

Labor Supply Responses to Minimum Wage Increase: Evidence from Turkey

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This paper examines the employment effects of the minimum wage in Turkey from a labor supply perspective. We investigate how an increase in the minimum wage affects the employment status of workers. We exploit the income tax exemption in 2008 which gave rise to an increase in the net minimum wage. The obtained results indicate that the minimum wage workers are more likely to remain at employment in the period following the minimum wage increase. Moreover, the results partially confirm that transition probabilities from informal to formal employment increased due to the minimum wage hike in 2008. The results do not indicate a statistically significant impact of the minimum wage increase on the labor market transitions of unemployed workers.

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1. Introduction

The impact of the minimum wage on employment is certainly the most discussed topic in the minimum wage literature. A large body of work based on theoretical and empirical considerations has been devoted to measuring and modeling the potential effects of the minimum wage on employment. However, almost the whole literature departs from a labor demand perspective¹ and neglects the supply side responses of workers to the minimum wage. A limited body of work has directly explored the impacts of the minimum wage by taking into account labor supply. In a theoretical framework, Basu et al. (1999) examine the labor supply behavior and highlight a remarkable interdependence between demand and supply. They suggest that a decrease in the aggregate labor demand may prompt the household members who were initially out of labor force to seek a job in order to compensate the higher unemployment risk of the household members who were initially in the labor market². In this model, Basu et al. (1999) show that a minimum wage which is below the market clearing level can lead the market wage to fall and unemployment to rise overtime.

Fugazza and Jacques (2004) develop a search model with a dual labor market assumption. According to this model, the government is not capable of enforcing full compliance with taxation laws and labor regulations. Thus, a formal and an informal market coexist in the economy. Their comprehensive model involves payroll taxes, unemployment benefits and minimum wage regulations. While an increase in the tax and social security contributions leads to an increase in informal sector, the introduction of the minimum wage has contrary effects on labor market. The latter increases participation in the formal sector and decreases participation in the informal sector. Two equilibriums occur depending on the ratio of the instantaneous net returns in the two sectors. If the net return in the formal sector is greater than in the informal one, probability of filling a vacancy in the formal sector increases and it compensates for the loss of profitability emerging from higher wage and *vice versa*. Rocheteau and Tasci (2008) also develop a search model and show that a minimum wage can

¹ These labor demand shifts caused by the minimum wage could occur at either or both of the extensive and intensive margins: the number of workers and/or the number of hours per worker could be adjusted. See Stewart and Swaffield (2008) for a full analysis of these potential labor demand responses.

² This is called the added worker effect in the labor economics literature. On the other hand, the worsening conditions in the labor market could be attributed to a lower labor supply. Individuals may cease their job seeking activities given that the unemployment rate is high in his/her area. This opposite argument is called discouragement effect. Basu et al. (1999) assume that the added worker effect dominates the discouragement effect.

increase social welfare, labor force participation and search effort of workers. They suggest that if firms have other instruments than wage to maximize their profits, the negative effects of the minimum wage could be mitigated to a considerable extent.

Another seminal work on labor supply in a segmented labor market was performed by Lemieux et al. (1994) who drew attention to the determinants of the workers' decisions in the underground economy³. They present a time allocation model to explain how income opportunities and taxation affect the allocation of time between regular and underground sector jobs. According to their model the net wage in the regular sector is positively correlated with hours worked in this sector, but it is negatively correlated with hours worked in the underground sector. Besides, a higher tax rate leads a worker to reduce his/her hours of work in the regular sector and to increase the hours of work in the underground sector. The predicted positive relationship between tax rate and hours worked on the underground sector is confirmed by the empirical part based on Canadian micro data.

As the theoretical approaches indicate, the relationship between labor market regulations and labor supply is particularly important by taking the informality problem into account. It is a well-known fact that public authorities seek to eliminate informal employment⁴ given that the latter reduces the welfare of the society via several mechanisms. For instance, a non-declared work causes tax evasion and suppresses the employment regulation. Informal employment is publicly undesirable from an equity perspective since the insurance offered to workers who have an informal job is generally lower in comparison to the other workers. From this point of view, labor market regulations such as the minimum wage might make the formal labor market more attractive. An improvement in conditions in the formal labor market could motivate the workers to make more effort for getting a formal job. Zajdela (2009) highlights the importance of a decent income from labor and job quality

³ They classify a job as a *regular sector job* if the earned income from this job is reported in the income-tax statement and as an *underground sector job* otherwise. By this definition, their aim is to capture untaxed market activities.

⁴ It should be noted that, informal sector and informal employment refers to different aspects of *informalization* (Husmanns, 2004). Although informal employment and informal sector are used interchangeably in many studies, they do not overlap at all times. According to the statistical definition of informal employment approved in 2003 at the 17th ICLS, a job is considered as informal if “[it] is not subject, de jure or de facto, to the labor legislation or to the social insurance system as a result of its non-declaration, its occasional nature or the brevity of the period in which it is occupied” (Bensalem et al., 2011). In this paper, we also define informal employment with the non-affiliation to the social security system.

on the labor supply decisions of inactive or unemployed persons. She points out the unemployment or inactivity traps could be accelerated due to inefficient activation politics.

