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Impact of Turkish Policy Reform on Labor Force Status of Disabled Males: A Difference-in-Difference Analysis

Summary: This paper aims to study the effect of a Turkish policy reform enacted in 2008 that requires firms to hire disabled applicants. Our attention is only on males to avoid complications arising from gender differences in disability and labor force participation. The data is from the Turkey Health Survey (THS) of the Turkish Statistical Institute (TurkStat) for the years 2008 and 2012. We define "disability" as an impairment of long-term health conditions that lasts more than six months and that restricts the individual in daily activities. We use difference-in-difference (DD) estimation, in which the DD estimator is the difference between disabled and non-disabled individuals in the difference in labor force participation before and after the new policy. The results suggest an insignificant effect of the treatment on the treated, implying that the policy reform does not create any incentive for disabled males to participate in the labor force.

Keywords: Disability, Labor force participation, Difference-in-difference.

JEL: C31, C34, I12, J21, J24.

Disability is regarded as one of the key elements of labor force participation. The relationship between disability and labor force participation has been analyzed widely for advanced economies. In fact, focusing on the labor force outcomes of disabled individuals in developing countries deserves special attention since the employment-to-population ratio is lower among disabled individuals in these countries. For this purpose, in this study, we try to analyze the labor force status of disabled individuals in Turkey, a middle-income developing country, by considering a major change in Turkish labor law in 2008. Our objective is to investigate whether the change in labor law affects the labor force participation of disabled individuals using the Turkey Health Survey (THS) of the Turkish Statistical Institute (TurkStat 2020)¹ for the years 2008 and 2012. Since the data was collected in March 2008 and the change in labor law was announced in May 2008, the change in labor law can serve as a random experiment.

¹ **Turkish Statistical Institute (TurkStat).** 2020. Turkish Statistical Institute Labor Force Statistics. <https://www.tuik.gov.tr/> (accessed September 10, 2020).

By the end of June 2020, the unemployment rate was 13.4%, and 49% of the working-age population participated in the labor force in Turkey. For females, the labor force participation rate was 30.8%, whereas for males, the rate was 67.6% (Turk-Stat 2020). A huge gap between labor force participation rates by gender in Turkey is obvious. Therefore, to avoid **complications** arising from gender differences in labor force participation in Turkey, following Michael P. Kidd, Peter J. Sloane, and Ivan Ferko (2000) and Michele Campolieti (2002), in this study, we limit our attention to working-age males only.

We use difference-in-difference (DD) analysis and control the variations among other socioeconomic indicators, such as age, education level, marital status, and region. To our knowledge, this is the first study that examines the impact of labor policy reform on the labor force participation decisions of Turkish males using a rich micro data set and by implementing DD methodology.

The organization of the paper is as follows. Section 1 presents a brief literature review. Section 2 provides information about the modification in the labor law related to disabled individuals. Section 3 discusses the data and methodology used in the study. Section 4 shows the descriptive analyses and DD estimation results. Finally, Section 5 concludes the study.

1. Literature Review

In most studies, disability is significantly related to lower labor participation rates (John Bound et al. 1999; Kidd, Sloane, and Ferko 2000; Brenda Gannon 2009; Erin J. McCauley 2019), lower employment rates (Marjorie Baldwin and William G. Johnson 1994; Melaine Jones 2017; Chad D. Bown and Caroline Freund 2019), lower education levels (Timothy J. Perri 1984; Tom Karmel and Nhi Nguyen 2008; Arlette Simo Fotso et al. 2018), lower wages (Johnson and James Lambrinos 1985; Robert Haveman and Barbara Wolfe 1990; Baldwin and Johnson 1994; Kidd, Sloane, and Ferko 2000; Jones 2017; Bruce D. Meyer and Wallace K. C. Mok 2019), higher medical expenditures (Dorothy Rice and Mitchell P. LaPlante 1992; Michael Palmer et al. 2015; Jae Woo Choi et al. 2016), and lower economic well-being (Haveman and Wolfe 1990; Suguru Mizunga and Sophie Mitra 2012; Palmer et al. 2015; Meyer and Mok 2019).

Previous studies on developed countries point out the negative association between disability and labor force participation. For instance, Kidd, Sloane, and Ferko (2000) show that men with disabilities are less likely to participate in the labor force and that their wages are lower than their non-disabled counterparts. Gannon (2009) finds similar results for Ireland. Campolieti (2002) also suggests that disability status has significantly negative effects on the labor force participation of older males living in Canada. Douglas A. Webber and Melissa J. Bjelland (2015) observe that individuals with work-limiting disabilities are very likely to leave the labor force in the United States. In a recent study, McCauley (2019) finds that having a disability is associated with a decline in the probability of labor force participation in the United States and that an increase in education moderates the negative relationship.

