THE EFFECTS OF YOUTH MINIMUM WAGE ON LABOUR MARKET AND SCHOOLING OUTCOMES: EVIDENCE FROM TURKEY

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Approval of the Graduate School of Social Sciences

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ABSTRACT

THE EFFECTS OF YOUTH MINIMUM WAGE ON LABOUR MARKET AND SCHOOLING OUTCOMES: EVIDENCE FROM TURKEY

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This study analyzes the impact of youth minimum wage policy on labour market and schooling outcomes in Turkey based on a quasi-experimental approach. Before January 2014, minimum wage was determined according to the age of a worker. Young workers under 16 years of age were entitled to get a lower pay. This created a cut-off at the wages paid to workers based on this age. Differentiation of minimum wage was eliminated in 2014. Exploiting this cut-off, we use an RD design to study the effects of minimum wage for 15-16-year-old males on the outcomes variables for being employee, employment, unemployment, labour force participation, being in education and being neither in employment nor in education. We employ Survey of Income and Living Conditions in Turkey. Indeed, we take 12 months before and after the change in the minimum wage policy, thereby covering 2013 January- 2014 December. In this study, we develop two models. In the first one, we follow a conventional RD methodology. The second one extends the first by adding a difference-in-differences aspect to RD, thereby forming a difference-in-discontinuities model. Both models are compatible regarding the empirical

findings. The results of the difference-in-discontinuities model suggest that change in probability of finding a job is 0.03-0.06 pp less for 15-year-old males from 2013 to 2014, relative to 16-year-old males. Moreover, change in probability of being in labour force is 0.01-0.03 pp less, but the change in probability of unemployment is 0.02-0.03 pp more for the younger group. This model also reveal that minimum pay encourages young males to attend school, but raises the incidence of being neither in employment nor in education among them.

Keywords: Minimum Wage, Regression Discontinuity, Labour Market, Education, Youth.

ÖZ

ASGARİ ÜCRETİN GENÇLERDE İŞGÜCÜ PİYASASI VE OKULLAŞMA ÇIKTILARI ÜZERİNDEKİ ETKİLERİ: TÜRKİYE ÖRNEĞİ

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Bu çalışmada, gençler için Türkiye'deki asgari ücretin işgücü piyasası ve okullaşma çıktıları üzerindeki etkileri yarı-deneysel bir yaklaşımla incelenmektedir. 2014 yılı Ocak ayından önce asgari ücret çalışanın yaşına göre belirlenmiştir. Nitekim asgari ücret 16 yaşın altındaki gençler için daha düşüktür. Bu durum, ücretlerde yaşa göre bir kesme olmasına neden olmaktadır. Ancak, bu uygulama 2014 yılında terk edilmiştir. Bu kesimi kullanarak çalışmada, Regresyon Süreksizlik (RS) tasarımı ile asgari ücretin 15-16 yaş grubundaki erkeklerde çeşitli çıktılar üzerindeki etkileri incelenmiştir: istihdam, ücretli istihdamı, işsizlik, işgücüne katılım, eğitimde olma, ne eğitimde ne de istihdam olma. Bunun için, çalışmada Gelir ve Yaşam Koşulları Anketi kullanılmıştır. Nitekim asgari ücretteki değişimden 12 ay önce ve sonrası, yani 2013 Ocak-2014 Aralık dönemi, ele alınmıştır. Bu çalışmada iki model geliştirilmiştir. Birincisi standart RS yöntemine dayanmaktadır. İkincisi ise, ilkine farkların-farkı boyutunu katarak süreksizliğin-farkı modelinin kurulmasıyla elde edilmektedir. İki modelin sonuçları birbirine oldukça yakın seyretmektedir. Süreksizliğin-farkı modeline göre, 15 yaşındaki erkeklerin, 16 yaşındakilere göre, 2013 yılından 2014 yılına iş bulma olasılıklarındaki değişimin 0.03-0.06 puan daha

az olduğu görülmüştür. Ayrıca, daha genç kesim için, işgücüne katılma olasılığındaki değişimin 0.01-0.03 puan daha az, buna karşın işsiz kalma olasılığındaki değişimin ise 0.02-0.03 daha fazla olunduğu bulunmuştur. Bu çalışma ayrıca, Türkiye'de asgari ücretin gençleri okula teşvik ettiğini gösterirken, ne eğitimde ne de istihdamda olma durumunu da kötüleştirdiğini ortaya koymuştur.

Anahtar Kelimeler: Asgari Ücret, Regresyon Süreksizlik, İşgücü Piyasası, Eğitim, Genç.

To my Daughter, Ceren KÜÇÜKBAYRAK

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1. Motivation, Aim and Organization of the Study

Minimum wage as a social policy tool is extensively used by policymakers worldwide. Since workers are exposed to abuse through unduly low earnings, countries intend to protect them from being exploited by applying minimum wages. Furthermore, such policy that prevents workers being paid no lower than a certain level might serve other purposes. For instance, if most of the workers who are paid at minimum level are poor or at risk of poverty, then it might be used to alleviate poverty. Moreover, minimum wages might improve wage distribution by truncating it when the compliance is high. Nevertheless, because it raises labour cost, minimum wages might depress job opportunities for individuals who could be paid at that level. Therefore, it is difficult for countries to determine the optimal amount of minimum pay. Indeed, it should be high enough to ensure a certain amount of money providing individual and/or his family a decent life, but it should be low enough to avoid a significant reduction in number of people employed. In other words, it should be designed properly to balance out the gains and the costs.

Notwithstanding its widespread use and potential benefits, minimum wages are not effectively designed in many countries. A common reason would be lack of agreement on its effects on the labour market. In fact, voluminous studies continue to discuss the effects of minimum wages, especially on employment figures. Is there any significant effect on the number of workers hired? If so, what is the sign of the effect and its magnitude? Is it possible that minimum wages increase employment? Does it create permanent unemployment? Can minimum wage encourage people to

participate more in the labour market? We can extend this list because many of these questions are not fully answered neither empirically nor theoretically.

Neoclassical economics suggest that by imposing a statutory wage floor, minimum wage policy harms employment levels, while simultaneously generating voluntary unemployment. The idea is as follows: Firstly, in response to an increase in the minimum amount of pay, employers demand fewer workers to employ at this higher price. Secondly, increase in expected earnings motivate more people, who were not active in the market before the introduction of the policy, to look for a job and become voluntarily unemployed. The contraction of the quantity demanded and the increase in the quantity of supplied create unemployment in the market. Earlier empirical studies on minimum wage found support for the predictions of the neoclassical model. In fact, discussions centered around the magnitude of negative employment effect, not on the sign of it.

As empirical strategies developed over time, labour economists started to question the earlier findings. Following Card and Krueger's influential study in 1994, the possibility of non-negative effects started to be discussed. In fact, exploiting the minimum wage hike in fast-food restaurants in New Jersey, they show that such policy could increase employment rates. In parallel with the empirical literature, economic theory developed to allow for other possibilities that might arise following the minimum pay policy. For instance, it might lead to either no or positive effects on the number of workers hired under certain market structures. In particular, monopsonistic markets might generate employment gains after being exposed to such policy. The idea is that in the absence of minimum pay, the market power of the monopsonist allows to pay wages less than the marginal productivity of workers hired. In this case, an increase in the wage rate due to minimum pay policy might not reduce employment even if the average cost of labour goes up. Instead, the number of workers employed might increase in monopsonistic markets as a response to this policy.

There are other models suggesting beneficial effects of the minimum wage. Particularly, as efficiency model suggests increase in the productivity of workers might reverse adverse employment effects of the minimum wage. In fact, after the introduction of the minimum pay policy, workers may put more effort, thereby improving labour productivity. As they do, the firms can expand their production and hence, employ more workers. Similarly, the search model implies that the minimum wage might not harm employment rates because it may increase the number of efficient matches in the labour market. Indeed, the possibility of a job vacancy to be filled would increase if the minimum wage leads additional persons to supply their labour to the labor market.

Minimum wages can be influential in sectors in which it does not apply, i.e. the uncovered sector. In fact, the introduction of two-sector model by Mincer (1976) proposes that minimum wage can improve the number of persons employed, while reducing average wages in the uncovered sector. The idea is based on worker flows: when the minimum wage is imposed on certain sectors, regions and/or occupations, workers displaced in these sectors due to the reduction in labour demand might be attracted by the higher possibility of finding a job in the uncovered sectors. This creates flee of persons from uncovered to covered sectors, thereby reducing wage rates due to increase in labour supply in the former. On the other hand, higher wages secured by the policy in covered sectors might attract some workers from the others, even if the chance of getting a higher paid job is relatively low. As such, queuing for the jobs in the sectors affected by minimum wage would create unemployment in these sectors more than the decline in employment.

The two-sector model underpins why minimum wages might affect the labour markets in less developed economies, mostly characterized by high levels of informality and low degree of compliance. If the minimum wage were influential only in the sectors in which it applies, these economies would not suffer too much from employment reductions. In fact, we would expect a negligible decline in the number of workers followed by the minimum pay rule. However, empirical

evidence frequently reveals the opposite (e.g. Boeri et al., 2011). Minimum wage is found to reduce employment rates even in developing economies. Moreover, studies indicate that it might raise average wages in the sectors out of the scope of policy because minimum pay policy induces some spillover effects. Indeed, it mostly behave as a reference price for the wage setting processes in these economies. As such, even though the policy may have a limited coverage, or even if high rates of informality prevails, there will be an invisible wage floor in the uncovered and/or informal sectors as well. Thence, in this context, minimum pay affects the economy at large.

The presence of potential spillover effects necessitates a careful analysis of minimum wage effects in developing economies like Turkey. Despite the economy wide mandated coverage of the minimum wage policy, its applicability remains limited in Turkey because of extensive informality in labour market. In particular, 17.7% of male wage earners were working without social security in 2016. Furthermore, the incidence of informality –measured as individuals working without social security coverage - is much higher among the youth. For instance, the rate of informality was 67.5% for males aged 15-19 years old in 2016 but was 90.8% in the same year for 15-16-year-old males. On the other hand, a significant share of workers in the country work around the minimum wage. In fact, according to the official records of the Social Security Institution, 40.4% of male wage earners were reported to be earning just the minimum wage in 2016. Moreover, the Household Labour Force Survey data reveal that while 12.9% of 15-16-year-old male wage earners were paid at minimum wage level, 29.1% of the corresponding males aged 15-19 years were reported to earn at the minimum wage in 2016. Hence, whether the minimum pay policy significantly affects the Turkish labour market, especially the youth, is a credible inquiry. This is because, notwithstanding significant informality levels, the minimum wage seems to bound many workers in the country.

In Turkey, young individuals account for a significant portion of the population. In fact, out of 40 million, 3.4 million males in the country are aged 15-19 years old as of December 2016. Moreover, young individuals have difficulty entering the labour market in Turkey. In particular, while the unemployment rate among 15-19 years old males was 15.7% in 2016, their labour force participation rate was 37.1% only. Because young persons are underrepresented in the labour market, Turkey applied a sub-minimum wage for young workers for a long period, before 2014. The reason behind this rationale is to ease their labour market entry. With a similar motive, many countries apply lower rates for young individuals as well. For instance, in Chile, workers under 18 years old receive about 25% less compared to older workers. Likewise, Australia and New Zealand apply stepwise rates based on the age of workers. Belgium, Finland, France, Ireland, Netherlands are some of the European countries allowing lower amounts of minimum pay for young workers (ILO, 2014). These lower rates applied to young workers in many countries is called as the "youth minimum wage".

Differentiating the minimum wage by age might be justifiable on the grounds of productivity differences. In particular, certain groups such as young persons might be less productive so that they can be paid at lower rates. Moreover, the effects of the minimum wage are frequently more pronounced for the youth (Belman and Wolfson, 2014). In fact, they are more vulnerable to the minimum pay policies because they are more loosely attached to the labour market. For instance, following the imposition of a minimum wage, young workers can easily be substituted by older workers, who might be more able, experienced, educated and/or more productive. If this happens, the chances of young individuals being hired would decline further. Therefore, the youth minimum wage policy may support labour market attachment of young individuals.

Some studies point out no and even positive effects of minimum wage on employment rates and efficiency in the labour markets. These findings can be explained by various theoretical models as mentioned earlier. Nonetheless, one

potential reason is that these studies focus on aggregate effects of the policy. The minimum wage can create a compositional shift in the labour used rather than a change in employment at the aggregate level. As the minimum pay policy is put into force, the rise in the labour cost might drive employers to substitute low skilled young workers for higher skilled older workers. Even if the policy significantly distorts youth employment, aggregate effects would not show up because the same number of workers are hired in place of the displaced workers. Hence, disaggregation of labour is crucial while analyzing the minimum wage effects.

Given the importance of disaggregation, young individuals are worth focusing on. Indeed, since they are more vulnerable to be affected by labour market policies, changes in the minimum wage might have more severe effects on the youngsters. Furthermore, unlike other groups in the labour market, these effects could be longer lasting as they might influence schooling choices of young people. If an attractive minimum wage drives them out of school, then reduction in skill acquisition would lower employment opportunities and hence their future well-being. On the other hand, the behavior of the youth might differ from the older ones when workers are laid off following the minimum wage. Indeed, after being laid off, a younger worker might consider enrolling in school if he/she believes that re-entering labour market does not worth, whereas an older worker either looks for a way to be rehired or to search for a new job. Particularly, education is an alternative to labour market in Turkey at younger ages. Indeed, the net enrollment ratio in upper secondary education was 82.7% for males in 2015/2016 school year. Moreover, this ratio for young males aged 14-17 years was 85.1%. Since the legal minimum age of working is 15 years in Turkey, those who are aged at 15-17 years old can be either in school or in the labour market. This is why we expect the minimum pay policy to have crucial effects on education decisions of young people in Turkey.

Broadly, we aim to analyze the impact of the minimum wage on the labour market and school participation of young males in Turkey by exploiting the elimination of age-based differentiation at the beginning of 2014. In particular, using this change

as a quasi-experiment, we study how the minimum wage affects employment, unemployment, and labour force and schooling participation of young males in the country. We ask the following questions:

- Does youth minimum wage policy significantly affect the employment for young males in Turkey? If so, what is the direction and magnitude?
- Does minimum wage worsen young males' unemployment in the country?
- How does the labour force participation behavior of young males change after a rise in the minimum wage?
- Is there a meaningful impact of the minimum wage policy on school enrollment of young males? If so, what is its direction? Does a higher minimum wage push male students out of school towards labour market? Or, does it lead young males to enroll more in school?
- Are there any significant effects of the minimum pay policy on the share of young males who are neither in employment nor in education?

This study is composed of six chapters. Chapter 1 is the introduction. Chapter 2 presents the theoretical arguments and related literature on the issue. We particularly focus on the economics literature on how minimum wage policies affect labour market and schooling outcomes. Employment, working hours, unemployment, labour force participation, wage distributions and schooling effects are scrutinized. Following the theoretical discussions and the empirical literature, we describe the institutional setting. Specifically, we provide historical background and legal structure of the minimum pay policy in Turkey. Moreover, we portray how this policy in the country is modified in 2014. The policy change in 2014 constitutes the experiment we use to determine the minimum wage impact in Turkey. Chapter 4 introduces data and the research design. Since the minimum wage prior to 2014 was determined according to age, we construct a design based on Regression Discontinuity. In this chapter, we also discuss the extent to which minimum wage binds for young males in Turkey. Chapter 5 presents the empirical results. Robustness checks are also given in this chapter. Chapter 6 concludes.

1.2. Significance of the Study

Minimum wage is an important policy instrument used as a way of intervening in the labor market. In many countries, it becomes a crucial element in reducing impoverishment and preventing individuals from falling into poverty. However, raising minimum pay means increasing labour cost, thereby cutting the demand for labour, especially for the least skilled workers. In this regard, it might be harmful for the employability of these individuals. Besides, it might have several consequences in terms of labour market and the well-being of citizens as discussed in the following parts. Therefore, the overall effect of the minimum wage is ambiguous. In fact, neither the theory nor empirical work has yet reached a firm conclusion on the issue. Furthermore, the issue is more complex in developing economies. This is because minimum wages might influence labour markets differently from the developed economies. On the one hand, it might not exert any pressure on the markets in these countries because of high rates of informality and non-compliance. On the other hand, if the minimum wage is taken as a benchmark for wages, then the concentration of workers around the minimum level leads us to expect significant effects. The impact of the minimum pay policy remains less-well studied in developing economies Moreover, there is no empirical consensus on these effects. Hence, this study contributes to the literature by providing evidence on the impact of this policy in one of the largest developing economies, Turkey.

In many developing countries, young individuals are underrepresented in the labour markets. In fact, they have very high unemployment and low activity rates in these economies. For instance, while the unemployment rate among males was 7% in Latin American and Caribbean countries (except high income) in 2016, it was 15.3% for young males aged 15-24 years (World Bank, 2018). Hence, it is important to adopt policies to facilitate their entrance in the labour market, while protecting them from being exploited. In particular, the minimum wage policy might be an effective tool to serve this purpose. However, to design it properly, the ex-ante outcomes of policy should be studied properly. In this study, we analyze

how labour market and schooling outcomes are affected by the minimum pay policy in Turkey while focusing on the young males.

Young people might have other choices than being a part of the labour market. This is because individuals acquire knowledge and skills mostly when they are young via formal/informal education and training. Therefore, when they legally become old enough to work, youngsters decide whether to continue their education and collect its returns through higher productivity later in their lives, or to enter the labour market and earn money immediately. Minimum wage might be influential on school participation choices of individuals when they are young. This is why examining educational behavior in response to minimum pay policy carries importance for young persons. This study contributes to this end by providing empirical evidence on the issue for young males.

1.3. Limitations of the Study

In this study, we focus on males to analyze how youth minimum wage policy affects labour market and schooling outcomes for them. Our motivation lies on the fact that female's behavior might differ from that of the males in regards to their labour force participation. In particular, social and cultural factors might be more influential than the economics factors in labour supply decision of young females. Additionally, the schooling decisions of females might be more affected by the factors other than labour market conditions. For instance, the families living in certain regions of the country might be conservative in sending their daughters to school. Thence, the analysis of the minimum wage for females within our context would require different tools and models than the ones we utilized in this study.

CHAPTER 2

THEORETICAL ARGUMENTS AND LITERATURE REVIEW

2.1. Labor Market Impact of Minimum Wages

2.1.1. Theoretical Discussions

2.1.1.1. Effects of Minimum Wage on Labor Market Outcomes in Neoclassical Theory

The foundation of neoclassical theory is based on competitive markets. The assumption is that there are many buyers and sellers and economic agents do not have any impact on prices. Prices are determined by the interaction of demand and supply (Boyer and Smith, 2001). Agents also behave rationally so that suppliers and demanders optimize their choices (Stigler, 1969). In a standard neoclassical model, utility-maximizing individuals are the suppliers of labour and profit-maximizing firms are the demanders of it. Labour is also regarded as a homogeneous input. In other words, each worker in the market is assumed equally productive (Vercherand, 2014). Therefore, in that setting, all workers are paid by their value of marginal product in the equilibrium (Borjas, 2016). In other words,

$$w=p*MP_L,$$

where w is the market wage rate, MP_L is marginal productivity of labour, and p is the output price. In this model $p*MP_L$, value of marginal product of labour, constitutes the demand for labour from the perspective of the firm. Since the firm is a price taker in the labour market, it faces a perfectly elastic labour supply at the market wage rate. Then, the intersection of firm's labour demand and market-determined wage rate identifies the number of workers hired by the firm at the equilibrium (see Figure 2.1 (a)).

As an external intervention, a statutory minimum wage sets a price floor in this model. If minimum wage is above the equilibrium wage rate, then this will reduce the number of workers demanded by the firm. Workers whose value of marginal product is less than the minimum wage would be laid off or work shorter hours. Moreover, the employment cut depends on two factors: the discrepancy between the minimum wage and equilibrium market wage, and the wage elasticity of labour demand. If the minimum wage is set high and labour demand is relatively elastic, then the number of displaced workers will be larger (Stigler, 1946). Furthermore, when the wage elasticity of labour supply is high, more people are attracted by the minimum wage and decided to enter the labour market after the imposition of the minimum wage with the hope of receiving a higher wage.

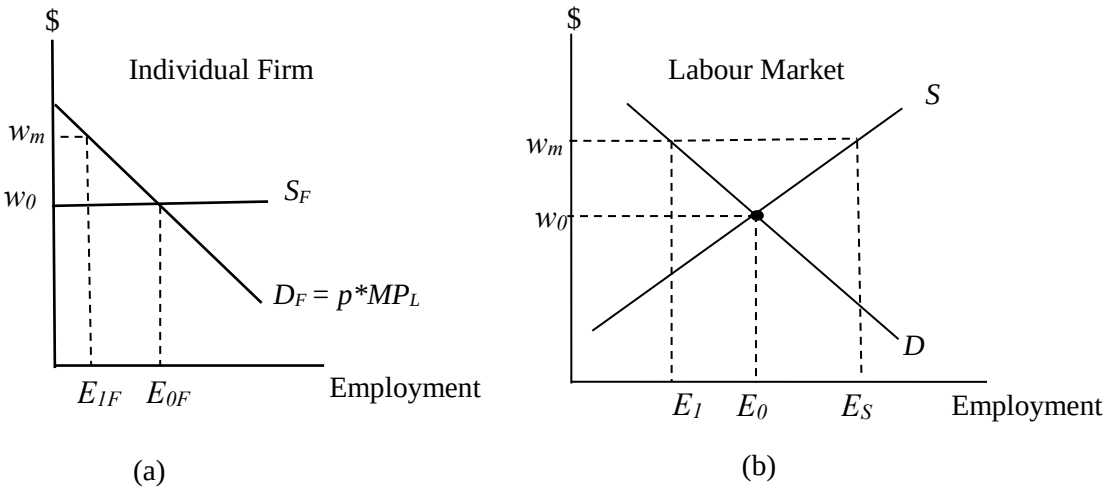


Figure 2.1. Impact of Minimum Wage on Employment in Competitive Markets

Figure 2.1 represents the standard model that neoclassical theory describes the impact of minimum wage on employment. Suppose that the competitive labour market is initially in equilibrium at wage rate w_0 and employment E_0. If the government imposes minimum wage rate w_m, then E_0-E_1 of workers are displaced as long as the minimum wage has national coverage and all firms comply with the law (Borjas, 2016). Because the minimum wage is set above the equilibrium level, firms move leftward along the labour demand curve, from E_0 to E_1. At the same

time, some workers are attracted by higher wages – a rightward movement along S --thereby creating an excess supply in the market (E_S-E_1). Hence, the depicted model implies that minimum wage legislation creates an unemployment risk for workers. Indeed, only the workers who are productive enough to be paid at the minimum level are able to survive in the market (Borjas, 2016). In this setting, if the market supply (demand) is relatively more elastic, then E_S (E_1) will be larger (smaller), thereby exacerbating the number of workers unemployed (E_S-E_1) in the market after the introduction of the minimum wage.

