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Master in Economics and Finance

Disability and Labor Market Outcomes in Mexico

María José Favela Cantarero

Director: Javier Elizalde

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To God, my parents, my teachers and classmates in the MEF 2022-2023 term and especially to my husband who has supported me all throughout this year and to the baby we have on the way.

Abstract

This study tries to find the effect of having a disability in labor market outcomes, that is, employability and wages, in Mexico using 2020 cross-sectional data. Coming from the literature of gaps for other disadvantaged groups like women, people of color, the economic effect of having reduced employment rates and wages relates to reduced opportunities and higher poverty risk. While there is plenty of literature of the effect of disability for developed countries, while the research in developing countries has lagged due to problems of data availability and measurement error. The studies of countries in the Americas, Africa and South East Asia show much variability in the significance of their estimates.

In this study, we aim to understand not only the effect of having a disability on labor market outcomes, but also the heterogeneity between different disability types, interacted with gender. We also seek to understand the main determinants in wages and participation rates of people with disability, which include the effect of education, experience and being on disability benefits, through probit and Heckman type regressions. Since people with disability (PWD) differ on average with the rest of the on some determinant variables, most notably education, we wish to disentangle the effect of differences in endowments from true discrimination or prejudice. We do this by applying a Oaxaca-Blinder decomposition to our employment and wages models.

Through the study, we find that disability in general has a strong and significant effect on employment, and on wages typically through reduced employment probabilities. The magnitude of the effect differs across disability categories, being stronger for people with mental and learning disabilities, and negligible for some sensory disabilities, especially hearing. Consistent with most of the literature, this varies importantly by gender. Finally, and contrary to what an OECD (2010), we don´t find conclusive evidence that receiving a disability benefit from the government reduces participation, instead it is used more as a supplement to income.

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Introduction

The inclusion of people with disabilities in various spheres of life has been a pending subject in developed societies, and even more so in developing countries. A 2010 OECD report on disability and work, states that promoting the employment of disabled persons aids in economic and social inclusion, offering a channel through which to escape poverty and provide for themselves and their families, as well as a space of interaction with other persons. Work is associated with better mental health outcomes, and life satisfaction (World Health Organization, 2011). Additionally, having people with disabilities to work is also beneficial for society, since adding people into the working force broadens the base upon which social systems can be supported. Furthermore, it contributes to lessening the burden of tax systems with respect to disability benefits schemes. This of course, is true for the existing welfare systems in developed countries, but there are some estimates for Latin America that show that the inclusion of this demographic in the work force can have a positive impact on GDP of 2-3%. (OECD, 2010)

However, the reality is that people with disabilities are far from being integrated into society in general, and more concretely, into the labor market. According to some estimates by the Interamerican Bank for Development (IDB), their employment rate is 24% lower for males between 24 to 35 years old. It is even lower for females (12%) within the same age range (Duyrea et al, 2019)

The labor outcomes not only look different in terms of unemployment, for also for those that work, “people with disability work part-time more often than others” (OECD, 2010, p.51), and face high unemployment risks, measured as the rate of employment and unemployment. which gives a sense of how many people seeking employment get it. Mexico is in a similar situation than Iceland, where people with disability (PWDs, henceforth) see relatively high employment and low unemployment levels. In terms of income, this group has low income, unless they are highly educated and with a job.

Lower employment rates and wages are symptoms of a lack of full incorporation of those with disabilities into the labor market due to several factors. Some of those factors are related to biases held by employers and concerns about the potential costs of accommodation (Bonaccio et al, 2020; Becker, 1971). Some others are related to what has been called occupational segregation (Maroto & Pettinicchio, 2014), which is when disabled persons tend to work in lower-paying jobs. And finally, some of them are related to a tendency within that group of people to be in school for a reduced period of time, compared to the rest of the population. The same IDB report states that there is an important gap in enrollment (7% gap in primary school, up to 10% in secondary for eight countries in LAC) and completion rates, which is estimated at 19%. This has also been documented recently for Mexico, where disabled children receive less education

years on average compared to non-disabled children (Terskaya, 2019). Early-on discrimination of PWD can have implications for outcomes later in life. With respect to the "gender wage gap", Mechtenberg (2009) proposed a model to explain how gender-biased grading affects grades, career choices and ultimately the wage for boys and girls in OECD countries.

A higher propension for health problems has also been identified as a potential channel through which the labor outcomes of people with disabilities are impacted (Mani, Mitra & Sambamoorthi, 2008; Baldwin & Johnson, 1994). This is worrisome since PWD tend to have worse access to health services (Duryea et al, 2019). What we glean from this short review is that exclusion in different spheres of life from education, health and other government services has a negative impact on the labor outcomes of PWD and can lead to higher rates of poverty (OECD, 2010).

It must be pointed out that disability is not an unequivocal concept, nor is the reality of disability a homogeneous one. In economic literature, disability can mean one of two related concepts. Firstly, it can be understood as a job status ("being on disability") which entails that a person is unable to work temporarily or permanently due to a health status, and in developed countries, entails receiving a pension. This is the term managed by Aizawa, Mommaerts & Rennane (2022) or Gannon (2005). In a broader sense, a disability can refer to a functional limitation, that paired with an unsuitable environment leads to a constraint on being able to perform certain tasks of everyday life. In this work, although we encounter both definitions in our data, we are going to be working mostly with the latter definition.

Discrimination and lack of inclusion are costly for a society. At a family level, having a member that is going to be dependent for all their life as opposed to being able to support themselves has implies lower earning and a permanent higher expenditure for the home, not considering higher potential health expenses. As the OECD (2010) has pointed out, leaving people with disabilities out of the labor market implies missing a sizable (6-10% depending on the country) part of the labor force. At the same time, if there is a social security network which pays out disability benefits, that is a further pressure on the administration. At the macro level, general labor market discrimination reduces the returns on investment in human capital (ie, training and education) for those discriminated against. This can lead people to underinvest in education, which affects the productivity and general skill level of the labor force (Phelps, 1972). Of course, research on employment and wage gaps related to disability have been unclear with respect to potential effects of disability on productivity, that while important, are very difficult to measure.

While there have been a couple of recent studies on the Mexican labor market, one that analyses the gender gap in the urban labor market (Cuellar & Moreno, 2022) and another that studies the impact of the Great

Recession on the last 15 years on labor market outcomes at a macro level, neither of the two analyze the subject of disability as a source of heterogeneity of results.

The study of disability in economics is relatively recent, motivated partly by the introduction of legislation that designates people with disability as a protected class. In the United States, for example, the Americans with Disabilities Act of 1990 was an instance that fostered awareness about the necessity of the inclusion of this demographic into economic life. The earliest work found studying disability and labor market discrimination was done by Johnson and Lambrinos (1985), which studies wage differentials, followed by Baldwin and Johnson (1994), Loprest, Rupp & Sandell (1995) and Kidd, Sloane and Ferko (2000); early studies usually worked with US and UK data.

During the following 20 years after the Baldwin and Johnson paper, there was quite a lot work done on both labor market participation and wage gaps between people with disability and those without. Since the earliest work, a lot has been done on EU, Scandinavian and South Asian countries, and apart from statistical summaries, not much has been done for Latin America. The studies on disability and work have been mostly carried out using cross-sectional data, a few other based on regularly administered surveys which allowed for panel data (Gannon 2005, Frutos & Castello 2015). The ability to study disability and work across time made possible to study other types of outcomes such as the effect of the onset of disability on labor status, unemployment length and market exit and entry. Both studies mentioned make use of some regular surveys to study labor dynamics, usually related to the onset of disability (which in this case restricts us to the case of work- or age-related disabilities as opposed to congenital).

A lot of the literature incorporates some measure of heterogeneity of disability; mostly, based on type of disability and while surveys usually ask questions following the Washington Groups' recommendations (that is, focusing on activity limitations rather than saying disability outright), researchers group answers in different categories. Baldwin and Johnson (1994) for instance compare discrimination-prone with non-discrimination-prone disabilities, while Choe and Baldwin (2011) consider sensory disabilities (hearing, speech, and vision). Gannon (2005) compares groups with "severe", some and no limitations (regardless of type).

Some studies have also been done for developing countries, which might give different results for three reasons: first, we have the problem of data availability, since not a lot of countries measure disability along with other social and economic indicators, which makes micro-based studied more difficult. This is the case for a lot of countries in Latin America, for instance. Another reason is that the informal sector has a bigger role in developing economies, which could prove to be a reprieve for persons with disabilities (more flexible conditions) or a bigger obstacle (no protection under law). Finally, there is evidence that suggests that

disability is correlated to poverty (Braithwaite and Mont 2009; Mitra, Posarac and Vick 2013; Trani et al 2015), and family poverty and child disability seems to be highly related (National Academies of Sciences 2015). From these studies however, it is unclear whether disability is strictly a path for poverty and not is poverty itself might be related to higher disability incidence. While not entirely conclusive, Larson (2007) study on poverty during pregnancy finds that "poverty has consistently been found to be a powerful determinant of delayed cognitive development and poor school performance" for Canada. For cases of later onset, it is also true that poverty can be related in the sense that low-paying jobs may be more dangerous and likely to lead to disabling injuries (Kidd et al 2000; Mani, Mitra and Sambamoorthi 2018). In the case of Mexico, the relationship may be muddled since the rate of poverty risk (disabled poverty vs non-disabled poverty) is very close to zero, meaning that the likelihood of poverty is very similar. On the other hand, this measure does not take into account the poverty gap or depth.