An effective minimum wage should motivate workers to participate in the labor market, seek a job, remain employed etc. Particularly, for the labor markets of developing countries, labor market regulations including the minimum wage are expected to motivate workers to move from informal to formal employment. Therefore, governments often seek to promote well-being of formal employees while they fight against informal employment. For instance, in the action plans of strategy for the fight against informal economy, Turkish public authorities highlight the benefits of working as a formal employee and promote the workers to collaborate with government in the fight against informal employment⁵. In this regard, we examine the effects of the minimum wage policy on the workers' decisions regarding their labor market status in this paper.

We investigate how an increase in the minimum wage affects the employment status of workers. We exploit the income tax exemption in 2008 which gave rise to an increase in the net minimum wage. Turkish tax structure is frequently criticized as being excessively high especially for low wage earners. Both employers' and employees' representatives often state that the tax burden on minimum wage is excessively high and that reforms are needed to achieve the goals of minimum wage legislation. Immervoll (2007) points out that the minimum wage legislation is effective in 21 OECD countries and that only three of them impose a tax rate exceeding 20% for minimum-wage earners: Netherlands, Poland, and Turkey. However, the change in income taxation in 2008 which will be explained below mitigated the income tax burden on minimum wages. This increase in the net minimum wage provides an original natural experiment which enables us to assess whether it plays a role in the worker's behavior.

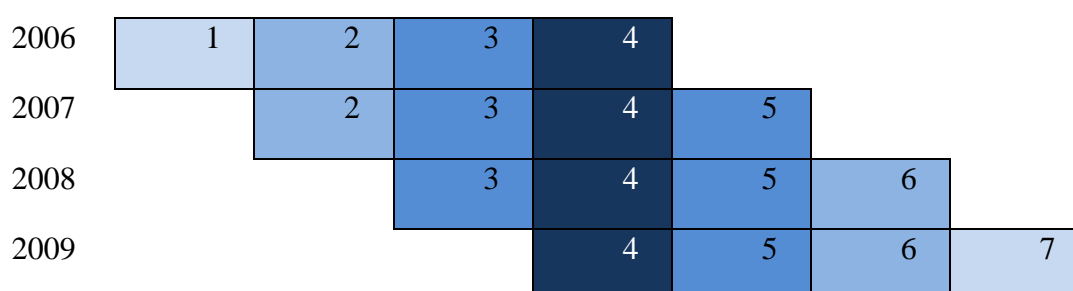
The rest of the paper is organized as follows. The next section describes the data and provides a descriptive analysis on the effects an increase in the net minimum wage on labor supply. Section 3 presents an explanation of the methodology used. Section 5 reports our empirical results. Finally, the last section summarizes our main findings and concludes the paper.

⁵ See "Action Plan of Strategy for Fight Against the Informal Economy" prepared by Turkish government for further details.

2. Data and Descriptive Statistics

The data used in this chapter is extracted from Income and Living Conditions Survey (SILC) which is conducted by TURKSTAT. This data set with panel structure is available on an annual basis over the period 2006-2009 and the sample represents the overall population in Turkey. SILC provides a rich source of information on the socio-economic characteristics of civilian non-institutional Turkish resident population. It collects information on labor force status, working hours, labor income, social security coverage, job characteristics, as well as demographic and individual characteristics such as gender, age and educational attainment. TURKSTAT uses a rotational design methodology proposed by Eurostat. From one year to the next, some replications are retained while others are dropped and replaced by new replications. A nationally representative sample is selected for the panel design and followed up for 4 years. Figure 1 below illustrates the rotational design of the survey. Once the rotational system is fully established, the sample for any one year includes 4 replications, which take part in the survey for 4 years. Each year, one of the 4 replications from the previous year is replaced by a new one. Thus, the first panel sample is completed in 2009 as it is represented as number 4 in Figure 1. The total sample size interviewed per year is around 7900 individuals. There are 31536 observations in the dataset which covers 2006-2009 period. The respondents were interviewed in the second quarter of the year (between April and July).

Figure 1 Illustration of rotational design



One of the important features of this data set is that it allows identifying formal and informal workers due to the question whether the interviewed individual is registered to the social security institution due to his/her main job or not. As we discussed above, this identification is in line with the accepted definition of informal employment.

Two panels of Table 1 report the net and gross minimum wage levels both in nominal and real terms between 2006 and 2009. It should be noted that the gross minimum wage has

slightly decreased over the years 2006-2008, and slightly increased in 2009. However, the evolution of the net minimum wage was clearly different.

Table 1

a) Net minimum wage between 2006 and 2009

	Nominal MW	Real MW	Real Growth Rate of MW (in percentage)	CPI
2006 (1)	380.5	302.7	-0.17	125.7
2006 (2)	380.5	288.7	-1.49	131.8
2006 Total	380.5	295.5	-0.8	128.8
2007 (1)	403	291.7	-3.63	138.2
2007 (2)	419.2	295.4	2.32	141.9
2007 Total	411.1	293.6	-0.7	140.0
2008 (1)	481.6	318.1	9.05	151.4
2008 (2)	503.3	318.7	7.89	157.9
2008 Total	492.45	318.4	8.5	154.7
2009 (1)	527.1	325.3	2.26	162.0
2009 (2)	546.5	328.0	2.92	166.6
2009 Total	536.8	326.7	2.6	164.3

b) Gross minimum wage between 2006 and 2009

	Nominal MW	Real MW	Real Growth Rate of MW (in percentage)	CPI
2006 (1)	531	422.4	-0.17	125.7
2006 (2)	531	402.9	-1.51	131.8
2006 Total	531	412.3	-0.9	128.8
2007 (1)	562.5	407.0	-3.65	138.2
2007 (2)	585	412.3	2.33	141.9
2007 Total	573.75	409.8	-0.6	140.0
2008 (1)	608	401.6	-1.33	151.4
2008 (2)	638	404.1	-1.99	157.9
2008 Total	623	402.7	-1.7	154.7
2009 (1)	666	411.1	2.37	162.0
2009 (2)	693	416.0	2.95	166.6
2009 Total	679.5	413.6	2.7	164.3

