steadily from 41.7% in 2004 to 51.6% in 2015 and it's also worth pointing that the greatest increase is between years 2012 and 2015, which a priori suggests that this situation could also have to do

with the decrease in the labour force participation and the employment rate of people with disabilities previously found for that period.

Figure 3: **Disability benefits recipients evolution from 2004 to 2015**
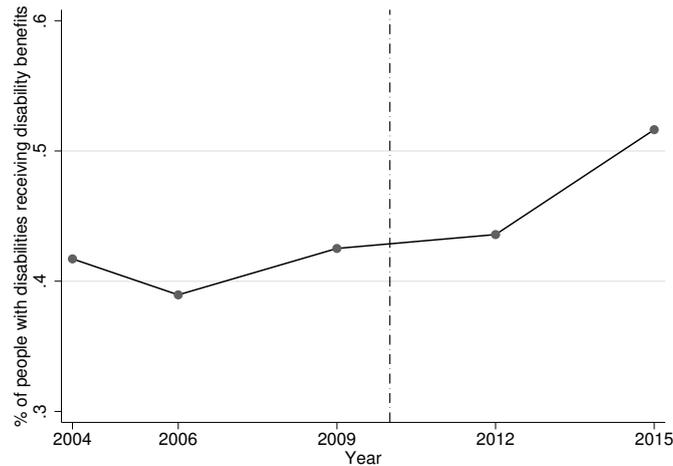
In order to account for that possibility we follow the Acemoglu & Angrist (2001) approach and include the disability benefits dimension into the analysis in two different ways. First, we simply add to the model of Equation (2) a dummy equal to one for people receiving any of these pensions and, second, we exclude those people from the analysis. The results of these regressions are presented in Table 5, with the odd columns following the first approach and the even columns following the second.

As suggested before, the receipt of disability benefits is negatively correlated with labour force participation and employment and it's positively correlated with unemployment, with statistically significant coefficients of -27.7%, -25.4% and 10.9%, respectively. We can also see that when we include the disability benefits as a dummy variable there is a drop on the point estimates for the *Law N. 20.422* mid term effects on labour force participation (-7.1%) and employment (-4.9%), regarding those of column (5) in Table 4 (-9.9% and -7.5%, respectively). On the other side, when we exclude those people from the analysis there is an increase in the coefficients for the two variables in the 2015 (-12.1% and -9.3%, respectively). It's also worth noting that the coefficients for the unemployment effect only vary slightly with both approaches, which supports the fact that disability benefits affect mainly the labour supply than the labour demand.

These facts together suggest that the mid term decreases on labour force participation and employment that we were previously documenting were partially driven by the increase on disability benefits during the period of analysis. However, once we account for that factor there is still non negligible negative effects of the *Law N. 20.422* in the short term for the unemployment rates of persons with disabilities and in the mid term for their labour force participation and employment rates.

Table 5: **OLS regression analysis accounting for disability benefits receipt**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.166***	-0.151***	-0.189***	-0.180***	0.101***	0.096***
	(0.011)	(0.012)	(0.011)	(0.013)	(0.014)	(0.015)
Disability×2012	0.003	-0.031	0.016	-0.005	-0.077***	-0.067***
	(0.020)	(0.027)	(0.019)	(0.026)	(0.023)	(0.025)
Disability×2015	-0.071***	-0.121***	-0.049**	-0.093***	-0.025	-0.020
	(0.020)	(0.029)	(0.019)	(0.029)	(0.032)	(0.037)
Disability benefits	-0.277***		-0.254***		0.109***	
	(0.013)		(0.012)		(0.020)	
R-squared	0.280	0.250	0.254	0.228	0.059	0.054
Observations	55,630	53,418	55,630	53,418	42,477	41,849
	Controls					
Year dummies	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Even columns add a dummy for people receiving any disability benefits (PI, PBSI or PASIS) and odd columns exclude those people from the analysis. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

4.3   Socio-demographic heterogeneity and robustness check

Before entering into discussion and trying to give plausible explanations to these results, we explore the possibility of heterogeneous effects according to the different socio-demographic groups and we implement some brief robustness checks to the previous regression analysis.

As shown in Figure 1, there are some differences in the prevalence of disabilities regarding to gender, age and educational attainment. Specifically, disabilities are slightly more prevalent among men than women, there is a positive gradient between these conditions and age and there is a negative gradient between disabilities and educational level. Therefore, to account for the possibility of *Law N. 20.422* heterogeneous effects, we estimate Equation (2) separately for men and women, for people aged between 25 and 44 and aged between 45 and 65 and for people with primary education, with secondary education and with tertiary education. These results are shown in panels (a), (b) and (c) of Table 6 for labour force participation, employment and unemployment, respectively.

It can be observed that the negative and significant mid term effect on labour force par-

ticipation is greater for men than for women (−9.3% and −6.4%, respectively). However, it should be considered that men may be more exposed to the negative impacts of the law as their participation in the labour force is also higher than the women's. On the other side, in terms of age and educational attainment, the negative and significant mid term impacts are concentrated among the older (−8.1%) and the less educated (−8.7%). The latter patterns raise certain concerns about the potential existence of a socio-demographic trap, as disabilities are more prevalent among those two groups.