The relationship between disability and employment status is more strained for developing countries. Mitra and Usha Sambamoorthi (2008) find that disability is a barrier to employment in Tail Nadu, India. Similarly, Mizunga and Mitra (2012) state

that disabled people have lower employment rates in Burkina Faso, Ghana, Mauritius, Bangladesh, Pakistan, the Philippines, Brazil, Mexico, and Paraguay. Enayatollah Homaei Rad (2017) also present lower employment for disabled individuals in Iran, and their results show that people with mental and hereditary disabilities who participate in the labor force are less common. In a recent study for Poland, Pawel A. Strzelecki (2019) examines the effect of early pension reform, and according to the results, improving the labor force participation rate of disabled people plays a relatively minor role in explaining the change in the total labor force participation rate in the economy.

Studies on the effect of disability policies and benefit programs on the labor force status of disabled individuals are mostly on developed countries. Courtney Coile, Mark Duggan, and Audrey Guo (2015) explore time trends in the labor force participation of veterans and non-veterans and whether they are consistent with the execution of the disability compensation program in the United States. According to their results, veterans' labor force participation has declined given the increase in benefits in the disability program. In a similar study, David H. Autor et al. (2016) examine the effect of the disability compensation program on veterans' labor force participation and earnings in the United States. Their results are in line with those of Coile, Duggan, and Guo (2015), in which an increase in disability benefits causes a decline in labor force participation. Autor et al. (2015) measure the causal impact of time out of the labor force on the employment of disabled individuals by looking at the implementation of the Social Security Disability Insurance program in the United States. They find that longer processing times reduce the employment of disabled applicants. Using data from Austria, Kathleen J. Mullen and Stefan Staubli (2016) examine how the disability insurance program changes the labor supply decisions of disabled individuals. According to their results, an increase in disability insurance program benefits is associated with a decrease in the employment of disabled individuals.

The labor force participation and employment conditions of disabled individuals in Turkey have been examined in a few studies. For instance, Burcu Düzgün-Öncel and Deniz Karaođlan (2016) make a descriptive analysis on the relationship between disability and the labor market outcomes of Turkish males. They find that both labor force participation and employment rates are lower for disabled males compared with their non-disabled counterparts. Next, the same authors (2020) examine the causal relationship running from disability to labor force participation for Turkish males using propensity score matching (PSM) methods. Their results suggest that disability has a negative impact on labor force participation.

Previous studies have tested the effectiveness of policy changes on labor market outcomes in both developed and developing countries, but the literature on the latter is relatively scarce. To our knowledge, our study is the first that uses the DD methodology to test the impact of the change in labor policy in a developing country. DD is considered to be one of the most appropriate methods to test the effect of an exogenous change in policies, and it is used widely in the labor economics literature. For instance, Alan Card and Alan B. Krueger (2000) examine the effect of the increase in minimum wage on the number of employees in the fast-food industry in New Jersey using the DD methodology. The authors find that an increase in the minimum wage causes a decrease in employment in the industry. In a more recent study, Oana Borcan, Mikael

Lindhall, and Andrea Mitrut (2014) investigate the effect of an unexpected wage cut of 25% incurred by the entire public sector in 2010 in Romania using DD as well. Their findings suggest that the wage cut caused a disproportionate change in the average grades and passing rates of public high schools relative to those of private ones between 2010 and the previous years. Yukiko Asai (2015) examines the causal effects of changes in the cash benefit amount on job continuity by applying the DD methodology. The results present little evidence that the job continuity of new mothers changes in response to changes in the cash benefit amount. Marcus O. Dillender, Carolyn J. Heinrich, and Susan N. Houseman (2016) study the impact of the employer mandate in the Massachusetts health insurance reform on part-time work using DD and find that the mandate increased part-time employment among low-educated workers.

2. Policy Reform

The labor law (No. 1475) in Turkey was enacted on August 25, 1971. Regarding disabled individuals, the law states that 3% of the employees in private institutions that have 50 or more employees should be made up of disabled individuals. If the employer has more than one workplace in the same city, then the number of disabled individuals will be calculated by considering these different workplaces as one workplace. It is important to note that no obligation for the public sector existed in the 1971 labor law.

The new labor law (No. 4857) was enacted on May 22, 2003. The content of the law regarding disabled employees has changed such that all private institutions should also hire individuals who have suffered from terrorist attacks. The percentage of those individuals should be 6%, and among those individuals, at least 3% should be disabled.