Source: Turkish Ministry of Labor and Social Security and TURKSTAT

Legend: MW: Minimum wage

CPI: Consumer price index

The ratio of net minimum wage to gross minimum wage was 72 % in 2006 and 2007, and increased to 79 % in 2008. The minimum subsistence allowance taking effect starting from 1 January 2008 provided an exemption from income tax for all wage earners, but mostly

for minimum wage earners approximately by a rate of 6-7 %. This change is exceptionally important given that it increased the net income of the minimum wage earners, but did not change gross minimum wage or total labor cost per employee. Therefore, one would expect that hiring and/or firing (labor demand) decisions would not be affected by this policy change in the income tax liability. However, workers' decisions (labor supply) could be modified depending on the magnitude of income increase. The relatively higher increase in the net minimum wage constitutes an interesting case of natural experiment to investigate low wage-earners' employment transitions, in a context where the employers' incentives to hire or fire the workers and payroll taxes for both employers and employees remained unchanged over the period under study.

Tables 2 and 3 below display the transition probabilities of workers who were formerly employed in formal salaried employment and who were formerly employed as minimum wage earners (in formal employment) into different labor market states respectively. In the second panel of each table, we present the transition probabilities of workers who are employed only in non-agricultural sectors⁶. We define the minimum workers as the employees who hold a formal salaried job and whose monthly wage is in the interval $0.95 * mw_t \leq mw_t \leq 1.05 * mw_t$ to account for rounding approximations. The labor market states are defined as formal wage earners (FWE), informal wage earner (IWE), a formal self-employed or employer (FSE), informal self-employed or employer (ISE), unemployed (U), inactive (I).

Table 2

a) Transition probabilities of formal wage earners

Formerly employed as FWE	FWE	IWE	FSE	ISE	U	I
2007	0.894	0.043	0.011	0.006	0.019	0.027
2008	0.901	0.021	0.013	0.007	0.027	0.031
2009	0.815	0.058	0.005	0.018	0.065	0.039

⁶ Given that agriculture is intensely an informal sector in Turkey, we prefer to present the results concerning the non-agricultural population separately. This is a very common preference in Turkish labor market studies. However, the results concerning the salaried workers do not change if the agricultural sector is included since the workers in this sector are mainly self-employed or unpaid family workers (Gursel and Imamoglu, 2013). Main difference between agriculture and other sectors arises from the nature of agricultural structure in Turkey, which is mostly based on small family farms. Therefore, the salaried work in agriculture is highly limited and its part in the total salaried employment is negligible as well.

b) Transition probabilities of formal wage earners in non-agricultural sectors

Formerly employed as FWE	FWE	IWE	FSE	ISE	U	I
2007	0.896	0.041	0.011	0.006	0.019	0.027
2008	0.901	0.021	0.013	0.007	0.027	0.031
2009	0.822	0.051	0.005	0.016	0.068	0.039

Table 3

a) Transition probabilities of formal MW earners

Formerly employed as MW earner	FWE	IWE	FSE	ISE	U	I
2007	0.787	0.066	0.000	0.000	0.044	0.104
2008	0.918	0.000	0.000	0.000	0.061	0.021
2009	0.633	0.046	0.000	0.000	0.120	0.201

b) Transition probabilities of formal MW earners in non-agricultural sectors

Formerly employed as FWE	FWE	IWE	FSE	ISE	U	I
2007	0.787	0.066	0.000	0.000	0.044	0.104
2008	0.918	0.000	0.000	0.000	0.061	0.021
2009	0.629	0.046	0.000	0.000	0.121	0.203

Source: SILC, own calculations

Firstly, we would like to note that the transition patterns of wage earners who hold a formal job substantially differ from 2006 to 2009. This group roughly constitutes 15 % of the total sample and 18 % of the non-agricultural sample. In 2006 and 2007 approximately 90 % of the formal wage earners remained in the same state. Transitions into other states are almost negligible. The transition probability into inactivity is around 0.03 and does not change notably. From 2008 to 2009, the part of the wage earners who remained employed in a formal job has decreased to 82 %, and the transition probability of being unemployed has gradually increased. However, it is important to keep in mind that 2009 was marked by a fall in economic activities depending on the global economic crisis. Therefore, the relatively higher probabilities of transition into unemployment and informal employment are associated with the effects of the economic crisis.

The picture alters significantly if we specifically focus on the minimum wage workers. According to the calculations, the probability of remaining in a formal job as a salaried worker is remarkably higher in 2008 compared to other years. Moreover, their probability of remaining at the same labor market status exceeds the average probability of all formal wage earners only in 2008. Moreover, we do not observe a transition from formal into informal employment for the minimum wage earners. One can assume that these sharp changes are due to the increase in the net wage of the minimum wage workers. Albeit a small rise in the probability of transition into unemployment is reported, this probability amounts to only 0.06 in 2008. Besides, it should be noted that the economic crisis in 2009 led to a rise in unemployment and a decline in the probability of being employed in a formal salaried job. Note that, the results remain essentially unchanged when employees in agriculture are excluded since there are not large numbers of formal salaried workers in this sector (Gursel and Imamoglu, 2013).