There are various studies about the relationship between disability and labor market outcomes for Southeast Asia (Tamil Nadu, Indonesia one, all the others citing the Tamil Nadu one). For Mexico, we were able to find a 2014 paper by Agovino, Parodi and Barajas that perform a spatial analysis of disability labor participation and employment rates compared to the non-disabled rates for 2000 data and find that the north and south of the country exhibit two different patterns, both in terms of environmental variables like GDP growth and human development as measured by the HDI, as well as in participation rates. The analysis suggests that job market conditions do not appear to be correlated to the decision to work or not, which would suggest that the gap in participation may be due then to more offer-side factors like education and experience. However, this study works with aggregated data which might obscure individual effects of education, experience, and type of disability.

Although this paper is recent and analyses the Mexican labor market, the present study might be relevant for the following reasons. The 2014 study is based on data from the 2000 *Censo de Población y Vivienda,* which is the predecessor of the *Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH),* which is a more comprehensive survey, done bi-yearly and which includes a lot more data. We will be using the latter in this study. There is reason to believe that some structural changes have happened since then, since legal protections for people with disabilities went into place post 2000 – in 2001 the introduction of a National Council for People with Disability by executive order, followed by the *Ley General de las Personas con Discapacidad,* later replaced by the 2011 *Ley General para la Inclusión de Personas con Discapacidad.*

Furthermore, in 2015 there were changes introduced in the tax code to create incentives for hiring persons with disabilities, like the possibility to deduct 100% of the worker's salary from the firm´s income tax, as

well as a 50% subsidy on the employer´s legal due of the worker's social security. These changes that were applied nationwide might influence in making employability and wages higher than in 2000.

A third reason this study of disability and labor in the Mexican context is relevant is the fact that we will incorporate various sources of heterogeneity, which Jones (2011) points out that is important to make useful comparisons between groups. This study works with UK data, which as we have stated previously, might be different than the Mexican case also in terms of the structure of the economy, that is, being more service oriented as opposed to primary and secondary sector oriented as is the case for Mexico.

Given the previous considerations, in this study we want to understand what the effects are of having different types of disability on employment and wages in the Mexican labor market. This main question will be answered partially through the supporting questions: Are the labor market outcomes for disabled people the same across gender, and within formal and informal markets? Does the employing sector and type of activity performed on the job impact differently for each type of disability? Do disability benefits, as suggested by the OECD (2010) discourage labor participation, or is it simply correlated with age? How labor market outcomes differ for people with congenital disabilities compared to those with a later onset? Finally, we want to understand if the labor gap in employability and wages can be fully explained by differences in traditional indicators such as education, experience, and health? If so, how much of this gap can be explained by "observable" factors?

To answer the previous questions, as we said above, we are going to be working with the 2020 edition of the *ENIGH.* This is a 300+ questionnaire done at the household level for 106 846 representative families in the country. This survey asks questions about demographic characteristics, nutrition, health conditions, job and use of time questions, and household expenditures and income. The data raised is used by the National Council of Social Policy Evaluation to construct a bi-yearly multidimensional poverty index for the country. It includes information at the dwelling (*vivienda*), household (*hogar*) and individual level.

In broad terms, we would expect to see a general negative and significant effect of disability on employability and wage level for all types of disability. This may vary by gender, with potentially higher SE for women. In some papers, we saw that the effect of disability on employment was non-significant for women, depending on the specification. With respect to the effect of formal or informal markets, due to the latter being being more flexible, especially with respect to wage level, we might expect that persons with disability would receive a wage at an equilibrium that considers both their productivity and potential employer's taste for discrimination. We speculate that this wage will then be lower but would entail a similar level of employment in the informal and formal labor markets. It should be noted that Mizunoya and Mitra

(2013) find that the disability gap in employment is "is more common in middle income countries compared to low income countries", which is consistent with Mitra, Posarac, and Vick (2013).

In line with previous research, we would expect a higher effect for mental disability and a lower impact on employment for persons with sensory disabilities, although this might vary by sector. As Baldwin and Choe (2014) have pointed out, having a sensory disability might be a handicap in jobs that put a premium on communication skills.

With respect to the difference between congenital and later onset disability, previous literature points to two competing effects. Having an at-birth disability might imply a negative effect due to having lower levels of education and health services from earlier in life. As Heckman et al (2010), even differences at the preschool level can have significant effects later. On the other hand, there is also the possibility that having a disability for longer gives the person an opportunity to adapt, which might imply lower obstacles to employment. Depending on the severity of the gap in education and health between PWD and the "general population", the first effect will dominate, and we will observe a negative effect of having a congenital disability. Following Mizunoya and Mitra (2013) we anticipate an employability gap of around 0.12-0.25 (estimates for Latin American countries). Of this gap, we expect that the "unexplained" portion of it to be between 0.6 or as high as 0.32%.

Although there is great interest in finding causal links of how disability may lead to poorer results in labor market outcomes, we find that data availability and the dataset used can only give us descriptive results, which can become a stepping stone to a more causal study in the future. First, we have that our data is cross-sectional, se we cannot observe how labor may change for different types of individuals, or study other labor outcomes like duration of employment/unemployment, promotions, job change and so on. Related to the concern of data availability, we have that since the survey used is not a labor or employment survey (a survey of this kind is done by the ENOE/ETOE monthly survey), we don´t have a direct measure of years working ("experience") so we will be using a proxy variable of years contributing to social security, that in most cases of formal work starts at around the same time.

Moreover, as we have stated briefly in the previous section, we have a confounding element in the relationship between poverty and disability. Recent development economics literature suggests that generational outcomes are very tightly connected, with parent´s education and job status relating to their children's potential results, for instance in educational attainment. Moreover, as we have mentioned, mother´s health status at time of birth (another indicator of poverty) may be related to disability prevalence at birth. These two things together mean that parents' poverty status might be a causal variable for both

poor labor market outcomes and disability. In this dataset, we have no way to control for these effects, so all results found in the work must be interpreted with this in mind.

A consideration of less importance is the fact that this survey was conducted during the pandemic (from August 21 to November 28, 2020), which affected the way interviews were conducted. Also, considering the major social and economic impact that the COVID-19 pandemic had, it may be that all results for employability and wages are depressed compared to other years. Due to time constraints, we will not be able to compare results to the same survey done in 2018.

Theoretical Framework and Model

On disability and its definitions

While the concept of disability has evolved through time from a medical-rehabilitatory framework, that considers the person with disability as a person that has a problem that must be fixed, to a social model where it is an interaction of the individual and their environment. The International Classification of Functioning, Disability and Health (ICF) makes a distinction between three interrelated categories: impairment, activity limitation and participation restriction (WHO, 2011). An impairment is a problem or alteration in a bodily function, an activity limitation refers to a difficulty in executing a task, while a participation restriction involves environmental and social factors which constitute barriers to involvement. This environmental barriers to full participation can be classified into physical (material, or having to do with information); social, having to do with how institutions and organizations are structured in a society; and cultural with deals with attitudes and behaviors relating to prejudice.

Disability is then a multidimensional concept, which is sensitive to degrees of severity or degree (it is not the same kind of limitation to have to wear glasses, than to not being able to see at all; or having impaired mobility in the legs with or without a wheelchair). This heterogeneity makes the study of disability on labor market outcomes very complex, and not without its downsides. Compared to other sources of labor market gaps such as race or gender, disability may also imply a lower productivity compared to a similar worker; and this in turn is related to the type of job involved.

The Declaration on the Rights of Disabled Persons (DRDP) classifies disabilities in four broad categories, physical, intellectual, mental or psychosocial, and sensory (visual and auditory). Each of these groups may be associated with different ailments, and has certain obstacles related to it. For instance, the kinds of barriers that people with physical disabilities face are physical as well (although prejudice also plays a role). For persons with a mental or disability, social barriers like forced institutionalization or the denial of legal

capacity or rights tend to have more importance. In terms of prejudice, people with intellectual disabilities are more likely to be subject to discrimination due to their appearance, and be excluded from education, health systems and the labor market (Carreon Castro et al, 2019).

Given this, we can conclude that the interaction of PWD with different aspects of their environment results in diverse life outcomes. With respect to work, the kinds of requirement a job has (more physical/intellectual), and the accommodations available for it can enable a person with a given disability to work in it (Loprest, Rupp & Sandell, 1995). This is also consistent with what Cater and Smith (1999) find, which is that the gap in white-collar jobs is less severe.

In measuring disability there is also some variability that is important to address, since it can limit the comparability of studies done on different countries. In datasets, disability can be measured as a self-assessment of how an impairment can be a functional limitation to the person answering the survey (denoted the "subjective" measure). Depending on the context, this type of answer can lead to under or overreporting depending on the environmental and social factors, which can be related in turn to the economic conditions of an area. Other sources of data use a legal status definition, based on administrative rules. This is called the "objective" measure and is usually based on some type of benefit eligibility. These indicators may be subject to some degree of overreporting (OECD, 2011), but are useful in that the definition is more homogenous.

Labor market equilibrium

The most basic labor market models consider two sides of an equilibrium: labor supply and labor demand. Labor supple is driven by the decisions of individuals, that in the neoclassical model choose a bundle of consumption and leisure, restricted by the number of hours. The marginal rate of substitution of consumption and leisure are wages. The decision to work (and how many hours) is the driven by this MRS evaluated at an initial endowment composed of hours available to the person and any non-work income they might have. This extra income includes things like investment income, gains from illegal activity, government transfers (which might also play a role given eligibility rates) and potentially income from other members of the household. The MRS evaluated at this non-work income is usually called the "reservation wage", and it´s sometimes used as a measure of workers´ bargaining power. We stated previously that the decision to work is done based on hours to work, however this is usually not very realistic except for some forms of self-employment and work based on commissions.