As described, neoclassical theory implies that minimum wages can create employment reductions so long as all workers are covered by the minimum wage legislation and all firms comply with it. Yet, in practice, minimum wages are applied in several ways to cover different types of workers. Some workers are even excluded from the minimum wage schemes in many countries. Even if minimum wages are nationally applied, some firms might have a tendency to disobey the minimum wage law.

Following Harris and Todaro (1970)[1], Mincer (1976) develops a model for analyzing employment and unemployment effects of minimum wage when only a part of the workers is covered by the legislation. It should also be noted that noncompliance of minimum wage law would affect the labour markets in the same way when some workers are excluded by law (Ehrenberg and Smith, 2012). According to this model, the presence of uncovered sector allows workers to move between sectors after the introduction of the minimum wage. In fact, two-sector model implies that imposition of minimum wage increases wages in covered sector above the equilibrium level thereby pushing some workers out of employment. The redundant workers in covered sector might move to uncovered sectors to find a new job. On the other hand, the wage differential between covered and uncovered sectors due to the minimum wage attracts some workers to the covered sector as

[1] Using a rural-urban migration flows in least developed countries; they construct a model of equilibrium unemployment.

well (Mincer, 1976; Welch, 1974). Not only the workers who become unemployed after the minimum wage law in covered sector, but also the individuals who were out of the labour force before the law would enter the labour market with the hope of finding a job in the covered sector in which the market wage is raised (Mincer, 1976).

The two-sector model has implications on unemployment as well. Following Mincer's model, Gramlich (1976) presents the idea of "queuing" for high-paid jobs. Indeed, the outflow of workers from the covered to uncovered sector does not fully match with the decline in employment in the covered sector. Even if the probability of job findings is relatively certain in uncovered sector, only some of the displaced workers move there. Some others might prefer to wait until they find a high-paid job in the covered sector. Moreover, as described above, some workers are attracted to the covered sector due to wages in this sector. On the other hand, since the labour demand declines due to the minimum wage in covered sector, those who prefer to wait in the queue have to endure some period of unemployment (Hohberg and Lay, 2015).

Within this framework, the impact of the minimum wage on the labour market depends on the size of wage differentials between the covered and uncovered sector, labour demand elasticities in each sector, total labour supply elasticity, the coverage of minimum wage, and the vacancy rate in the covered sector after the minimum wage law is passed (Mincer, 1976). For instance, if the labour force is not responsive to the changes in wages, i.e. fixed labour supply, then there will be a net outflow of labour from covered sector as long as the vacancy rate in that sector falls below the elasticity of labour demand. This results in a reduction in wage rates in uncovered sector, and hence a widening wage gap between the two sectors. On the other hand, an upward sloping labour supply curve reduces the downward pressure on wages in the uncovered sector (Mincer, 1976). Moreover, if there is a lot of job turnover in the covered sector, then individuals perceive that getting a high-paid job

will be high and this will encourage many workers to queue up for the job openings in that sector (Borjas, 2016).

2.1.1.2. Extensions to Neoclassical Theory

The neoclassical framework described above is based on presence of competitive markets. Nevertheless, empirical findings reveal that labour markets do not exhibit characteristics of the competitive markets as assumed by the theory (Karageorgiou, 2004). In fact, competitiveness is a strong assumption with which labour markets do not always comply. For instance, firms might have some degree of market power so that their labour supply curve is not perfectly elastic (Manning, 2003). Besides, the standard neoclassical theory ignores labour market imperfections. For instance, labour can be heterogeneous, such that they might differ in terms of their abilities, skills, knowledge, competencies and capabilities. Similarly, jobs might be different regarding risks or amenities they offer to workers, thereby creating heterogeneous jobs in the market. In addition, asymmetric information, rigidities in labour markets, different types of working arrangements and role of labour market institutions such as governments and trade unions are some of the other imperfections in the labour market ignored by the conventional neoclassical theory (Krasniqi, 2007). Thus, due to such imperfections, labour supply curve of individual firms might also be upward sloping, even though there exist many similar firms competing for the same type of workers (Borjas, 2016). This is why the classical model is extended to embrace imperfect competition, labour market frictions, information asymmetries, on-the-job trainings, institutions and other realities of labour markets as to mimic the real life better (Estlund and Wachter, 2012).

In what follows, we summarize the main models that are offered as extensions to standard neoclassical model and consider how minimum wages change labour market outcomes in these setups.

2.1.1.2.1. Monopsonistic Labour Markets

The standard neoclassical theory assumes competitiveness of labour markets in which employers do not have any market power in changing the market wage. Since the competitive firms cannot adjust the prices, they need to adjust their demand for labour and thereby reducing aggregate employment after the increase in labour cost due to minimum wage. However, some other firms can adjust wage rates by virtue of monopsonistic market structure. Even competitive firms might have some degree of monopsony power (Borjas, 2016). Indeed, the presence of labour market frictions can enable the firms to have power over their workers (Manning, 2003). Differential preferences of workers and labour mobility costs are some sources of such frictions (Robinson, 1933). These frictions can generate positively sloped labour supply curve because it is not the worker productivity alone that determines the wage rates. Yet, in this part, we focus on the effects of the minimum wage under monopsonistic market structure although there are some other sources of an upward sloping labour supply curve as mentioned above.

In a monopsonistic market, we have only one buyer of labour -- monopsonistic firm-- and many sellers of it. The monopsonistic firm have the market power so that it can determine the wage rate offered to workers of the same type. In such a market, the firm faces an upward sloping labour supply so that it needs to increase the wage rates to attract more workers. As shown in Figure 2.2, monopsonistic firm[2] has a positively sloped labour supply, S that lies below the marginal cost of labour, MC_L. Indeed, the marginal cost of hiring a worker is above the labour supply because the firm has to pay higher wages to all, while hiring an additional worker. Since the profit-maximizing firm hires up to a point where marginal hiring cost equals to the value of marginal product, the firm would hire fewer workers at a lower wage rate when compared to competitive firms. As seen in Figure 2.2, the monopsonist hires

[2] The firm represented in the Figure 2.2 is a non-discriminating monopsonist. This means that the monopsonistic firm offers the same price to all workers independent of their reservation wages, and hence it has to pay higher wages to all workers to attract an additional one.

E_M workers implied by the intersection of MC_L and labour demand curve, D, with a wage rate of w_M. When minimum wage is introduced, the monopsonistic firm can increase both employment and wage rates simultaneously, under certain conditions described below (Boeri and Ours, 2008). Assuming that the government introduces a minimum wage at w_m, the number of workers hired by the monopsonist increases to E_m. This is because, after the minimum wage is imposed, the marginal cost curve becomes the bold line as shown in Figure 2.2, and, it intersects with labour supply when E_m is employed. In fact, in such a market, labour is paid below the marginal productivity so that higher wages do not necessarily harm employment even if the average labour cost is raising. Instead, it reduces profits of the monopsonistic firm. In short, unlike the neoclassical theory, monopsony model allows positive impacts of the minimum wage on employment (Kwon, 2014).

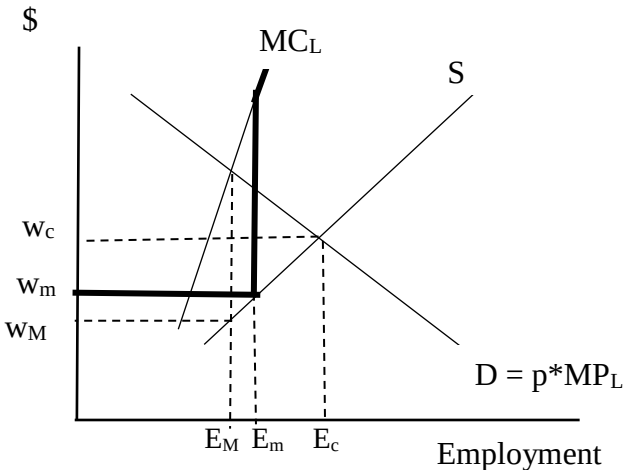


Figure 2.2. Impact of Minimum Wage on Employment for Non-Discriminating Monopsonist

Even though the monopsony model supports the fact that minimum wages can raise employment, it depends on *two conditions*. Firstly, minimum wage should be set below the value of marginal product. Otherwise, profit-maximizing behavior of the firm reduces the number of workers hired. In fact, there exists a non-monotonic link between the number of workers hired and minimum wage in monopsonistic

markets. A higher minimum wage can boost employment if it is set below value of marginal productivity, whereas an opposite effect occurs for higher levels (Boeri and Ours, 2008). Secondly, because the monopsonist has the ability to make adjustments via other inputs in the long run, the substitution and scale effects coexist. In fact, as the marginal cost of labour declines after the introduction of a minimum wage, labour becomes cheaper compared to other inputs. This induces the monopsonistic firm to substitute labour for some other input, say capital, which becomes more expensive than labour. On the other hand, despite a reduction in the marginal cost, the average cost of labour raises in response to minimum wage in that setting. Then, depending on the raising average costs, the firm contracts its output, thereby cutting down its labour use. This scale effect moves in way of reducing the number of workers hired. And, if the scale effect is large enough to dominate the substitution effect, then the overall impact of minimum wage on employment will be negative in the long run (Ehrenberg and Smith, 2012).

The possibility of higher employment due to minimum wage laws was first highlighted by Stigler (1946). He argues that if the minimum wage is skillfully set below the value of marginal product, then a firm, having a significant control over the wages, can raise the number of workers hired. Nonetheless, Stigler does not see such economy as realistic. On the other hand, Lester (1947) points out that experience under minimum wages contradicts Stigler's argument. In fact, several empirical studies reveal either zero or positive employment outcomes over the last two decades (Krasniqi, 2007). This is why competitive model loses its popularity after 1980s. Instead, the monopsony model gains support in 1990s after the seminal study of Card and Krueger (1994). In their study, they do not find any significant employment effect of the minimum wage in the fast-food industry in the US. Card and Krueger assert that one potential source of the zero-employment effect of the minimum wage would be the existence of some degree of market power in that industry. Monopsony model is still a safe haven for researchers when positive or zero impact of the minimum wage is found.

2.1.1.2.2. Efficiency Wage Model

The standard neoclassical theory predicts that a binding minimum wage reduces the quantity of labour demanded. However, this inference requires that worker's productivity is not affected by the wage rate (Rebitzer and Taylor, 1995). In his seminal study, Stigler (1946) discusses the relationship between wages, productivity and the minimum wage. Yet, he asserts that the minimum wage can raise the productivity of low-efficiency workers. This might arise because these workers are afraid of being fired after the imposition of the minimum wage and they decide to work harder. Nevertheless, he believes that this is not very likely since most of them might not afford the relevant costs to increase their productivity ensuring them to find a job at the higher wages. Moreover, firms can also increase the labour productivity through developing new techniques of production. In fact, techniques that are unprofitable for the firms turn out to be profitable investments as the labour become more expensive compared to other inputs after minimum wage is introduced (Mayneris et al., 2014). Regardless of the way used to raise productivity, the impact of minimum wage can be reversed under the neoclassical model as long as the productivity of workers increases.

Stigler's argument on the increasing productivity effects of the minimum wage is related to the *efficiency wage theory*. This theory is based on the idea that wage rates not only determine the number of workers employed but the productivity of workers as well (Georgiadis, 2013). According to the efficiency wage theory, firms can boost a worker's productivity by paying him a wage rate above the competitive level (Schmitt, 2013; Edwards and Gilman, 1999). Indeed, firms can increase worker efficiency through various channels when they raise workers' pay. Among these, reduction in "shirking" intensity of workers is the most pronounced way. The shirking model is developed by Shapiro and Stiglitz (1984). The essence of their model is based on monitoring and supervision cost of firms. In fact, since firms have limited capacity to monitor the performance of their workforce, workers can choose between working and shirking (Kwon, 2014). Shapiro and Stiglitz claim that

workers tend to shirk under the conventional competitive model due to imperfect monitoring and full employment, because were they to be fired, they would be rehired without any cost. To prevent shirking, firms might offer wages higher than the market wage because in that case if caught shirking the worker will face a wage loss. The threat of being fired from a high paying job is regarded as a way of improving worker's discipline and, hence, productivity.

Similar to the shirking model, the turnover model suggests that firms are required to pay higher wages to workers to avoid turnover costs. As they are paid at higher wages, workers are less likely to quit their jobs (Katz, 1986). Therefore, declining worker turnover within a firm via higher wages makes workers more productive (Estlund and Wachter, 2012). The selection model provides another explanation to the efficiency wage theory. This model is based on imperfect information of the firms on workers' true productivity. Because firms are not able to observe the true abilities of workers, they can increase the probability of attracting more productive workers by paying higher wages (Weiss, 1980). Moreover, a worker's own effort is related to the wage rate he gets. In fact, workers stick to their jobs and put more effort on their duties when they feel that they are being treated fairly by their employers. The perceived fairness of the wage might push the productivity of the workers as long as their effort is dependent on their morale and loyalty to the firm (Katz, 1986; Akerlof, 1984).[3]

Different from the standard neoclassical theory, the efficiency wage model argues that minimum wages do not necessarily hurt employment because wages, minimizing labour cost per efficiency unit of labour, might differ from the market-clearing wage rate (Katz, 1986). Higher productive efficiency due to minimum wage can increase the output produced by firms, thereby raising the number of workers hired. In fact, minimum wages increase not only the workers' pay, but also the average labour cost to firms. However, the boost in productivity that comes

[3] There are other explanations for the efficiency wage theory such as the nutritional model (Leibenstein, 1957), but they have not drawn as much attention as the ones discussed in the text.

about due the elimination of inefficiencies within firms can more than offset the rising costs. To illustrate this point suppose that after the introduction of the minimum wage, workers become more productive because of the decline in the intention to shirk. As Rebitzer and Taylor (1995) propose, this would reduce the supervision and/or monitoring costs and leave some resources free, which can be used to hire additional workforce without raising wages for workers.

Based on the efficiency model, positive relationship between wages and employment implies that minimum wages can increase aggregate employment even when many firms are competing for the same type of workers. Yet, some studies suggest that it can improve welfare and output, while reducing employment and creating unemployment (Carter, 1999). Using a general equilibrium-efficiency wage model, Carter (1999) shows that high-wage policies are able to increase output together with unemployment. Similarly, Drazen (1986) indicates that a minimum wage legislation can be Pareto improving relative to the competitive equilibrium even if unemployment is generated. The common ground of these studies is that increasing unemployment due to minimum wage might not be harmful as it is thought.

2.1.1.2.3. Search Model

As long as the minimum wage is binding, the neoclassic theory does not favor it under competitive markets, because of its adverse employment effects. On the other hand, the presence of monopsonistic market structure suggests that minimum wages do not necessarily harm employment. Nonetheless, each market structure is very stylized. Besides, they ignore several aspects of the real life (Rocheteau and Taşçı, 2008). Particularly, the real labour markets are with frictions so that they represent continuous flow of workers within and across firms. Moreover, jobs are not stable in an economy because they are simultaneously being created and destroyed (Ernst and Rani, 2011). Within such a dynamic process, unemployment exists since workers looking for job and open vacancies are not matched instantaneously. Even

if all the time necessary to match every worker-job pair passes, unemployment persists because in the meanwhile some workers and jobs are separated. Thus, an economy is never without unemployment (Pissarides, 1985; Mortensen and Pissarides, 1994).

Search theory is based on the *matching* of unemployed and vacancies in the market. The matching process takes some time regardless of the wage rate offered to the unemployed. Both job seekers and employers search for each other and they jointly decide to accept/reject the match seems to be closer to reality as Pissarides (2010) states in his Nobel Lecture. In that setting, the probability of a job seeker to have a successful match is summarized in a matching function that expresses number of jobs created as a function of number of unemployed and vacancies. In equilibrium, unemployment is determined based on the interaction between the search process and the labour demand (Ernst and Rani, 2011). Furthermore, wages are endogenous and determined by the generalized Nash bargaining[4] between the job seeker and the employer. According to search theory, identical workers can earn different amounts of pay and the sources of wage differentials are search duration and luck (Garloff, 2010).

The number of workers matched with job openings in search theory does not solely depend on labour demand. In fact, the search model argues that a higher pay due to minimum wage might attract more individuals with the hope of finding a job, thereby increasing their participation into labour force --i.e. labour supply (Arcidiacono and Ahn, 2004). Furthermore, after imposition of a minimum pay, individuals can choose to exert more effort to find a job. Since more people are searching jobs more extensively, the probability that a vacancy can be filled increases (Boeri and Ours, 2008). In this setting, the imposition of a minimum wage might or might not reduce employment in an economy because of conflicting effects on the supply and demand side of labour market (Flinn, 2006; Chowdry et

[4] Nash bargaining is a process of formalizing the interaction of participants using a two-player game in which players are contracting with each other depending on their preferences (Nash, 1953).

al., 2009). If the increase in labour supply dominates response of labour demand to the minimum pay, more job seekers matched with vacancies at the equilibrium after the imposition of a minimum wage. In that case, equilibrium employment would be higher due to the expansion of the labour market (Boeri and Ours, 2008). On the other hand, if the demand side effects are dominating, then minimum wage policy might result in less number of hires (Meer and West, 2016). Hence, the question on the employment effects of minimum wage in search models would be an empirical one. For instance, Garloff (2010) generates almost a zero impact of the minimum wage using a model without a bargaining process. Still, he emphasizes that positive employment effects might arise under certain circumstances. Similarly, Rocheteau and Taşçı (2008) show that raising the minimum wage can increase equilibrium unemployment when labour force participation decision and job search intensity of the workers are taken into account. But, they reveal that the associated increase in unemployment would be negligibly small. Alpizar (2016) also indicates that aggregate employment impact of minimum wage would be negative despite the fact that it increases employability of highly educated workers.

2.1.2. Empirical Evidence on the Impact of Minimum Wage on Labour Market Outcomes

2.1.2.1. Employment

Studies on the minimum wage mainly focus on its effects on labour market outcomes, particularly on employment. This is because discussions around the minimum wage started with the standard neoclassical theory predicting adverse employment effects, which might dilute the desired benefits of the policy. Since Stigler's (1946) influential work[5] on minimum wage, the distortionary employment

[5] Debates on the economic effects of minimum wage date back to earlier times before the Stigler's (1946) study. For instance, in 1915, Marie Obenauer and Bertha von der Nienburg (1915) conduct one of the earliest empirical research on effects of minimum wage on female employment (Neumark et al., 2014). In fact, the very first studies are conducted mostly by government officials in the US Bureau of Labor Statistics. Even though they do not stress any adverse employment effects of minimum wage, it would not be fair to expect the opposite based on studies made by the authors administering the laws on minimum wage (Peterson, 1959).

effects among the least-efficient workers has been the “conventional wisdom” of economists (Kane, 1997). Indeed, earlier studies provide a multitude of evidence about the adverse effects of the minimum wage policy. For instance, using cross sectional data of three industries in which the Fair Labour Standard Act in US applied during 1938-1950, Peterson (1957) finds that the negative correlation between employment and wage changes due to the minimum wage are not ignorable. Kaun (1965) also shows that minimum wages do reduce the number of workers hired by small producers in low-wage industries based on the data from Censuses in manufacturing during 1947-1958. In this study, Kaun computes factor utilization in production of the industries in which the minimum wage is imposed and indicates that the rise in labour cost are compensated through substituting labour for nonwage inputs. Based on earlier studies, Johnson and Browning (1983) assert that the only consideration on the impact of the minimum wage would be its magnitude, not the sign. Similarly, Rustici (1985) emphasizes that minimum wages reduce the employment opportunities of low skilled workers by increasing wage rates above market level as suggested in the neoclassical model.

Using time-series regressions, earlier studies until 1990s overwhelmingly estimate the change in number of workers as a response to an increase in the minimum wage over a period (see for example, Freeman, 1982; Ragan, 1981; Wellington, 1991; Iden, 1980; Neumark and Wascher, 1992). Even though most of them support the negative correlation between employment levels and the minimum wage, there is a wide range of differentiation in the magnitude of such estimates. Elasticities of minimum wage vary according to the period over which estimates are made (Borjas, 2016). To exemplify, Freeman (1982) estimates that a 10% increase in the minimum wage reduces teenage employment (16-19 years old age) by about 2.5% during 1948-1977. On the other hand, Ragan (1981) finds that a corresponding reduction in employment of the same age group is less than 1% when the period covered is 1963-1978 (Brown et al., 1982). In their landmark review, Brown et al. (1982) conclude that the employment elasticity of the minimum wage for teenagers is about -0.3 to -0.1. On the other hand, their work and other review studies are

criticized by later studies (Dolado et al., 1996). For instance, Kennan (1995) criticizes "conventional wisdom" based on Brown and his friends' largely quoted argument

> Our survey indicates a reduction of between one and three percent in teenage employment as a result of a 10 percent increase in the federal minimum wage. We regard the lower part of this range as most plausible because this is what most studies, which include the experience of the 1970s and deal carefully with minimum-wage coverage, tend to find (Brown et al., 1982:508).