In panels a and b of Table 4, we present the transition probabilities of workers who were formerly employed in informal salaried jobs. This category constitutes roundly 10 % of the whole sample. Compared to formal wage earners, these workers who hold an informal job exhibit a higher mobility into different labor market status. We would like to highlight that from 2007 to 2008, their transition probabilities into a formal salaried job reached to the highest level, nearly 20 % while it was only 13 % in 2007. Comprehensibly, the share of the informal workers who remained in the same state fell to 52 % in 2008. These tendencies are in line with the theoretical considerations developed by Fugazza and Jacques (2004) and Lemieux et al. (1994). Besides, in the year of economic crisis, the outflows became more limited, and nearly 60% of the informal salaried workers did not move into a different labor market status. Note that the transition into a formal self-employment state is negligible while the flow from informal salaried to informal self-employment is about 6-7 %. In 2007, 7 % of the informal wage earners became unemployed where this rate gradually increased in 2008 and 2009. The transition from informal employment to unemployment could be resulted from an increase in the net minimum wage. The higher benefits from being a formal salaried may motivate informal workers to leave the informal sector and seek a formal job. The flow to inactivity is limited by 10 % for this category over the period. Excluding the agricultural sector does not alter the results notably as we focus only on salaried employment.

Table 4

a) Transition probabilities of informal wage earners

Formerly employed as IWE	FWE	IWE	FSE	ISE	U	I
2007	0.123	0.606	0.017	0.070	0.076	0.108
2008	0.195	0.529	0.007	0.067	0.109	0.093
2009	0.080	0.601	0.008	0.075	0.113	0.124

b) Transition probabilities of informal wage earners in non-agricultural sectors

Formerly employed as IWE	FWE	IWE	FSE	ISE	U	I
2007	0.140	0.594	0.019	0.074	0.070	0.103
2008	0.208	0.517	0.008	0.054	0.112	0.102
2009	0.090	0.606	0.007	0.063	0.124	0.111

Source: SILC, own calculations

Table 5 displays the transition probabilities of the unemployed persons. Note that their transition patterns in the labor market are more dispersed compared to other categories. The unemployed workers have mostly become informal wage earners. The probability of finding a formal job is stable between 2007 and 2008 and it is less than the probability of remaining unemployed. The latter slightly increased in 2008. It is possible that the unemployed persons may keep seeking for a formal job by taking increasing benefits of being a formal employee into consideration rather than accepting an informal job. The probability of moving into self-employment is also more limited in 2008. The higher mobility into inactivity might be associated with the discouragement effect. Similar to the previous cases, employment opportunities are clearly more limited in 2009. Because of the economic crisis, the probability of being employed decreased dramatically while the probability of remaining unemployed almost doubled between 2007 and 2009⁷.

⁷ Transitions from inactivity to other labor market states could be another interesting issue to examine. However, in this period we do not observe any change in the labor market transitions of inactive persons. Thus, we do not report the results here. For a discussion on the wage level and inactivity trap see Gazier and Zajdela (2006)

Table 5 Transition probabilities of unemployed workers

Formerly unemployed	FWE	IWE	FSE	ISE	U	I
2007	0.177	0.332	0.022	0.082	0.204	0.184
2008	0.186	0.315	0.015	0.060	0.260	0.163
2009	0.109	0.240	0.004	0.070	0.388	0.189

Source: SILC, own calculations

To sum up, the descriptive analysis indicates that either the probability of remaining in or the transition into a formal salaried job increased in 2008 when the net minimum wage was raised without an increase in the gross minimum wage. In 2009, the economic crisis restricted employment opportunities. Wage earners who hold a formal job are unlikely to change their labor market status while the informal ones tend to move into other states. The labor market transitions of unemployed people are more dispersed as expected.

3. Methodology

To test whether the increase in the net minimum wage in 2008 had a statistically significant effect on labor force states, we employ various econometric models which will be summarized below. Firstly, we compare the probability of remaining employed for minimum wage earners before and after the minimum wage increase. We use difference-in-differences method (*DD hereafter*) which is a commonly used method to evaluate the impacts of several policies such as minimum wages, substitutions, pension regime etc.

In the simplest form of DD method, there are two groups (affected and control) and two time periods. The affected group is subject to a treatment such as an increase of the minimum wage in a given time and the control group is considered to be not exposed to the treatment. More formally, the basic DD model can be specified as follows:

$$y = \alpha + \beta(t = 1) + \gamma(D_i = 1) + \delta(t = 1)(D_i = 1) + \varepsilon_{it}$$

where $t = 1$ if the observation belongs to the period of a policy change, and $D_i = 1$ if the observation belongs to the affected group. Therefore, the dummy variable D captures the possible differences between the affected and control groups prior to the policy change and the time dummy t captures the aggregate factors which would change the outcome variable even in the absence of policy change. The interaction term, δ can be interpreted as a dummy

variable equal to one for the observations in the affected group which is observed in the second period i.e. after policy change.