In general, the decision to work is binary (employed/not employed), and then a contract stating some conditions like working hours, overtime payment, vacations and so on is drawn (in informal markets, there

is also more flexibility is this respect). The amount of hours worked may also be capped by law, so there may be corner solutions where workers want to work more hours than they are allowed to. The effect of wages on employment has then two distinct effects: one on the extensive margin to work or not, and the intensive margin of how many hours to work. This last margin has a very non-linear behavior due to things mentioned above (overtime pay is usually higher than regular pay), corner solutions, and the taxing system. Since income is taxed on a scaled basis, this also affects the willingness to work for additional hours since there is a tradeoff between more base income, but also a potentially higher tax rate.

In the decision to work, it is also important to consider that even though leisure may be understood as "free time", a person might allocate this time to other tasks, such as volunteering but mostly housework. The cost of hiring external housework (child-rearing, cooking, cleaning, etc.) figures into the decision, as well as cultural norms of who in the household is expected to do most of it.

Cahuc, Carcillo and Zylberberg (2014) point out that a model with household production, where the tradeoff is between work-leisure and house work might explain "why empirical studies reveal that the wage elasticity of the supply of female labor is generally higher than that of the supply of male labor" (p.25). We could posit that the opportunity cost of working for women tends to be higher, since it also takes into account the cost of house labor. This is why also variables like gender, marriage status and the number of children are relevant in the decision to work.

The same authors propose the following equation to estimate labor supply:

$$\ln h_t = \alpha_w \ln w_t + \alpha_r \mathcal{R}_t + \boldsymbol{x}_t \boldsymbol{\theta} + \varepsilon_t$$

Where we have hours of work as a function of the log wage, $\mathcal{R}_t$ non-work income (also called non-earned income), and **x** vector of individual characteristics, which might include things like preferences, time availability, demographic factors, and so on. In this vector we could also add health as a relevant characteristic, following Oi and Andrews (1992) reasoning, noting that "disablement may affect the work–leisure choice in three distinct ways — the effect on individual preferences and hence the demand for leisure; the effect on productivity and the effect on the time available for work and leisure" (Kidd et al 2000). In this respect, O'Donell (1998) developed a model that considers the possibility that a subset of disabled persons is unable to work. However, as we will see in the following section, in our data this population only accounts for around 2% of all people with a disability.

On the other side of the labor market, we have labor demand driven by firms, that in the traditional model choose a combination of labor and capital to produce goods and services. Given frictions in capital investment, in the short run firms adjust production via labor demand (that is, hiring and firing), which also

means that labor tends to be more volatile in the business cycle. In the long term, although labor and capital are more complements than imperfect substitutes, the ratio of production may change, for instance, through automatization. The conditional labor demand of firms depends on the relative price of labor, given by W/R, in a basic model implies that it is increasing with the price of capital. Similar to the previous discussion of non-linearities of wages, for firms the cost of additional labor depends on whether it implies hiring more workers or increasing the hours of the current workers, which depends on legal caps on hours, the cost of overtime pay, fixed costs of hiring and firing. If these fixed costs are high enough (which is correlated to the level of worker protection in the region), firms prefer to hire additional hours rather than additional workers. In our data we don´t consider firm-level data, but regional effects (economic growth and inflation) might be used as proxies for firm demand.

Given these two forces, we get a general labor market equilibrium, in which wages and hours of work are determined. It´s important to note that in this simple model, there is no unemployment since all workers that are willing to work given a wage are employed, which is not always the case due to market imperfections like imperfect information, wage rigidities, non-market biases (discrimination), etc. So far, we have seen that labor participation is driven by a reservation wage and other individual characteristics, but wages as a market equilibrium incorporate additional information. In labor economics, there exist two theories that explain a person´s wage.

We have the hedonic theory of wages, that considers that different workers may have different disutilities of working (affected by health, as Oi and Andrews have stated), but also that there are jobs with "different degrees of arduousness", or difficulty in performing it. This may also be called effort, which "covers a number of dimensions like accident risk, hours of work, environment, and the advantages, whether in kind or in status, that flow from holding a particular job". (Cahuc et al, 2014, p.170) In this context, we could have that different job activities and even economic sectors have higher or lower payoffs relating to effort. If there is perfect information and people "choose" jobs that maximize their utility, we might see some self-selection in the type of work workers are employed in, and then wage differentials might be explained by the theory of occupational segregation.

However, this theory would not explain why some arduous jobs like those in manufacturing or physically demanding are not always the best paid. In contrast, we have the theory of human capital, which rests on the idea that education improves the productivity of workers, for which firms are willing to pay a premium. This education can be had in both formal schooling but also on the job experience, where workers might acquire firm-specific or general knowledge which makes them more productive. In tight labor markets (that is, relatively low supply and high demand), there also exists the related concept of efficiency wages, which

is a payoff higher than the marginal productivity of the worker, to ensure that the worker does not leave and is more motivated on the job, which reduces fixed costs for firms.

Econometrical model

For the employment model, we are going to follow what Mitra & Sambamoorthi (2008) do, which is running a probit model with worker productivity and experience, as well as different measures of disability available in our data. Additional to this, to control somewhat for severity, we are going to include a dummy for multiple disabilities, and a variable that asks if the person has had a health problem requiring to go to a health facility in the previous year. This model also includes a measure of reservation wage via non-labor income. In our case, we are going to separate transfers relating to disability from this non-labor income, estimating an equation like the following:

$$L_i = \theta D_i + \delta_p P_i + \boldsymbol{\beta X} + \alpha_R \mathcal{R}_i + \varepsilon_i$$

Where L is a dummy variable of employment, Di includes dummies for different categories of disability, Pi includes productivity characteristics (education and experience), X is a vector that includes individual characteristics which include health, Ri is the reservation wage, disaggregated by disability benefits and all other non-work income and an error term for uncaptured worker characteristics.

For estimating the effects of disability on wages, we are going to be using the Heckman estimation (1977, 1979), which accounts for self-selection in the sample, related to the fact that we only observe wages for persons who are working, which might be different than for the rest of the population (that is, lower than their reservation wage). Using a Heckman estimation for wages is standard in labor economics literature, and common in the revised literature on disability. This is a two-stage estimation, which first calculates a "sample selection rule", which in this case just means the probability of being employed (the sample that we observe). This is usually estimated using a probit. The second stage includes as a regressor λ_i which is the sample probability, and other variables that are directly related to wages (from the hedonic and human capital theories mentioned above). Again, we are going to include disability as a regressor, having then the following equations:

Regression equation or second stage

$$w_i = \theta D_i + \delta_p P_i + \alpha_J J_i + \alpha_E E_i + u_{1i}$$

where Di represents the regressors related to disability categories, Pi the regressors related to productivity (in our sample, education and experience), Ji refers to jobs characteristics, Ei is a series of dummy variables for the economic sector the person is employed in and u_i is the error term.

Selection equation:

$$w_i \; is \; observed \; if \; = \; \theta D_i + \; \boldsymbol{\beta X} + \; \alpha_R R_i + u_{2i} > 0$$

where:

$$u_{1i} \sim N(0, \quad \sigma)$$

$$u_{2i} \sim N(0, \quad 1)$$

$$corr(u_{1i}, u_{2i}) = \rho$$

Where we have demographic characteristics **X** which are typically related to labor participation (gender, marriage status, children) and as in the employment probit model, a proxy for the reservation wage Ri.

For robustness checks, later we are going to break down these regressions by gender (as suggested by Ebaidalla & Ali (2022); Oncel & Karaoglan (2020); Jones (2011); Mitra & Sambamoorthi (2008); Kidd, Sloane & Ferko (2000), Baldwin & Johnson (1994 which only study males due to compounding problems of gender discrimination), by onset (birth vs later) and type of job (formal vs informal).

Finally, we are going to do two types of related decomposition, Oaxaca-Blinder for wages and Fairlie (2006) for employability to study the "disability gap". Why are we interested in the gap, having done the analysis described above? The hypothesis in the previous models is that there is something about having a disability that reduces both the probability of being employed, and the wages received in a given job. However, it is not possible to distinguish if this is due to discrimination on the employer's part, or a result of possible lower productivity of workers with disability, that on average are less educated and might have less work experience. One could then argue that if PWD had the same "endowments" as those of people without disability, perhaps then the effect of disability would not be significant. Without having this counterfactual however, it is not possible to estimate it directly. On the other hand, is these two groups turn out to have different returns on education and experience (potentially due to prejudice or other non-observable factors), then having the same endowments would not close the employment and wage gap.

With respect to the employment gap and educational achievement, Takeda and Lamichhane (2018) find that in India, disability is related to "negative educational attainment, completion, dropout and academic achievements" which in turn translate in poorer labor market outcomes. Relating it to family income, the effect of fathers' education is negligible but higher mothers' education has a positive effect on schooling.

On differential returns, Bellacicco & Pavone (2022) find in a longitudinal study of five years in a university in Italy that although contact with career services has a positive impact on employment rates, "the gap with peers without disabilities remains", and employment rates remain low. Andrewartha & Harvey (2017) find in Australia that "graduates from non-English speaking backgrounds and graduates with a disability have consistently worse employment outcomes". On a literature review, Moriña & Biagiotti find that a factor that hinders integration of graduates with disability in the workplace is firms' attitudes, since student feel the need to feel accepted into a work team.

Oaxaca and Blinder (1973) propose a method that decomposes the differences in an outcome variable between two groups into a component that is due to differences in the distribution of regressors or endowments, and a component that is due to these differences in coefficients. The authors break it down into something called the "explained" gap and "unexplained", that is usually attributed to discrimination. We may point out as a caveat that this last component also includes the effect of any omitted variables, so the role of prejudice may be overstated.