In 2008, the labor law (No. 4857) regarding disabled individuals changed significantly; these changes were enacted on May 15, 2008. First, the condition “suffering from terrorist attacks” is excluded from the former definition, and similar to the 1971 law, it only states that 3% of the employees that the employer hires should be disabled. The most important change in the labor law relates to the employment conditions of employees in the public sector. Previously, public institutions were not forced to hire disabled individuals. However, according to the 30th item in the law, 4% of employees in the public sector should be made up of disabled individuals. The 2008 THS data was prepared by the end of March; hence, the disabled individuals did not benefit from the change in the law yet. Thus, we compare the employment statuses of disabled individuals between 2008 and 2012. In other words, we test the effects of the law on disabled individuals in 2012, four years after the law is enacted. We expect that this law leads to an increase in the number of disabled individuals, especially in public institutions.

Other important issues regarding the item related to disabled employees in the labor law are as follows. Private institutions are subject to pay a ban of 1,842 Turkish liras for each month that they do not follow the rule. Public institutions are not exempt from the ban; they should pay the same amount of money. In addition, for private institutions, 100% of the insurance premiums of disabled employees are paid by the treasury. According to the law, if an employee becomes disabled when he/she is still

employed, then he/she has the priority to be employed as a disabled worker over new disabled worker candidates. Moreover, the Turkish Employment Agency acts as an intermediary between the employer and the disabled workers. Therefore, the agency can be considered as a key instrument for the job placement of disabled individuals. Lastly, the profile of the disabled workers that the employer should hire is governed by the Ministry of Labor and Social Security. The ministry also takes advice from the Ministry of Family and Social Policies regarding the disabled worker profile (i.e., how they should be hired, what kind of courses or apprenticeship programs they should take). Disabled individuals who are willing to be employed in the public sector should take the Public Employee Selection Examination for the Disabled; otherwise, the disabled employee is determined via a random selection method among the disabled applicants.

In short, the modifications in the labor law (No. 4857) aim to promote the labor force participation of disabled individuals. We also see that the effectiveness of the Turkish Employment Agency as well as the Ministry of Family and Social Policies is important for hiring disabled employees. We first test the impact of the law on the labor force participation of disabled individuals and then briefly discuss the effectiveness of the law together with the related institutions in Turkey based on our findings.

3. Data and Methodology

3.1 Data

The data used in this study is taken from the 2008 and 2012 waves of the THS conducted by TurkStat². The THS gives information about the health and labor force status of individuals along with demographic factors and socioeconomic indicators. Each survey is a nationally representative random sample and was administered to 20,624 individuals in 2008 and 37,979 individuals in 2012. The focus group is males aged 25-64 years to avoid complications arising from gender differences in the labor force and disability statuses. The sample size is 4,588 in 2008 and 8,949 in 2012.

Following Kidd, Sloane, and Ferko (2000), Campolieti (2002), Gannon (2009), and Webber and Bjelland (2015), we define individuals as “disabled” if they have an illness that has lasted more than six months and have any chronic illnesses such as coronary illnesses, hypertension, osteoarthritis, musculoskeletal disorders, diabetes, asthma, and chronic depression and anxiety. Furthermore, we detect the severity of the disability according to the severity of the restriction of daily activities caused by illnesses/health problems in the last six months. Thus, we have four disability categories: (i) non-disabled males; (ii) disabled individuals with no limitations; (iii) disabled individuals with some limitations; (iv) disabled individuals with severe limitations. For instance, in 2008, 3,605 out of 4,588 males (about 79%) are categorized as non-disabled, and in 2012, 7,192 males out of 8,949 (about 80%) are considered as non-disabled. Additionally, to overcome reverse causality, we control for work-related injuries or disabilities (Düzgün-Öncel and Karaođlan 2020). Our treatment group consists of

² Although the 2014, 2016, and 2019 THS data sets are available to us, we prefer not to use them in this study because the change in the design of the questionnaire (starting from the 2014 data set) makes compatibility with earlier data sets difficult.

disabled males with no, some, and severe limitations in their daily lives that are subject to the new labor policy, and the control group includes non-disabled males. To make the treatment and control samples comparable, we also demographically adjust these groups by applying sample weights on demographic and socioeconomic characteristics, such as age, marital status, and education.