Indeed, Kennan points out that averaging the estimates based on different methodologies, different periods of time and different--but closely related--data is as comparing apples and oranges, so that summative conclusions would be unconvincing.

Furthermore, earlier studies have difficulty in estimating the "true" impact of the minimum wage since regression equations estimated with time series data are not able to control the factors that can change employment levels, other than the minimum wage (Card and Krueger, 1995*a*). Macesich and Stewart (1960) argue that studies of US Bureau of Labor Statistics (BLS) based on the surveys in low-wage industries might be contaminated by seasonality during 1955-1957. They propose that before and after comparison of the number of workers might exaggerate the minimum wage impact on employment unless the information on the labour market trends are taken into account. Moreover, an early report of the BLS (1970) emphasizes that rise in relative size of young population, increase in schooling enrollment, and the shift in employment composition out of agriculture are some of the compounding factors, which can explain the relative rise in youth unemployment during 1960-1968. Indeed, various factors might concurrently affect employment and minimum wage rates, such as economic conditions, government policies, education systems and other labour market institutions. Their simultaneous determination might be a source of bias in negative estimate of employment effects of minimum wage, which can mislead the policy as mostly discussed in later studies (Lemos, 2004). Additionally, many studies until 1990s ignore distributional impact

of the minimum wage on employment. Existence of uncovered sectors, particularly when minimum wage schemes are first introduced in several countries, creates a movement of workers between covered and uncovered sectors and this might result in underestimation of its impact on employment as well (Williams and Mills, 1998).

Later studies, since the beginning of 1990s, have seriously challenged the adverse employment effects of the minimum wage, both theoretically and empirically (Lemos, 2004). Among them, the works of Card (1992*a*, 1992*b*), Katz and Krueger (1992), Card et al. (1994), Card and Krueger (1994, 1998), and Machin and Manning (1994) are of the salient ones.[6] In 1992, David Card publishes two articles that analyze whether the proposed negative employment effects of the previous research is valid or not. In both papers, Card focuses on the impacts on wages, employment and school enrollment of the minimum wage using difference-in-differences (DID) methodology. In one of his studies, he exploits 26% minimum wage increase in California in July 1988, and in the other, he uses the rise in the federal minimum wage in April 1990. Both studies come to the same conclusion: despite the fact that the earnings of low-wage workers rise following the hike in minimum wage, no significant employment reduction is observed. He even finds that employment rates among young workers increases following the boost in minimum wage. In their study, Katz and Krueger (1992) utilize a similar experiment. Using longitudinal surveys on fast-food restaurants in Texas in 1990 and 1991, they show that minimum wage increases are accompanied by an increase, not a reduction, in employment levels at the firms mostly affected by the policy change in US. Even though the 1994 study of Card and Krueger analyze the effects of the hikes in minimum wage in US with a similar methodology, their work attract more attention than the work of others. This is because they exhibit the flaws in using aggregate time-series data and encourage economists to consider using

[6] In 1992, the special issue of "*Industrial and Labor Relations Review"* published several studies analyzing the employment effects of the minimum wage. Even though these studies approached the issue differently and ended up with conflicting results, they are generally regarded as the foundations of what is called as the "new minimum wage research" (Neumark et al., 2014).

appropriate counterfactuals in analyzing the minimum wage effects (Wooden, 2009). In their seminal paper, Card and Krueger (1994) analyzes how rises in New Jersey's minimum wage rate affect employment levels at 410 fast-food restaurants. They conduct a survey before and after the change in the minimum wage in fast-food restaurants in New Jersey and in the neighboring state of Pennsylvania. Using a DID approach, they find a relative increase in young workers employed in the fast-food restaurants in New Jersey.

In addition to the research beginning in early 1990s, Card and Krueger's (1995*b*) influential book "*Myth and Measurement"* starts a new era on the economics of the minimum wage. Reanalyzing earlier studies, it splinters the conventional notion of distortionary employment effects. Many studies then question the traditional rule of thumb: *minimum wage is bad for employment*. Moreover, numerous work provide contradictory evidence on the orthodox approach. Indeed, whereas several studies (e.g. Bernstein and Schmitt, 1998; Dickens et al., 1999; Machin and Manning, 1994, 1996) cannot identify any significant reductions in employment levels due to minimum wage; relatively fewer studies (e.g. Portugal and Cardoso, 2006; Slonimczyk and Skott, 2012; Dickens et al., 2014) indicate that it can positively affect employment, even among young workers. In the meanwhile, some economists embrace the standard theoretical view. After the new debate on the economics of minimum wage flared up, David Neumark and William Wascher, for example, provide lots of evidence supporting the classical opinion. In 1992, they analyze employment effects of the minimum wage among teenagers and young adults. Using state-level panel data of US over the period 1973-1989, they find that employment elasticity of minimum wage ranges between -0.2 and -0.1 (Neumark and Wascher, 1992). In the study, they point out that both the sign and magnitude of the elasticities they get are very close to findings of the earlier research. The research following these authors support the classical notion regarding the negative employment effects of the minimum wage (see for example, Neumark and Wascher, 1993, 1995a, and 2000). Neumark and Washer are not alone in their journey along the "*new minimum wage research*". Indeed, many studies provide

evidence on the existence of negative employment effects (see for example, Currie and Fallick, 1993; Kim and Taylor, 1995; Gowers and Hatton, 1997; Williams and Mills, 1998). In the meantime, some studies do reveal mixed effects (see for example, Deere et al., 1995 and Magruder, 2013).

In sum, the long-running discussion on the employment impact of the minimum wage is continuing. Why is the debate still going on? The first and foremost answer is the differences in the data and empirical methodology adopted in the studies. To illustrate, in 2000, Neumark and Wascher re-analyzed Card and Krueger's seminal study published in 1994. In this study, Neumark and Wascher (2000) use payroll records from the sample of restaurants in New Jersey and Pennsylvania. Their sample mostly coincides with the restaurants, which generates Card and Krueger's data set in their 1994 study. In spite of the replication of Card and Krueger's DID methodology, Neumark and Wascher do not reach any positive employment effects as Card and Krueger obtain. On the other hand, increasing availability of credible data and developing better econometric models and techniques are contributing to resolve the puzzle. Moreover, although empirical minimum wage literature vastly concentrated on its impact in developed economies, it might affect labour markets in developing countries differently. Indeed, these countries mostly have different economic environments compared to developed ones, which might influence how minimum wages affect labour markets (Lemos, 2009). Among them, the degree of compliance and labour market structure are of special importance (Del Carpio and Pabon, 2017). For instance, minimum wages in developing countries are often set high and, a high degree of low skilled workers earn at or around the minimum wage so that changes in minimum wages might affect more workers in such settings. Accordingly, adverse employment effects of the minimum wage might be expected to be higher in these economies than in more developed economies (Broecke et al., 2017). On the other hand, developing countries are usually characterized by high

degree of informality and non-compliance with minimum wage, thereby generating moderate effects on employment (Broecke et al., 2015)[7].

2.1.2.2. Hours of Work, Unemployment and Labour Force Participation

Minimum wage effects on different labour market outcomes other than the number of workers employed are also studied in various papers. For instance, if the firing cost of labour is too high due to, say the existence of employment protection laws, employers encountering a hike in the minimum wage might consider reducing hours of work, instead of the number of workers hired, to compensate the increase in labour costs. Moreover, adjustments through working hours would be a quicker way to respond to wage hikes (Hamermesh, 1993). Hence, the studies showing small or no significant employment effects by examining only the number of workers might be wrong in making the conclusion that there are no or moderate employment effects (Neumark et al., 2004). In their study, for example, Couch and Wittenburg (2001) find that increases in minimum wage reduce working hours of teenagers so that the total responsiveness of labour demand to the changes in minimum wage would be underestimated. Similarly, Pereira (2003) shows that in response to 35.5% increase in the minimum wage in Portugal firms adjust through not only reducing number of workers hired, but also reducing average working hours. Stewart and Swaffield (2008) analyze the effects of minimum wage at the intensive margin in the UK. They find that hours of work among low skilled workers reduce by 1-2 hours per week following the imposition of the minimum wage in the country. On the other hand, using longitudinal data in US, Zavodny (2000) does not find any significant minimum wage effects among young workers on working hours, though he finds adverse employment effects. Moreover, based on China's experience during 2005 and 2006, Jia (2014) shows that increases in minimum wage do not affect females' hours of work, while raising working hours of males.

[7] For a more detailed discussion on the role of minimum wage and its impact on labour markets of developing economies see for example Broecke et al. (2015, 2017), Lemos (2009), and Del Carpio et al. (2018).

If a worker loses his job due to minimum wage policies, then what happens to him? Does he start to look for a new job? Or, is he discouraged, making him to move out of the labor market? In fact, the behavior of workers affected by minimum wage schemes might influence the total number of unemployed and the total size of the workforce. Moreover, high periods of unemployment would be harmful for labour productivity and businesses due to the depreciation in skills (Del Carpio and Pabon, 2017). This is why minimum wage effects on unemployment and labour force participation, in addition to employment, are under empirical scrutiny.

Mincer (1976) proposes that the minimum wages create unemployment even in the presence of a sector in which minimum wage does not apply. He claims that workers would move out of covered to uncovered sector. Movement of workers to uncovered sector puts downward pressure on wages, thereby leaving wage rates in covered sector higher than those of in the uncovered sector. Then "waiting" for the jobs in covered sectors creates some amount of unemployment, which might turn out to be permanent (Mincer, 1976). On the other hand, Burdett and Mortensen (1998) claim that minimum pay can reduce inefficiency in unemployment, thereby reducing unemployment levels. This type of inefficiency can arise when a wage offer is lower than reservation wage of a worker, although his productivity is higher. This might happen in the existence of labour market frictions, like in the case of monopsonistic competition. Then, a rise in minimum wage can shift wage offer distribution and hence reduce this inefficiency (Portugal and Cardoso, 2006). Therefore, some economists find supporting evidence for the classical view on minimum wage's effect on unemployment (see for example, Gorry, 2013; Cahuc and Michel, 1996), while some advocate new research on minimum wage (see for example, Portugal and Cardoso, 2006).

Despite attracting less attention, how minimum wage schemes affect participation to the labour market is under study as well. For instance, Wessels (2001, 2005) asserts that reduction in expected well-being of displaced workers due to minimum wage discourage individuals looking for a job when they are young. On the other

hand, in two-sector model, proposed by Mincer's work (1976), there might be an increase in the participation of individuals in covered sector, while an offsetting decline in the participation in uncovered sector. Therefore, when minimum wage has partial coverage and labour supply is not fixed, the resulting impact of a rise in minimum wage on labour force participation becomes unclear. Yet, in his primary analyses on minimum wage's impact, Mincer finds that labour force participation of individuals decline associated with increases in minimum wage in US during 1954-1969. Similarly, Brochu and Green (2013) show that increases in minimum wages reduce the transitions of workers from 'out of labour force' to 'unemployment' and increase the flows from 'unemployment' to 'out of labour force', thereby leaving more people out of the market. On the other hand, Flinn (2006) discusses that minimum wages that improve the bargaining power of individuals might foster their participation under the search model with endogenous contact rate and participation decision.

2.1.2.3. Wages and Wage Distributions

Minimum wage is a policy tool aiming at improving welfare of (very) low-skilled workers through protecting them from receiving unduly low pay. In line with this objective, one might naturally expect that these workers would benefit from minimum wage increases --if they were lucky enough to keep their jobs. Then, does minimum wage push up the take-home pay of the workers located over the low end of the wage distribution? Can minimum wages reduce the wage dispersion in favor of low-wage earners? Compared to its effect on employment, empirical literature presents more consistent findings regarding the impact of minimum wage on the wages of workers earning close to it and on the wage distribution. In fact, most of studies analyzing whether minimum wage creates any adverse employment effect suggest that it increases wages of workers earning at and around the minimum wage. Alaniz et al. (2011), for instance, find that in the sectors in which minimum wages apply, a hike in the minimum wages significantly increase the wages of workers earning around 20% of the minimum wage before the increase. In their

influential paper, Dinardo et al. (1996) emphasizes the role of labour market institutions in improving wage distributions in US during 1979-1988. Similarly, Lee (1999) finds that a significant proportion of the increase in wage inequality in the lower tail of the wage distribution in US during 1980s can be attributed to the concurrent decline in the real minimum wages. Furthermore, there are many other studies indicating that minimum wage improves wages and wage distribution (see for example, Dube et al., 2010; Autor et al., 2016; Barany, 2016; Pelek, 2013).

Conventional theory suggests that minimum wages might lead to a better distribution of wages through truncating it (Barany, 2016). Then, what happens to wage rates of other workers lying on different parts of the wage distribution? Besides, how are the workers that fall outside the law affected by changes in minimum wages? Are there any significant effects for them? The two-sector model--with a covered and an uncovered sector--implies that the minimum wage increases wages of the workers in the covered sector, while reducing them in the uncovered sector due to flow of workers to this sector with the hope of finding jobs. However, contrary to theoretical predictions, some studies indicate that in developing countries, in which informality is the fact of life, wages would *increase,* rather than decrease, in informal sectors following hikes in minimum wage (see for example Maloney and Mendez, 2004; Del Carpio et al., 2018). A plausible interpretation is that minimum wages might act as a reference price throughout the economy as a whole. Then, it is likely that increases in minimum wages can lead to parallel shifts in wage rates in sectors in which the minimum wage does not apply. This effect is introduced by Souza and Baltar (1980) as "*Efeito Farol*" or the "*Lighthouse Effect*", commonly used by researchers thereafter. In their work, Souza and Baltar study the case of Brazil, where minimum wages are taken as a reference to wages in the public sector, cash transfers and for collective bargaining in the private sector (Boeri et al., 2011). In such a setting, it is not difficult to imagine why minimum wages might be influential in other parts of the economy. Alternatively, the lighthouse effect might arise because low-skilled workers can sort themselves into formal sectors following increases in the minimum wage, thereby increasing productivity and wages in

informal sectors (Boeri et al., 2011). Fiszbein (1992) discusses that increase in demand for the goods produced in informal sectors can be another reason for the rise in informal sector wages. The idea is as follows: minimum wage hikes improve the wellbeing of low-paid workers, and since these workers mostly demand informal sector products, it will increase the demand and hence the wages in these sectors. Besides, some studies show that minimum wages might increase the wages of workers lying on upper parts of wage distribution, even in the covered sectors (see for example, Autor et al., 2016, Butcher et al., 2012). For instance, Grossman (1983) asserts that employers might raise the wage rates of other workers, above the minimum wage, to prevent their work effort from falling.

2.1.2.4. Minimum Wage Effects on Teenagers

A wide range of studies analyzing the minimum wage effects on labour markets focus on low-skilled, low-experienced and low-wage earning young individuals. In fact, teenagers constitute a significant share among minimum wage earners in many countries so that they are more likely to be exposed to changes in minimum wages (Smith, 2014). In this study, we also analyze how youth minimum pay policy affects this vulnerable group in various aspects in Turkey. Thence, the literature on this policy effects for youth is crucial to this study. Empirical findings on the impact of the minimum wage becomes closer to consensus when the focus turns to teenagers. Indeed, the literature signals that the minimum wage policy mostly harms youth employment (Broecke et al., 2015, 2017; Christl, 2017). Using the increase in minimum wage received by 18-19-year-old workers in 1987 in Portugal, Pereira (2003), for example, finds that the number of younger workers employed declines relative to older workers. Moreover, he estimates that the minimum wage elasticity of employment for teenagers ranges between -0.4 and -0.2. Yannelis (2014) uses a similar experiment. Employing a relative decline in minimum wages among workers below 25 years of age, he shows that the policy would increase the rate of new hires among young workers exposed to lower minimum wage. Hyslop and Stillman (2007) also utilize a reform altering the youth minimum wage in New

Zealand in 2001. Specifically, the minimum wage applied to 18-19-year-old workers increased by 69% and the amount applied to 16-17-year-old workers went up by 41% in the country. They find adverse effects on youth employment two years after the reform, despite zero effect in the shorter run. Studies of Hyslop and Stillman, Yannelis, Pereira and many others are based on an experimental design applied to a *change* in the minimum wage for teenagers. On the other hand, some work exploit age-based structure of the minimum wage to analyze its effect on teenagers. For instance, using the differential rate of the minimum wage by age in UK, Fidrmuc and Tena (2013) provide a support to the negative employment effects on youth. Similarly, Kreiner et al. (2017) estimate the minimum wage effects on youth by employing the minimum wage structure in Denmark allowing workers who are under 18 years old to receive a lower amount. In this study, they show that as a worker turns 18, the 40% increase in minimum wage reduces the employment rate by 15 percentage points (pp) at that age.

Though fewer in number, there are also studies suggesting that minimum wages can positively affect youth employment. For instance, using the age discontinuity of minimum wage in UK, Dickens et al. (2014) find that there exists a positive impact on employment and activity rates of low-skilled youth. Furthermore, they discuss that the positive effects encountered in this study can be explained by labour market frictions. In particular, a higher minimum wage might increase the job search intensity of youth so that it increases their labour market participation as well. On the other hand, even though higher minimum wages can induce younger workers to look for jobs more intensely, there should be a corresponding rise in demand to be matched with job vacancies. Similarly, using increases in the minimum wage applied to young workers in Portugal, Portugal and Cardoso (2006) find that higher minimum wages would drive up employment among the youth. Unlike Dickens et al., Portugal and Cardoso analyze how this effect might come about. To do so, they analyze changes in the number of job separations and the number of new hires. Their findings show that young workers are less likely to be hired and fired, but the

impact on job separations seems to dominate, thereby leading to positive employment effects.

There are also a small number of studies that fail to find any significant association between youth employment and the minimum wage policy. For instance, Allegretto et al. (2011), analyzing how minimum wages affect employment of 16-19-year-old workers in the US during 1990-2009, find that minimum wages do not significantly harm youth employment. Additionally, they argue that studies showing negative employment effects are biased because they fail to control for spatial heterogeneity in employment trends. Taking these heterogeneity into account might change the estimates substantially in a way that eliminates the association between minimum wage and employment. Similarly, Olssen (2011) studies the effects of the minimum wage on workers aged 15-21 years old in Australia. In this study, he does not find any significant impact on the short-run employment and the hours of work for young workers. By reviewing 64 studies on US between 1972 and 2007, Doucouliagos and Stanley (2009) find that there exists little or no relation between minimum wage and youth employment, when the publication selection bias is corrected.

2.2. Schooling Impact of Minimum Wage

2.2.1. Theoretical Discussions

Economic theory on the impact of minimum wage on school attainment of young adults is based on the Human Capital Theory. This theory analyzes the schooling decision of individuals with costs and future benefits as key arguments[8]. To illustrate, if a worker is about to invest in, say, an additional year of schooling, he should bear the financial costs of schooling together with its opportunity cost, the *foregone earnings today*. On the other hand, he expects to be rewarded by higher

[8] Following the main concepts of human capital theory highlighted by Friedman and Kuznets (1954), Jacob Mincer (1958) first analyzed the schooling model discussed in this section.

earnings in future as he collects the return to his investment. As such, the trade-off between higher earnings in the future and lower earnings today determines workers educational attainment and hence the skill level before entering the labour market (Borjas, 2016). How does a young person compare the current costs and future benefits of education? The human capital theory assumes that individuals compare the benefits and costs based on the maximization of the present value of their lifetime earnings. Therefore, young workers can be attracted by a better option involving either higher future returns or lower present costs associated with educational investment.

Within this framework, predictions of human capital theory regarding the impact on schooling of minimum wage is double-edged. On the one hand, minimum wages might compress the wage distribution so that it can raise the wage rates of low-wage workers (Acemoğlu, 2001). Then, the higher wages available to low-wage workers increases the opportunity cost of schooling for young individuals. Besides, for those who can find a job at a minimum wage might choose to invest less in schooling depending on the raise in costs due to minimum wage policy (Belman and Wolfson, 2014). As a result, minimum wages can prevent some teenagers from schooling, and hence generating a negative correlation between schooling and minimum wage. The distortionary effects of minimum wage on schooling that occur through the opportunity cost is also known as the "price effect" (Pacheco and Cruickshank, 2007).

On the other hand, economic theory suggests that minimum wage might increase or decrease employment opportunities. If, say, it reduces the probability of finding a job, then the cost of foregone work will decline, thereby raising the return to schooling and the enrollment of teenagers. This effect works against the price effect, making it difficult to draw a conclusion about the net impact of minimum wage on schooling (Belman and Wolfson, 2014). Pacheco and Cruickshank (2007) argue that two conditions should hold for a positive effect to arise. Firstly, there should be a strong link between productivity of a worker and his wage rate. In particular,

if a worker's productivity is not high enough to be paid at minimum wage, then he is unlikely to find a job. Secondly, a worker should believe that he could improve his productivity to a sufficient level to secure employment through more schooling. Alternatively, minimum wages might reduce educational attainment when it raises the employment opportunities. Hence, how and to what amount the minimum wage affects employment will determine its impact on schooling (Belman and Wolfson, 2014).