The method is based on considering the gap as the difference in expected values of some Y variable between two groups, in this case disabled (D) and non-disabled (ND).

$$R = E(Y_{ND}) - E(Y_D)$$

based on a linear model for Y (in this case, it could be either wages or employability). Stata supports other specifications of the Y model:

$$Y_l = \beta_l \boldsymbol{X}_l + \epsilon_l \,; E(\epsilon_l) \;\; l = D, ND$$

The gap can be rewritten the following way

$$R = \{E(X_{ND}) - E(X_D)\}'\beta^* + \{E(X_{ND})'(\beta_{ND} - \beta^*) + E(X_D)'(\beta^* - \beta_D)\}$$

Where β* is called a non-discriminatory coefficient vector, which can be estimated from a pooled model of both groups, or some other reference parameter. Here we make explicit that both groups will have different associated betas. The first component of the previous equation is called the 'quantity effect', and the second component is the unexplained part, which considers that the betas for both groups are a deviation from the non-discriminatory coefficient.

We can also consider that β* can be a weighted average from both groups, and have the following model:

$$R = \{E(X_{ND}) - E(X_D)\}\{\boldsymbol{W}\beta_{ND} - (I - \boldsymbol{W})\beta_D\} + \{(I - \boldsymbol{W})'E(X_{ND}) + \boldsymbol{W}'E(X_D)\}(\beta_{ND} - \beta_D)$$

Where **W** is a weighting matrix, which the econometrician can choose. The Farlie decomposition is similar, and it was developed later to be able to use this method with binary variables, for instance employment, but the mechanics behind it are the same.

Data and Summary Statistics

As mentioned previously in the introduction, we are going to be working with data from the 2020 *Encuesta Nacional de Ingresos y Gastos de los Hogares* or ENIGH (National Survey of Household Income and Expenses), gathered by INEGI from August 21 to November 28, 2020. This is a bi-annual survey based on two-stage stratification, that collects a comprehensive amount of data at the household and individual level that includes residence characteristics (including access to services), sociodemographic characteristics from residents, activity and occupational data from residents older than 12, financial and capital perceptions and expenses of the household and their members. All this information is divided into tables that are linked to each other via dwelling, household, and resident id. The residence id contains information on the geographical location of the house (state) if it´s rural or urban and the primary censal unit. Since this is a representative sample, we also have a variable named Factor that is used as a "factor of expansion" to be able to generalize results from analysis.

The data used is drawn from the Work (*Trabajos*), Income (*Ingresos*), and Population (*Población*) tables. This last one contains all sociodemographic characteristics of individuals, as well as information on use of time and access to health services. All the datasets have different number of observations since in the Work table only residents that work are included and in the Income table only resident that receive any income are included. This leaves us with around 315,619 observations.

For the work data, we only consider the primary job of respondents (since residents might have more than one job). This might pose a problem if the secondary job "competes" in time with the primary work, but in measuring employability (a dummy variable) this might not be such a problem. In measuring wages (esp. hourly wages) there is a chance to confound the mixed income from both jobs however the Income table distinguishes the income received from each of these two activities.

From there, we use construct variables for having an informal job (no contract), being self-employed, temporal work, if the respondent receives an assigned wage or other types of pay (including no pay), hours worked weekly, a classification of the activities performed on the job and a category for the sector the respondent is employed in. Additionally, we include two variables which measure the amount of legal (as mandated by the Federal Work Law) and "extra" benefits that the primary job entails.

The Income table is structured such that we can observe the amount received per month for the current month and five months prior per resident that has any income. Using this data, we construct a semester average and retrieve four categories of income that are of interest for the analysis: wage from primary job, other work income (tips, bonuses, fees, payment for work, etc), amount received due to disability benefits (called *Pensión para el Bienestar de Personas con Discapacidad*) and an aggregate category of other sources of income. It should be noted that eligibility for this program is based on the "objective" measure of disability, since it required submitting a medical record by any public health institution that certifies that the person has a permanent disability (DOF 30/12/2022).

Finally, for the Population Table we retrieve information of five types: sociodemographic characteristics, disability status, education, job status and other labor market characteristics, and a variable for health status. For the first categories, we include age, gender, number of children, married status and an indicator for indigenous people.

Apart from the Work table, the Population table has some relevant information on jobs and work. Experience is one of the main explanatory variables for wage levels as discussed above, however there is no direct question asking about the number of years a respondent has worked. For that, we construct a proxy variable of the number of years contributing to social security. In Mexico, once a person is hired, their employer is obligated to register them and pay some part of the contribution to social security of that worker, which for subordinated employees in formal jobs is a good approximation of their work experience. This measure might fail for those in informal jobs and self-employed workers. However, since citizens are also allowed to contribute independently of an employer, some experience may be captured there.

Then we have a variable of self-reported ease of getting help with finding a job, another measure of hours of work, a dummy variable of having worked last week, if the respondent has been job-seeking the past week. Finally, we have a first measure of work-specific disability in a variable that is equal to 1 when the "person has a physical or mental limitation that prevents them from working for the rest of their lives".

The ENIGH includes a series of questions on the difficulty of performing eight types of tasks due to "birth or health" problems. The activities are walking, seeing, use of arms and hands, learning/concentrating (intellectual disability), hearing, self-care (eating, bathing, and dressing), communication and talking, mental or emotional problems. Following the Washington's Group for Disability Statistics recommendation, we consider a person to have a disability if they report having "a lot of difficulty" or "cannot do at all". We also have a dummy variable indicating if the source of the disability if from birth or otherwise and keep the level of difficulty to have an alternative measure of health status.

For education following the levels used in Mitra et al (2008), we generate a series of dummy variables for highest grade achieved, ranging from no education (illiterate) to higher education (bachelor's degree or higher). Finally, also taking cues from the same authors, we have a health measure if the person has had a health problem in the past year that required treatment.

Disability

	Single	Multiple	Total
No disability	293,797	0	293,797
Disability	13,099	8,723	21,822
Total	306,896	8,723	315,619

In this sample, people with disability account for around 6.91% of the population, and we see that while most people only have one disability, a sizable portion of this demographic have multiple disabilities, with 80% having at most two disabilities.

	Frequency				Correlation			
	Sensory	**Physical**	**Mental**	**Intel.**	**Sensory**	**Physical**	**Mental**	**Intel.**
Sensory	5,960				1			
Physical	2,834	7,426			0.3740	1		
Mental	201	293	644		0.2887	0.2712	1	
Intellectual	454	366	20	995	0.3396	0.2945	0.4412	1

The most numerous categories of disability are physical disabilities, which comprehend use of legs and walking, use of arms and hands and taking care of themselves; this is followed by sensory disabilities, which in this case include hearing, seeing, and talking difficulties. We can also see that mental and intellectual disabilities are the most interrelated categories, and then sensory and physical disabilities.

	Walking	**Seeing**	**Use of arms**	**Learning**	**Hearing**	**Dress**	**Talking**	**Mental**
Low severity	9,407	6,725	3,497	3,476	3,481	2,076	1,772	2,110
High severity	2,032	821	525	755	565	1,355	850	1,032
w/ work disability	2.142%	1.537%	2.660%	2.198%	2.101%	2.885%	2.632%	2.578%

On the degree of disability, we respondents report two levels of difficulty which are considered a disability: one is not being able to do the task at all (high severity), and the other is being able to do it with a lot of difficulty (low severity). In general, for all categories, the number of people that report not being able to perform any work due to disability is between 1.5 to 2.89%, that is, low enough to be negligible in our sample.

Variable	Obs	% of all causes	Std. dev.
Walking	11,439	7.77%	0.267737
Seeing	7,546	12.72%	0.333241
Use of arms	4,022	10.62%	0.308088
Learning	4,231	29.12%	0.454362
Hearing	4,046	15.37%	0.360736
Dress	3,431	15.33%	0.360337
Talking	2,622	41.50%	0.492808
Mental	3,142	27.94%	0.448795

Age is highly correlated with the probability of having a disability (of any type), running a very simple probit regression we find that a one-year increase in age increases the probability of having a disability by around 6.93%. Given this, a more "natural" contrast group for the rest of the working population is not necessarily all PWD, but those who have a disability from birth. This proportion of all PWD varies by category of disability. Talking and learning appear to be most commonly early onset, while walking and use of arms (that is, physical disabilities) tend to be more closely related to age and work-related accidents. The age average for PWD that have a cause of disability other than birth is 61.54 years, while for those that have an at-birth disability it is 30.82, which is closer to the average of people without a disability 30.99.

Basic demographic characteristics

	Walk	See	Arm	Learn	Hear	Dress	Talk	Mental	None	Birth
Obs	11,439	7,546	4,022	4,231	4,046	3,431	2,622	3,142	293,797	3,356
Age	63.12	59.03	62.13	52.54	66.07	61.36	45.05	51.22	30.99	30.82
Children	4.72	4.45	4.75	4.77	4.90	5.08	4.43	4.64	2.94	3.07
Female	0.548	0.550	0.553	0.519	0.465	0.538	0.450	0.499	0.513	0.475
Married	0.495	0.497	0.470	0.290	0.459	0.341	0.220	0.265	0.425	0.197
Indigenous speaking	0.090	0.099	0.082	0.078	0.109	0.076	0.052	0.069	0.061	0.051
Reports any health problems the previous year	0.541	0.512	0.545	0.500	0.519	0.567	0.489	0.521	0.428	0.457

Doing a summary of basic demographic statistics in our sample, we confirm that PWD tend to be older than the general population with no disability, with talking disabilities are on average younger, which is consistent with them being the group with a higher proportion of at-birth onset. We also observe that on

average, PWD have more children than those without, and the difference remains significant when controlling for cause, using a simple t-test.