Thus, the key feature of difference in differences model is to compare the experiences of the two groups before and after treatment given that one of them is not affected by the treatment. An introduction or a significant increase in the minimum wage could be considered as a *quasi-experiment* and a DD approach is commonly used to estimate its effect on the employment outcome. The initial assumption is that the minimum wage increase does not evenly affect all wage earners. In this regard, the workers who are paid more than the minimum wage are generally employed as the control group as we do in this section (Currie and Fallick, 1996; Zavodny, 2000; Yuen, 2003; Papps, 2012). The double difference between the two groups before and after the period of policy change is compared.

One important shortcoming of DD method is that the coefficients of this model can only be estimated with a linear probability model i.e. OLS with a binary outcome. Nevertheless, it is a well-known fact that the estimated binary outcomes with linear probability models will be unbiased but not best. In other words, the estimated coefficients with OLS do not have the smallest possible sampling variance (Aldrich and Nelson, 1984). Moreover, if the estimated binary outcome is a probability, as in this case, OLS regression is even more complicated since it can predict the probabilities outside [0,1] interval (Huang et al. 2013).

By taking into account these limitations of OLS, we follow the previous literature and in addition to DD estimator, we perform a binary logistic regression i.e. logit. Unfortunately, DD estimator is not valid when the model is nonlinear. Thus, with this second model, we estimate the probability of remaining employed for minimum wage earners before and after the minimum wage increase. The binary logistic model enables us to estimate the probability of remaining employed over time under the *ceteris paribus* conditions, i.e. by holding individual attributes constant. The estimated model can specified as follow:

$$\Pr(E_{i,t} = 1 | E_{i,t-1} = 1) = f(\alpha + \beta MW_{2008} + \gamma_1 X_{i,t-1} + \gamma_2 Z_{i,t-1} + \theta C_{2009} + \varepsilon_{i,t})$$

where the employment variable ($E_{i,t}$) is the binary dependent variable and equal to 1 if individual i is employed at time t , and 0 if otherwise, given that he or she is employed at time $t - 1$ as a minimum wage earner. The minimum wage variable (MW_{2008}) is a dummy variable equal to one 1 if the observation belongs to post treatment period, i.e. 2008, when an increase

in the net minimum wage occurred. The vector $X_{i,t-1}$ contains the individual characteristics including gender, marital status, educational attainment, and years of work experience. $Z_{i,t-1}$ is a vector of job specific characteristics as sector, occupation and firm size. $\varepsilon_{i,t}$ represents the residual term.

As for the employment transitions of informal wage earners and unemployed individuals, we employ a multinomial logit estimation procedure to estimate the individual's employment state observed in the following year⁸. In this specification, the dependent variable takes on one of six values: formal wage earner (FWE), informal wage earner (IWE), formal self-employed or employer (FSE), informal self-employed or employer (ISE), unemployed (U), and inactive (I). Formally, for the informal wage earners, the estimated model can be expressed as follows:

$$\Pr(S_{i,t} = k | E_{i,t-1} = 1) = f(\alpha + \beta MW_{2008} + \gamma_1 X_{i,t-1} + \gamma_2 Z_{i,t-1} + \theta C_{2009} + \varepsilon_{i,t})$$

where the labor market status variable ($S_{i,t}$), can take one of six values specified above given that given that the individual i , is employed at time $t - 1$ as an informal wage earner. The other variables are the same as above. Similarly the estimated model for unemployed persons takes the form:

$$\Pr(S_{i,t} = k | U_{i,t-1} = 1) = f(\alpha + \beta MW_{2008} + \gamma X_{i,t-1} + \theta C_{2009} + \varepsilon_{i,t})$$

where the labor market status variable ($S_{i,t}$), belongs to the the individual i , who is unemployed at time $t - 1$. In this specification, $X_{i,t-1}$ is a vector of individual specific characteristics that contains gender, marital status, educational attainment, and age group.

4. Results

4.1. Transition probabilities of minimum wage earners

Table 6 reports estimated probabilities of remaining employed for minimum wage workers. Second and third columns of tables display the estimated coefficients by using DD method explained above. In the third column, we exclude the wage earners who work in agriculture. Note that, the estimated coefficients remain almost unchanged when agriculture is excluded. The fourth column reports the estimated coefficients by binary logistic model (log

⁸ Multinomial logit model is not appropriate for formal wage earners since a vast majority of them retains their employment status.

of odds ratios). In the sub-sample of this estimation which consists of minimum wage earners, there is no observation from agriculture. Thus, the results would not change if we re-estimated the model without the agricultural sector.

In DD estimation, the coefficient of the interaction term (MW*Post treatment) is positive and significant at 5 % level, indicating that the probability of remaining employed for the minimum wage earners increased after the minimum wage hike in 2008. This result does not change if we focus on sectors other than agriculture. As for the logit model used to estimate the probability of remaining employed within the minimum wage population, the coefficient of post treatment variable is positive and significant. Thus, this result also confirms that the minimum wage workers were more likely to remain employed following the minimum wage increase in 2008. The estimated coefficients of control variables are in line with the traditional hypothesis of economic theory. Higher educational attainment is a factor which increases the probability of remaining employed. The probabilities of remaining employed for the individuals who work in large firms and in services are higher. We would like to highlight that the economic crisis in 2009 seems to reduce the probability of remaining employed of wage earners.