Table 6: **OLS regression analysis by socio-demographic groups**

	(1) Men	(2) Women	(3) Aged 25-44	(4) Aged 45-65	(5) Primary Education	(6) Secondary Education	(7) Tertiary Education
	(a) Labour force participation						
Disability×2012	-0.038	0.015	-0.045	0.010	-0.009	0.038	-0.053
	(0.029)	(0.027)	(0.043)	(0.023)	(0.026)	(0.035)	(0.075)
Disability×2015	-0.093***	-0.064**	-0.054	-0.081***	-0.087***	-0.029	-0.082
	(0.029)	(0.028)	(0.046)	(0.023)	(0.026)	(0.035)	(0.075)
R-squared	0.266	0.197	0.217	0.300	0.314	0.250	0.132
Observations	26,807	28,823	27,411	28,219	19,594	26,037	9,999
	(b) Employment						
Disability×2012	-0.005	0.003	-0.010	0.018	-0.022	0.070**	-0.004
	(0.028)	(0.025)	(0.041)	(0.022)	(0.025)	(0.034)	(0.073)
Disability×2015	-0.059**	-0.055**	-0.038	-0.065***	-0.085***	0.005	-0.071
	(0.028)	(0.025)	(0.043)	(0.022)	(0.025)	(0.033)	(0.081)
R-squared	0.177	0.184	0.207	0.281	0.278	0.227	0.116
Observations	26,807	28,823	27,411	28,219	19,594	26,037	9,999
	(c) Unemployment						
Disability×2012	-0.085***	-0.081*	-0.080**	-0.076***	-0.040	-0.102***	-0.069
	(0.026)	(0.044)	(0.039)	(0.029)	(0.036)	(0.034)	(0.065)
Disability×2015	-0.023	-0.052	0.017	-0.031	0.023	-0.065	0.015
	(0.039)	(0.056)	(0.064)	(0.038)	(0.052)	(0.046)	(0.095)
R-squared	0.038	0.064	0.060	0.061	0.068	0.051	0.034
Observations	24,571	17,906	22,748	19,729	13,028	20,589	8,860
	Controls						
Disability	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓	✓
Disability Benefits	✓	✓	✓	✓	✓	✓	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

Regarding the mid term effect of the *Law N. 20.422* on employment, there aren't significant differences between men and women and the patterns with respect to age and education are the same as before. An interesting finding in this area is a positive and significant short term effect for people with secondary education, which suggests that the short term decrease of their unemployment rate wasn't only due to a decrease on their labour force participation. One possible explanation is that more educated people were more informed at first about the law and could have reacted offering a greater labour supply. However, this positive effect doesn't remain across time.[6]

Moving into the robustness check in order to account for potential anticipation effects and for different year effects between people with and without disabilities, we estimate Equation (2) including interaction terms for the years previous to the law enactment. We do this in three different ways, excluding one of the years each time. The results of these regressions, that control for all the relevant characteristics, are shown in Table 7.

Table 7: **Robustness check**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Labour force participation			Employment			Unemployment		
Disability×2004		-0.005	-0.001		0.017	-0.002		-0.038	0.004
		(0.019)	(0.021)		(0.018)	(0.020)		(0.029)	(0.031)
Disability×2006	0.005		0.004	-0.017		-0.020	0.038		0.042
	(0.019)		(0.020)	(0.018)		(0.019)	(0.029)		(0.029)
Disability×2009	0.001	-0.004		0.002	0.020		-0.004	-0.042	
	(0.021)	(0.020)		(0.020)	(0.019)		(0.031)	(0.029)	
Disability×2012	0.005	0.000	0.004	0.010	0.027	0.008	-0.064**	-0.103***	-0.061**
	(0.023)	(0.023)	(0.023)	(0.022)	(0.021)	(0.022)	(0.029)	(0.028)	(0.029)
Disability×2015	-0.069***	-0.073***	-0.070***	-0.054**	-0.037*	-0.057**	-0.011	-0.050	-0.008
	(0.023)	(0.023)	(0.023)	(0.022)	(0.022)	(0.022)	(0.037)	(0.036)	(0.037)
R-squared	0.280	0.280	0.280	0.254	0.254	0.254	0.059	0.059	0.059
Observations	55,630	55,630	55,630	55,630	55,630	55,630	42,477	42,477	42,477
	Controls								
Disability	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disability benefits	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

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[6]It's worth noting that we don't find this short term positive employment effect for people with tertiary education and that the magnitude of the mid term negative impact for this group is very similar than the one for the group with primary education. However, probably due to the low prevalence of disabilities among people with tertiary education, the point estimates for this group aren't statistically significant.

It can be seen that for each one of the three outcome variables all the coefficients for the interaction terms previous to 2010 are not statistically significant. On the other side, the *Law N. 20.422* effects remain being negative and significant only in 2015 for labour force participation and employment and only in 2012 for unemployment, discarding that the results are being driven by anticipation effects.

Additionally, and to account for the potential problems related to the EPS 2012 data, we report in Tables A2-A4 of the Appendix the same analysis of Tables 3-6, but excluding the information for that survey year. The results for the mid term negative impacts of the *Law N. 20.422* on the labour force participation and the employment of individuals with disabilities remain virtually the same. However, without that information we can say nothing about the labour short term effects of the law.