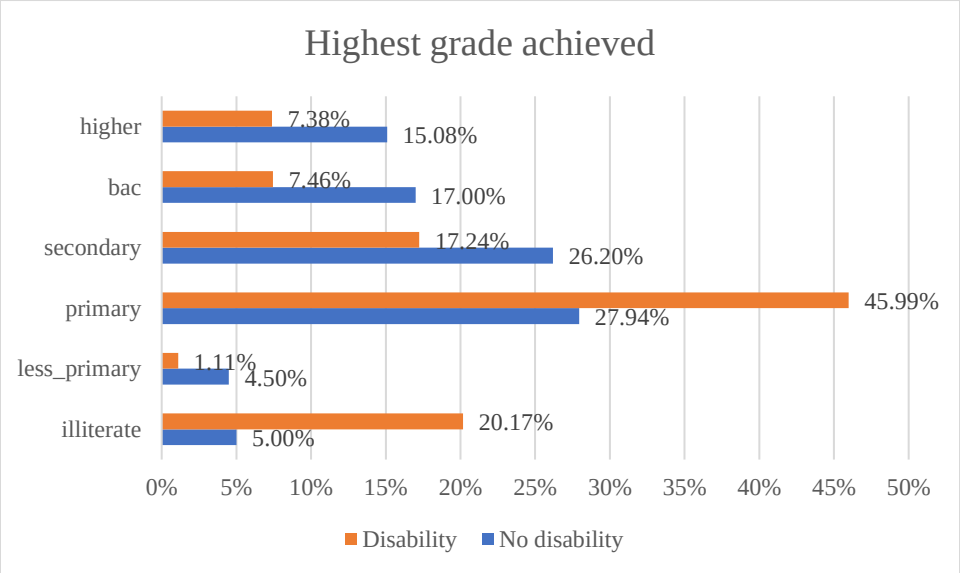
	No disability	At-birth disability	Diff
Obs.	90,205	1,402	
Number of children	3.086558	2.952211	**0.134347**
Std. dev	0.0066182	0.0546382	

H0: diff = 0

Ha: diff < 0	**Ha: diff !=0**	**Ha: diff > 0**
pval: 0.994	**pval:** 0.0121	**pval:** 0.006

The groups are roughly balanced in terms of gender distribution, and by contrast there is some heterogeneity in terms of indigenous representation (ranging from 4 pp higher for hearing and 3 pp for walking and seeing). In married status, the rates are higher for PWD, and the rate drops for those with a lifelong disability. As expected, the prevalence of health problems is higher for all categories of disability.

Education



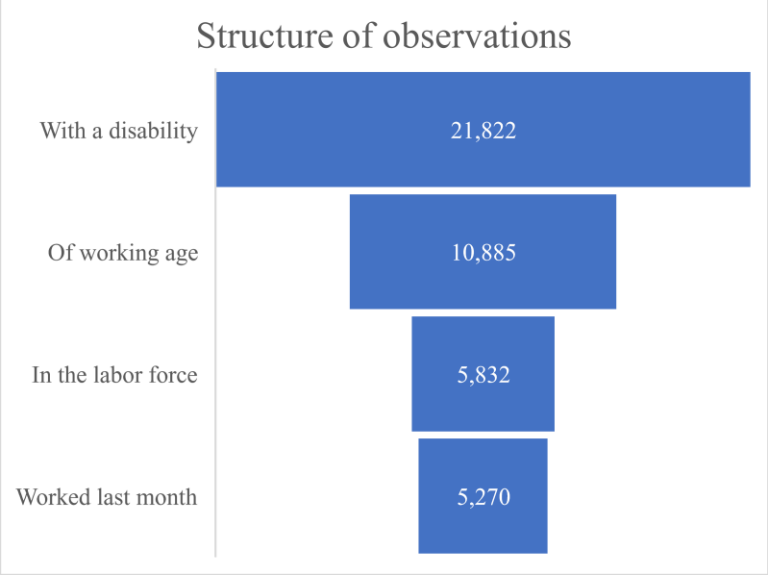
As is documented in other sources, PWD have much lower completion rates of education than people without a disability. A significant portion of those with a disability are completely illiterate, which means they haven't received any education. Most of that group achieve at most primary level education but see a significant gap in achievement of higher grades, such as secondary, baccalaureate and higher education.

Variable	1st Quartile	Median	3rd Quartile
No disability	primary	secondary	high school

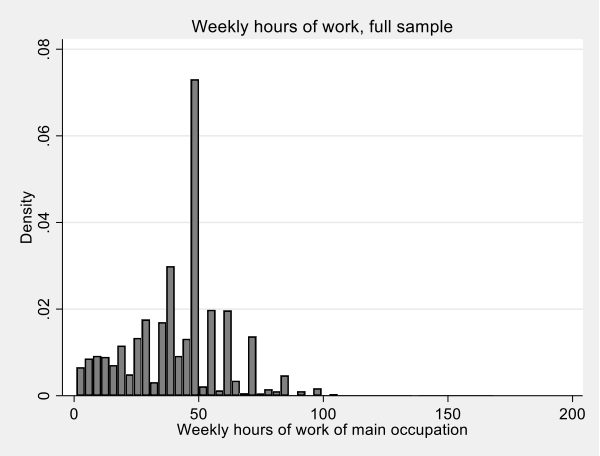
Walking	primary	primary	secondary
Seeing	primary	primary	secondary
Use of arms	primary	primary	secondary
Learning	illiterate	primary	primary
Hearing	illiterate	primary	primary
Dress	illiterate	primary	primary
Talking	illiterate	primary	primary
Mental	illiterate	primary	primary

In general, we see a trend that educational achievement in Mexico is low, with most of the population reaching up to secondary level (that is, 9 years) of education. The median is much lower for PWD, where the median for all categories is primary, and for those with a learning, hearing, talking, mental or a disability for taking care of themselves the majority will achieve at most 6 years of schooling, which is less than the mandatory level of education which is 12 years of schooling (Constitución Política de los Estados Unidos Mexicanos, Art.3*)*.

Work and labor market



As we have mentioned above, only around 7% of the sample have any type of disability, and of those, roughly half are of working age and a quarter are either seeking a job or worked last month. The working age in Mexico goes from 16 years if the person has completed their mandatory education and up to 65 which is the retirement age (although there is a possibility to retire early if they have contributed to a retirement plan for 1250 weeks). Compared to this group, around 65% of those without a disability are of working age, and half of this demographic are in the labor force, that is either working or looking for work. The unemployment rates are much higher for PWD (9.64% vs 2.39%).



Doing a simple histogram of the typical work week in our sample, we have that there is some importance of part time work, and a spike around 40 hours (which averages to the typical 8-hour workday), which is similar to what we have in other countries.

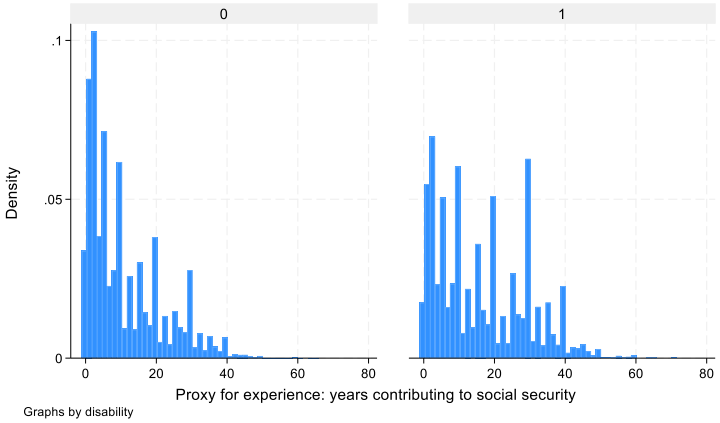
Variable	Walk	See	Arm	Learn	Hear	Dress	Talk	Mental	None
Obs.	11,439	7,546	4022	4,231	4,046	3,431	2,622	3,142	293,797
Worked last month	0.277	0.361	0.253	0.191	0.283	0.094	0.133	0.130	0.477
Looking for job	0.135	0.103	0.131	0.093	0.141	0.133	0.071	0.093	0.025
In labor force	0.413	0.464	0.384	0.284	0.424	0.228	0.204	0.223	0.501
Disabled for work	0.021	0.015	0.027	0.022	0.021	0.029	0.026	0.026	0.001
Informal job	0.266	0.323	0.293	0.314	0.320	0.239	0.398	0.295	0.382

In this table, we have a couple of statistics on work, that are dummies of some job market outcomes. Not accounting for working age considerations (that is, some people older than 65 might not retire and keep working), a little under half of the non-disabled sample reports having worked last month, which holds a significant gap over different disability categories, the most dramatic being for those with a mental, learning, and talking difficulty. The participation rate, as measured by the labor force variable, shows that there might be some discouragement for work, as the participation rate falls some 5-10 pp for some motor and sensory disabilities, and higher for those talking, mental and learning disabilities. This seems unrelated however with the impossibility of being able to work ("work disability") which is stable across categories. The rate of informality in jobs, measured as not having a contract for work, seems to vary slightly across categories, and it´s small (but significantly) lower for PWD, which might support the argument that in informal markets, PWD have less protections and therefore are hired less.