Table 6 Estimation results of the probability of remaining employed

	DID estimation	DID estimation	Logit estimation
MW workers	-0.225*** (0.050)	-0.234*** (0.050)	
Post treatment	-0.0009 (0.014)	0.0001 (0.014)	1.137* (0.646)
MW*Post treatment	0.183** (0.086)	0.181** (0.087)	
Gender	0.00005 (0.0126)	0.0009 (0.013)	-0.538 (0.519)
Married	0.041** (0.017)	0.039** (0.017)	-0.159 (0.574)
Education			
Illiterate	-0.0001 (0.114)	0.0009 (0.114)	-0.806 (1.454)
Literate but not completed any school	0.042 (0.053)	0.027 (0.055)	-0.969 (0.894)
Primary school	Ref.	Ref.	Ref.
Secondary school	0.012 (0.024)	0.016 (0.024)	0.563 (0.705)
High school, vocational or technical high school	0.043** (0.018)	0.044** (0.018)	1.409** (0.671)
University, faculty or upper	0.040* (0.022)	0.043* (0.022)	0.592 (0.962)

Experience (years)	-0.002** (0.001)	-0.002** (0.001)	0.058** (0.025)
Occupation			
Unskilled	Ref.	Ref.	Ref.
Semi-skilled	0.023 (0.018)	0.022 (0.018)	0.311 (0.493)
Skilled	0.041* (0.023)	0.037 (0.023)	-0.186 (1.109)
Sector			
Agriculture	-0.172* (0.095)	---	No Obs.
Industry	-0.041*** (0.015)	-0.041*** (0.015)	-0.760 (0.527)
Construction	-0.116*** (0.039)	-0.117*** (0.039)	-1.358* (0.832)
Services	Ref.	Ref.	Ref.
Firm size			
10 or less	Ref.	Ref.	Ref.
11-19	0.043* (0.024)	0.044** (0.025)	1.623* (0.915)
20-49	0.043** (0.021)	0.040** (0.021)	0.149 (0.675)
50 or more	0.059*** (0.018)	0.055*** (0.019)	-0.319 (0.573)
2009 year dummy	-0.037** (0.016)	-0.034** (0.016)	-0.028 (0.516)
Constant	0.850*** (0.030)	0.853*** (0.030)	0.073 (0.871)
R²	0.07	0.07	0.176
Number of obs.	2228	2205	124

Notes: significance levels;*** p<0.01, ** p<0.05,*p<0.1.

Standard errors in parentheses are corrected by White (1980) procedure

4.2. Transition probabilities of informal wage earners

We display the results concerning outflow transitions of informal wage earners in panels a and b of Table 7. The coefficients are obtained by using multinomial logit regression which is explained above. In the first panel of Table 7, the sample covers all sectors including agriculture. In the second panel, informal wage earners who work in agriculture are excluded from the sample. Note that remaining as informal wage earner is the base outcome in the estimations. As seen from the first panel of Table 7, the probability of transition into formal salaried employment increased in the post treatment period, i.e. following the net minimum wage hike in 2008. The coefficient of the post treatment variable is significant at 5 % level.

However, the latter becomes insignificant, but does not change its sign while agriculture is excluded from the sample.

According to estimated results the probability of transition into formal self-employment decreased following the minimum wage hike in 2008. It seems plausible given that being a formal wage earner has become more attractive due to the higher minimum wage. Thus, the workers in the labor market could prefer a salaried job to self-employment. The probability of transition from informal salaried work to unemployment also increased following the minimum wage increase in 2008. The estimated coefficient is significant for the non-agricultural sample. It is also expected under the assumption that a higher minimum wage could motivate workers to leave their informal jobs and make greater effort in order to find a formal salaried job. The minimum wage increase in 2008 does not seem to have affected significantly the transitions from informal salaried into informal self-employment and inactivity.

Table 7 Estimation results of the transition from informal salaried employment into other labor market states.

Panel A: All sample

	IWE to FWE	IWE to FSE	IWE to ISE	IWE to U	IWE to I
Post treatment	0.398** (0.191)	-1.020* (0.595)	-0.149 (0.252)	0.317 (0.233)	-0.116 (0.212)
Gender	0.113 (0.169)	0.573 (0.513)	0.286 (0.210)	0.254 (0.184)	0.034 (0.171)
Married	0.261 (0.220)	0.791 (0.730)	0.337 (0.299)	-0.340 (0.237)	-0.459** (0.223)
Education					
Illiterate	-2.048** (1.064)	-0.014 (1.101)	-0.404 (0.491)	0.420 (0.381)	0.671** (0.304)
Literate but not completed any school	-0.694* (0.394)	-1.286*** (0.043)	0.233 (0.376)	0.207 (0.369)	0.507* (0.294)
Primary school	Ref.	Ref.	Ref.	Ref.	Ref.
Secondary school	-0.175 (0.248)	1.181* (0.643)	-0.192 (0.297)	0.154 (0.256)	-0.537* (0.296)
High school, vocational or technical high school	0.215 (0.255)	0.966 (0.727)	-1.090** (0.539)	0.257 (0.318)	0.614** (0.265)
University, faculty or upper	-0.103 (0.596)	1.947** (0.886)	-1.861* (1.115)	-0.451 (0.740)	-0.316 (0.701)
Experience (years)	-0.047*** (0.009)	0.004 (0.023)	0.001 (0.009)	-0.019* (0.011)	0.019** (0.009)
Occupation					
Unskilled	-0.180	0.282	0.053	0.300	0.324*