In addition to price effects, Chaplin et al. (2003) suggest that minimum wage can generate an "income effect" if it affects the household income or expected lifetime income of teenagers. According to Chaplin et al., income effect will be ambiguous. A higher minimum wage might increase the lifetime individual/household income so that it raises the demand for *education*, as long as it is a normal good. Yet, the problem is that it might not increase individual/household income as it can lead job losses in the meanwhile. If minimum wage lowers income through eliminating job opportunities, then teenagers might reduce their demand for education (Chaplin et al., 2003). Then, whether minimum wage creates a positive or negative income effect is not clear. Furthermore, based on their approach, the overall effect of minimum wage on schooling depends on both the direction and size of the price and income effects that are moving in opposite directions. For example, if the income effect is positive and high enough to offset the price effect, then we expect minimum wage to bolster educational attainment of young people. Otherwise, there would be negative impact of minimum wage on schooling.

As discussed, minimum wages can increase, decrease or have no impact on the schooling decisions of teenagers. Neumark and Wascher (1995a, 1995b, and 2003) agree upon the general issue, but they believe that these effects are not symmetric for low- and high-skilled teenagers. The idea is based on the substitution of workers. In fact, employers can replace high-skilled young workers for low-skilled ones when the government imposes a minimum wage above the market level. High-skilled teenagers might be in school and can be attracted by the minimum wage.

Then, the shift in demand for labour from low-skilled teenagers to high-skilled teenagers will lead the more skilled students to leave school (Campolieti et al., 2005). On the other hand, one can argue that minimum wage might attract low-skilled workers to the labour market as well. Indeed, if a low-skilled student is not successful in school with which he has little attachment, then even little amount of wage increments, following minimum wage, might attract that student to work. It is because a low-skilled student expects to earn at or around minimum wage if he leaves school in the future. Besides, leaving school today with the hope of receiving minimum wages means that the low-skilled young person does not necessarily bear the associated costs of education. Still, low-skilled students might not be pulled by the minimum wage if there are few jobs available with low quality workers and if these students compete with adults for these jobs (Warren and Hamrock, 2010)

2.2.2. Empirical Evidence on the Impact of Minimum Wage on Schooling

Much of theoretical and empirical discussion on the minimum wage focus on its impact on the labour market. In contrast, less attention is devoted to the effects of the minimum wage on educational attainment of teenagers (Ehrenberg and Marcus, 1982). Work might be an option for young individuals attending school when labour market opportunities change. Alternatively, teenagers might be attracted by future labour market benefits so that they would decide to invest more on schooling today. Accordingly, it is crucial to analyze empirically how the minimum wage affects school enrollment of teenagers.

The human capital theory implies that the impact of minimum wage on educational attainment is ambiguous. As Turner and Demiralp (2001) highlight "This ambiguity in the possible impact of higher minimum wages on educational attainment adds another dimension of social cost and/or benefit to the already heated debate" (p:97). On the other hand, despite growing literature, empirical evidence reports mixed results. In fact, while several studies find negative effects of the minimum wage on schooling, others find positive, no or mixed impact. For instance, Landon (1997)

analyzing the minimum wage effects on high school enrollment by using provincial level data for six provinces in Canada during 1975-1986, finds that minimum wage elasticity of enrollment is -0.08 and -0.17 for 16-year-old males and 17-year-old males, respectively. Neumark and Wascher (1995a, 1995b, 1995c, 2003), studying the relationship between minimum wage, employment and school enrollment based on US experience, find that minimum wages can lead students to leave school to queue for the minimum wage jobs. The students starting to wait in the queue will either find a job or become 'idle', i.e. be neither in school nor in employment. Their results also show that the minimum wage increases the low-wage teenagers to be pushed out of the labor market. On the other hand, Agell and Lommerud (1997) argue that minimum wages can increase the productivity requirements of jobs, and hence create positive effects on human capital accumulation of workers when they are young. Similarly, Smith (2014) finds that minimum wage reduces the probability of school dropouts for teenagers coming from families with low socioeconomic status. Smith discusses that the underlying reason on the positive educational impact of minimum wage can be the reduction in working hours of working teenagers.

There are several studies providing mixed evidence. For example, employing Canadian data over 1993-1999, Campolieti et al. (2005) do not confirm a significant substitution of students for non-student teenagers as opposed to the findings of Neumark and Wascher. Furthermore, the minimum wage is found to have no net impact on school enrollment of teenagers Crofton et al. (2009) show that minimum wage is positively associated with dropout rates for Hispanic students but is not significantly related with the dropout rates for others. Turner and Demiralp (2001) also find that the minimum wage reduces the likelihood of being idle for teenagers living outside the central cities, whereas it has no impact for those living there. Similarly, Ehrenberg and Marcus (1982) point out that their evidence for non-white teenagers is ambiguous regarding the minimum wage effects on school enrollment.

In addition to the theoretical debate, one possible explanation for the divergence of the empirical findings would be that minimum wage might have differential effects on school enrollment across racial, gender or socioeconomic groups (Turner and Demiralp, 2001; Crofton et al., 2009). Crofton et al., for instance, argue that the reason why dropout rates of Hispanics are negatively affected by the minimum wage, while the non-Hispanics are left unaffected could be the sociological differences between the two groups. In particular, Hispanic students' dropout decision seems to be more responsive to a wide range of economic factors, including the minimum wage policy. Empirical literature also points out differences in methodology, data and variables used, as another reason for the divergent results. For example, schooling indicator chosen is quite diverse. A wide range of variables such as probability of continuing to the next grade, and enrollment, completion and dropout rates are utilized (Perova and Trujillo, 2015). The nature of the dependent variable used in model estimations might also generate some differences in the findings. Warren and Hamrock (2010), for example, argue that the high school completion rates, a commonly used measure of schooling, are usually biased since they do not sufficiently account for grade retention, mortality, migration and other factors.

2.3. Empirical Literature in Turkey

Even though there are voluminous studies analyzing whether the minimum wage significantly affects labour markets both directly and indirectly through educational choices of workers, its impact is less well studied in developing economies. In Turkey, the effects of minimum wage are still being questioned. Indeed, there are only a few studies examining how and to what extent the Turkish labour market is affected by the minimum wage policy. Furthermore, empirical studies on the issue does not have a long history. This is because of the lack of availability of adequate data that allow researchers to follow labour market trends. In fact, the regular Household Labour Force Surveys, providing information on the Turkish labour market, started to be conducted since April 1988. Besides, the scant literature in the

country exhibits full range of results on employment --positive, negative and none. Since they are few in number, we present the findings of all studies to the best of our knowledge.

Studies examining the existence and direction of minimum wage effects on the Turkish labour market mostly exploit time-series or cross-sectional data. Such type of work usually asks the following questions: "Does a long-term relationship between minimum wage rates and employment/unemployment trends exist?" "What is the direction of these associations if they do exist?" Moreover, the main findings of these studies present either negative or no significant relation. For instance, Akgeyik and Yavuz (2006) study how the minimum wage, GDP and unemployment rates are related by using time-series data for the period 1974-2003. They find that there exists significant long-term links among them. The results of the causality tests suggest that minimum wage Granger causes unemployment in Turkey. Similarly, using October 1988 round of Household Labor Force Survey (HLFS), Öztürk (2007) shows that minimum wage has detrimental effects on labour force participation and employment of females. In particular, she argues that minimum wage can increase the hours of work demanded by the firms above the desired level of females so that it would reduce their activity and employment rates. On the other hand, by exploiting time-series data over 1969-2006, Korkmaz and Çoban (2006) find that while no significant association exists between minimum wage and unemployment, minimum wage and inflation Granger causes each other. Güven et al. (2011) also arrive at similar findings for the manufacturing industry. In fact, using 1968-2008 period, they do not reject the hypothesis of the non-existence of a long-run relation between minimum wage and employment. They argue that this insignificant association can be attributed to low levels of minimum wage in Turkey. In fact, during period of interest, Kaitz index, *defining minimum wage relative to average wages*, was relatively lower. In this case, the margin of minimum wage above the average wages remains low. This would then hinder the adverse effects of minimum wage implied by neoclassical theory. Similarly, making a time-series analysis for females using 1988-2009 data, Günsoy and Tekeli

(2013) find no significant relationship between female employment and the minimum wage.

Limited number of studies on minimum wage effects use longitudinal data. Despite the restricted availability and use in Turkey, longitudinal data allows researchers to study transitions of individuals among different states, e.g. from employment to unemployment, thereby enabling a better understanding of the dynamics in the labour market due to the minimum wage policy. Using panel structure of HLFS data from 2002 to 2005, Papps (2012), for instance, examines employment effects of the minimum wage and social security taxes. He finds that both policy measures reduce the probability of remaining employed and the probability of finding a job. Besides, he shows that these effects become larger for vulnerable groups in the labour market such as females, rural workers and teenagers under 30. On the other hand, by using regional level data in Turkey during 2004-2014, Pelek (2015) finds that minimum wage does not worsen formal employment of 15-29 year-old individuals. Moreover, her findings show a positive impact on informal employment of youth, but no sign of adverse effects on total employment of this age group. Exploiting a quasi-experimental approach, Gürcihan Yüncüler and Yüncüler (2016) present similar set of findings. Yet, their work moves ahead of the Pelek's study in terms of analyzing the intensive margin as well. In particular, they show that a higher minimum wage raises the probability of informal employment, while it has no aggregate disemployment effect. On the other hand, they find that adjustments mainly occur via working hours in formal sectors. In fact, they show that minimum pay increases weekly hours of formal sector workers indicating that employers would make the existing employees to work more instead of firing some due to higher wages. Similarly, using DID methodology, Bakış et al. (2015) follow a quasi-experimental approach. They find that increases in minimum wage encourage school enrollment of teenagers while reducing their labour force participation. Moreover, to the best of our knowledge, this work is the unique study analyzing minimum wage effects on educational attainment in Turkey. Dağlıoğlu and Bakır (2015) employ administrative records from the Social Security Agency

to investigate employment effects of the minimum wage in the formal sectors. They show that minimum wages increase employment probability of males. In short, the limited literature on the minimum wage effects in Turkey is far from reaching a consensus.

CHAPTER 3

INSTITUTIONAL SETTING

3.1. Historical Background and Legal Structure of Minimum Wage in Turkey

In Turkey, the governments have been involved in wage determination process since 1806. In fact, they started to set the minimum rates of wages in few sectors in this year. This is regarded as the first attempt in determining minimum wage levels in the country. In 1921, the act on the working conditions of coalminers in Ereğli Coal Field stated that minimum wage levels of the coalminers in Ereğli would be determined by a Council of three persons--a representative of workers, a representative of employers and a representative of the government (Eser and Terzi, 2008). In 1923, Economic Congress of Turkey decided that minimum wages would be determined at the local level by Municipal Councils once in every three months based on living conditions. Although this rule could not be put into practice, it was an important attempt for the introduction of minimum wage (Güven et al., 2011). Besides, the Congress decided in the same year that no one under 12 years of age could work in any job so that 12 years of age was accepted as the legal minimum working age (Koç, 2000).

Even though there were several attempts to introduce a statutory minimum wage in Turkey, its legal structure could not be established until 1936. According to first Labour Act No. 3008 enacted in 1936, minimum levels of wages would be determined by a regulation (Article 32). However, due to World War II, the implementation of the minimum wage law was postponed until 1951 (Korkmaz and Avsallı, 2012). After fifteen years of delay, Minimum Wage Regulation was first introduced in 1951. This Regulation defined the minimum wage as the wage level that could meet the basic needs of individuals like food, housing, health, cloth and

fuel (Article 1). In 1961, the right to minimum pay was also assured by the 1961 Constitution. During 1951-1967, Local Commissions were constructed to determine the minimum wage levels in the country according to sectors at the local level. However, its implementation remained limited until the end of this period. This was mainly because of the lack of coordination between Local Commissions resulting in unequal pay among very similar localities (Korkmaz, 2004).

The determination of the minimum wage by Local Commissions was abandoned with the introduction of the new Labour Act No. 931 in 1968. This Act declared that a Central Commission formed by the Ministry of Labour would determine the minimum wage levels biennially (Article 33). The Minimum Wage Regulation following the new act changed the structure of minimum wage significantly (Korkmaz and Avsallı, 2012). This Regulation allowed a Central Commission to determine the minimum wage either at the local, regional or national level. Moreover, the differentiation of minimum wage according to age was introduced for the first time. In fact, the Regulation stated that minimum wage levels could be determined based on whether a worker is a child (those who are 16 years old or younger) or an adult (those who are over 16 years old) (Article 11). In 1969, the Central Commission determined the minimum wage levels by six regions and age (16 years old and younger; over 16 years old). In particular, those defined as a child by the act were allowed to receive 10.3%-13.3% less than the adults did.

In 1971, the Constitutional Court reversed Labour Act No. 931. Following this, the new Labour Act No. 1475 was enacted in the same year. However, only very few amendments were made in the new Labour Act. In particular, Article 33 regulating the minimum wage hardly changed. The only change in this Article concerned the coverage and construction of the Central Commission. In fact, the new Labour Act No. 1475 extended the coverage of minimum wage to all employees covered by the act and working with a labour contract. In 1972, based on Article 33, a new Minimum Wage Regulation was issued with minor changes to the previous one (Erdoğdu, 2014). The Central Commission determined minimum wage for labour

working in industrial sectors in four regions by age in 1972. In particular, those who were 16 years old or younger were allowed to receive 14.9%-17.4% less than those who were older than 16 (Figure 3.1). The region-based differentiation of the minimum wage was abandoned in 1973. During 1974-1989, the minimum wage was determined by sector and age. Moreover, the minimum wage differential between younger and older workers was about one third of the older workers, during 1975-1989 (Figure 3.1). This wage differential was substantially larger than the differentials observed between the minimum wage levels of the same age groups in the previous periods. In 1989, the sectoral differentiation of the minimum wage was abandoned. Furthermore, since 1987, Central Commission started to determine the minimum wage levels at least once in every year because of the rising inflation levels (Gökdere, 1997).

In 1982, a new Constitution was prepared and accepted. In Article 2, Turkey was declared as a welfare state. Moreover, taking all necessary measures that enables every worker to receive a fair pay was stated as one of the responsibilities of the state (Article 55). In the third Clause of Article 55, it was also declared, "in determining the minimum wage, economic and social conditions of the country shall be taken into account". Thus, in 1982, the Constitution adopted a principle in determining minimum wage levels of Turkey for the first time (Sencer, 1986). Although a "minimum wage" was secured by the Constitution, taking economic and social conditions of the country into account while determining the minimum wage restricted the way it is determined (Korkmaz and Avsallı, 2012). Indeed, instead of emphasizing the provision of a subsistence income to all workers, the development plans prepared after 1980 highlighted that wages should enhance labour productivity and foster competitiveness in the country (Esen, 1999). In 2001, Article 55 of the Constitution was revised so that it reads as, "in determining a minimum wage, the living conditions of the workers and the economic situation of the country shall be taken into account" (Gönenç, 2004). This amendment allowed minimum wage levels to be determined by taking into account the living conditions of the workers in addition to the economic situation of the country.

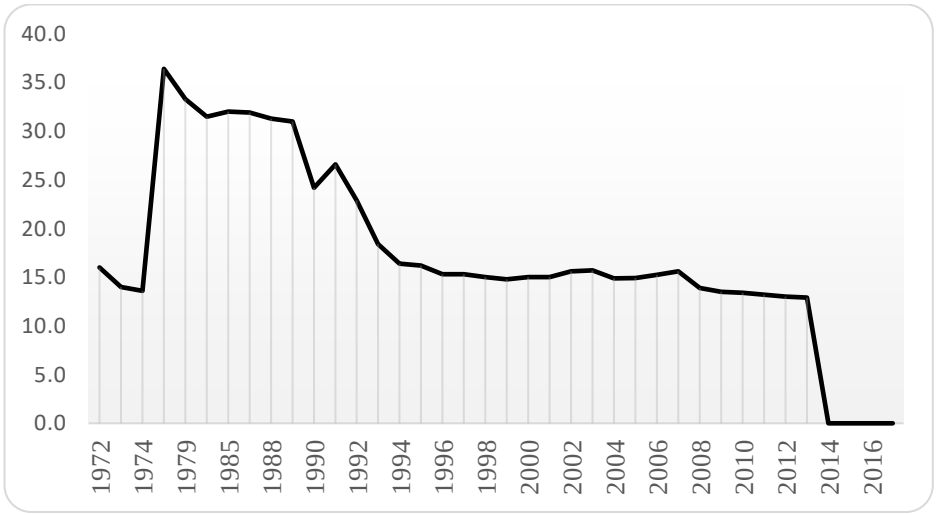
During 1989-2002, no significant changes were made in the country either in regard to the coverage or the determination of the minimum wage. In this period, the minimum wage was determined at the national level by age. Furthermore, the criterion on the age-based differentiation remained same. The age threshold determining the minimum wage level was 16 years of age. However, the difference in the minimum wage levels applied to younger and older workers declined gradually over this period. Indeed, the minimum wage of the younger workers was 31% less than that of the older workers in 1989, whereas this rate declined to 15.6%[9] in 2002 (Figure 3.1).

In 2003, the Labour Act No. 1475 was replaced by the Act No. 4857, which is still in force today. One crucial change introduced by this Act was the increase in legal minimum working age. In fact, Article 71 of the Act banned the working of children under 15 years of age.[10] Article 39 of the Act also extended the coverage of minimum wage to all workers--either covered or not covered by this law--working with labour contract. Moreover, it slightly changed the structure of the Central Commission. In 2004, the Minimum Wage Regulation based on Act No. 4857 was created. Unlike the previous regulations, this regulation explicitly declared that the minimum wage should be determined according to the age threshold of 16. During 2003-2013, the minimum wage of younger workers was 12.8%-16% less than that of the workers of 16 years of age and over (Figure 3.1). Besides, the minimum wage differential between the former and latter shows a declining trend over time. In fact, younger workers were subjected to 15.7% lower minimum wages than older workers in the first six months of this period of 2003; whereas this rate declined to 12.8% in the second half of 2013.

[9] In 2002, the minimum wage was determined twice a year. Hence, this percentage is the average of the differentials in that year.

[10] Children under 15 years of age are allowed to work only under appropriate conditions in certain sectors (Law No. 4857, Article 71). The conditions under which a child can work are determined by several regulations issued by Ministry of Labour and Social Security.

On 31 December 2013, the Central Commission determined that minimum wage levels for younger and older workers would be the same in 2014. This change was suggested by the employee representative in the Commission, the Confederation of Turkish Trade Unions, during the negotiations that lasted for six weeks. Despite the objection of the employer representative, the Turkish Confederation of Employer Associations, the proposal was accepted by the Commission with the majority of votes. In fact, the primary aim of this change was to eliminate any kind of discrimination in determining the minimum wage (Decision of Minimum Wage Determination Commission, 2013). Following this change, government amended the first Clause of Article 7 of Minimum Wage Regulation in 2014, thereby reading as, "minimum wage is determined at least every two years". In other words, the elimination of minimum wage according to age was adopted by law. This amendment closed the age-based minimum wage gap among workers in Turkey as of January 2014. Since then, the national statutory minimum wage is determined by the Central Commission.



Notes: Differentials are calculated as the average of minimum wage differentials of different groups (by region, by sector or by different periods in a year) when necessary.
Source: Minimum Wage Determination Commission (during 1972-1995), and Ministry of Labour and Social Security (during 1996-2017).

Figure 3.1. Minimum Wage Differentials among Younger and Older Workers in Turkey (1972-2017, % of Adult Minimum Wage)

3.2. Minimum Wage in Turkey

A significant proportion of workers in Turkey earn around the minimum wage. In fact, 41.3% of formal sector workers (i.e. those with social security registration) in the private sector and 35.7% of those in the public sector are reported to Social Security Institution as minimum wage earners in 2016. The legal basis of the minimum wage in Turkey is the Labour Act No. 4857 and the Minimum Wage Regulation[11]. Article 39 of the Labour Act declares that minimum wages are to be determined by Ministry of Labour and Social Security (MoLSS) through the Minimum Wage Determination Commission at least every two years. Even though Labour Act states that it can be determined at least every two years, it was typical of the Commission to determine minimum wage two times in a year during 1997-2015[12]. However, the Commission determines minimum wage annually since 2016.

MoLSS chairs the meetings of the Commission, which is composed of fifteen members: two members are from MoLSS, one from Turkish Statistical Institute (Turkstat), one from Treasury, one from Ministry of Development, five from the employee organization representing the majority of employees and five from the employer organization representing the majority of employers. The meetings of Commission are held in December of every year, and the minimum quorum is ten members. The Commission decides by majority of votes and Chairman has the casting vote in the event of a tie. Furthermore, according to Article 8 of Minimum Wage Regulation, the minimum wage should be determined based on documentary evidence provided by Commission members and the decision of the Commission are absolute.

[11] Minimum wage legislation also depends on the relevant requirements declared in the agreements signed with the country's international partners (See Appendix D).

[12] 2005 and 2006 are exceptions. In these years, minimum wage was determined once for a year.

The regulations on the minimum wage assert that Commission take social and economic conditions of the country, living condition indices for salaried workers[13], actual wages and the average living standards into account while determining the minimum wage. Article 5 of the regulation forbids discrimination based on mother tongue, race, color, sex, disability, political opinion, philosophical belief, religion and similar reasons. Accordingly, the Commission sets the minimum wage level based on three main pillars: daily calorie need of workers, cost of living indices and food inflation.

(i) *Daily calorie need*: Daily calorie need of a labourer working in jobs involving heavy physical tasks is taken as 3,500 calories. Moreover, if the job involves medium physical tasks and light physical tasks, a labourer working in these jobs needs 3,000 calories and 2,500 calories in a day, respectively.