Variable	Walk	See	Arm	Learn	Hear	Dress	Talk	Mental	None
Weekly hours	35.138	35.966	35.444	35.392	37.218	32.460	35.559	35.014	39.482
Wage	1901.28	2420.82	1963.13	1918.67	2068.51	1585.04	2415.02	2029.13	3361.34
Work income	760.279	721.288	875.643	528.951	467.423	573.935	389.680	397.014	962.779
Disability benefits	26.883	23.697	34.042	42.461	27.790	76.287	104.295	70.730	2.656

Hours work (last week)	35.259	36.724	35.861	34.476	37.468	33.149	36.645	34.438	41.829
No pay	0.609	0.502	0.582	0.559	0.556	0.659	0.444	0.577	0.294
No wage	0.532	0.441	0.517	0.441	0.468	0.576	0.281	0.443	0.226

For those who report having worked last month (that is, for employed persons), we have that on average, PWD work 5 hours less a week than those without a disability, that work around 40 hours. We see a significant drop in wage and work incomes, curiously lower for those with mental disabilities, as well for sensory disabilities (which is consistent with what has been found in literature). Wages in our sample are in current Mexican pesos. The average amount of monthly disability benefits varies greatly across categories, with those with a talking and mental disabilities having the highest amount, and some persons that do not consider themselves disabled receiving some amount. Worryingly, a high proportion of those who work and are disabled report receiving no wage or no pay in their work, which might be due to working in family firms or similar enterprises; or being self-employed.



An important determinant in wages is experience, which is how many years a person has been at work, since it is a proxy for skills that a person might acquire that makes them more valuable. In this case, since there are no direct questions asking about years of work, we have a measure of years contributing to social security, which in Mexico greatly correlates with work experience since employers must sign up their workers to social security upon hiring. This number however might be downward biased due to those people employed in the informal sector (who can sign up and contribute voluntarily but may choose not to do so). In general, we observe somewhat similar behavior of experience for disabled and non-disabled.

Finally, another way to understand how the wage gap operates is through Maroto & Pettinicchio´s (2014) occupational segregation theory. We have data on the economic sector in which people in the sample are employed, and we can measure what the average wage in each sector is to try and see if the authors' hypothesis holds.

	No disability	**Disability**	**Total**
Construction, utilities, and mining	9.55%	7.38%	9.45%
Corporate and financial services	0.75%	0.26%	0.72%

Education, health and culture	7.08%	3.84%	6.92%
Foreign worker	0.28%	0.15%	0.27%
Government	3.65%	2.16%	3.58%
Hospitality	7.74%	7.15%	7.71%
Housework	0.00%	0.01%	0.01%
Manufacturing industries	15.92%	12.84%	15.77%
No answer	0.03%	0.03%	0.03%
Other services	13.34%	12.91%	13.32%
Primary sector	19.39%	32.03%	20.01%
Real estate	0.55%	0.42%	0.55%
Retail and wholesale commerce	17.59%	18.06%	17.62%
Transport and communications	4.13%	2.76%	4.06%
Total	**100%**	**100%**	**100%**

For both groups, the distribution in economic sectors is roughly the same, for instance in hospitality, other services, real estate, and commerce. However, there is one sector where PWD are overrepresented and that is the primary sector (agriculture, fishing and other exploitation activities). Running a simple regression of wage on dummies of the different sectors, we obtain the following results:

Average wage, by Economic Sector	
Construction, utilities and mining	5,393.811
Corporate and financial services	9,201.55
Education, health and culture	9,075.63
Foreign worker	28,085.39
Government	10,512.15
Hospitality	2,525.25
Housework	2,916.00
Manufacturing industry	5,137.96
Other services	3,937.78
Real estate	5,722.67

Retail and wholesale commerce	3,287.16
Transport and communication	6,044.51
Primary sector	2,081.08

On this table, we see that the primary sector has the lowest pays, which has an average monthly wage of $2080.65 Mexican pesos (around 124 USD), followed by Real Estate and the "Other services" category. Manufacturing pays 3000 (179.20 USD) more and is a sector where there is a gap of underrepresentation of PWD. The highest paying sectors are Government and Education, health and culture, in which PWD are less likely to be employed in (although the gaps are lower).

Activity performed on the job	No disability	Disability	Total
Artisans	9.589%	11.518%	9.684%
Auxiliary in administrative activity	5.123%	2.460%	4.991%
Commercial and sales employees	12.804%	14.033%	12.865%
Foreign workers	0.277%	0.149%	0.270%
Industrial low-skill workers	29.327%	28.025%	29.262%
Industrial machinery operators, assemblers, drivers	9.814%	5.313%	9.591%
Officials, directors and bosses	3.220%	1.365%	3.128%
Personal services and security	7.376%	7.125%	7.363%
Professionals and technicians	12.497%	6.692%	12.210%
Workers in primary sector	9.974%	23.320%	10.635%
Total	**100.000%**	**100.000%**	**100.000%**

Next, we have data on the type of job performed, according to the SINCO catalog of the *INEGI,* we have that PWD are overrepresented in the artisans' jobs, commercial and sales agents, and as we saw previously, heavily skewed towards workers in primary sector. On the flipside, they are underrepresented in the directors and officials category, as well as professionals and technicians.

Average Wage, by Type of Job	
Artisans	2,906.48
Auxiliary in administrative activity	6,830.09
Commercial and sales employees	2,579.19
Foreign workers	28,293.74

Industrial low-skilled workers	3,227.28
Industrial machinery operators, assemblers, drivers	5,954.80
Officials, directors, and bosses	14,081.03
Personal services and security	3,818.79
Professionals and technicians	8,696.88
Workers in primary sector	1,181.00

In this regression, like the previous one, the "baseline" wage corresponds to workers in the primary sector, which has a monthly wage of 1180 pesos, or 71 euros. The lowest paying jobs are artisans, commercial and sales employees and industrial low-skilled workers, the same categories where PWD are overrepresented. The highest paying jobs are directors and officials, as well as foreign workers. Using this data, the economic segregation hypothesis seems to be supported, although including workers individual characteristics may change the results as well.

Results

Table 1: Probit model of employability, using different categories of disability

VARIABLES	(1) work_lwk	(2) work_lwk	(3) work_lwk	(4) work_lwk	(5) work_lwk
dis_walk	-0.398***	-0.397***			
	(0.040)	(0.040)			
dis_see	-0.136***	-0.135***			
	(0.045)	(0.045)			
dis_arm	-0.223***	-0.223***			
	(0.066)	(0.066)			
dis_learn	-0.088	-0.087	-0.164*		
	(0.089)	(0.089)	(0.086)		
dis_hear	-0.089	-0.089			
	(0.080)	(0.080)			
dis_dress	-0.542***	-0.541***			
	(0.100)	(0.100)			
dis_talk	-0.480***	-0.480***			
	(0.138)	(0.138)			
dis_ment	-0.575***	-0.573***	-0.670***		
	(0.100)	(0.100)	(0.097)		
physical			-0.468***		

			(0.035)		
sensory			-0.162***		
			(0.039)		
disability				-0.413***	-0.422***
				(0.018)	(0.027)
mandatory	0.023	0.023*	0.023		0.024*
	(0.014)	(0.014)	(0.014)		(0.014)
exp	-0.014***	-0.014***	-0.014***		-0.014***
	(0.001)	(0.001)	(0.001)		(0.001)
married	0.060***	0.060***	0.060***	0.283***	0.063***
	(0.014)	(0.014)	(0.014)	(0.009)	(0.014)
female	-0.591***	-0.590***	-0.590***	-0.591***	-0.588***
	(0.014)	(0.014)	(0.014)	(0.009)	(0.014)
isp	0.244***	0.244***	0.246***	0.372***	0.251***
	(0.036)	(0.036)	(0.036)	(0.017)	(0.036)
cause_dis	-0.039	-0.039	-0.034	-0.017	0.003
	(0.051)	(0.051)	(0.051)	(0.031)	(0.051)
benefit	-0.191	-0.192	-0.219*	-0.337***	-0.254**
	(0.132)	(0.132)	(0.130)	(0.068)	(0.129)
l_other	-0.083***	-0.083***	-0.083***	-0.080***	-0.083***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
age	-0.012***	-0.012***	-0.012***	0.005***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
health_prob		-0.012			
		(0.014)			
Constant	2.132***	2.137***	2.131***	1.005***	2.134***
	(0.031)	(0.032)	(0.031)	(0.015)	(0.031)
Observations	49,583	49,583	49,583	101,016	49,583

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this first regression, we have that disability is significantly related to a reduction in the probability of being employed, although not all "categories" of disability are significant, specifically learning and hearing disabilities. The highest effect is of those of mental disabilities, and it is significant across specifications, having a stronger effect in the least disaggregated categories; this is followed by the effect of having a difficulty in dressing, feeding, and taking care of oneself. The effect of receiving a disability benefit (that is, a government transfer is ambiguous, not significant when using disaggregated categories, but the error becomes smaller when using a single measure of disability. Perhaps this is because this variable captures the fact that some types of disability are more prone to receive this benefit than others. As expected, being married is associated with an increase in employability, and being female in a decrease. What is unexpected is that speaking an indigenous tongue seems to be positively correlated with the probability of work (although it does not say what type of jobs this demographic holds). The log reservation wage, or "other" is an important and consistent predictor across specifications, which confirms that having alternative

sources of income may decrease participation as well. In model 2 we also added the health problem variable, which does not seem to have any effect nor does it increase the precision of our estimates.

We tried using the disability for work definition, but it was not very useful since it perfectly predicted the outcome, which is consistent with comment on disability definition problems other authors have mentioned.