4.4   Labour state dependence

The last dimension to analyze in order to complement the above findings is the potential state dependence of labour force status. In effect, previous employment or unemployment histories may be key determinants for the likelihood of current ones and this could be even more true for people with disabilities (Gannon, 2005). Individuals out of the labour force or unemployed in the past, for instance, may face more obstacles to be participating in the present and this could be harder in the presence of disabilities limiting their work capacity. In this line, the *Law N. 20.422* may have affected persons with disabilities differently according to their previous labour status, making necessary to account for this situation to correctly estimate its labour effect.

A first approach to this issue is to look at the transition matrix of individuals' labour status before and after the law enactment. It's worth mentioning that this is only possible to built for people in our sample we observe at least once before and once after 2010.[7] Panel (a) of Table 8 shows the labour transition matrix only for people without disabilities and panel (b) only for individuals with these conditions.

It's observed for the group without disabilities that the strongest persistence across time is within the employed people. Moreover, the big decrease in unemployment between periods is mainly explained through a transition to employment, with almost two thirds of the unemployed moving in that direction, and there is also an important movement of more than one quarter of inactive people to employment. When analyzing the labour transitions of people with disabilities, however, the history is quite different. The strongest persistence across time is seen within the inactive people and the majority of the transition out of unemployment is to inactivity. Even though more than one third of unemployed people with disabilities is moving towards employment, this doesn't compensate in absolute terms the transition out of employment, mainly directed to inactivity.

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[7]The detail of the panel composition of this sub-sample is shown in Table A5 of the Appendix. Also, the unconditional difference-in-difference and the regression analysis (Tables 2-5) for this group are shown in Tables A6-A9. Although the magnitude of the coefficients of interest vary, the main findings remain virtually the same.

Table 8: **Labour transition matrix before and after law enactment, according to disability status**

(a) People without disabilities

Pre 2010	Post 2010		
	Employed	Unemployed	Inactive
Employed	0.885	0.023	0.092
Unemployed	0.637	0.075	0.288
Inactive	0.283	0.060	0.657

(b) People with disabilities

Pre 2010	Post 2010		
	Employed	Unemployed	Inactive
Employed	0.707	0.035	0.258
Unemployed	0.409	0.085	0.506
Inactive	0.169	0.054	0.777

Notes: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. The total sum of each row is 100%. The pre 2010 information is from the last survey year with labour information available between 2004, 2006 and 2009 while the post 2010 information is from the first survey year with labour information available between 2012 and 2015.

In a complementary way, we can look at the individuals' labour transition matrix for the period previous to the law enactment in order to analyze if it has changed or not across time. This is shown in panel (a) of Table 9 for individuals without disabilities and in panel (b) for people with disabilities.

It should be noted that for both groups the persistence of unemployment is greater than in the previous case and this is consistent with the high unemployment rates for the years before 2010, compared to the sharp decline for the years 2012 and 2015 (see Table 1). For people without disabilities the strongest persistence again is within the employed, being virtually the same as before, and the transitions to inactivity and its persistence are somewhat smaller than in the previous case. For persons with disabilities, on the other hand, there is more persistence within the employed than within the inactive for the period previous to the law enactment. Moreover, the transitions from employment and unemployment to inactivity are much more smaller than the ones observed in panel (b) of Table 8.

To quantify a priori these differences in the labour transition patterns we can implement an unconditional difference-in-difference between the two previous matrices. As shown in panel (c) of the Table A10 in the Appendix, this exercise suggests that after the law enactment people with disabilities experienced an increase of 9.3% in the outflow from employment to inactivity, of 11.5% in the transition from unemployment to inactivity and of 2.3% in the persistence of inactivity. This average raise of 7.7% on the group's transition out of the labour force is explained by average decreases of -6.3% on their transition to employment and of -1.4% on their movement to unemployment. Thus, the

existence of these differences in the labour transition patterns across time suggests the importance of including previous labour status histories into the regression analysis to a more precise identification of *Law N. 20.422* labour effects.

Table 9: **Labour transition matrix before 2010, according to disability status**

(a) People without disabilities

t (2004-2006)	t + 1 (2006-2009)		
	Employed	Unemployed	Inactive
Employed	0.869	0.082	0.049
Unemployed	0.474	0.296	0.230
Inactive	0.247	0.166	0.587

(b) People with disabilities

t (2004-2006)	t + 1 (2006-2009)		
	Employed	Unemployed	Inactive
Employed	0.769	0.109	0.122
Unemployed	0.343	0.324	0.333
Inactive	0.147	0.169	0.684

Notes: Author's own elaboration based on EPS 2004, 2006 and 2009. The total sum of each row is 100%. For those with labour information available in 2004, t is that year and $t+1$ is the first year with information available between 2006 and 2009. For those without labour information available in 2004, t is 2006 and $t+1$ is 2009

Moving into the estimation of these dynamic models it's important to show before, as a benchmark of comparison for them, the results from the fixed effects regressions. In this line, Table 10 presents these estimations for Equation (1) and Equation (2) for the three outcome variables. As stated before, the advantage of this approach is that it allows us to control for individuals' unobserved time-invariant heterogeneity, but the disadvantage is that the results are mainly based on people changing disability status across time (Bell & Heitmueller, 2009), thus not being entire comparable to our previous findings.