Males who state that they are seasonal workers, students, and/or pensioners, individuals who have other income resources, and individuals who are unable to work are considered as “out of the labor force” (Düzgün-Öncel and Karaoğlan 2020). Individuals who are employed and unemployed are considered as “in the labor force”. The age of an individual is a continuous variable in the survey year. Regarding marital status, in the THS, we observe whether the individual is married, single, widowed, or divorced. In the analysis, we categorize the marital status of the respondents into three groups: married, single, and widowed/divorced (Düzgün-Öncel and Karaoğlan 2016). Lastly, education is categorized as follows: illiterate, primary education, secondary education, high school education, and university or higher education.

3.2 Methodology

We use differences with two dimensions: disability status and policy reform. Thus, we have two difference estimators and a DD estimator. The first one is the difference in labor force status between disabled and non-disabled individuals. The second one is the difference in labor force status before and after the policy reform. Finally, the DD estimator is the difference between disabled and non-disabled individuals in the difference in labor force participation before and after the new policy.

To determine the effect of the DD, we use a saturated model as the following:

$$L_{idk} = \alpha + \gamma D_i + \psi K_i + \beta(D_i \cdot K_i) + \epsilon_{idk}, \quad (1)$$

where L_{idk} is the binary labor force status, D_i is a binary variable taking the value of 1 for disabled individuals, and K_i is the dummy variable equal to 1 for the implementation of the new policy. In other words, K_i equals 0 if the data is from 2008 and equals 1 if the data is from 2012. Therefore, we can state that the dummy variable also controls for the macroeconomic instability between the two periods since 2008 can be referred to as a crisis and 2012 can be referred to as a recovery period in Turkey. Equation (1) includes two main effects for disability and policy reform and an interaction term that marks observations who are disabled and subject to the new labor policy. This is a saturated model since the conditional mean function takes on four possible values and there are four parameters to be estimated (Joshua D. Angrist and Jörn-Steffen Pischke 2008).

We are mainly interested in the DD estimator of β , which shows the treatment effect on the treated. In other words, β tells us whether disabled individuals are more willing to participate in the labor force after the change in policy. Mathematically, we can show the calculation of β as follows:

$$\beta = [E(L_{idk}|d = \text{disabled}, k = \text{new policy}) - E(L_{idk}|d = \text{disabled}, k = \text{new policy})] - [E(L_{idk}|d = \text{non - disabled}, k = \text{new policy}) - E(L_{idk}|d = \text{non - disabled}, k = \text{old policy})]. \quad (2)$$

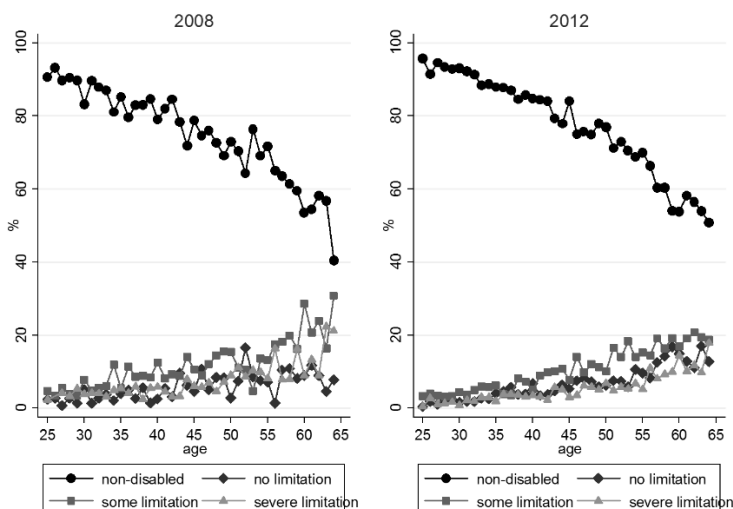
4. Results

4.1 Descriptive Results

Figure 1 depicts the prevalence of disability by age for the years 2008 and 2012 using four different disability groups: (i) non-disabled individuals; (ii) disabled individuals with no limitations in daily activities; (iii) disabled individuals with some limitations in daily activities; (iv) disabled individuals with severe limitations in daily activities. We can interpret the graphs as conditional probabilities such as $prob(disabled|age)$. Although our focus is on the effect of disability status on labor force participation, presenting a general picture would serve as a precursor analysis to such a relationship (Düzgün-Öncel and Karaoğlan 2020).

First, we observe that the probability of being disabled increases with age for both the years 2008 and 2012. For instance, the share of non-disabled individuals aged 25 is about 90% (96%) in 2008 (2012), whereas this share falls to 40% (50%) when the age increases to 65. However, we see that the pace of increase in the disability share by age is greater in the year 2008. In other words, the disability gradient by age is greater in 2008 than the gradient in 2012.