Table 2: Breaking the effect by gender, and in the informal labor market

VARIABLES	(1) work_lwk female	(2) work_lwk male	(3) informal female	(4) informal male
dis_walk	-0.196***	-0.540***	0.052	-0.049
	(0.065)	(0.052)	(0.092)	(0.068)
dis_see	-0.141**	-0.122**	-0.068	0.128*
	(0.068)	(0.059)	(0.098)	(0.066)
dis_arm	-0.177*	-0.294***	0.000	0.282***
	(0.103)	(0.088)	(0.157)	(0.109)
dis_learn	0.096	-0.298**	-0.121	-0.022
	(0.132)	(0.122)	(0.186)	(0.159)
dis_hear	0.037	-0.150	-0.164	0.228**
	(0.144)	(0.097)	(0.222)	(0.110)
dis_dress	-0.678***	-0.434***	-0.084	-0.573***
	(0.177)	(0.123)	(0.353)	(0.208)
dis_talk	-0.438*	-0.423**	0.140	-0.118
	(0.238)	(0.174)	(0.360)	(0.231)
dis_ment	-0.165	-0.899***	0.249	-0.250
	(0.151)	(0.140)	(0.210)	(0.232)
mandatory	0.112***	-0.071***	-0.307***	-0.510***
	(0.021)	(0.020)	(0.025)	(0.019)
exp	-0.007***	-0.021***	-0.029***	-0.016***
	(0.001)	(0.001)	(0.002)	(0.001)
married	-0.217***	0.461***	-0.184***	-0.074***
	(0.019)	(0.022)	(0.024)	(0.021)
isp	0.148**	0.283***	-0.132*	0.010
	(0.058)	(0.048)	(0.071)	(0.039)
benefit	-0.025	-0.254	-0.245	0.116
	(0.204)	(0.172)	(0.293)	(0.203)
l_other	-0.088***	-0.078***	0.007***	0.005***
	(0.002)	(0.002)	(0.002)	(0.001)
age	-0.012***	-0.015***	0.009***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.617***	2.100***	-0.679***	-0.096***
	(0.044)	(0.042)	(0.052)	(0.036)
Observations	21,204	28,379	14,916	23,982

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Comparing the outcomes of males and females, we confirm again that some disabilities seem to affect women more (for instance, the self-sufficiency and seeing category), but the effects in general seem to be stronger for males, especially with respect to mental disabilities. In males, a learning disability also has a significant effect, while for females its effect is almost negligible. When considering the informal market, having a disability does not seem to have any impact, especially in females but for males a hearing, self-sufficiency and use of arms disability (related to physical barriers) still have an effect, but it is lower.

Table 3: Breaking down the effect by onset of disability

VARIABLES	(1) work_lwk Later	(2) work_lwk Early onset
dis_walk	-0.407***	-0.171
	(0.041)	(0.195)
dis_see	-0.143***	-0.047
	(0.047)	(0.143)
dis_arm	-0.246***	0.372
	(0.068)	(0.363)
dis_learn	-0.058	-0.326
	(0.096)	(0.242)
dis_hear	-0.103	0.035
	(0.084)	(0.282)
dis_dress	-0.532***	-0.791
	(0.103)	(0.534)
dis_talk	-0.508***	-0.380
	(0.151)	(0.356)
dis_ment	-0.549***	-1.031**
	(0.103)	(0.449)
mandatory	0.024*	-0.036
	(0.014)	(0.107)
exp	-0.014***	-0.016**
	(0.001)	(0.006)
married	0.061***	-0.004
	(0.015)	(0.105)
female	-0.589***	-0.729***
	(0.014)	(0.105)
isp	0.244***	0.166
	(0.036)	(0.288)
benefit	-0.194	-0.149
	(0.140)	(0.420)
l_other	-0.082***	-0.086***
	(0.002)	(0.013)
age	-0.012***	-0.014***
	(0.001)	(0.005)
Constant	2.129***	2.291***
	(0.032)	(0.239)

Observations	48,724	859

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Jones (2011) pointed out that a person with a lifelong disability may have a different behavior and outcomes than someone that acquired it later on: "Moreover, onset at birth or in childhood will affect pre-labour market experiences, entry to the labour market and an individual's entire labour market history" (p.1002) In this case, although we see some lower coefficient for some types of disability, which is consistent with the higher adaptation hypothesis, the low number of observations of early-onset does not allow us to conclude much from this.

Table 4: Decomposition

	(1) General	(2) Male	(3) Female
(1) Number of obs	141,650	69,564	72,086
(2) N of obs G=0 (no disability)	126938	62536	64402
(3) N of obs G=1 (disability)	14712	7028	7684
(4) Pr(Y!=0|G=0)	0.5876	0.6788	0.4991
(5) Pr(Y!=0|G=1)	0.3467	0.4256	0.2746
(6) Difference – GAP	0.2409	0.2533	0.2245
(7) Total explained	0.0061	-0.0083	0.0154

Using the Fairlie decomposition technique, we confirm that there is a sizable gap in employability between disability and non-disability, slightly higher in males than in females. The decomposition is based on model 5 from table 1, excluding the variable disability. Row number four gives the probability of being employed given the model, that allows for differing coefficients between disability and no disability. Row 6 is the simple gap between both groups. In all three cases, the explained part (that is, the component due to endowments) is low, which would suggest that prejudice and non-observable productivity factors play a major role. This explained part considers a pooled model using observations with and without disability, and explains the gap in terms of differences in endowments (the levels of education, experience, female composition, indigenous-speaking population, etc.). The unexplained part, the rest of the 0.2409 gap would be due to differences in coefficients for all these variables, which might incorporate things like discrimination. One caveat in this is that we are using the more general definition of disability, which hides a lot of heterogeneity between categories, which might include the possible returns to education, since someone with a learning disability might not achieve the same results than someone with a physical disability.

Table 5: Wage estimation using single category of disability

VARIABLES	(1) l_wage	(2) select	(3) l_wage	(4) select	(5) l_wage	(6) select
work_lwk	0.054***		0.033		0.102***	
	(0.016)		(0.029)		(0.027)	
disability	0.554***	-0.789***	-0.134***	-0.581***	-0.074***	-0.587***
	(0.018)	(0.013)	(0.026)	(0.019)	(0.024)	(0.019)
less_primary	-0.011		-0.004		-0.082	
	(0.225)		(0.368)		(0.344)	
primary	0.134***		0.086*		0.012	
	(0.025)		(0.045)		(0.042)	
secondary	0.305***		0.239***		0.038	
	(0.025)		(0.044)		(0.041)	
bac	0.503***		0.411***		0.129***	
	(0.025)		(0.044)		(0.042)	
higher	0.978***		0.872***		0.581***	
	(0.025)		(0.044)		(0.041)	
exp	0.021***		0.044***		0.028***	
	(0.001)		(0.001)		(0.001)	
exp2	-0.000***		-0.001***		-0.000***	
	(0.000)		(0.000)		(0.000)	
isp	-0.183***		-0.215***		-0.172***	
	(0.014)		(0.025)		(0.024)	
htrab					0.009***	
					(0.000)	
leg_ben					0.715***	
					(0.022)	
extra_ben					0.019***	
					(0.003)	
married		0.242***		0.346***		0.343***
		(0.004)		(0.010)		(0.010)
female		-0.370***		-0.475***		-0.474***
		(0.004)		(0.009)		(0.009)
age		0.009***		-0.000		0.000
		(0.000)		(0.000)		(0.000)
benefit				-0.490***		-0.486***
				(0.104)		(0.104)
l_other				-0.170***		-0.171***
				(0.001)		(0.001)
Constant	9.284***	-0.914***	8.012***	0.317***	7.384***	0.315***
	(0.030)	(0.005)	(0.053)	(0.013)	(0.051)	(0.013)
Observations	280,252	280,252	128,355	128,355	128,355	128,355

In the estimation of wage, we included disability both in the selection equation (since having one has proven to reduce employability) and in the wage equation. It appears that disability has a higher impact on earnings through employment than wage discrimination itself, especially once we control for education, in which all

categories except having less than primary are significant and experience. Once we include in the selection equation receiving disability benefits and the reservation wage, the effect of disability on selection remains more and less constant, but it´s effect on wages themselves is ambiguous and seems to be small once we control for other factors. Related to the hedonic theory of wages, the effort/risk attached to the job (measured by hours of work, as well as the probability of receiving legal benefits as well as some "extra" benefits, that is, additional to those legally mandated, are significant; especially the former category, which may relate to employer bargaining power.

Table 6: controlling for economic sector and job type

VARIABLES	(1) l_wage	(2) select	(3) l_wage	(4) select	(5) l_wage	(6) select
work_lwk	0.020		0.076***		0.042	
	(0.027)		(0.028)		(0.027)	
dis_walk	-0.149***	-0.536***	-0.155***	-0.535***	-0.147***	-0.536***
	(0.039)	(0.029)	(0.040)	(0.029)	(0.039)	(0.029)
dis_see	-0.116***	-0.228***	-0.138***	-0.228***	-0.126***	-0.228***
	(0.039)	(0.031)	(0.040)	(0.031)	(0.039)	(0.031)
dis_arm	-0.044	-0.082*	-0.048	-0.082	-0.045	-0.082*
	(0.065)	(0.050)	(0.067)	(0.050)	(0.065)	(0.050)
dis_learn	-0.049	-0.339***	-0.086	-0.338***	-0.048	-0.338***
	(0.082)	(0.058)	(0.084)	(0.058)	(0.081)	(0.058)
dis_hear	-0.055	-0.462***	-0.089	-0.460***	-0.062	-0.461***
	(0.065)	(0.047)	(0.067)	(0.047)	(0.065)	(0.047)
dis_dress	0.096	-0.442***	0.175	-0.442***	0.120	-0.442***
	(0.125)	(0.080)	(0.128)	(0.080)	(0.124)	(0.080)
dis_talk	-0.042	-0.390***	-0.052	-0.392***	-0.046	-0.391***
	(0.125)	(0.096)	(0.129)	(0.096)	(0.124)	(0.096)
dis_ment	0.061	-0.426***	0.018	-0.425***	0.039	-0.425***
	(0.113)	(0.078)	(0.116)	(0.078)	(0.112)	(0.078)
less_primary	0.015		0.011		0.019	
	(0.351)		(0.360)		(0.347)	
primary	0.042		0.054		0.037	
	(0.043)		(0.044)		(0.043)	
secondary	0.136***		0.174***		0.127***	
	(0.042)		(0.043)		(0.042)	
bac	0.215***		0.306***		0.194***	
	(0.043)		(0.044)		(0.042)	
higher	0.452***		0.685***		0.409***	
	(0.043)		(0.044)		(0.043)	
exp	0.037***		0.039***		0.034***	
	(0.001)		(0.001)		(0.001)	
exp2	-0.001***		-0.001***		-0.001***	
	(0.000)		(0.000)		(0.000)	
isp	-0.198***		-0.219***		-0.211***	