Once controlled for all observable characteristics and for unobserved heterogeneity, the average impact of *Law N. 20.422* on the labour force participation of people with disabilities increases slightly in magnitude to -6.6%, being negligible in the short term in 2012 but greater and statistically significant (-9.9%) in the mid term in 2015. In a similar way, the average law impact on individuals with disabilities' employment increases its magnitude to -4.3%, being also concentrated in the mid term in 2015 with a 1% significant estimate of -6.7%. Regarding the unemployment effect of the law, it reduces its magnitude and loses its statistical significance. These results suggest that non controlling for individuals' unobserved and invariant characteristics may imply an underestimation of the law impact on labour force participation and employment and an overestimation of its effect on unemployment.

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Table 10: **Fixed effects regressions**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.054***	-0.054***	-0.060***	-0.061***	0.039**	0.041***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.016)	(0.016)
Post	-0.035***		0.048***		-0.096***	
	(0.006)		(0.006)		(0.006)	
Disability×Post	-0.066***		-0.043***		-0.022	
	(0.018)		(0.017)		(0.024)	
Disability×2012		-0.033		-0.017		-0.028
		(0.021)		(0.020)		(0.025)
Disability×2015		-0.099***		-0.067***		-0.014
		(0.022)		(0.021)		(0.035)
Observations	55,630	55,630	55,630	55,630	42,477	42,477
	Controls					
Year dummies	✗	✓	✗	✓	✗	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓
Disability benefits	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Robust standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

Finally, we implement the Arellano-Bover/Blundell-Bond system GMM approach to account for the potential dynamic effects of labour force status. Specifically, this model includes a lag of the dependent variable in the control vector and estimates a system with an equation in differences instrumented by the lagged variables and an equation in levels instrumented by the lagged differences of the variables (Arellano & Bover, 1995; Blundell & Bond, 1998). Additionally, it applies the technique of forward orthogonal deviations previously explained, instead of first differencing. This in order to minimize the loss of information due to the unbalanced panel gaps, thus preserving the largest possible sample size.

In particular, we are able to estimate these models with a pooled sample of 38,401 observations and the average characteristics of this group are shown in column (2) of Table A11 in the Appendix. It's worth mentioning that they are in general virtually the same as those from the base pooled sample reported in column (1) of the same table, although slightly more inclined towards the older age group. Thus, the results of these

dynamic models are shown in Table 11.[8]

Table 11: **Arellano-Bover/Blundel-Bond system GMM estimation**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.129***	-0.126***	-0.150***	-0.151***	0.075***	0.074***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.018)	(0.017)
Post	-0.015***		0.024***		-0.041***	
	(0.004)		(0.004)		(0.004)	
Disability×Post	-0.029*		-0.019		-0.017	
	(0.017)		(0.016)		(0.027)	
Disability×2012		-0.001		0.005		-0.044
		(0.022)		(0.021)		(0.028)
Disability×2015		-0.061***		-0.039**		0.023
		(0.019)		(0.018)		(0.035)
Lagged labour force participation	0.262***	0.263***				
	(0.014)	(0.015)				
Lagged employment			0.221***	0.223***		
			(0.013)	(0.013)		
Lagged unemployment					0.083***	0.095***
					(0.015)	(0.015)
Observations	38,041	38,041	38,041	38,041	26,281	26,281
	Controls					
Year dummies	✗	✓	✗	✓	✗	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓
Disability benefits	✓	✓	✓	✓	✓	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Robust standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

The first thing to note is the persistence of labour status across time, as suggested by the positive and statistically significant coefficients of the lagged dependent variables in each model, specially in the case of labour force participation and employment. It also should be pointed that when controlling for this potential labour state dependence the mid term effects of the *Law N. 20.422* remain being negative and statistically significant for labour force participation (-6.1%) and employment (-3.9%), although with smaller

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[8]In Table A12 of the Appendix we also report the results from the original Arellano-Bond GMM model. Although we don't find in that case statistically significant effects from the *Law N. 20.422* on the labour market outcomes of persons with disabilities, it should be mentioned that the analysis is based on a smaller sample of 20,541 observations with average characteristics that differ significantly from the original pooled sample. The summary statistics of that sample are shown in column (3) of Table A11.

magnitudes than the previous case. Moreover, there is no significant unemployment effects of the law, suggesting that the decrease previously found may be not representing an average increase in employment but an average increase in inactivity of people with disabilities, as supported by the labour force participation analysis.

4.5 Discussion

In summary, and contrary as expected, Chilean *Law N. 20.422* seems to have implied no significant effects on the labour outcomes of persons with disabilities in the short term. However, then in the mid term there is a prevalence of negative and significant impacts on labour force participation and employment of people with disabilities, even when accounting for the presence of disability benefits receipt, for individuals' time-invariant unobserved characteristics and for the potential labour state dependence. So, how can we interpret these results?

There are at least five factors that can help us to understand these previous findings. First, in November of 2012, the *Law Assessment Department of the Chilean Chamber of Deputies* made a technical study of *Law N. 20.422*, combined with an analysis of citizen perception, in order to assess the efficiency and efficacy of the law implementation. They conclude at that moment that it had not been completely applied yet, being one of the reasons the weak institutional basis of the SENADIS. In particular they suggest that, besides a lack of resources, the institution had a lack of power to accomplish with its function of inspecting and sanctioning to protect people with disabilities and also had a deficit on its function of promoting and raising awareness about the rights of this group (Law Assessment Department, 2012). This situation is consistent with the non improvement on the labour force participation and the employment rate of individuals with disabilities, at least for the first years after the law enactment.