	(0.201)	(0.520)	(0.252)	(0.205)	(0.187)
Semi-skilled	Ref.	Ref.	Ref.	Ref.	Ref.
Skilled	-0.160 (0.499)	-0.579 (0.844)	0.889** (0.444)	-0.049 (0.573)	-0.511 (0.536)
Sector					
Agriculture	-0.430 (0.331)	0.558 (0.753)	0.446 (0.324)	0.233 (0.304)	-0.172 (0.241)
Industry	0.146 (0.229)	1.516*** (0.577)	0.112 (0.318)	-0.072 (0.308)	-0.0005 (0.230)
Construction	-0.136 (0.231)	-0.410 (0.871)	0.101 (0.291)	0.816 (0.237)	-0.774*** (0.274)
Services	Ref.	Ref.	Ref.	Ref.	Ref.
Firm size					
10 or less	Ref.	Ref.	Ref.	Ref.	Ref.
11-19	0.123 (0.265)	0.095 (0.672)	-0.352 (0.337)	0.045 (0.251)	0.041 (0.236)
20-49	1.378*** (0.312)	-1.335*** (0.060)	0.369 (0.479)	0.848** (0.380)	0.858 (0.362)
50 or more	1.292*** (0.317)	-0.594 (1.149)	-1.457 (1.006)	-0.117 (0.545)	0.143 (0.393)
2009 year dummy	-0.543** (0.241)	-0.722 (0.538)	-0.064 (0.253)	0.323 (0.238)	0.153 (0.205)
Constant	-1.175*** (0.283)	-5.199*** (0.955)	-2.423*** (0.387)	-2.190*** (0.328)	-1.722*** (0.287)
R²	0.068				
Number of obs.	1478				

Panel B: Nonagricultural sample

	IWE to FWE	IWE to FSE	IWE to ISE	IWE to U	IWE to I
Post treatment	0.305 (0.201)	-1.276** (0.660)	-0.309 (0.283)	0.439* (0.251)	0.037 (0.227)
Gender	0.111 (0.178)	0.552 (0.577)	0.138 (0.240)	0.199 (0.204)	-0.092 (0.189)
Married	0.329 (0.232)	1.116 (0.737)	0.372 (0.336)	-0.129 (0.267)	-0.394 (0.261)
Education					
Illiterate	-1.686 (1.070)	0.843 (1.142)	-0.552 (0.746)	0.668 (0.467)	0.248 (0.481)
Literate but not completed any school	-0.642 (0.406)	-1.241*** (0.057)	-0.091 (0.470)	0.184 (0.481)	0.477 (0.332)
Primary school	Ref.	Ref.	Ref.	Ref.	Ref.
Secondary school	-0.121 (0.260)	1.659** (0.684)	-0.260 (0.322)	0.236 (0.277)	-0.344 (0.343)
High school, vocational or technical high school	0.222 (0.263)	1.339* (0.793)	-1.031* (0.551)	0.253 (0.332)	0.686** (0.272)
University, faculty or upper	-0.067 (0.611)	2.256** (0.973)	-1.860* (1.122)	-0.413 (0.738)	-0.170 (0.688)
Experience (years)	-0.051***	0.006	-0.004	-0.017	0.018*

	(0.009)	(0.026)	(0.010)	(0.012)	(0.010)
Occupation					
Unskilled	-0.133 (0.202)	0.210 (0.559)	0.188 (0.253)	0.217 (0.214)	0.348* (0.194)
Semi-skilled	Ref.	Ref.	Ref.	Ref.	Ref.
Skilled	-0.099 (0.509)	-0.692 (0.876)	0.979** (0.447)	-0.132 (0.576)	-0.519 (0.527)
Sector					
Industry	0.138 (0.230)	1.516*** (0.583)	0.154 (0.318)	-0.052 (0.307)	-0.099 (0.229)
Construction	-0.137 (0.231)	-0.436 (0.885)	0.126 (0.295)	0.765 (0.237)	-0.711*** (0.271)
Services	Ref.	Ref.	Ref.	Ref.	Ref.
Firm size					
10 or less	Ref.	Ref.	Ref.	Ref.	Ref.
11-19	0.294 (0.273)	0.458 (0.695)	-0.270 (0.402)	0.102 (0.288)	-0.561* (0.346)
20-49	1.354*** (0.320)	-1.321*** (0.068)	0.299 (0.526)	0.810** (0.394)	0.581 (0.389)
50 or more	1.312*** (0.320)	-0.553 (1.186)	-1.459 (1.003)	-0.125 (0.539)	0.023 (0.390)
2009 year dummy	-0.635*** (0.253)	-1.157* (0.694)	-0.306 (0.286)	0.322 (0.263)	0.114 (0.229)
Constant	-1.162*** (0.290)	-5.616*** (0.992)	-2.266*** (0.413)	-2.344*** (0.662)	-1.704*** (0.302)
R²	0.068				
Number of obs.	1237				

Notes: significance levels;*** p<0.01, ** p<0.05,*p<0.1.

Standard errors in parentheses are corrected by White (1980) procedure

4.3. Transition probabilities of unemployed workers

The estimated results concerning the transition from unemployment into formal salaried, informal salaried, formal self-employment, informal self-unemployment and inactivity are given in Table 8. Note that remaining unemployed is the reference category. The age groups are included to control variables since the work experience is not available for unemployed people. The presented results are the coefficients obtained by estimating multinomial logit model. The results do not confirm that the minimum wage increase affected the transition probabilities of unemployed individuals. The coefficients have the sign positive; however they are not statistically significant. This could be resulted from the structure of unemployment in Turkey. It is a well-known fact that the share of higher educated workers is

dramatically larger in Turkish labor market⁹. Therefore, the increase in the minimum wage by 8.5 % could be insufficient to change their incentives on labor market states.