	(0.024)		(0.025)		(0.024)	
sinco_1	0.095***				0.040	
	(0.035)				(0.040)	
sinco_2	0.145***				0.072*	
	(0.034)				(0.038)	
sinco_3	-0.093***				-0.095**	
	(0.033)				(0.040)	
sinco_4	1.342***					
	(0.142)					
sinco_5	-0.293***				-0.296***	
	(0.031)				(0.034)	
sinco_6	0.095***				0.031	
	(0.031)				(0.037)	
sinco_7	0.745***				0.673***	
	(0.036)				(0.040)	
sinco_8	-0.056*				-0.035	
	(0.033)				(0.038)	
sinco_9	0.421***				0.326***	
	(0.032)				(0.037)	
married		0.337***		0.338***		0.336***
		(0.010)		(0.010)		(0.010)
female		-0.478***		-0.477***		-0.476***
		(0.009)		(0.009)		(0.009)
age		0.000		0.000		0.000
		(0.000)		(0.000)		(0.000)
benefit		-0.484***		-0.486***		-0.485***
		(0.105)		(0.106)		(0.105)
l_other		-0.170***		-0.170***		-0.170***
		(0.001)		(0.001)		(0.001)
scian1			0.226		0.179	
			(0.326)		(0.315)	
scian2			0.447		0.334	
			(0.328)		(0.317)	
scian3			0.483		0.277	
			(0.326)		(0.314)	
scian4			1.516***		1.456***	
			(0.355)		(0.344)	
scian5			0.613*		0.432	
			(0.326)		(0.315)	
scian6			-0.093		-0.105	
			(0.326)		(0.315)	
scian7			-0.058		-0.674	
			(0.862)		(0.831)	
scian8			0.280		0.178	
			(0.326)		(0.314)	
scian10			0.070		0.028	
			(0.326)		(0.314)	
scian11			0.090		0.102	
			(0.326)		(0.315)	
scian12			0.384		0.225	

			(0.330)		(0.319)	
scian13			0.164		0.097	
			(0.326)		(0.314)	
scian14			0.380		0.238	
			(0.326)		(0.315)	
o.sinco_4					-	
Constant	8.207***	0.309***	7.860***	0.310***	8.106***	0.309***
	(0.057)	(0.013)	(0.330)	(0.013)	(0.320)	(0.013)
Observations	128,355	128,355	128,355	128,355	128,355	128,355

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the Heckman specification, all disability types are significantly related to selection of being in the labor market, which contrasts a lot with the probit analysis, and having a seeing or walking disability are also related to lower wages in and of themselves. As anticipated in the previous section, the job description has an important impact on the possible wage a person might receive, but the economic sector on the other hand seems to be indifferent (except for foreign workers, that systematically receive higher wages). In these specifications, having controlled for experience, age does not have any effect, which makes sense since it would tend to be collinear with the former variable.

Table 7: Oaxaca Decomposition

	OLS		Heckman	
	(1)	(2)	(3)	(4)
VARIABLES	Differential	Decomposition	Differential	Decomposition
Prediction_1	8.676***		8.766***	
	(0.003)		(0.008)	
Prediction_2	8.394***		8.394***	
	(0.022)		(0.022)	
Difference	0.282***		0.372***	
	(0.022)		(0.023)	
Endowments		0.182***		0.197***
		(0.017)		(0.017)
Coefficients		0.162***		0.213***
		(0.018)		(0.019)
Interaction		-0.062***		-0.038***
		(0.011)		(0.011)
Observations	64,883	64,883	30,075	30,075

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, we arrive at the Oaxaca-Blinder decomposition, using a threefold specification (Jann, 2008), first based on a simple OLS model, the second using our Heckman selection model using disability and the specification one from table six (that is, including job type). When correcting for sample selection, the gap between disability and non-disability becomes higher, consistent again with higher unemployment/participation. In the first model, it is suggested that the gap is mostly explained by endowments, and the interaction of the two makes the difference smaller (there is some sort of compensation). However, in the second model, the difference due to coefficients ("unexplained") plays a higher role.

Discussion, conclusion, and proposals for future research

Through all the regressions, we see that disability, while being a very heterogenous concept and having a somewhat unclear definition (since it depends on the subject's experience and not a medical or objective measure), has a definitive impact on labor market outcomes. We also observe throughout regressions that gender as an intersectional category seems to play a role in disability, and as we see in other papers, while in males having a disability has a significant, negative impact for females, the effect is much smaller, and which much higher variability. As in other studies revised, having a hearing disability does not affect labor outcomes much, but a mental disability has a very large impact. On the other hand, contrary to what Mitra and Sambamoorthi (2008) find, a measure of health, while it makes the estimates more precise, is not significant by itself. In the future, having more information on health status of the person could yield different results, although this would probably be more related to age.

In general, we also observe that education does play a role in labor market outcomes, and that the higher educated individuals can access higher wages in Mexico. In these last regressions we also see some support in the segregation hypothesis, since the job type a person has been significantly related to increases or decreases in earned income. Unfortunately, we weren´t able to distinguish very clearly if this is due purely to prejudice and self-selection that lead PWD to go for jobs with lower average pay, or if these jobs are the only ones accessible to them due to education, where in the summary statistics we observed an important gap.

From the previous work, we conclude that having a disability has a negative effect on employment (reducing the probability of being employed) and on wages, mostly through employment and education in the Mexican labor market. The effect tends to be smaller for those with sensory disabilities, then variable across those with physical disabilities (although the higher coefficient might be driven by the "self-sufficiency" type included in this category. Within learning disabilities, perhaps due to it being a very broad

category, since it includes people with autism which vary in terms of cognitive difficulties, the errors are too high to have a reliable estimation and being able to conclude much. In all specifications of the employability, demographic characteristics like gender and age play an important role. Age, although all the regressions are done only for the sample that is of working age, is very closely related to disability and seems to be a high driver of reduced employment.

In some of the papers, like Jones, Davies and Drinkwater (2018), the onset of disability related either to workplace accidents which becomes more likely the longer a person has been employed or aging is very strongly related to a voluntary exit from the labor force, which would also explain this strong effect. The difference between early-onset or at-birth disability is not clear, due to it being a very small part of the sample, and the population of all people with disability in Mexico. In the future, being able to break down further the effect of different causes of disability could give more clues into the contrasting effects of adaptation of the person compared to lower probability of high academic achievement.

In this study we also confirm the contrasting effect of labor market outcomes for males and for females. Although we did not break down the wage regressions by gender, the impact of selection (that is, lower employment) is strong and consistent throughout specifications. In the employment regressions, we find that the effect tends to be stronger and more significant for males, except for especially when related to physical disabilities except for the self-sufficiency category, with a small higher coefficient for females.

A caveat on this is to point out that Gannon (2005) found that the effect of disability tends to be more overestimated for males than for females in Ireland, which might also be the case in our study, so further analysis is needed to conclude one way or another. The limitation of having a single year cross section does not allow for more comprehensive analysis. In terms of formal or informal markets, though having an imperfect measure of informality as not having a contract (which might be the case for self-employed individuals or those working in small family enterprises); having a disability seems less important and has no clear significant effect. Receiving disability benefits, that the OECD (2010) suggested might discourage labor participation, does not have a clear effect on employment, although other sources of non-earned income have a clear effect. When using the log of disability benefit received instead of having a dummy of receiving or not receiving, it is never significantly related to employment, so perhaps people use it as a supplemental income to lower wages.

The employing economic sector, while in general does have some effect on wages in general, once we control for education, experience and employment probability is not a very good predictor on earnings. The effect of the job description (that is, the difference in payments to a low-skilled worker to a manager) is

more significant and may be related to economic segregation or job accessibility due to education being not only a productivity booster but a signaling mechanism.

Finally, in employment, it appears that although factors like education seem to be important, most of the gap is unexplained which might be suggestive of high prejudice, or possible low accommodating workplaces lead to higher unemployment. We find in both wages and employment probability an important gap between PWD and the general population, in which health plays a minor role, and education and experience do not fully explain it (less than 50% of all this gap). Using data from labor market surveys done in Mexico, perhaps we could include more variables related to productivity that might be more useful in accounting for the gap.

In future research, studying further the interaction of different variables with the disability categories might give us more insight into the sources of the results that we find in this study. First, how apart from the differing educational achievement documented in the summary statistics, the returns of this education might be different. In this sense, having information on school performance like final grades or if student need extra help on classes, might also give us a sense of significant gaps in productivity between people with disabilities and those without them. While the Oaxaca-Blinder regression that we use gives us some insight that endowments play a non-negligible role, we did not break down how each component of the regression contributes to the observed gap, which might be more relevant when designing public policy to boost labor market outcomes with disability. Another future direction would be to incorporate the same ENIGH survey pre-2020 and post-2023, to see if we observe any structural changes related to the rise of teleworking, but also economic conditions. Some studies in this sense have suggested that different groups are more sensitive to business cycle fluctuations. An increase in available data could also help with the high errors we see in some regressions, especially on the question of early vs later onset which remains unanswered in this study.

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