Second, in July of 2012 a Law establishing *Measures Against Discrimination*, the *Law N. 20.609*, was enacted in order to judicially reestablish the rule of law when an arbitrary discrimination situation happens, imposing sanctions to the people involved. Specifically, the 12th article of the document establishes a fine ranging from five to fifty *Monthly Tax Units*[9] to the responsible for the discriminatory behaviour (Law N. 20.609, 2012). According to data from the *Judicial Power*, since this law enactment and until March of 2016, the majority of the legal complaints (43%) were due to disability discrimination (SIGA Chile, 2016). All this situation is consistent with the channel of the potential increase in costs due to the threat of discrimination lawsuits (Acemoglu & Angrist, 2001), which hinders the demand of labour and could explain the decrease in the employment of people with disabilities for 2015.

Third, in the year 2014 a *Tax Reform* was held in Chile and among the various changes implied by the tax system's restructuring there was a gradual increase of the *First Category Tax* paid by companies, from 20% to 21% in 2014 and then to 22.5% in 2015.

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[9]In the recent days, a *Monthly Tax Unit* is worth 48353 Chilean pesos, which is approximately equivalent to 63.3 euros or to 72 US dollars.

It's worth noting that the reform didn't include special exemptions or benefits regarding people with disabilities. This situation could result in a decrease of companies' resources, which can also be diminishing their demand for labour and explaining thus the reduction for the employment of people from this group in 2015.

Fourth, the principles of universal accessibility and universal design stated by the *Law N. 20.422* were legally materialized and regulated just in March of 2016 with the *Law Decree N. 50 of Universal Accessibility*. According to the NGO *Ciudad Accesible*, in that year individuals with disabilities in Chile didn't have yet a public transport system properly adapted to their needs. Until that moment there had been only partial advances in the buses and the metro of Santiago, the capital city of the country, but the interurban, regional and rural transport was still in debt in terms of adaptation and inclusion (Ciudad Accesible, 2016). This situation suggests that the channel of reducing access barriers and opportunity costs for people with disabilities wasn't operating well until 2015, thus not encouraging a reduction in their reservation wage and an increase in their labour supply.

Fifth, and in the same line, there are some relevant problems of information to people with disabilities. According to the *II National Study on Disability* (Ministry of Social Development, 2016) in 2015 just 11.4% of the individuals from this group declared to know the *Law N. 20.422* and only 5.5% of them were signed in the *National Registry of Disability* (RND, for its Spanish name: *Registro Nacional de la Discapacidad)*. The latter is very relevant because being registered in the RND is a basic requirement to access some benefits like technical aids or to apply for competitive funds. When looking at our sample, on average only 53% of persons with disabilities in 2015 have requested a certification of their condition to the *Commission on Preventive Medicine and Invalidity*, which is a previous mandatory requirement to be able to register at the RND.

All of these factors help us to illustrate the reasons to explain the fact that we are identifying a negative and significant impact of *Law N. 20.422* on the labour force participation and employment of people with disabilities in the mid term.

5 Concluding remarks

Eight years after the enactment of the *Law N. 20.422* we provide pioneer evidence about its labour effect on people with disabilities in Chile. In spite of being framed in a context of disability as a human right issue, following a difference-in-difference approach we find that the law implied negative effects on the group's mid term labour force participation and employment. This holds even after accounting for the increasing trend of individuals receiving disability benefits, for unobserved heterogeneity and for the potential dynamic effects of labour state dependence. It has been shown that it's important to control for these factors as they may also have important effects on the labour outcomes of this group.

Some plausible explanations for these results are the weak institutionality of SENADIS and its lack of resources, the increase in employers costs due to the threat of discrimination lawsuits, the absence of universal accessibility in practice and the lack of awareness

and information about the law and the rights and benefits it promotes. This last reason can be crucial for policy implications because an important part of the effectiveness of enhancing the other factors may depend on it. There is no point in increasing the resources of SENADIS and strengthening its faculties, for example, if people with disabilities are not well informed about their labour rights or about the benefits and programs they can access (and the requirements to do so) and if firms are not aware of the potential benefits of the labour inclusion of this group. These benefits are both for people with disabilities, as they increase their autonomy and personal self-assessment and they impact positively on their family economy, and for the firms including them, as they experience more motivation and a better work climate within their employees and a better reputation and higher levels of productivity (ILO, 2013). Therefore, the emphasizing and promoting of these elements may acquire an important role.

We must recognize that analyzing the impact of the law on the labour status of individuals with disabilities only provides us a partial understanding of the situation. Although the study of quantities allows us to know what's happening in the equilibrium with the labour outcomes of people with disabilities, an important challenge for future research is to extend the analysis incorporating the wage dimension in order to have more clarity about which of the channels is actually prevailing between the movements of the labour supply and demand. A more comprehensive analysis also may exploit the potential differences between the type of jobs in which people with disabilities are involved. It could be the case, for instance, that they are self-selected in certain occupations where their conditions result to be less limiting or that they prefer self-employment over wage-employment, seeking for more flexibility. If so, that should also be in consideration when assessing the labour effects of the *Law N. 20.422*.