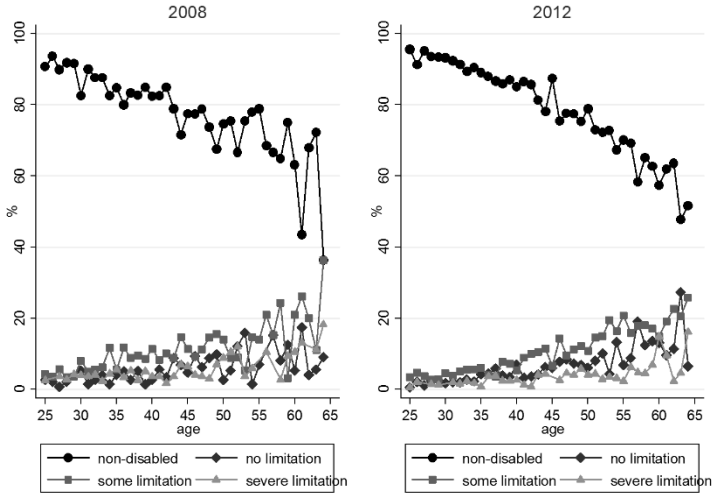
Figure 2 shows the share of disability by age according to individuals in the labor force for the years 2008 and 2012. We observe a similar pattern as in Figure 1, in which the share of disabled individuals who are in the labor force decreases with age. Furthermore, again, the pace of decrease is higher in 2008 for non-disabled individuals, implying a more profound gradient.



Notes: Sample weights applied. Work related injuries controlled.

Source: TurkStat Health Survey (2020) and author's calculations.

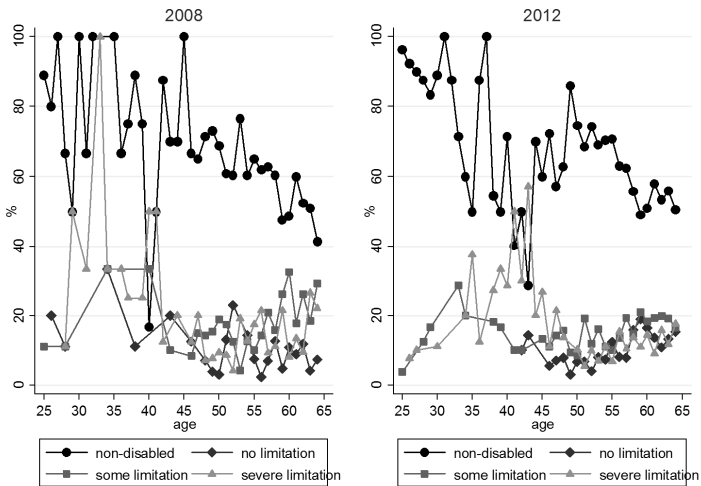
Figure 1 Prevalence of Disability by Age



Notes: Sample weights applied. Work related injuries controlled.

Source: TurkStat Health Survey (2020) and author's calculations.

Figure 2 Prevalence of Disability by Age according to Males in the Labor Force



Notes: Sample weights applied. Work related injuries controlled.

Source: TurkStat Health Survey (2020) and author's calculations.

Figure 3 Prevalence of Disability by Age according to Males Out of the Labor Force

Figure 3 depicts the prevalence of disability by age according to individuals out of the labor force for the years 2008 and 2012. Unlike in Figures 1 and 2, we observe a volatile pattern in the disability status of males who are out of the labor force, especially those in their middle ages. One of the explanations would be a justification bias in which males may use their disability status as an excuse for being out of the labor force. Furthermore, selective mortality could have caused the least healthy individuals to drop out of the sample, leading to the noise in middle-aged males.

Tables 1 and 2 show the distribution of demographic indicators of working-age males by disability status for the years 2008 and 2012. The values are in percentages, and the values in parentheses are 95% confidence intervals.

According to Tables 1 and 2, disabled individuals have lower education levels. In addition, the level of education decreases even more among disabled individuals with some or severe limitations. For instance, in 2008 (2012), the share of non-disabled individuals with primary education is about 50% (47%), while the same ratio is 71% (68%) for disabled individuals with severe limitations. Moreover, we observe that 15.58% of non-disabled males have university or higher degrees, whereas this percentage is only 6.74% for disabled males with severe limitations in 2008. The same shares are 19.27% and 10.02%, respectively, for the year 2012.