Table 3.9 Estimation results of the transition from unemployment into other labor market states

	U to FWE	U to IWE	U to FSE	U to ISE	U to I
Post treatment	0.271 (0.351)	-0.024 (0.284)	0.642 (0.799)	-0.558 (0.455)	-0.156 (0.346)
Gender	-0.215 (0.288)	-0.087 (0.230)	0.546 (0.824)	0.055 (0.370)	-0.080 (0.262)
Married	0.330 (0.353)	0.362 (0.265)	1.691*** (0.560)	0.690 (0.458)	0.317 (0.293)
Education					
Illiterate	-1.458*** (0.043)	0.209 (0.511)	-15.118 (0.774)	-0.557 (1.027)	0.903* (0.533)
Literate but not completed any school	-0.025 (1.197))	1.232* (0.639)	-12.383 (1.055)	1.560* (0.849)	2.093*** (0.655)
Primary school	Ref.	Ref.	Ref.	Ref.	Ref.
Secondary school	0.321 (0.436)	0.323 (0.306)	-14.302 (0.646)	0.273 (0.511)	0.393 (0.403)
High school, vocational or technical high school	0.609 (0.451)	-0.082 (0.344)	-0.460 (0.817)	0.700 (0.582)	1.225*** (0.369)
University, faculty or upper	2.174*** (0.529)	-1.492* (0.829)	1.385 (1.648)	-0.643 (1.191)	0.912* (0.549)
Age groups					
15-19	-0.025 (0.562)	-0.105 (0.447)	14.155 (1.044)	-1.901 (1.167)	-0.586 (0.540)
20-24	-1.417** (0.672)	-0.732 (0.460)	-0.936** (0.443)	-0.398 (0.705)	-0.647 (0.508)
25-29	Ref.	Ref.	Ref.	Ref.	Ref.
30-34	-0.668 (0.653)	-0.058 (0.479)	14.405 (1.289)	0.308 (0.671)	-0.306 (0.534)
35-39	0.214 (0.570)	-0.142 (0.484)	14.842 (1.117)	-1.009 (0.899)	-0.810 (0.632)
40-44	-0.389 (0.595)	-0.888* (0.519)	-0.805 (0.513)	-0.278 (0.704)	-0.652 (0.570)
45-49	0.196 (0.614)	-1.362** (0.672)	-0.496 (0.506)	0.089 (0.777)	-0.111 (0.576)
50-54	0.075 (0.645)	-0.466 (0.584)	-0.242 (0.533)	-0.547 (0.922)	-0.009 (0.601)
54-59	0.465 (0.833)	0.524 (0.688)	15.550 (1.212)	-0.408 (1.215)	0.489 (0.719)
60-64	-0.694 (0.795)	-0.112 (0.636)	15.446 (1.379)	0.133 (0.893)	-0.990 (0.789)
65+	-1.107* (0.529)	-0.292 (0.636)	14.705 (1.379)	-2.204 (0.893)	-0.585 (0.789)

⁹ See Hatakenaka (2006) and Ercan (2007) among others for a discussion of educational attainment and unemployment in Turkey.

	(0.646)	(0.449)	(0.484)	(1.151)	(0.514)
2009 year dummy	-0.663* (0.355)	-0.803*** (0.280)	-1.477 (1.281)	-1.011** (0.441)	-0.283 (0.305)
Constant	-0.769 (0.596)	0.336 (0.441)	-18.039 (1.033)	-1.170* (0.705)	-0.700 (0.471)
R²	0.102				
Number of obs.	560				

Notes: significance levels;*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Standard errors in parentheses are corrected by White (1980) procedure

5. Conclusion

This paper examines the employment effects of the minimum wage in Turkey by taking the labor supply responses into consideration. We carry out an empirical study on the effects of the minimum wage on the labor market transitions of workers. We examine the impact of the minimum wage on outflows into different labor market states for formal wage earners, informal wage earners and unemployed persons separately. We employ an individual dataset with panel structure and follow the workers' transitions after the net minimum wage increase in January 2008. This increase which resulted from a tax exemption did not affect the gross wage; thus we suggest that there is no reason for a change in employers' incentives.

The results indicate that the minimum wage workers are more likely to keep their status in the labor market following the minimum wage increase. It is an expected result since the workers' incentives are highly dependent on wages. The probability of keeping the job is significantly higher in the post treatment period for the minimum wage earners. On the other hand, the results partially confirm that transition probabilities from an informal salaried work into a formal job increased due to the minimum wage hike in 2008. This result is also consistent with general economic assumptions, because moving from an informal employment to a formal one implies an additional cost to the employer. Thus, even though workers are more motivated for getting a formal job by taking into consideration the higher minimum wage in the formal sector; it might be in the employers' interest to keep the informal jobs. Moreover, the obtained results concerning the unemployed workers do not indicate a statistically significant impact of the minimum wage increase on their labor market transitions.

A more general conclusion can be drawn from this study: the minimum wage policy in Turkey should be re-assessed by taking the gross-net wage gap into consideration. High insurance contributions and tax burden on wages probably distort the incentives of low wage workers. Increasing the net returns from working in the formal sector seems to be efficient in terms of motivating workers for getting formal employment.

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