Another important dimension we don't explore here due to our data limitations is the potential heterogeneity within disabilities. Unlike other socio-demographic characteristics, they can be quite diverse in terms of type and intensity and they can have dynamic effects according to their origin and duration (Jones, 2011). The negative effects of these conditions, for example, may be different for someone who is born with a disability in comparison to someone who acquires it in his or her adult life due to a work accident, or may also differ depending on whether the condition is mild, moderate or severe. In the same way, the *Law N. 20.422* could also have affected this sub-groups differently and, if so, this may suggest that the elaboration and implementation of the legislation and public policies aimed to people with disabilities should be able to identify this heterogeneity in order to develop intervention strategies well designed for the different sub-groups' needs.

To raise evidence that supports or refutes the latter, however, it's crucial to count with more comprehensive data about disabilities in the country. One valuable effort towards that direction is the *II National Study on Disability* of 2015, which includes very detailed information regarding this issue. Therefore, implementing this kind of surveys with more frequency and with panel data features may be a key way to extend the research on the topic, considering that the *I National Study on Disability* is from 2004 and that disability information is not abundant in the surveys and main sources of information that are currently available in Chile. In the last *National Population*

Census of 2017, for instance, the questions about disability prevalence were excluded, making impossible to have a more recent insight for the situation of this group.

Finally, it should be mentioned that in May of 2017 a new Disability Act was enacted in Chile, the *Law N. 21.015*, modifying some aspects of the *Law N. 20.422* to aim specifically to the labour inclusion of people with disabilities. In particular, the law establishes that firms with 100 or more workers must hire at least 1% of people with disabilities and it gives inspecting faculties for this to the *Directorate of Labour*, which depends from the *Ministry of the Interior*. For firms that are not able to fulfill the quota due to well-founded reasons, the law states alternative mechanisms related to the contracting of services with companies that employ workers with disabilities or with the realization of money donations to projects or programs from certain associations, corporations or foundations (Law N. 21.015, 2017). The latter implies that the reform may not necessarily have a positive employment impact if the firms decisions of including people with disabilities are out-weighted by these other alternative options. These changes, however, just came into effect on April 1st of 2018, so in some years from now we will be able to analyze and assess the real efficacy of this reform as another important challenge for future research.

Appendix

Table A1: **Panel composition**

Time periods	Individuals	Observations
1	6,318	6,318
2	2,714	5,428
3	3,606	10,818
4	4,039	16,156
5	3,382	16,910
Total	20,059	55,630

Note: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

Table A2: **OLS regression analysis without using EPS 2012 information**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Labour force participation			Employment			Unemployment		
Disability	-0.338***	-0.272***	-0.272***	-0.355***	-0.284***	-0.284***	0.139***	0.125***	0.125***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.013)	(0.013)
Post	-0.013***	-0.013***		0.022***	0.020***		-0.042***	-0.038***	
	(0.004)	(0.004)		(0.005)	(0.005)		(0.004)	(0.004)	
Disability×Post	-0.127***	-0.099***	-0.099***	-0.104***	-0.074***	-0.074***	-0.014	-0.015	-0.015
	(0.022)	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.033)	(0.033)	(0.033)
R-squared	0.050	0.267	0.268	0.042	0.244	0.245	0.009	0.055	0.055
Observations	46,202	46,202	46,202	46,202	46,202	46,202	35,809	35,809	35,809
	Controls								
Year dummies	✗	✗	✓	✗	✗	✓	✗	✗	✓
Demographics	✗	✓	✓	✗	✓	✓	✗	✓	✓
Human capital	✗	✓	✓	✗	✓	✓	✗	✓	✓
Family	✗	✓	✓	✗	✓	✓	✗	✓	✓
Health	✗	✓	✓	✗	✓	✓	✗	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Table A3: **OLS regression analysis accounting for disability benefits receipt, without using EPS 2012 information**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.161***	-0.150***	-0.185***	-0.178***	0.097***	0.094***
	(0.011)	(0.012)	(0.011)	(0.013)	(0.014)	(0.015)
Disability×2015	-0.070***	-0.120***	-0.048**	-0.092***	-0.026	-0.020
	(0.020)	(0.029)	(0.019)	(0.029)	(0.032)	(0.037)
Disability benefits	-0.286***		-0.257***		0.120***	
	(0.014)		(0.014)		(0.023)	
R-squared	0.279	0.248	0.252	0.226	0.056	0.051
Observations	46,202	44,446	46,202	44,446	35,809	35,300
	Controls					
Year dummies	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Even columns add a dummy for people receiving any disability benefits (PI, PBSI or PASIS) and odd columns exclude those people from the analysis. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Table A4: **Robustness check, without using EPS 2012 information**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Labour force participation			Employment			Unemployment		
Disability×2004		-0.004	-0.001		0.018	-0.002		-0.039	0.004
		(0.019)	(0.021)		(0.018)	(0.020)		(0.029)	(0.031)
Disability×2006	0.004		0.004	-0.018		-0.019	0.039		0.042
	(0.019)		(0.020)	(0.018)		(0.019)	(0.029)		(0.029)
Disability×2009	0.001	-0.004		0.002	0.019		-0.004	-0.042	
	(0.021)	(0.020)		(0.020)	(0.019)		(0.031)	(0.029)	
Disability×2015	-0.068***	-0.072***	-0.068***	-0.054**	-0.036*	-0.056**	-0.013	-0.051	-0.009
	(0.023)	(0.023)	(0.023)	(0.022)	(0.022)	(0.022)	(0.037)	(0.036)	(0.037)
R-squared	0.279	0.279	0.279	0.252	0.252	0.252	0.056	0.056	0.056
Observations	46,202	46,202	46,202	46,202	46,202	46,202	35,809	35,809	35,809
	Controls								
Disability	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓	✓	✓	✓
Previous labour status	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disability benefits	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