Table 1 Sample Weighted and Clustered Distribution of Demographic Variables by Type of Disability in 2008 (% , 95% Confidence Interval)

	Non-disabled	Disabled with no limitations	Disabled with some limitations	Disabled with severe limitations
education				
primary or lower	50.71 (49.03, 52.39)	50.67 (44.12, 57.20)	64.11 (59.39, 68.57)	71.03 (65.11, 76.30)
secondary	33.69 (32.12, 35.30)	31.83 (26.04, 38.25)	27.51 (23.43, 31.99)	22.22 (17.50, 27.78)
university or higher	15.58 (14.40, 16.84)	17.48 (13.03, 23.05)	8.37 (6.06, 11.44)	6.74 (4.23, 10.59)
area				
urban	73.55 (72.04, 75.00)	72.19 (65.93, 77.69)	69.89 (64.29, 73.16)	60.31 (54.13, 66.18)
marital status				
married	85.99 (84.79, 87.12)	95.51 (91.85, 97.57)	94.49 (91.85, 96.31)	91.26 (87.08, 94.18)
health				
good	85.82 (81.52, 84.05)	49.32 (42.79, 55.87)	27.75 (23.66, 32.24)	13.88 (10.13, 18.74)
Sample size	3,605	234	469	280

Notes: Work-related injuries are controlled. Sample weights are applied. Confidence intervals are shown in parentheses.

Source: TurkStat Health Survey (2020) and authors' calculations.

Table 2 Sample Weighted and Clustered Distribution of Demographic Variables by Type of Disability in 2012 (% , 95% Confidence Interval)

	Non-disabled	Disabled with no limitations	Disabled with some limitations	Disabled with severe limitations
education				
primary or lower	47.37 (46.19, 48.55)	45.94 (41.96, 50.26)	56.62 (53.18, 60.01)	68.83 (63.91, 73.36)
secondary	33.34 (32.24, 34.47)	31.85 (27.97, 35.99)	28.87 (25.84, 32.09)	21.13 (17.26, 25.60)
university or higher	19.27 (18.36, 20.22)	22.20 (18.82, 25.98)	14.49 (12.23, 17.10)	10.02 (7.34, 13.54)
area				
urban	77.40 (76.39, 78.37)	76.64 (72.79, 80.08)	69.88 (66.62, 72.95)	67.20 (62.24, 71.81)
marital status				
married	84.87 (83.60, 85.31)	94.59 (92.27, 96.24)	92.44 (90.40, 94.07)	88.34 (84.64, 91.24)
health				
good	85.12 (84.28, 85.93)	65.86 (61.76, 69.74)	38.47 (35.30, 41.74)	17.75 (11.69, 18.44)
Sample size	7,912	516	835	406

Notes: Work-related injuries are controlled. Sample weights are applied. Confidence intervals are shown in parentheses.

Source: TurkStat Health Survey (2020) and authors' calculations.

Furthermore, the majority of males in the sample live in urban areas. The statistics show that 73.55% (77.40%) of non-disabled males live in urban areas in 2008 (2012). Finally, we observe that disability status and good health status are negatively associated with each other. The statistics indicate that non-disabled males are less likely to report bad health, and the prevalence of bad health increases with the level of disability.

Tables 3 and 4 show the distribution of labor market outcomes of working-age males by disability status for the years 2008 and 2012, respectively. Consistent with the previous literature, we find that males are more likely to be out of the labor force if they are disabled. The likelihood increases further as the severity of disability increases. We find that 84.84% (83.78%) of non-disabled males are in the labor force, whereas this number is only 54.28% (44.72%) for individuals with severe disability in 2008 (2012). The findings also point out that the prevalence of being employed is the lowest among disabled males with severe limitations and the highest among non-disabled males. The employment category “disabled” refers to males who state that they

Table 3 Sample Weighted and Clustered Distribution of Labor Market Indicators by Type of Disability in 2008 (% , 95% Confidence Interval)