(ii) *Living indices:* In Turkey, official living indices are available neither for salaried workers nor for all. However, Turkstat calculates the expenditures required to meet daily calorie needs of a worker. Based on this, it estimates the total daily expenditures of a worker at minimum, and the Commission uses them as a substitute for living indices for workers as implied by law. The methodology for calculating a worker's minimum daily expenditure is as follows. Firstly, a balanced diet basket is constructed for three types of labourer working in jobs involving heavy tasks, medium tasks and light tasks. In fact, 73 items from Consumer Price Index (CPI) basket are designated as the food basket for each worker type. The shares of each item for each type of laborers are constructed based on the earlier study[14] conducted by Hacettepe University on the required food intake for a

[13] If these indices are not available, the regulation allows the Commission to use general living condition indices (Article 7 of Minimum Wage Regulation).

[14] This study was submitted to Turkstat to be used for the Commission studies, thereby is not available for public use.

balanced diet. Then, using November prices[15] in each NUTS-2 region, total food expenditures are calculated[16]. In order to obtain a nation-wide expenditure, the total food expenditure of a worker of each type in each region is weighted with the number of workers in that region. The weighted food expenditure obtained is then multiplied by four[17] to get total expenditure of a worker per day.

(iii) Food inflation: Increasing minimum wage by at least the rate of inflation is crucial for the Commission. Hence, it closely follows CPI trends and the changes in food prices to determine minimum wage levels. In fact, during the meetings, Turkstat presents main developments in prices and changes in its components, particularly in processed food.

Moreover, the Commission tracks other developments in the country and global economic trends. In particular, Undersecretariat of Treasury presents developments in the growth rates, annual industrial production statistics, and the developments in manufacturing industry. It also informs the Commission on main developments in the world economy and their probable impacts on domestic labor markets. Besides, labour market developments, changes in labour costs and wage trends in both public and private sectors in Turkey are provided by the Ministry of Development. GDP forecasts and labor markets predictions (e.g. unemployment rates, employment etc.) are also presented by the Ministry. As a result, Commission uses various indicators

[15] Since the study of Turkstat on the daily expenditure of a worker is presented during the Minimum Wage Determination Commission meetings held in December, the most recent prices available are for November.

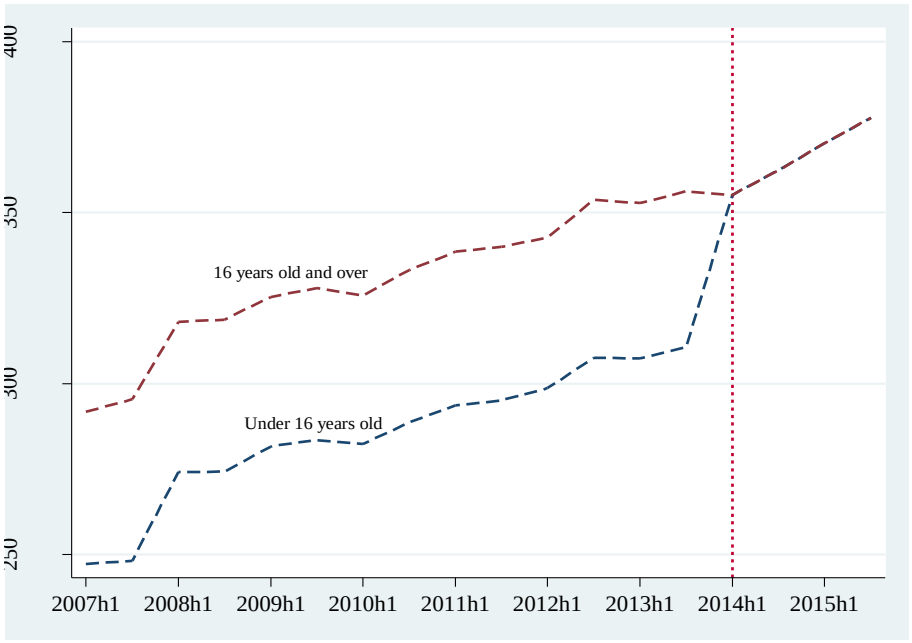
[16] The calculation of total food expenditures are based on average prices. To illustrate, a balanced diet to meet 3,500 calories of food intake per day includes 120 gr. meat, 50 gr. legumes, 350 gr. milk, yoghourt or cheese, 100 gr. potatoe and so on. To find the contribution of the meat to total food expenditure, Turkstat takes the average of lamb and beef prices, and then multiplies the average prices of meat with 0.12. This occurs because the daily food intake required to meet a certain calorie level does not point out a single item all the time, it says that taking 120 gr. meat is enough without specifying the type of meat.

[17] It is assumed that food expenditure constitutes one fourth of the total expenditure of a worker.

that may provide information on the economic and social conditions of workers in determining the minimum wage level in Turkey.

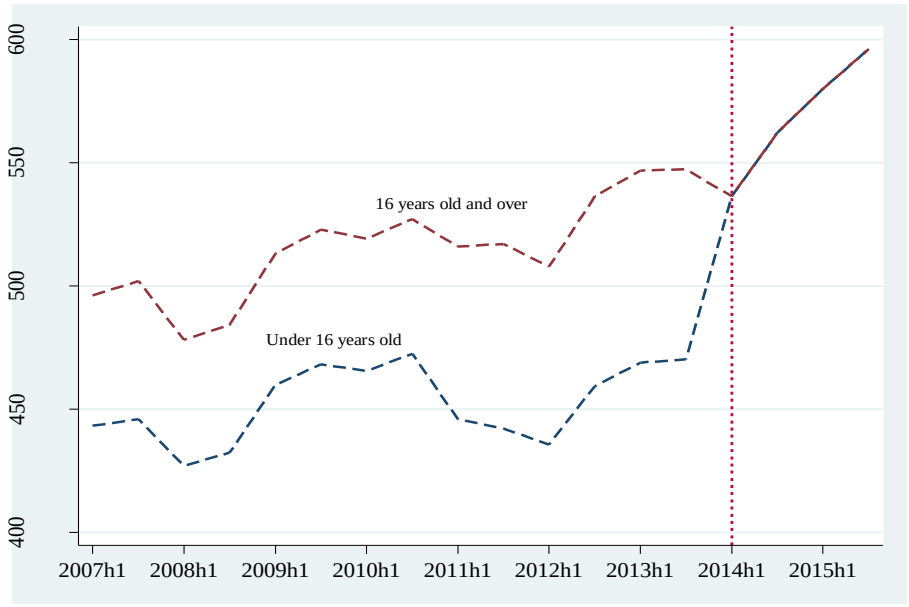
3.3. Change in Youth Minimum Wage Policy

Minimum Wage Determination Commission removed the age-based differentiation of minimum wage on 31 December 2013. This change was not anticipated because the issue of equating the minimum wages for all workers was raised up during the meetings, beginning on December 6, 2013 and ending on December 31, 2013, and no media debate or discussions were made before. Then, the Commission declared a single minimum wage to be applied to all workers in Turkey starting on 1 January 2014. Following the new rule, the nominal minimum wage applied to 15-year-old workers increased by 20.7% from December 2013 to January 2014. Although the minimum wage was set differently for workers younger and older than 16 years of age, the minimum wage for the two groups moved together until 2014. Figure 3.2 shows the evolution of the real minimum wage (nominal wages corrected for CPI) for workers under 16 years of age and workers at and above 16 years old, from the first half of 2007 to the second half of 2015. The figure reveals that the growth of minimum wages for the two groups in real terms were very similar until 2014. The reform that eliminated the age differential in minimum wages had a significant impact on nominal and real minimum wages. Indeed, while the real minimum wage for workers under 16 years old increased by 14.3% in the first half of 2014, real minimum wage for older workers reduced by 0.1% in that period. The relative increase in real minimum wages of 15 year olds is likely to change their behavior as long as it has an impact on the wages received.



Notes: Minimum wage is determined for the first and the second half of each year during 2007-2015. Therefore, h1 refers the "first half of a year" and h2 refers the "second half of a year".
Source: Ministry of Labor and Social Security

Figure 3.2. Real Minimum Wage by Age (2007h1-2015h2)



Notes: Minimum wage is determined for the first and the second half of each year during 2007-2015. Therefore, h1 refers the "first half of a year" and h2 refers the "second half of a year".
Source: Ministry of Labor and Social Security

Figure 3.3. Real Cost of Minimum Wage by Age (2007h1-2015h2)

Furthermore, the change in minimum pay policy significantly affected employers' labour cost in regard to workers employed at minimum wages. As shown in Figure 3.3, until 2014, the real cost of minimum wage earners (labour costs are corrected for PPI) under 16 years of age was substantially lower than that of the older workers. In fact, during the first half of 2007 and second half of 2013, minimum wage earners under 16 years of age costed 12.2% less in real terms, on average, than the cost of workers at and above this age. Furthermore, in the first half of 2014, the real cost of 15-year-old minimum wage earners increased by 14.1% with the policy change. Given the significant amount of the rise in labour costs applied to younger workers, we analyze the impact of this policy change in Turkey.

3.4. Labour Market and Education Outcomes of Young Males in Turkey

3.4.1. Labour Market Outcomes

Young individuals account for a significant portion of the population in Turkey. In particular, out of 40 million males[18] in the country, 3.4 million are aged 15-19 years as of December 2016. Moreover, young males are underrepresented in the labour market. Indeed, the labour force participation rate of 15-16-year-old males was 23.3% and their employment rate was 20.3% in 2015. Despite the rising trend over time, both the labor force participation and employment rates are still low compared to older males in the country (Figure 3.4). Before the policy change in minimum pay, the employment rate of these males was 19.3% in 2013, and it increased to 21.4% in 2014. Furthermore, this increase in the employment rate was higher for 16-year-old males compared to 15-year-old males. In fact, according to HLFS, while the employment rate of 15-year-old males increased by 1.5 pp in 2014, it increased by 2.4 pp for 16-year-old males in the same year. Similarly, the increase in the labour force participation rate was higher for 16-year-old males in 2014.

[18] As discussed in the following parts, our focus is on young males in this study. Therefore, we focus on males aged 15-16 years in this part.

Indeed, whereas this rate increased by 2.0 pp in 2014 for 15-year-old males, it increased by 2.4 pp for 16-year-old males.

Source: Own Calculations using 2004-2015 HLFS.

Figure 3.4. Employment and Labour Force Participation Rates of 15-16-year-old Males (2004-2015).

In the country, young males aged 15-16 years old mostly work in low quality jobs and without social security. In fact, 87.9% of 15-16-year-old male workers did not have any social security in 2015. Furthermore, informality is higher for 16-year-old males. While 92.1% of 15-year-old males were working without social security in 2015, the corresponding ratio for 16-year-old male workers was 84.6%. Besides, a significant proportion of young males are in agricultural related occupations. Indeed, based on ISCO08 occupational classification, 17.2% of males of 15-16 years old were “market-oriented skilled agricultural workers” and 10.7% of them were “agricultural, forestry and fishery labourers” in 2015 (Table 3.1). Moreover, according to 2015 HLFS, 28.3% of 15-16-year-old male workers were working in agricultural sectors and, 11.9% of them were working in food and beverage service activities.

Table 3.1. Occupational Distribution of 15-16-year-old Employed Males (2015, %)

	Ratio
Hospitality, retail and other services managers	0.1
Legal, social and cultural professionals	0.1
Science and engineering associate professionals	0.1
Health associate professionals	0.4
Business and administration associate professionals	0.4
Legal, social, cultural and related associate professionals	0.3
Information and communications technology professionals	0.1
General and keyboard clerks	1.2
Customer services clerks	0.1
Numerical and material recording clerks	0.1
Other clerical support workers	0.2
Personal service workers	12.3
Sales workers	10.1
Personal care workers	0.4
Market-oriented skilled agricultural workers	17.2
Subsistence farmers, fishers, hunters and gatherers	0.1
Building and related trades workers, excluding electricians	3.9
Metal, machinery and related trades workers	7.1
Handicraft and printing workers	1.8
Electrical and electronic trades worker	2.7
Food processing, wood working, garment and other craft and related trades workers	9.0
Stationary plant and machine operators	2.5
Assemblers	0.7
Drivers and mobile plant operators	0.2
Cleaners and helpers	4.8
Agricultural, forestry and fishery labourers	10.7
Labourers in mining, construction, manufacturing and transport	8.1
Food preparation assistants	2.0
Street and related sales and service workers	1.0
Refuse workers and other elementary workers	2.3

Notes: Based on ISCO08 classification.
Source: Own Calculations using 2015 HLFS.

In Turkey, young males aged 15-16 years old are frequently employed as regular or casual employees. Moreover, unpaid family working is prevalent for this age group of males. In particular, according to the 2015 HLFS, 64.4% of 15-16-year-old males were employed as regular or causal employees, and 34.6% of them were unpaid family workers. Furthermore, compared to male workers in general, 15-16-year-old

males have slightly shorter working hours. Indeed, HLFS data show that these young males worked 48.3 hours[19] per week while male workers in general worked 49.9 hours per week in 2015. However, when we exclude unpaid family workers, 15-16-year-old males' working hours per week increase to 53.2 hours, on average, in the same year, while that of males in general to 50.2 hours.

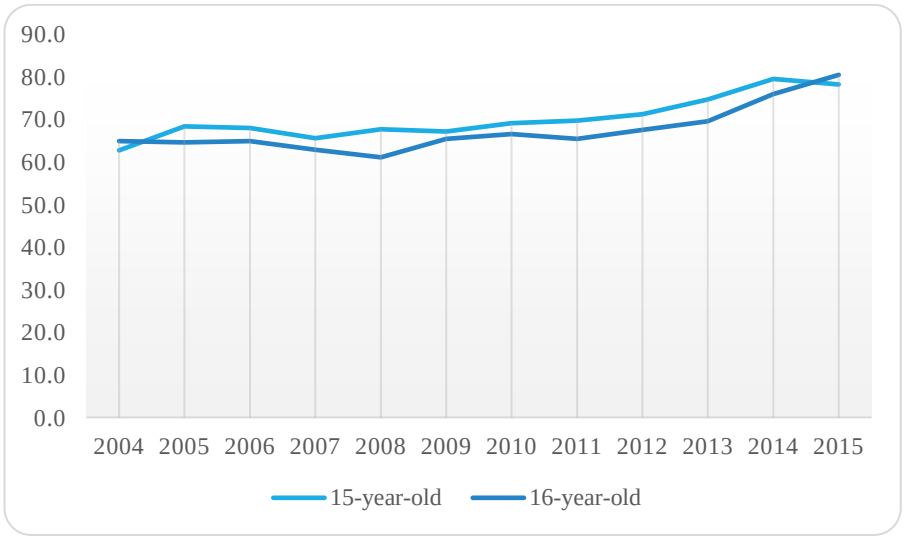
3.4.2. Education Outcomes

Most males aged 15-16 years attend formal education in Turkey.[20] According to HLFS, 79.3% of them were enrolled in high school[21] in 2015. Particularly, whereas 78.2% of 15-year-old males were in high school, high school enrollment rate for 16-year-old males was 80.4% in that year. Furthermore, high school enrollment rates show increasing trends as presented in Figure 3.5. Indeed, this rate increased by 4.8 pp for 15-year-old males after the policy change in 2014, and it increased by 6.4 pp for 16-year-old males. The upward trends in high school enrollment are due to increasing enrollment rates in vocational high school. In particular, Figure 3.6 illustrates that the enrollment rate in vocational high school among 15-year-old males increased by 5.0 pp, while it increased by 3.5 pp for 16-year-old males in 2014 relative to 2013. However, as shown in Figure 3.7, the enrollment rate in general high school decreased by 0.2 pp for 15-year-old males in the same year, whereas this rate increased by 2.8 pp for 16-year-old males.

[19] Hours of worked corresponds to usual working hours in the main job.

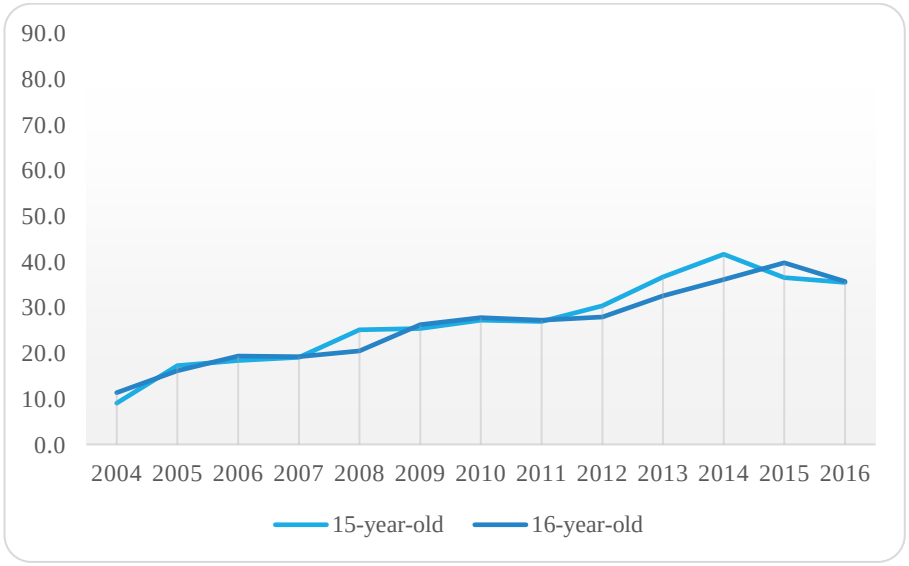
[20] In 2012, the compulsory schooling system was changed with Law No. 6287. Whereas 8 years continuous education was mandatory prior to the amendment, twelve years --4 years for each of the primary, elementary and high school-- years were enforced by this amendment. Regarding the years covered in this study, we are focusing on the post-reform period. Moreover, even though the Law forces individuals to enroll in school, it does not create a jump in the high school enrollment ratios for males in 2012 (Figure 3.5).

[21] This rate does not include open education.



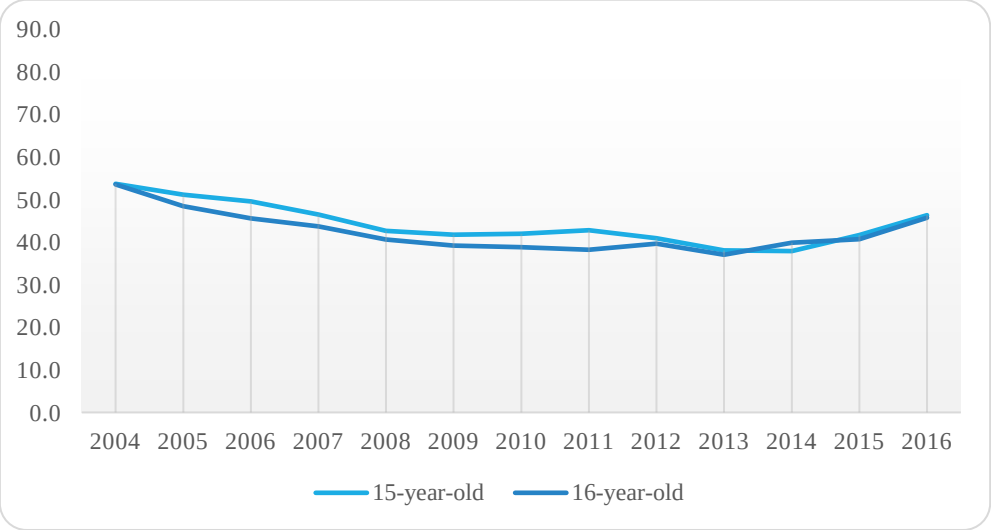
Source: Own Calculations using 2004-2015 HLFS.

Figure 3.5. High School Enrollment Rates of Males (2004-2015)



Source: Own Calculations using 2004-2015 HLFS.

Figure 3.6. Vocational High School Enrollment Rates of Males (2004-2015)



Source: Own Calculations using 2004-2015 HLFS.

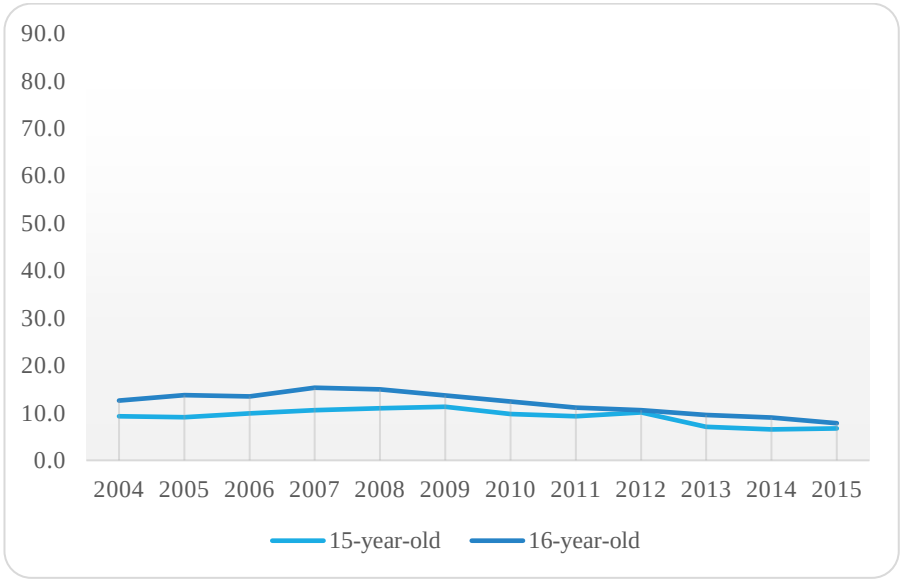
Figure 3.7. General High School Enrollment Rates of Males (2004-2015)

3.4.3. Neither Employed nor in Education

Among the non-employed young males, a significant portion do not attend formal education in Turkey. Indeed, based on HLFS, 7.3% of 15-16-year-old males were neither employed nor in education in 2015. Furthermore, while 25.6% of these young males were unemployed, 74.3% of them were out of the labour force in that year. Besides, those who are out of the labour force are discouraged workers: 42.7% of the 15-16-year-old males who were neither employed nor in education were not looking for a job because (i) they did not believe that they could finding a job or (ii) at a previous time they showed much effort but could not find a job.