Table A5: **Panel composition of sample restricted to people observed at least once before and once after the law enactment**

Time periods	Individuals	Observations
2	638	1,276
3	1,582	4,746
4	4,039	16,156
5	3,382	16,910
Total	9,641	39,088

Note: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

Table A6: **Unconditional difference-in-difference on labour market outcomes with sample restricted to people observed in the sample at least once before and once after the law enactment**

(a) Labour force participation

	Without disability	With disability	Difference	Observations
Pre 2010	.811	.511	-.300***	24,816
Post 2010	.766	.360	-.406***	14,272
Difference	-.045***	-.151***	**-.106*****	
Observations	36,487	2,601		39,088

(b) Employment rate

	Without disability	With disability	Difference	Observations
Pre 2010	.690	.371	-.319***	24,816
Post 2010	.715	.302	-.413***	14,272
Difference	.025***	-.069***	**-.094*****	
Observations	36,487	2,601		39,088

(c) Unemployment rate

	Without disability	With disability	Difference	Observations
Pre 2010	.148	.273	.125***	19,655
Post 2010	.067	.162	.095***	10,508
Difference	-.081***	-.111***	**-.030**	
Observations	28,992	1,171		30,163

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

Table A7: **OLS regression analysis with sample restricted to people observed at least once before and once after the law enactment**

	(1)	(2)	(3)	(4)	(5)
	(a) Labour force participation				
Disability	-0.300***	-0.286***	-0.266***	-0.274***	-0.265***
	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Post	-0.045***	-0.007	-0.014***	-0.030***	-0.030***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Disability×Post	-0.106***	-0.077***	-0.076***	-0.064***	-0.063***
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
R-squared	0.046	0.199	0.219	0.256	0.258
Observations	39,088	39,088	39,088	39,088	39,088
	(b) Employment				
Disability	-0.319***	-0.314***	-0.287***	-0.292***	-0.278***
	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Post	0.025***	0.056***	0.046***	0.031***	0.030***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Disability×Post	-0.094***	-0.065***	-0.065***	-0.051***	-0.050***
	(0.019)	(0.018)	(0.018)	(0.018)	(0.018)
R-squared	0.037	0.179	0.207	0.238	0.240
Observations	39,088	39,088	39,088	39,088	39,088
	(c) Unemployment				
Disability	0.125***	0.134***	0.124***	0.125***	0.116***
	(0.017)	(0.017)	(0.017)	(0.016)	(0.016)
Post	-0.082***	-0.079***	-0.075***	-0.071***	-0.070***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Disability×Post	-0.030	-0.028	-0.027	-0.033	-0.034
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
R-squared	0.019	0.040	0.052	0.059	0.061
Observations	30,163	30,163	30,163	30,163	30,163
	Controls				
Demographics	✗	✓	✓	✓	✓
Human capital	✗	✗	✓	✓	✓
Family	✗	✗	✗	✓	✓
Health	✗	✗	✗	✗	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Table A8: **OLS regression analysis decomposing interaction term, with sample restricted to people observed at least once before and once after the law enactment**

	(1)	(2)	(3)	(4)	(5)
	(a) Labour force participation				
Disability	-0.300***	-0.286***	-0.266***	-0.275***	-0.265***
	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Disability×2012	-0.056**	-0.025	-0.026	-0.015	-0.014
	(0.025)	(0.023)	(0.023)	(0.023)	(0.023)
Disability×2015	-0.156***	-0.126***	-0.124***	-0.111***	-0.111***
	(0.024)	(0.023)	(0.023)	(0.023)	(0.022)
R-squared	0.047	0.200	0.220	0.257	0.259
Observations	39,088	39,088	39,088	39,088	39,088
	(b) Employment				
Disability	-0.319***	-0.314***	-0.288***	-0.292***	-0.278***
	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Disability×2012	-0.049**	-0.019	-0.020	-0.009	-0.007
	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)
Disability×2015	-0.138***	-0.109***	-0.107***	-0.091***	-0.091***
	(0.023)	(0.022)	(0.022)	(0.022)	(0.021)
R-squared	0.037	0.179	0.208	0.238	0.241
Observations	39,088	39,088	39,088	39,088	39,088
	(c) Unemployment				
Disability	0.125***	0.134***	0.124***	0.125***	0.116***
	(0.017)	(0.017)	(0.017)	(0.016)	(0.016)
Disability×2012	-0.051*	-0.049*	-0.047*	-0.053**	-0.054**
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Disability×2015	0.001	0.001	0.002	-0.004	-0.004
	(0.036)	(0.035)	(0.035)	(0.035)	(0.035)
R-squared	0.020	0.041	0.054	0.061	0.062
Observations	30,163	30,163	30,163	30,163	30,163
	Controls				
Year dummies	✓	✓	✓	✓	✓
Demographics	✗	✓	✓	✓	✓
Human capital	✗	✗	✓	✓	✓
Family	✗	✗	✗	✓	✓
Health	✗	✗	✗	✗	✓