	Non-disabled	Disabled with no limitations	Disabled with some limitations	Disabled with severe limitations
labor force status				
out of the labor force	15.15 (13.98, 16.40)	30.76 (25.02, 37.17)	29.56 (25.37, 34.13)	45.71 (39.56, 52.00)
in the labor force	84.84 (83.59, 86.01)	69.23 (62.82, 75.97)	70.43 (65.86, 74.62)	54.28 (47.99, 60.43)
employment				
employed	90.51 (89.39, 91.52)	95.48 (90.80, 97.83)	86.79 (82.49, 90.17)	62.16 (54.94, 68.87)
unemployed	8.04 (7.11, 9.09)	3.22 (1.34, 7.53)	9.90 (7.00, 13.81)	9.72 (6.20, 14.93)
disabled	1.43 (1.06, 1.94)	1.29 (0.32, 5.03)	3.30 (1.78, 6.03)	28.10 (22.08, 35.03)
employment type				
employee	73.43 (71.92, 74.89)	64.12 (57.60, 70.16)	63.39 (58.66, 67.88)	68.25 (62.23, 73.71)
employer	3.90 (3.30, 4.60)	6.72 (4.09, 10.86)	3.58 (2.17, 5.87)	2.38 (1.07, 5.20)
self-employed	20.95 (19.62, 22.35)	28.25 (22.71, 34.52)	31.11 (26.83, 35.70)	27.77 (22.58, 33.64)
unpaid family worker	1.70 (1.31, 2.19)	0.08 (0.02, 3.52)	1.91 (0.09, 3.78)	1.58 (0.05, 4.16)
Sample size	3,605	234	469	280

Notes: Work-related injuries are controlled. Sample weights are applied. Confidence intervals are shown in parentheses.

Source: TurkStat Health Survey (2020) and authors' calculations.

Table 4 Sample Weighted and Clustered Distribution of Labor Market Indicators by Type of Disability in 2012 (% , 95% Confidence Interval)

	Non-disabled	Disabled with no limitations	Disabled with some limitations	Disabled with severe limitations
labor force status				
out of the labor force	16.21 (15.35, 17.10)	32.35 (28.44, 36.53)	31.50 (28.38, 34.80)	55.27 (50.02, 60.40)
in the labor force	83.78 (82.89, 84.64)	67.64 (63.46, 71.55)	68.49 (65.19, 71.61)	44.72 (39.59, 49.97)
employment				
employed	77.69 (76.69, 78.65)	65.44 (61.23, 69.42)	64.31 (60.94, 67.54)	37.66 (32.86, 42.73)
unemployed	5.51 (4.99, 6.07)	1.54 (0.77, 3.05)	3.84 (2.71, 5.41)	4.87 (3.09, 7.61)
disabled	1.30 (1.06, 1.60)	0.96 (0.40, 2.29)	2.35 (1.50, 3.66)	17.61 (14.05, 21.85)
employment type				
employee	77.16 (76.14, 78.15)	74.11 (70.13, 77.73)	69.93 (66.65, 73.02)	70.91 (65.83, 75.52)
employer	3.61 (3.19, 4.09)	4.31 (2.85, 6.46)	3.14 (2.13, 4.61)	2.67 (1.39, 5.05)
self-employed	18.21 (17.30, 19.15)	20.98 (17.66, 24.73)	25.91 (22.98, 29.07)	25.22 (20.86, 30.14)
unpaid family worker	1.00 (0.78, 1.27)	0.05 (0.01, 1.80)	1.00 (0.05, 2.00)	1.18 (0.04, 3.12)
Sample size	7,912	516	835	406

Notes: Work-related injuries are controlled. Sample weights are applied. Confidence intervals are shown in parentheses.

Source: TurkStat Health Survey (2020) and authors' calculations.

do not work and do not seek work since they are disabled; thus, it is a totally subjective measure, different from our disability indicator. In fact, the descriptive statistics confirm that 28.10% (17.61%) of disabled individuals with severe limitations state that they do not look for work because they are disabled in 2008 (2012). Similarly, the likelihood of being employed is lower among disabled individuals with no or some limitations relative to non-disabled males. The descriptive statistics also show that the prevalence of unemployment is highest among non-disabled males, which implies that they continue to look for work and stay in the labor force even if they do not have regular jobs.

We then group the employed individuals according to their employment type. We observe that the probability of being self-employed is the highest among disabled individuals with some limitations in both 2008 and 2012. In addition, the probability of being an employee decreases with the level of disability. These two findings may imply that disabled individuals with some or severe limitations prefer to be self-employed rather than work as employees, which could be related to the insufficiency of policies for disabled individuals in Turkey (Düzgün-Öncel and Karaoğlu 2020).

4.2 Difference-in-Difference Estimation Results

We have two difference estimators and a DD estimator. The first one is the difference in labor force status between disabled and non-disabled individuals. The second one is the difference in labor force participation before and after the policy reform. The DD estimator is the difference between disabled and non-disabled individuals in the difference in labor force status before and after the policy reform. Here, our control group is non-disabled individuals, and the treatment group is disabled individuals with no, some, and severe limitations who are subject to the new labor policy.