Figure 3.8 illustrates the proportion of young males who are neither employed nor in education in Turkey. It shows that this proportion has been declining over time for both 15-year-old and 16-year-old males. This is line with increasing trends in high school enrollment and employment rates. Furthermore, the ratio of young people who are neither employed nor in education was 9.6% for 16-year-old males,

and it was 7.1% for 15-year-old males in 2013. In 2014, this ratio declined to 9% and 6.5% for 16-year-old and 15-year old males, respectively.



Source: Own Calculations using 2004-2015 HLFS.

Figure 3.8. Proportion of Males who are Neither Employed nor in Education (2004-2015).

CHAPTER 4

DATA AND IDENTIFICATION

4.1. Data Description

In this study, the primary source of data we use is the Survey of Income and Living Conditions (SILC). It is a nationally representative household survey, annually collected and published by Turkstat since 2006. Furthermore, SILC is compiled in line with the Compliance Program of the European Union (EU) to provide statistics about poverty, income distribution, social exclusion and living conditions in Turkey, comparable with EU countries. As such, questionnaire and methodology of SILC for Turkey and EU countries are much alike. In this context, data in SILC cover a rich set of variables on demography, health, housing, economic conditions, labour, social exclusion, asset ownership and income status in Turkey (Turkstat, 2017). Although household roster in SILC lists all household members, questions about education, labour market, health and income are only asked to the household members who are aged 15 years and over (Turkstat, 2012).

The survey design of SILC is appropriate to produce both cross sectional and panel data. In particular, a group of respondents, who are sampled from non-institutional civilian population in Turkey[22], are followed for a period of four years. A rotational design is applied in SILC, so that only a part of the households[23] in a year remains in the sampling frame in the following year. Furthermore, in place of the households rotated out, new households are added to sample. Specifically, 75% of households in one year's sample is kept in the next year's sample, and the remaining 25% is

[22] Non-institutional civilian population covers all individuals residing within the borders of Turkey, except the immigrants and the persons who are living in dormitories, prisons, elderly homes, military barracks, hospitals, hotels and child-care centers.

[23] The sampling unit in the survey is 'households'.

replaced with other households sampled from the same population. Figure 4.1 is a demonstration of 2012-2015 SILC rotational design. We have generated 7 sub-samples (samples 11-17) for illustration purposes. As shown, households in the subsamples of 11-17 are all interviewed during the period 2012-2015. After four years from the start of the sample design, subsample 14 is shown four times in total. This subsample constitutes the four-year panel [24] in 2012-2015 SILC data.

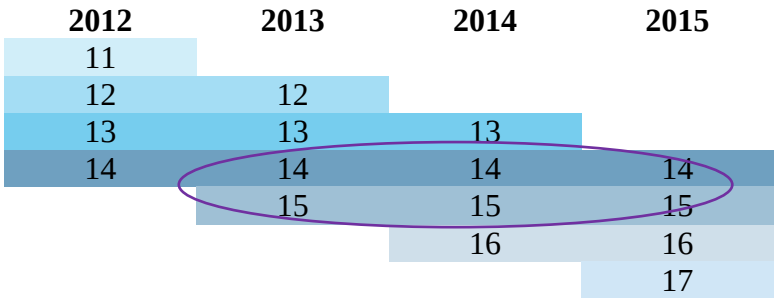


Figure 4.1. Panel Design of SILC, 2012-2015

Even though SILC is compiled annually, it includes retrospective information on the monthly main activity of individuals aged 15 years old and over. This enables us to follow persons who are in the panel for 48 months. The monthly individual activity compiled in a given year refers to the previous year's information. To illustrate, the question corresponding to main activity in January in 2014 refers to the individual's main activity in January 2013. Thence, if a person declares himself as a "self-employed, working full time" in January 2014, then it means that he was self-employed in the first month of 2013, not of 2014.

Panel data of SILC contains month of birth and year of birth information for each person observed. Therefore, we are able to compute "age in months", which allows

[24] It is also possible to have three-year and two-year panel data in this sampling design. For instance, in 2012-2015 data, the subsamples 14 and 15 constitute the three-year panel covering 2013-2015 years (shown as the purple circle in Figure 4.1).

us to use the empirical design described in the next section. In fact, it is the primary reason why we use the SILC data. On the other hand, as in many EU countries, Household Labour Force Surveys (HLFS) in Turkey are more comprehensive than SILC regarding labour market information. Yet, *for public use*, age of individuals are available only in years, which for us means a single support point below 16 years of age (i.e. the age threshold for receiving a higher minimum wage before the policy change described in the previous chapter). Hence, SILC becomes a more appropriate data set for our purposes than HLFS.

Throughout the study, we mainly use panel data of 2012-2015 SILC. In fact, the monthly individual activity is of our interest. Since we focus on the years before and after the policy change described in chapter 3, we employ 2014-2015 part of this panel. This means that we are using 2013-2014 monthly individual activity for this study.

Moreover, our focus will be on *males* in this study because:

(i) Behaviors of females regarding the labour force participation might be different from that of males in Turkey. Indeed, social and cultural factors might be more influential than economic factors in female's labor supply decision in this country (State Planning Organization and World Bank, 2009). Therefore, compared to males, we would require different tools and models than the ones described in the next section to analyze females' behavior in the Turkish labour market.

(ii) Since female labor force participation is much lower than that of males, the number of observations for females would not be enough to provide consistent estimates for the minimum wage effects within our empirical design.

The Outcome Variables:

Main activity of a respondent in each month is a separate question so that each individual, aged 15 years old and over, answers a sequence of questions, which are *main activity in January*, *main activity in February…main activity in December*. Since we employ 2014-2015 panel of SILC, we are able to collect information on *main activity in January 2013…main activity in December 2014*. The answers are coded as follows:

(1) Wage and salaried employee working full-time

(2) Wage and salaried employee working part-time

(3) Own-account workers working full-time including self-employed, employers and unpaid family workers

(4) Own-account workers working full-time including self-employed, employers and unpaid family workers

(5) Looking for a job

(6) In formal education/apprentice

(7) Retired, being in early retirement or quit working

(8) Old, disabled or unable to work

(9) In compulsory military service[25]

(10) Taking care of elderly/children/disabled and homemakers

(11) Other inactive persons.

These categories are mutually exclusive. This means that a respondent has to declare the main activity in that month he/she spends most of his/her time doing it. Using these categories, we construct the following binary outcomes[26]:

[25] Throughout the study, we exclude the observations under (9) (in military service) because males doing their compulsory military service are included in the institutional population of the country.

[26] SILC includes a variable on the usual hours of work in the main job, which refers to the working hours in the job that the respondent is working during the reference week --the last week before the survey is conducted. Therefore, since this information is not available on a monthly basis, we are not able to integrate the intensive margin in our model.

Employee: It takes value of 1 if the respondent is categorized as either (1) or (2), and 0 otherwise. In other words, it refers to *wage and salaried employees* regardless of whether they work full-time or part-time.[27]

Employed: It takes value of 1 if the respondent is categorized as either (1), (2), (3) or (4), and 0 otherwise.

Unemployed: It takes value of 1 if the respondent is categorized under (5), and 0 otherwise. Therefore, it shows whether a person is *looking for a job* in the relevant month. We categorized such individuals as unemployed in a loose way. On the other hand, standard definition of unemployment refers to the persons who are actively looking for a job and ready to start a job within a short time. Nonetheless, since the SILC data does not include further information allowing us to define unemployment in the usual way, we regard those who are looking for a job as unemployed.

Labour force participation: It refers to the binary variable, taking value of 1 if respondent is categorized either (1), (2), (3), (4) or (5), and 0 otherwise. It means that we regard the labour force as the persons who are either employed (regardless of the employment status) or unemployed.

Education: It takes the value of 1 if the respondent is categorized under (6), and 0 otherwise. It includes persons doing apprenticeship as well.

Neither in employment nor in education: It refers to binary variable, taking value of 0 if the respondent is classified under (1), (2), (3), (4) or (6), and 1 otherwise.

4.2. Design

4.2.1. Regression Discontinuity

The introduction of Regression Discontinuity (RD) by Thistlethwaite and Campbell (1960) was a prelude to the quasi-experimental world. Their influential study described treatment and control groups without relying upon matching to make

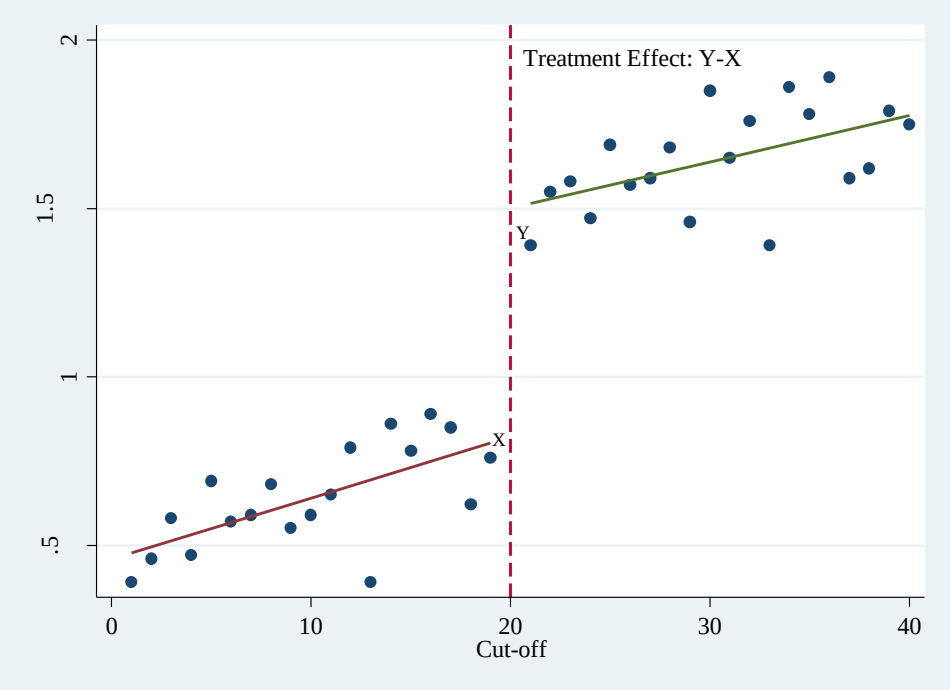
[27] It can be useful to make a distinction between part-time and full-time jobs in our analyses for young males. However, the number of observations in each support point becomes smaller if we distinguish full-time and part-time employees. Hence, we are not able to make this distinction in this study.

comparisons as in preceding quasi-experimental studies. Instead, their methodology was based on the allocation of individual units according to their scores of some continuous variable. Specifically, treated units have scores that lie either above or below a predetermined cut-off value, whereas control units lie on the other side of the cut-off. This allocation would allow them to estimate the effects of the treatment constructed in that way. On the other hand, their discussion was not fully formalized in the study. Later, their preliminary approach was revised, elaborated, formalized and made stronger (van der Klaauw, 1997, 2002; Angrist and Lavy, 1999; Hahn et al., 2001; Goldberger, 2008; Imbens and Kalyanaraman, 2012) thereby yielding a *new method* applicable to various questions in the empirical world (Jacob et al., 2012). It can be used to examine, for example, the effects of unionization on earnings; impact of scholarships on future schooling outcomes; and the labour supply effects of welfare reforms, unemployment benefits and disability programs (Lee and Lemieux, 2010).

Within RD design, individual units are allocated to the treatment depending on their scores of a known variable. This variable whose numeric scores determine the allocation is named as rating, running, assignment or forcing variable in the literature (Lee and Lemieux, 2010). Thereafter, throughout this study, we use *rating variable* to be consistent. A variable that is measured *prior to* the allocation can be a rating variable like the days of social security premiums paid before being laid off, used to determine beneficiaries of an unemployment insurance (Jacob et al., 2012). The main idea in RD design is that individual units just below and just above a cut-off point, *a known value of the rating variable*, are good enough comparisons to detect the treatment effect. To illustrate, suppose that one attempts to examine the impact of scholarships given to high school students on academic achievement in college. Then, test scores used to assign students to the scholarship can be a good starting point because the students whose scores are above a predetermined value are qualified to receive the scholarship, whereas those having a lower score are not. In that case, one can treat the students around a small interval of this score value -- the cutoff point determining the scholarship-- as very similar except receiving the

scholarship. Because the near-losers and the near-winners have very close scores, RD regression estimates can account for the unobserved differences between them. Therefore, the students just above the cutoff value can be assigned to the *treatment group*, while others just below make up the *control group*. The comparison of academic achievements of treatment and control groups would therefore yield a casual impact of high school scholarships.

Figure 4.2 is an illustration of RD design. Supposing that individuals are allocated to the treatment according to whether their value of the rating variable (along the x-axis) is above the cutoff point shown in the Figure; point X can be regarded as a value of the outcome variable of an individual unit receiving the treatment at the cut-off point. Similarly, point Y can be a rational counterfactual for the same unit, but not receiving the treatment. Then, Y-X would be the causal estimate of the treatment impact in that setting.



Source: Obtained by using hypothetical data that allows a discontinuous shift of the fitted line.

Figure 4.2. A Hypothetical Illustration of RD Design

4.2.1.1. What are the Requirements of RD Design?

RD design requires relatively fewer assumptions than others (e.g. random selection of participants) do, thereby popularizing its application in various policy/program evaluation studies (Hahn et al., 2001, Jacob et al., 2012). In fact, by controlling for the scores of the rating variable, it is possible to produce causal estimates about the treatment since it can be considered as if the individual units are randomly placed around the cut-off. This is why Lee and Lemieux (2010) regard this design as very similar to randomized experiments. Besides, the estimates produced by RD design are more plausible than those from other quasi-experimental approaches like DID as long as one can validate its requirements, because individuals around threshold are regarded as almost randomly assigned to the treatment.

As described earlier, RD design can be used to evaluate a policy or program, as long as subjects receive program benefits if their value of a known variable is above or below a predetermined threshold. Hence, it cannot be applied unless the policy action determines a cutoff on a variable that allows assigning individuals to the benefits of such policy. Following RD design, we exploit age-based differentiation of minimum wage in Turkey before January 2014 in this study. Specifically, workers who were 16 years old and older were qualified to receive higher amounts of minimum wage. In this setting, this enables us to use "age (in months)" as the rating variable together with "16 years and 0 month old" as the cutoff point.

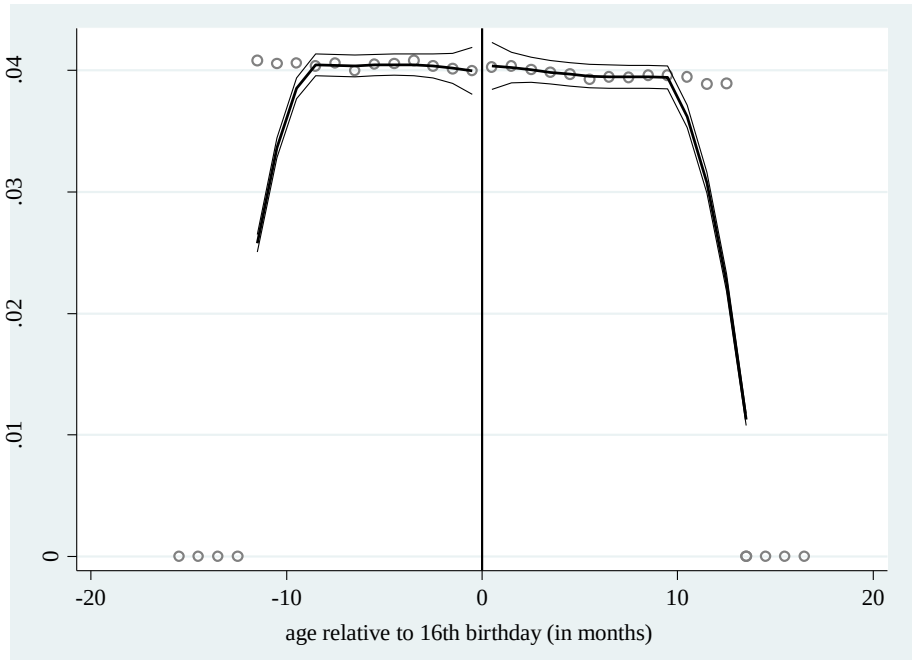
Since RD is a non-experimental design, a set of conditions must be satisfied to generate estimates for the effects of the minimum wage that are unbiased.[28] First, treatment should not cause or affect the scores of rating variable, i.e. rating variable should be measured before the implementation of the policy or be an unchangeable variable like the *age of a person* as we use in this study. Furthermore, the cut-off

[28] For detailed checking lists for the internal validity of RD design, see for example Lee (2008), Lee and Lemieux (2010), McCall and Bielby (2012), Jacob et al. (2012) and Gertler et al. (2016).

point should be exogenous to the rating variable and the assignment to the policy should only depend on individual scores and the cut-off value (Jacob et al., 2012). Because the unique rule in setting the minimum wage was *age*, which is our rating variable, and age threshold was determined by law without any changes before 2014, our rating variable satisfy the exogeneity condition. Furthermore, to treat the assignment as good as randomized, all variables determined prior to the start of treatment should be independent of the treatment status around the cut-off. In other words, treatment and control groups should have the same distributions of baseline covariates (Lee, 2008). Though we expect very similar distributions of all other factors determining labour market and schooling status of males around the age cut-off, we are not able to check this condition due to our use of monthly data. Other than age and the main activity status, information on other variables is not available on a monthly basis. However, we believe that we can eliminate confounding factors by focusing on a small interval around the age cut-off as described below.

Another potential threat to identification in RD design can arise if the individual units have direct control over the rating variable (Schmieder et al., 2010). The idea is as follows: if candidates have potential benefits from receiving treatment, then to get the benefit, they might tend to cheat by manipulating the rating variable, which would invalidate the RD design (Lee and Lemieux, 2010). This behavior is called manipulation in the empirical literature. To illustrate this point, suppose that the allocation of a welfare benefit is based on whether total household income is below a threshold set by the government. Then, some members of low-income households might leave their jobs, or move to informal ones, to get these benefits. When this happens, RD estimates would be biased because the impact of welfare benefits on the labour supply are contaminated by their behaviors shifting them outside the labour market. Fortunately, manipulation is not likely in our study since individuals do not have the power to put themselves in either side of the cut-off by changing their ages. Indeed, since age is a variable over which one can have no control, this condition is instinctively satisfied. Besides, as Lee (2008) suggests, this imprecise control of individuals over their age is sufficient to produce a random allocation

around the cut-off value of 16 years, thereby yielding causal inferences about the minimum wage. Another way of testing manipulation is to examine the continuity of the rating density function around the cut-off point. McCrary (2008) develops a formal test for this. The McCrary test results suggest that there is a modest increase in the density at the cut-off value (Figure 4.3). Despite its statistical significance at 5% level, this increase is very small (0.01) in magnitude so that we can safely ignore it. Figure 4.3 shows the density of individuals with the bin size of one month. This figure also presents visual evidence on the smoothness of the rating variable density around the cut-off value.



Notes: Based on McCrary (2008) density test.
The rating variable is age in months, and the cut-off value is normalized to zero.
Source: Own calculations using SILC.

Figure 4.3. Density of Males Aged 15-17 Years Old

Finally, except for the treatment status, nothing should exhibit discontinuity at the cut-off point. That is to say, there should be no other way in which the individual

units on one side of the cut-off value are treated differently from those on the other side (Jacob et al., 2012). Otherwise, isolating the true impact of the treatment would be difficult, thereby leading biased RD estimates. Regarding our study, we would like to highlight that numerous employment subsidies are available for unemployed only when they turn 18. Therefore, not only do firms demand workers over 18, but teenagers older than that wish to enter the labour market because more job opportunities are available. In other words, age 18 creates a cut-off that might influence the labour market outcomes of youngsters differently in each side. Moreover, age 17 might be another cut-off because schooling decision of the individuals above this age would be different from that of younger individuals. Indeed, individuals who are 17 and over might consider entering college as an alternative to labour market. Nonetheless, the choice of younger people would be entering secondary education versus labour market. The last crucial cut-off for our design corresponds to legal minimum working age. Indeed, individuals under age 15 are not legally allowed to work in Turkey. Based on these cut-offs, we restrict our analysis to 15-16[29] age group to avoid probable differential treatment of individuals on both sides of 16-year-old age cut-off.[30,31]

[29] This corresponds to young who are aged between 15 years and 0 old and 16 years and 11 month old. And, throughout the study we stick on this age group.

[30] Using a similar approach, Chen and van der Klaauw (2008) restrict their sample to eliminate the confounding resulting from other factors that can influence participants differently on either side of the cut-off point.

[31] In their study, Kreiner et al. (2017) point out similar threats to their RD setting. They discuss that in Denmark, teenagers not only are able to receive higher minimum wages but also become eligible to certain types of welfare benefits as they cross over the age threshold. To eliminate the potential bias, they remove welfare benefit recipients in their analyses. However, we believe that non-recipients of welfare benefits older than 18 might be more able compared to the welfare benefit recipients, so that their employability is higher. In such a case, the effects of minimum wage increase can be confounded by the endogeneity of welfare benefit eligibility.