Notes: *** p<=.01, ** p<=.05, * p<=.1. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Table A9: **OLS regression analysis accounting for disability benefits receipt, with sample restricted to people observed at least once before and once after the law enactment**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.157***	-0.139***	-0.175***	-0.161***	0.085***	0.077***
	(0.014)	(0.016)	(0.014)	(0.016)	(0.017)	(0.018)
Disability×2012	-0.007	-0.034	-0.001	-0.015	-0.054**	-0.052*
	(0.023)	(0.030)	(0.022)	(0.031)	(0.026)	(0.028)
Disability×2015	-0.082***	-0.133***	-0.064***	-0.111***	-0.014	-0.009
	(0.022)	(0.032)	(0.021)	(0.031)	(0.034)	(0.038)
Disability benefits	-0.278***		-0.267***		0.126***	
	(0.016)		(0.016)		(0.024)	
R-squared	0.270	0.242	0.249	0.224	0.064	0.059
Observations	39,088	37,588	39,088	37,588	30,163	29,705
	Controls					
Year dummies	✓	✓	✓	✓	✓	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Clustered standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Even columns add a dummy for people receiving any disability benefits (PI, PBSI or PASIS) and odd columns exclude those people from the analysis. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability.

Table A10: **Labour transition matrices' unconditional difference-in-difference**

(a) People without disabilities labour transition differences across time [(8a)-(9a)]

	Employed	Unemployed	Inactive
Employed	0.016	-0.059	0.043
Unemployed	0.163	-0.221	0.058
Inactive	0.036	-0.106	0.070

(b) People with disabilities labour transition differences across time [(8b)-(9b)]

	Employed	Unemployed	Inactive
Employed	-0.062	-0.074	0.136
Unemployed	0.066	-0.239	0.173
Inactive	0.022	-0.115	0.093

(c) Labour transition matrices' unconditional difference-in-difference [(8b)-(9b)]-[(8a)-(9a)]

	Employed	Unemployed	Inactive
Employed	-0.078	-0.015	0.093
Unemployed	-0.097	-0.018	0.115
Inactive	-0.014	-0.009	0.023
Average	-0.063	-0.014	0.077

Notes: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Panel (a) shows the difference between panel (a) of Table 8 and panel (a) of Table 9. Panel (b) shows the difference between panel (b) of Table 8 and panel (b) of Table 9. Panel (c) shows the difference between panel (b) and panel (a), and the average for each column.

Table A11: **Summary statistics of dynamic panel samples**

Variables	(1) Base model Mean	(2) A-B/B-B model Mean	(3) A-B model Mean
Female	.52	.52	.54
Age	44.7	45.2	47
Aged between 25-44	.49	.47	.40
Aged between 45-65	.51	.53	.60
Completed primary education	.35	.35	.37
Completed secondary education	.47	.47	.47
Completed tertiary education	.18	.18	.16
Received previous training	.10	.10	.07
Head of household	.58	.59	.61
Married	.63	.63	.64
Number of other household members working	.92	.93	.89
Number of children from 0-4 years	.15	.14	.11
Number of children from 5-12 years	.37	.35	.31
Number of children from 13-17 years	.29	.28	.28
Disability	0.70	.071	.074
Presence of disability in household	.12	.12	.11
Presence of individuals NCDs	.33	.34	.37
Labour force	.76	.77	.74
Employed	.67	.67	.66
Unemployed	.12	.10	.09
Total observations	55,630	38,041	20,541

Note: Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015.

Table A12: **Arellano-Bond GMM estimation**

	(1)	(2)	(3)	(4)	(5)	(6)
	Labour force participation		Employment		Unemployment	
Disability	-0.043**	-0.046**	-0.044**	-0.047**	0.024	0.024
	(0.018)	(0.018)	(0.019)	(0.019)	(0.025)	(0.025)
Post	-0.035***		0.054***		-0.077***	
	(0.007)		(0.008)		(0.007)	
Disability×Post	-0.002		0.007		-0.023	
	(0.024)		(0.025)		(0.035)	
Disability×2012		-0.001		-0.001		-0.023
		(0.025)		(0.026)		(0.037)
Disability×2015		0.028		0.043		-0.024
		(0.027)		(0.030)		(0.047)
Lagged labour force participation	0.098***	0.115***				
	(0.019)	(0.017)				
Lagged employment			0.168***	0.171***		
			(0.017)	(0.014)		
Lagged unemployment					0.062***	0.073***
					(0.016)	(0.016)
Observations	20,514	20,514	20,514	20,514	12,919	12,919
	Controls					
Year dummies	✗	✓	✗	✓	✗	✓
Demographics	✓	✓	✓	✓	✓	✓
Human capital	✓	✓	✓	✓	✓	✓
Family	✓	✓	✓	✓	✓	✓
Health	✓	✓	✓	✓	✓	✓
Disability benefits	✓	✓	✓	✓	✓	✓

Notes: *** $p<=.01$, ** $p<=.05$, * $p<=.1$. Robust standard errors in parentheses. Author's own elaboration based on EPS 2004, 2006, 2009, 2012 and 2015. Year dummies are for 2006, 2009, 2012 and 2015. Demographic characteristics refer to age, squared age and a binary variable for gender. Human capital characteristics include dummy variables for secondary education, tertiary education and previous training. Family characteristics consider a binary variable for marital status, the number of children of different age groups (0-4, 5-12 and 13-17) and the number of other people working in the household. Health characteristics include dummies for the presence of NCDs and of another household member with disability. Disability benefits is a dummy variable for people receiving either PI, PBSI or PASIS.

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