Table 5 presents difference-in-differences in line with the conditional expectations. The first element of the table shows that the average mean status of disabled individuals after the policy reform is 0.6446. The last row and the last column of the table present two differences: the difference between disabled and non-disabled individuals; and the difference between before and after the policy reform. Finally, the last element of -0.0157 , which is the treatment effect on the treated (β in Equation (1)) shows the difference-in-differences. This effect puts forward what would have happened to the treated if they were in the control group. In other words, -0.0157 is the change in labor force status of disabled individuals after the change in labor law if they were non-disabled individuals before the policy reform.

Table 5 Difference-in-Difference Table (Mean of the Labor Force Status)

	Disabled = 1	Non-disabled = 0	Disabled - Non-disabled
new policy = 1	0.6446	0.8394	-0.1948
old policy = 0	0.6696	0.8487	-0.1791
new policy - old policy	-0.025	-0.0095	-0.0157

Notes: Labor force status is a binary variable; $L_i = 1$ if the individual is in the labor force, and $L_i = 0$ if the individual is out of the labor force. Disabled individuals refer to individuals who report any level of disability.

However, the values in Table 5 are only the differences between conditional expectations and do not include any controls. To incorporate controls such as

demographic and socioeconomic characteristics, we present the DD regression results using the saturated model in Equation (1).

Table 6 shows the DD regression results with different sets of controls. The first column shows the same DD results as in Table 5. The second column includes age dummies. The third column incorporates demographic controls such as marital status and area in addition to age dummies. The fourth column includes education as a socioeconomic status control. We observe that despite being positive, the treatment effect on the treated is insignificant in all columns, which implies that policy reform does not affect the labor supply of disabled males. Furthermore, the effect of policy reform is also insignificant in all four columns of Table 6. On the other hand, the effect of disability on labor force participation is significant and negative, indicating that disability causes a decline in the labor force participation of Turkish males.

Table 6 Difference-in-Difference Estimation Results (Saturated Model)

Controls	(1)	(2)	(3)	(4)
	None	Age controls	Col. (2) and demographic controls	Col. (3) and socioeconomic controls
treatment effect on treated	-0.0157 (0.0200)	0.0185 (0.0169)	0.0183 (0.0168)	0.0161 (0.0167)
disability	-0.179** (0.0160)	-0.0566*** (0.0136)	-0.0585*** (0.0135)	-0.0561*** (0.0135)
policy reform	-0.009 (0.074)	-0.0011 (0.0062)	0.023 (0.0061)	0.003 (0.0062)

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The table reports the treatment effect on the treated in a regression with the indicated controls. The heteroscedasticity consistent standard errors are in parentheses.

Source: The data is from the TurkStat Health Survey (2020).

5. Conclusion

In this paper, we examine the effect of policy reform in 2008 on the labor force participation of disabled working-age males in Turkey using TurkStat's THS for the years 2008 and 2012. We categorize the individuals as non-disabled, disabled with no limitations, disabled with some limitations, and disabled with severe limitations in daily activities. The descriptive statistics suggest that the probability of being disabled increases with age for both the years 2008 and 2012. Furthermore, the probability of being out of the labor force increases with the level of disability. To reveal the effect of policy change, we use the DD methodology. We have a DD estimator that shows the difference between disabled and non-disabled individuals in the difference in labor force participation before and after the law change. We replicate our estimation by including different controls, such as age, demographic characteristics, and education. The estimation results suggest that the treatment effect on the treated is insignificant in all specifications, implying an insignificant impact of the policy reform on the labor force participation of disabled individuals.

There may be several reasons for the ineffectiveness of the reform. First, because of data limitations, we can implement the analysis from the labor supply side only. Unfortunately, the data set does not provide us the information regarding the labor demand, such as firm-level data that shows the number of disabled males in the firm. Second, the lack of information about the policy reform by disabled individuals may further prevent these individuals from participating in the labor force. Hence, the

effectiveness of institutions that play a key role in the employment of disabled individuals (such as the Turkish Employment Agency) or related ministries (such as the Ministry of Labor and Social Security) should be questioned and improved. Third, the most recent change in the labor law is related to the increase in the employment opportunities of disabled individuals in the public sector. However, to be employed in the public sector, an individual should get a threshold grade from the Public Personnel Selection Exam for the Disabled (EKPSŞ), and this examination has been implemented since 2012. Thus, one may expect a considerable increase in the number of disabled employees in the public sector in consecutive years. Unfortunately, we cannot test the effect of the law in later years using the later waves of the survey given the change in the design of the questionnaire. The effect of the EKPSŞ on the employment status of disabled individuals using the later waves of the survey may be a topic of further research.

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