4.2.1.2. Sharp RD Design

RD design can be applied in two ways: sharp and fuzzy design. Sharp RD design is employed if the treatment allocation is a discontinuous and a *deterministic* function of an observable rating (Angrist and Pischke, 2009). Indeed, knowing the score of the rating variable is enough to specify whether an individual receives the treatment or not. In other words, the likelihood of being treated is either zero or one for all in each side of the cut-off value. Besides, as the individual passes this threshold, this probability sharply changes from zero to one --or, from one to zero, depending on the structure of the assignment. The fuzzy design is different in the sense that allocation to treatment is a *stochastic*, not a deterministic, function of the rating variable. It can happen if one cannot determine which of the individual units get the treatment by just looking at the score of the rating variable. In this setting, the likelihood of being treated can be either less than one or greater than zero in each side of the cut-off so that one cannot perfectly predict the treatment by using the above rule. Then, the likelihood of being treated changes by less than one when the individual unit passes the known cut-off. More formally, if we let the treatment variable, D_i, depend deterministically on the rating variable z_i in the sharp RD setting, then $D_i=g(z_i)$ such that g(.) is discontinuous at the cut-off point z_0. On the other hand, in the fuzzy design, the treatment variable, D_i becomes a random variable given the z_i. In this setup, the conditional probability function given by

$g(z)=E[D_i|z_i=z]=P[D_i=1|z_i=z]$ is discontinuous at z_0 (Hahn et al., 2001).

In this study, we use the fact that prior to January 2014, the minimum wage in Turkey was determined according to the worker's age. Indeed, the minimum wage for workers below 16 years of age were lower than the amount determined for those who were at least 16 years old. This policy allows us to allocate workers deterministically to either side of the cut-off. In fact, before 2014 all workers at and above this age threshold were eligible to be paid at a higher minimum wage, whereas the others could not. In other words, the likelihood of being eligible to a

higher minimum wage changes from 0 to 1, as an individual turns 16. Based on this age rule, we can employ the sharp design in our model specification.

Within the policy context described above, let z_i denote the rating variable (age in months) and z_0 the cut-off value (16 years and 0 month old[32]). Furthermore, being eligible to get a higher minimum wage is given by a dummy $D_i \in \{0, 1\}$ indicating whether a person's age is either *16 years old and over* (D_i=1) or below it (D_i=0).[33] That is, $D_i=D(z_i)=\mathbf{I}(z_i \geq z_0)$, with **I(.)** representing the indicator function. An outcome variable, y_i[34], can take two values based on the side on which an individual lies. In particular, it can be either y_{1i} (when the individual is able to have a higher minimum wage, D_i=1) or y_{0i} (when he/she is not, D_i=0), and, the difference between the two, $y_{1i}- y_{0i}$, gives its impact on the outcome (Angrist and Pischke, 2009). Here, the point is that a person can be either 16 years old and over, or under it, and he/she can never be on both sides of the 16 years old threshold simultaneously. Therefore, we cannot observe y_{1i} and y_{0i} at the same time to derive the minimum wage effect (Imbens and Lemieux, 2008).Yet, the RD design enables us to evaluate this effect by comparing average outcomes of the persons who are just below and just above this age. To see why, consider the following equation for an outcome variable:

$$y_i=\alpha+\beta_i D_i+u_i \qquad (4.1)$$

where, $\alpha=E[y_{i0}]$, $\beta_i=y_{i1}-y_{i0}$, $y_{i0}=\alpha+u_i$. A simple comparison of the average outcomes of individuals who are treated (16 year-olds and older) and not treated (younger

[32] To simplify the wording, we use "16 years old" thereafter, instead of "16 years and 0 month old".

[33] Since we combine RD setting with DID, definition of the treated group would differ in our model, which is presented below.

[34] In this study, the outcome is a range of variables representing labour market and schooling status of male teenagers, and will be presented in the following parts. Yet, they are all binary variables that can be handled in the same way.

than 16) does not necessarily produce an unbiased estimate for the average effects of minimum pay[35], $E[\beta_i]$. But, if individuals near this threshold are comparable, then RD can be treated as nearly an experimental design in the close vicinity of this age. Indeed, treated and untreated young males can be seen as comparable if their potential outcomes are very close on average when treated and when not. If this condition were satisfied, then taking the difference in these averages within a small neighborhood of 16 years would lead to the minimum wage effects (van der Klaauw, 2008).

A formal discussion on the identification of RD is introduced by Hahn et al. (2001). In particular, they suggest that under continuity and certain smoothness conditions, RD inference is possible. The idea is that average effects of the minimum wage can be obtained by differing left and right limits of the conditional expectation function (CEF) approaching to threshold as long as continuity is satisfied. Indeed, they show that when the assumption of continuity holds together with smoothness of CEF in the close vicinity of 16 years of age, then the following equality results in the desired effect.

$$\lim_{z \downarrow z_0} E[y_i|z] - \lim_{z \uparrow z_0} E[y_i|z] = E[y_{1i} - y_{0i}|z=z_0] = E[\beta_i|z=z_0] \quad (4.2)$$

Continuity condition: $E[\beta_i|z]$ and $E[\varepsilon_i|z]$ are continuous in z at z_0, i.e, $E[y_{1i}|z]$ and $E[y_{0i}|z]$ are continuous at z_0.

Equation (4.2) is based on the fact that by means of continuity, $E[y_{1i}|z=z_0-\varepsilon]$ can be seen as a counterfactual for $E[y_{1i}|z=z_0]$, for arbitrarily small $\varepsilon>0$. Then, the difference between the right and left limits of CEF at the threshold value becomes $E[\beta_i|z=z_0]$, i.e. average effects of minimum wage in our setting. Either non-

[35] We restrict our estimation for males aged between 15-17 years old, as discussed above. Therefore, our results will yield the *local*, not average effects. However, it is the local effects that we look for because policy makers would like to figure out the expected impacts before determining whether to differentiate minimum wage by age so that young workers are subject to lower amounts of minimum wage.

parametric or semi-parametric estimation techniques are suitable to obtain these effects. In particular, local averages can easily be estimated for $z=z_0$ and $z=z_0-\varepsilon$ to have a non-parametric estimate, especially for large samples (van der Klaauw, 2008). Nevertheless, we employ *age in months* as the rating variable, which might violate continuity condition on potential outcomes (Calonico et al., 2014). In fact, we might not able to compare local averages at $z=z_0$ and $z=z_0-\varepsilon$, because we do not observe the outcomes for all small $\varepsilon>0$. To illustrate, since we do not have data for young males who are 16 years and 1 day old, and for males who are 15 years and 364 days old, we cannot compare their employment probabilities. Fortunately, in their influential work, Lee and Card (2008) argue that the RD inference can still be possible even with a discrete rating. In fact, they propose that a non-parametric approach might not work because a local linear regression cannot assign any weight to the observations on $z_0-\varepsilon$ for very small ε, due to lack of data.[36] Instead, they suggest that using a parametric approach, treatment effects can still be obtained even if the rating variable is discrete. Specifically, RD identification might properly be attained by estimating the relevant regression within an interval around threshold value, say [-h, h] and h>0, with an appropriate function relating the outcome and the rating. Besides, they show that the standard errors would be appropriate under modest assumptions, described below, when they are based on clustering by the rating variable.[37]

More formally, in the case of a discrete rating, we might not able to view $E[y_{1i}|z=z_0-\varepsilon]$ as a proper counterfactual for $E[y_{1i}|z=z_0]$, as mentioned. Nonetheless, we can still identify $E[\beta_i|z=z_0]$ by rewriting equation (4.1) in the following form

$$y_i= \alpha+\beta D_i+f(z_i)+\eta_i \qquad (4.3)$$

[36] As opposed to Lee and Card, later research reveals that non-parametric approach can be also used (e.g. Calonico et al., 2014). Nonetheless, we follow a parametric approach in the estimation of our model.

[37] Following their work, this approach is used in several quasi-experimental studies (see for example, Oreopoulos, 2006; Lalive, 2008).

where, $u_i=f(z_i)+\eta_i$ and f(.) is a continuous function such that $f(0)=E[y_0|z=z_0]$. Then, by approximating this function with a first order polynomial[38], equation (4.3) yields

$$y_i= \alpha+\beta D_i+\gamma(z_i-z_0)+a_i+\eta_i \quad (4.4)$$

Here, $a_i \equiv f(z_i)-\gamma(z_i-z_0)$ is specification bias. In fact, it measures the deviation of f(.) from the true CEF. In this context, Lee and Card show that estimate of β can provide treatment effect under appropriate conditions on a_i.[39] In particular, they treat a_i as a random variable such that $E[a_i|z=z_i]=0$.[40] Since the specification bias is viewed as a random error, there exist a within-group correlation in η. Then, if one attempts to take into account this correlation due to grouping structure, error terms should be adjusted to provide consistent estimates for β. To do so, Lee and Card discusses two cases. In the first case, they consider equality of random errors in each side of the threshold. They assume independent, but unequal, random errors in the second. The former implies that polynomial approximations of $E[y_{1i}|z=z_0]$ and $E[y_{0i}|z=z_0]$ would be of the same sign and magnitude. Yet, the latter requires only independency of them. In our model, we assume the first case so that clustered standard errors are employed for inference.

Lee and Card discuss that within a sharp RD setting, the equality of these errors is automatically satisfied if the approximation errors remain identical regardless of whether the support point at threshold is included in treated group or in non-treated group. One particular setting, in which this condition holds, occurs if the origin of

[38] Higher order polynomial are also possible. The idea, however, remains same.

[39] This specification implicitly presumes that the trends in each side of the cut-off do not differ. On the other hand, it is also possible to let these trends differ by including interactions between Di and (z_i-z_0). If we assume that f(.) is of a higher polynomial approximation, then we should also include higher order interactions to allow for differing trends in our estimation.

[40] Lee and Card point out that orthogonality of a_i and z_i might not be always easy to satisfy. However, the orthodox approach requires no specification error, which is a condition that is more restrictive.

these errors is not related to treatment. In this study, the outcome variables we intend to estimate the minimum wage effects on are the labour market and schooling status of teenagers. Nonetheless, it is possible that within our estimation interval (15-17 years of age), there are small ability differences by monthly age of teenagers that can affect individual activity by age. On the other hand, by taking into account the differences before and after the change in minimum wage policy, as discussed below, we can ensure that ability differences are independent of the treatment status in this setting.

Specifically, suppose that the random errors in each side of the threshold, a_{1i} and a_{0i} are defined as follows:

$$E[y_{1i}|z=z_0]= \alpha_0+\gamma(z_i-z_0)+ \beta+a_{1i}$$
$$E[y_{0i}|z=z_0]= \alpha_0+\gamma(z_i-z_0)+a_{0i}$$

Then, if $a_{1i}=a_{0i}$, we obtain $E[y|z=z_0]=\alpha_0+\beta D_i+\gamma(z_i-z_0)+a_i$, such that the RD inference from estimate of β through clustering standard errors on z would be valid.[41]

4.2.2. Differences-in-Discontinuity

Within the conventional RD model, we are able to analyze treatment effects as long as it only depends on the ratings of a single variable. In our case, this variable is the age in months of an individual. When age is defined in a monthly scale, there might

[41] Independent of the research design, clustering of standard errors is a way of adjustment often used in empirical world as long as observations within the same cluster are believed to have unobserved characteristics that are correlated. And, males born in the same month of a given year might share some common, but unobserved, characteristics. Then, clustering for *age in months* makes sense to our regression estimates. However, one potential problem might be the number of clusters. In fact, we have relatively few clusters --24 in each regression estimate. Because asymptotic approximations for clustered standard errors require large numbers of clusters, using 24 clusters as in our study might lead to invalid inference (Angrist and Pischke, 2009). On the other, as Cameron and Miller (2015) list, there are several ways to adjust standard errors when few clusters are available. This is why we run our regressions with the standard errors corrected by the Moulton (1986) factor as well (Table B.22-Table B.24). Still, these findings produce similar results with those obtained when clustered standard errors are not corrected.

be some unobserved confounding factors such as ability differentials pertaining to certain age groups (in months), thereby contaminating the treatment effect. Indeed, such confounding might generate another jump at the threshold value. This would then interrupt the usual RD design. Nonetheless, taking before/after difference of the policy change in 2014, January allows us to remove such contamination. Indeed, by comparing the discontinuity before and after the policy change might yield the effects of the rise in minimum wage for 15-year-old males in Turkey. This design is like a combination of RD with DID. Borrowing from Grembi et al. (2016), we call it as "difference-in-discontinuities" ("diff-in-disc" in short).

Now, let $D_i=D(z_i)=\mathbf{I}(z_i \leq z_0)$. In "diff-in-disc" framework, we define the treatment as being lower than 16 years old age, because they become entitled to receive higher amount of minimum pay after 2014, January. Furthermore, let Post be the post-treatment dummy, i.e. Post=1 if month of the year is January 2014 and after, Post=0 otherwise. Then, outcome variable y_i would take four values. Indeed, it can be either $y_{1i,\,post}$ (when $D_i=1$, and Post=1), $y_{0i,\,post}$ (when $D_i=0$, and Post=1), $y_{1i,\,pre}$ (when $D_i=1$, and Post=0) or $y_{0i,\,pre}$ (when $D_i=0$, and Post=0).

If we define $\mu^{-}_{pre}=E[y_{0i}|\, z_i=z_0,\, t\leq t_0]$, $\mu^{+}_{pre}=E[y_{1i}|\, z_i=z_0,\, t\leq t_0]$, $\mu^{-}_{post}=E[y_{0i}|\, z_i=z_0,\, t\geq t_0]$, and $\mu^{+}_{post}=E[y_{1i}|\, z_i=z_0,\, t\geq t_0]$, then Grembi et al. (2016) show that $\hat{\tau}_{DD}$, given below, would be "diff-in-disc" estimator.

$$\hat{\tau}_{DD}= (\mu^{+}_{post} - \mu^{-}_{post}) - (\mu^{+}_{pre} - \mu^{-}_{pre})$$

Similar to standard RD framework, an unbiased estimate of treatment requires that continuity condition holds in this framework. Hence, we apply the clustering --of standard errors with respect to rating-- approach to the regression estimates within this design.

4.2.3. Model Specification

We change the model given by equation 4.4 in two ways. 1) Adding interaction of D_i and z_i-z_0 to allow for different trends on each side of the cut-off value, we form a standard RD model. 2) Adding DID dimension further; we form a "diff-in-disc" model.

4.2.3.1. RD Model

The conventional RD model is given in 4.5:

$$y_i=\beta_1 D_i+\beta_2(Age_i-c)+\beta_3 D_i*(Age_i-c)+u_i \quad (4.5)$$

Here, the variable definitions are as follows:

- y_i: Binary outcome variable on being employee, employed, unemployed, in labor force, in education, and neither in employment nor in education.
- D_i: Treatment dummy, taking the value of 1 if the teenager is *older* than 16 years and 0 month in the relevant month of the survey and 0 otherwise.
- Age_i: Age in months.
- c: The cut-off value, which is 16 years and 0 month.
- Age_i-c: The distance to cut-off variable, showing how far each individual is from the cut-off value.

4.2.3.2. "Diff-in-Disc" Model

When we include the variables that are necessary to reflect the DID dimension, we end up with a model given in 4.6: [42]

[42] We also develop an alternative model to check robustness of our findings to model specification, which is constructed based on "diff-in-disc" design. In this model, we use *calendar time in months* as the rating variable, and *January 2014* as cut-off. In fact, 15-year-old individuals become subject to higher minimum wages as they cross over January 2014, which can be handled in an RD design. Since the alternative model uses a time variable as the rating, this model can be regarded as an "event-study" specification of the minimum wage policy. This alternative model together with its results are presented in the chapter 5.

$$y_i=\beta_1 D_i+\beta_2(Age_i-c)+\beta_3 D_i*(Age_i-c)+ \alpha_1 Post+\alpha_2 D_i*Post+u_i \quad (4.6)$$

The variable definitions are the same as in 4.5, except the treatment dummy. Indeed, 4.6 provides effects of the change in minimum pay policy in January 2014. Besides, to account for a possible change in discontinuity at 16 years old age before and after the raise in minimum wage for those under this cut-off, we have the following DID terms:

- Post: Post-treatment dummy, taking value of 1 if the time variable (available in months) is January 2014 and after and 0 otherwise.
- D_i: Treatment dummy, taking the value of 1 if the teenager is younger than 16 years and 0 month in the relevant month of the survey and 0 otherwise.
- D_i*Post: Interaction of treatment and post-treatment dummies.

In each model, we allow for a first order polynomial link between the outcome and rating variable. Furthermore, additional covariates are not used because (i) except for age and main activity, no other variable is available on a monthly basis in SILC data, (ii) variables like labour market experience, occupation etc. are not exogenous to the main activity of teenagers, so that even if the data were available, it would not be meaningful to include any, and (iii) inclusion of other explanatory covariates are not necessary to identify unbiased or consistent estimates in RD design (Angrist and Pischke, 2009).

4.3. Descriptive Statistics

The model presented in the previous section is based on the comparisons of 15-year-old and 16-year-old males.[43] Specifically, the model takes *age in months* as the rating variable so that the treatment status is determined accordingly. Indeed, 15-year-old males constitute the treatment group in diff-in-disc setting.

[43] We also use narrower bandwidths in the model estimations. Specifically, we estimate models for the males aged between 15 years and 6 months old and 16 years and 6 months old, as well. However, to provide a general idea we describe 15-year-old and 16-year-old males.

Table 4.1. Selective Descriptive Statistics (Males, 2013)

	16-year-old Males	15-year-old Males	Difference
Education (in years)	7.6	7.6	0.01
	(0.02)	(0.03)	(0.04)
Job tenure (in years)	1.4	1.1	0.24***
	(0.03)	(0.05)	(0.06)
Household size	4.1	4.2	-0.05*
	(0.02)	(0.02)	(0.03)
Real monthly wage (in logs)	5.4	5.3	0.13***
	(0.03)	(0.03)	(0.04)
1=employee	0.12	0.07	0.05***
	(0.01)	(0.01)	(0.01)
1=employed	0.18	0.12	0.06**
	(0.01)	(0.01)	(0.01)
1=in education	0.70	0.78	-0.09***
	(0.01)	(0.01)	(0.01)
1=neither in employment nor in education	0.13	0.10	0.03***
	<0.01	<0.01	<0.01
1=unemployed	0.10	0.07	0.03***
	<0.01	<0.01	<0.01
1=in labour force	0.28	0.19	0.09**
	<0.01	0.01	0.01
1=good health	0.92	0.91	0.01*
	<0.01	(0.01)	(0.01)
Hours of work[1]	50.03	43.08	6.5**
	(0.63)	(1.11)	(0.55)
Unit of analysis[2]	609	604	
Total number of observations	7,567	7,244	

Notes: Clustered standard errors (with respect to age) are in parentheses. *** 1% significance, ** 5% significance, *10% significance.
[1]Corresponds to average hours of work in the main job during the reference week.
[2]Corresponds average number of observations in each age group when it is presented in months.
Source: Own calculations using 2013-2014 SILC.

Table 4.1 presents selective descriptive statistics for males in 2013. It compares various characteristics of 15-year-old and 16-year-old males before the policy was

introduced in the country. As seen, the two groups of males are very similar in many respects. In fact, there exists no significant difference in the educational attainment of 15-year-old and 16-year-old males. Furthermore, these two groups of males are living in households of similar sizes, and the proportion of those having good health are very close, though the difference is significant at 10% level. On the other hand, 15-year-old males differ from 16-year-old males in terms of job tenure, working hours and real monthly wages. Indeed, 15-year-old males have less experience in the labour market, working fewer hours and earn less. Furthermore, proportion of males who are involved in one of outcome variables are different in each group. To be more specific, the share of males being either employee, employed, unemployed or in labour force are higher for 16-year-old males in 2013. Similarly, the share of 16-year-old males who are neither in employment nor in education is higher than that of 15-year-old counterparts. On the other hand, a fewer proportion of 16-year-old males attend school in the same year. Nonetheless, these characteristics are outcomes and not determined independently of the age of males.

Table 4.2 illustrates same statistics for males in 2014. The general picture remains almost same except the outcomes. Indeed, we observe that the differential between 15-year-old and 16-year-old males regarding the proportion of employee, employed and labour force participation become wider after the policy change in 2014. That is, much fewer proportion of 15-year-old males are now employee, employed or in labour force. Moreover, the differences between 15-year-old and 16-year-old males become narrower for the unemployment, education and neither in employment nor in education outcomes. Lastly, it might be crucial to point out that while the working hours of 16-year-old males declines between 2013 and 2014, it raises for 15-year-old males (Table 4.1, Table 4.2). Indeed, although 16-year-old males were working more than 15-year-old males in 2013, the latter group becomes to work longer hours compared to the former after the policy. This might indicate that after being exposed to higher minimum pay, less proportion of 15-year-old males are employed, but the remained workers work longer hours.

Table 4.2. Selective Descriptive Statistics (Males, 2014)

	16-year-old Males	15-year-old Males	Difference
Education (in years)	7.6	7.6	0.01
	(0.02)	(0.03)	(0.04)
Job tenure (in years)	1.3	1.0	0.38***
	(0.04)	(0.06)	(0.07)
Household size	4.1	4.2	<-0.01
	(0.02)	(0.02)	(0.03)
Real monthly wage (in logs)	5.6	5.3	0.28***
	(0.03)	(0.04)	(0.05)
1=employee	0.12	0.06	0.06***
	<0.01	<0.01	<0.01
1=employed	0.18	0.09	0.08***
	<0.01	<0.01	<0.01
1=in education	0.71	0.81	-0.10***
	(0.01)	(0.01)	<0.01
1=neither in employment nor in education	0.10	0.10	0.01*
	<0.01	<0.01	<0.01
1=unemployed	0.09	0.08	0.01**
	<0.01	<0.01	<0.01
1=in labour force	0.28	0.17	0.10***
	(0.01)	(0.01)	(0.01)
1=good health	0.92	0.93	-0.02**
	<0.01	<0.01	<0.01
Hours of work[1]	48.68	49.58	-0.90
	(0.54)	(1.01)	(1.15)
Number of months*unit of analysis	606	582	
Total number of observations	7,873	7,303	

Notes: Clustered standard errors (with respect to age) are in parentheses. *** 1% significance, ** 5% significance, *10% significance.
[1]Corresponds to average hours of work in the main job during the reference week.
[2]Corresponds average number of observations in each age group when it is presented in months.
Source: Own calculations using 2013-2014 SILC.

4.4. Is Minimum Wage Binding?

In this part, we investigate the effects of the minimum wage on wages of teenagers. We would like to answer the following two questions: 1) What happened to the average wages and 2) wage distribution of teenagers. These questions are of interest to us because we expect them to affect the labour market and schooling outcomes of teenagers. Furthermore, this analysis sheds light as to whether of the minimum wage binds for young males in Turkey. In particular, we ask, whether the minimum wage binds wage distribution of the young individuals of 15-16 years of age both before and after the policy change described in chapter 3. In fact, minimum wages affect labour markets to the extent that they bind.

The literature on the minimum wage suggests that it might be influential in raising wages of workers who are earning around the minimum wage, thereby improving the wage distribution by truncating it (DiNardo et al., 1996; Lee, 1999). Moreover, two-sector model implies that minimum pay might increase the earnings of workers in the covered sector, while reducing the earnings in the uncovered sector. This is based on the movement of workers between two sectors following the minimum pay policy (Welch, 1974; Mincer, 1976; Gramlich 1976). However, as discussed above, empirical studies do not always corroborate the predictions of the two-sector model. Indeed, instead of depressing the wages in the uncovered sector, minimum wages may increase the average wages in that sector (Boeri et al., 2011). This is called as the *lighthouse effect*, which might arise when (i) the minimum wage acts as a reference to the wages throughout the economy, (ii) low-skilled workers sort themselves in formal sectors or (iii) the demand for informal sector products rises following the minimum pay policy.

As a developing economy, Turkey has widespread informal employment, especially among young workers. Indeed, according to 2013 HLFS, 90.5% of 15-year-old males and 84.2% of 16-year-old males were working without social security in

Turkey[44]. Moreover, the ratio of informal workers became 86.4% for 15-year-old males and 85.6% for 16-year-old males in 2014. The rise in formality among 15-year-old males might be a sign of an improvement in their earnings after the increase in minimum wage at the beginning of 2014. However, since minimum wage compliance is low, especially for the young males in the country, one might question whether the minimum wage is binding for this group.

We start with analyzing the proportion of young males working at and around the minimum wage. Such an analysis would be beneficial because the density of workers at the minimum wage shows the extent to which it is binding (Hyslop and Stillman, 2007). To do so, we use HLFS data of Turkey. This is because SILC does not include wages on a monthly basis, but HLFS does. It collects net monthly wages received in the reference week, together with the age of the respondent.[45] We merge annual data from HLFS corresponding to years 2009 to 2014 and use this data set in the analysis of wages throughout the study.[46]According to HLFS data, about 80% of young males aged 15-16 years old were earning less than the minimum wage before 2014. In fact, during 2009-2013, 79.7% of 15-year-old male workers were earning less than the minimum wage, while the corresponding share of 16-year-old males was 83.9%. In 2014, these shares declined to 76.6% and 75.8% for 15-year-old and 16-year-old workers, respectively. These changes suggest that the non-compliance with the minimum wage decreased for young males after the change in the minimum wage policy, although it is still high. Moreover, the proportion of

[44] We exclude the individuals who are attending school while working. It is because we are not able to observe the individuals who are working and going to school simultaneously in SILC data. Monthly individual activity mutually excludes workers and students. So, to provide a consistent analysis, we do not include workers who are continuing to education in this part.

[45] HLFS aims to gather information on the labour market in Turkey. HLFS questionnaire covers a wide range of variables like economic activity, occupation, employment status, hours of work, and net monthly wages for salaried workers etc. As noted earlier, the age variable in the survey is in years.

[46] In order to increase the number of observations, we take as long of a period as possible before the change in the minimum wage policy.

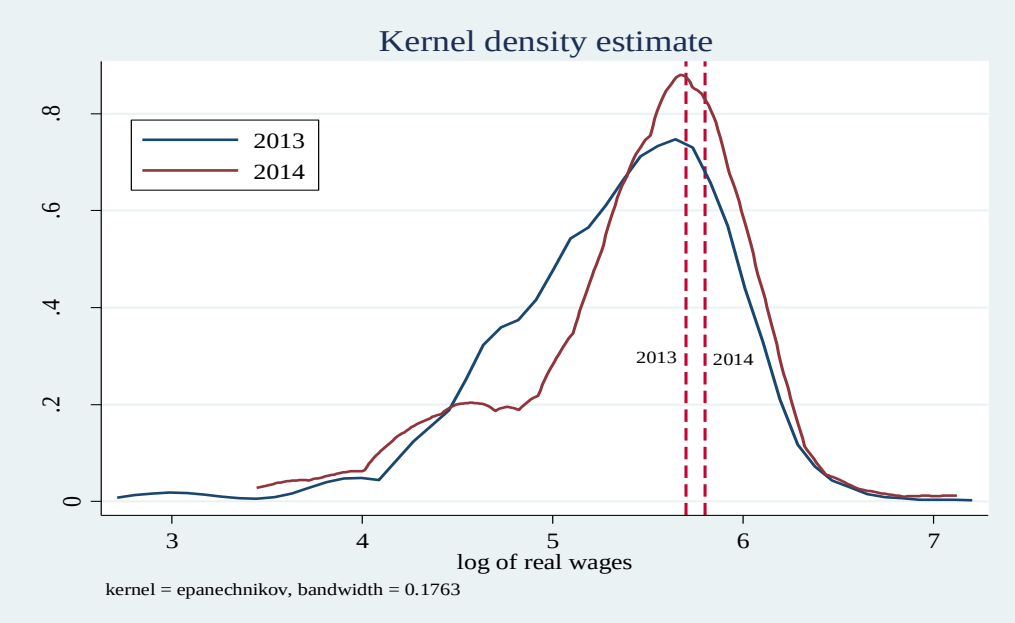
workers paid exactly at minimum wage level[47] increased from 7.3% to 14.7% for 15-year-old males, and from 9.1% to 18.4% for 16-year-old males after the change in the minimum wage policy in Turkey (see Table 4.3). Despite the high level of informality, these figures show that the minimum wage can somewhat be binding for young males. Besides, they signal an improvement in wages for the workers around the minimum wage. Indeed, the mass of young males at the minimum wage rises following its increase for 15-year-old workers. However, the rationale behind the rise in the density might be different for each group. To be specific, an increase in the proportion of minimum wage earners among 15-year-old males might have resulted from the rise in formality as noted above. On the other hand, the mass of 16-year-old workers at the minimum wage might have rose as employers replace 15-year-old male workers with their 16-year-old counterparts. This is because 15-year-old male workers lose much of their labour cost advantage after the elimination of age-based wage differentiation in the minimum pay.

Table 4.3. Share of Young Workers Below or Near the Minimum Wage (%)

	15-year-old males		16-year-old males	
	2009-2013	2014	2009-2013	2014
Share of minimum wage earners	7.3	14.7	9.1	18.4
Share of less than minimum wage earners	79.7	76.6	83.9	75.8

Notes: Workers do not attend school while working. Appropriate weights are used. ±5% bandwidth around the minimum wage is used.
Source: Own calculations using 2009-2014 HLFS.

[47] Due to possible measurement, rounding and recall errors in HLFS data, we use ±5% bandwidth around the minimum wage.



Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the log of average minimum wage in a year in real terms.
Source: Own calculations using 2013-2014 HLFS.

Figure 4.4. Kernel Density Estimates of the Log of Real Monthly Wages, 15-Year-Old Males (2013-2014)

Next, we move to the visual evidence on the change in the wage distribution. We estimate the Kernel density of real wages for 15-year-old and 16-year-old males. Kernel density estimates are commonly used in the empirical literature because they depict unconditional wage distributions, thereby showing the spikes if there exists any (see for example, Pereira, 2003; Portugal and Cardoso, 2006; Rani et al., 2013). Indeed, if there are spikes in a wage distribution at and around the minimum wage, then it might be regarded as binding[48] (Rani et al., 2013). Figure 4.4 and Figure 4.5 present Kernel density estimates of the logarithm of real wage distributions for young male workers in 2013 and 2014. While drawing these figures, we use

[48] Rani et al. (2013) point out that there can be other reasons creating spikes in the wage distributions such as the presence of wages specific to some occupations. Yet, Kernel density estimates are useful in showing the whole wage distribution and the density around the minimum wage.

Epanechnikov Kernel density function[49] with optimal bandwidth that minimizes the mean integrated squared error (Silverman, 1992). The dashed lines in these figures correspond to the logarithm of the real minimum wages in each year.[50] A visual inspection of these figures suggests that young male workers in Turkey are concentrated at or around the real minimum wages in both years. This can be viewed as a signal of a binding minimum wage for 15-year-old and 16-year-old male workers. Moreover, Figure 4.4 shows that after the rise in minimum wage of 15-year-old males, their density around the minimum wage's new level increased in 2014. It indicates that the elimination of age-based differential in minimum wage improved the wage distribution of 15-year-old males. Besides, Figure 4.5 shows that the density of 16-year-old male workers at the minimum wage also increased prominently in 2014.

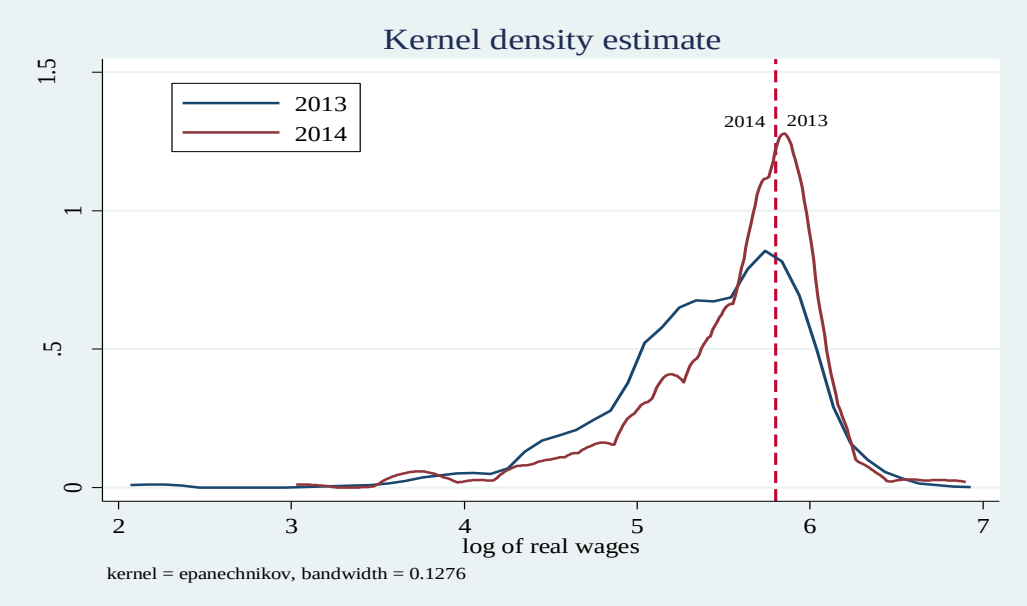
In order to analyze whether a lighthouse effect is possible, we also estimate Kernel densities of real wages for males working in formal and informal sectors separately. Because most of the young males aged 15-16 years old work in the informal sector, i.e. without social security, Kernel density estimates of the logarithm of real wages (Figure 4.4 and Figure 4.5) are very close to those obtained from the informal sector estimates (Figure A.1 and Figure A.2). In particular, densities around the real levels of minimum wage in each year is relatively high both for 15-year-old and 16-year-old males working in the informal sector. On the other hand, the mass around the real minimum wage is much higher for young males working with social security[51] (Figure A.3 and Figure A.4). Furthermore, we observe significant increases in the mass at the minimum wage level for both age groups after the change in the policy

[49] This is the default Kernel used by STATA.

[50] Since the minimum wage is set biannually in Turkey, we take the averages of the minimum wages for each group in each year to avoid complication in the figures.

[51] We have relatively fewer observations for young males working in the formal sector. Indeed, each year we have about 100 observations for 15-16 years old workers. As such, these estimates must be regarded with caution.

in each sector. Kernel density estimates also illustrate that real wage distribution for both 15-year-old and 16-year-old male workers shift rightwards in each sector in 2014. The improvements in wage distributions in both sectors and the increase in densities around the minimum wage suggest a possible lighthouse effect in the country.

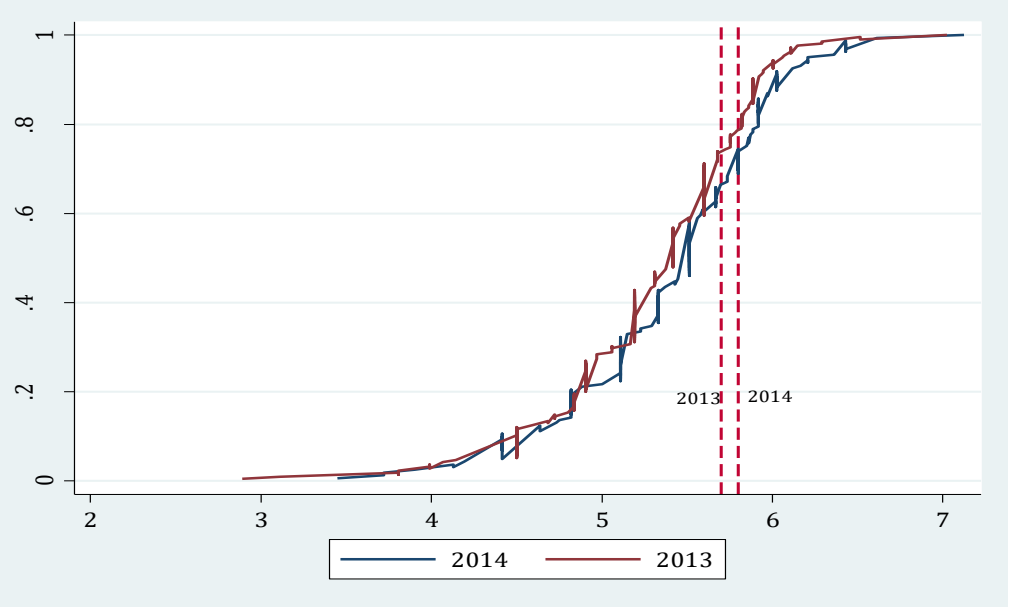


Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the log of average minimum wage in a year in real terms.
Source: Own calculations using 2013-2014 HLFS.

Figure 4.5. Kernel Density Estimates of the Log of Real Monthly Wages, 16-Year-Old Males (2013-2014)

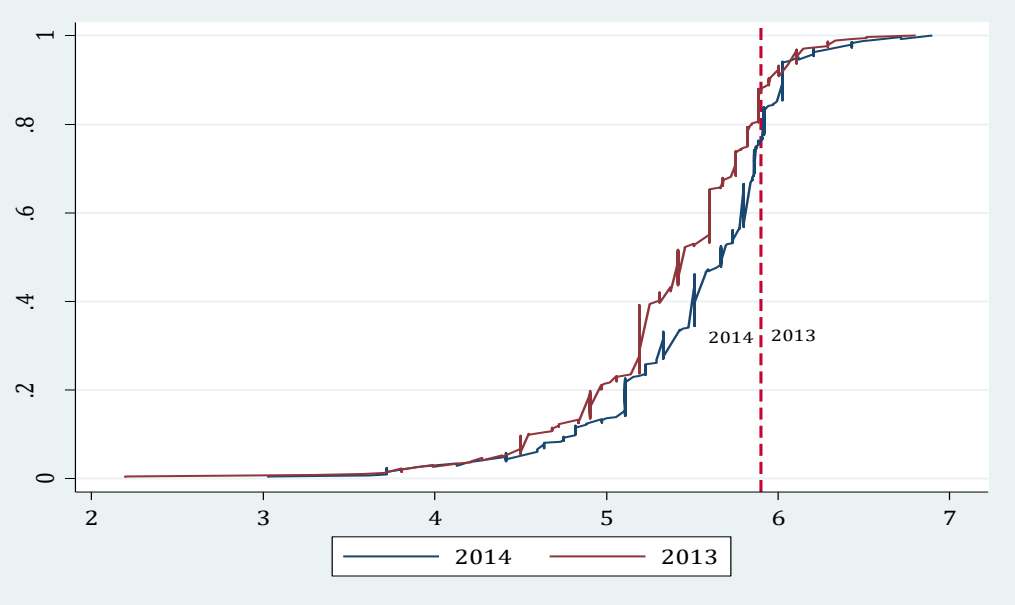
We also explore the cumulative density distributions (cdf) of young male workers' wages. A closer look at the density distributions might be helpful because the cliffs around minimum wage give a signal of a binding minimum wage (Maloney and Mendez, 2004). Figure 4.6 shows cdf of the logarithm of real monthly wages of 15-year-old male workers before and after the increase in their minimum wage in 2013 and 2014, respectively. The vertical lines in this figure represent the logarithm of the real minimum wage in each year. As shown, there is an increase in the density

of 15-year-old males at the new minimum wage level following the reform. Besides, we observe a modest cliff in the density distribution of this age group at the minimum wage in 2014, thereby indicating a binding minimum wage to a certain extent. Figure 4.7 shows the cumulative density of the logarithm of real wages of 16-year-old males. This figure indicates that the cumulative density of the unaffected workers in 2014 dominates their cumulative density in 2013. Moreover, as this figure reveals, the cliffs at the minimum wage are more apparent for 16-year-old males compared to their 15-year-old counterparts.



Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the log of average minimum wage in a year in real terms.
Source: Own calculations using 2013-2014 HLFS.

Figure 4.6. CDF of Log of Real Monthly Wages of 15-Year-Old Males (2013-2014)



Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the log of average minimum wage in a year in real terms.
Source: Own calculations using 2013-2014 HLFS.

Figure 4.7. CDF of Log of Real Monthly Wages of 16-Year-Old Males (2013-2014)

CHAPTER 5

EMPIRICAL RESULTS

In this chapter, we present the results of the models we construct in the previous chapter. Our discussion on these results is divided into two main sections. In the first part, we examine the minimum wage effects on the labour market outcomes of young males in Turkey. In the second part, we move to the discussion on the education effects for the same group of males. Before analyzing the empirical results, we also provide the visual evidence on the outcome variables in each dimension within the RD setup we form in chapter 4.

5.1. Outcome Trends in RD Setting

Most studies based on an identification within the RD setting start with a visual representation of data. Although this is not sufficient to evaluate the minimum wage effects on the outcomes of interest, it is beneficial to provide a visual assessment on the general patterns of data in close vicinity of the cut-off. As such, the visualization provides information on functional link between outcomes and ratings. Besides, one can observe the size of the jump at the cut-off value by comparing average outcomes within the closest points to the cut-off in each side (Lee and Lemieux, 2010). Indeed, the basic strategy within a conventional RD design would be as follows:

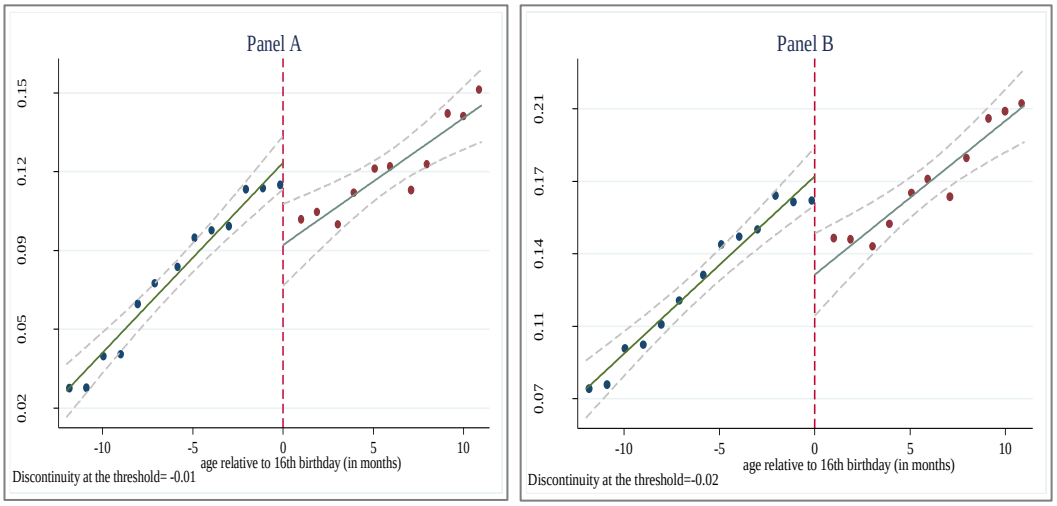
1. Plotting average outcomes against the midpoints of *'age in months'* using a specified bin size within an interval around '*16 years old'* threshold.
2. Estimating the links between outcomes and *age in months* separately in each side of *16 years old,* with a polynomial function of a specified order.
3. Investigating visually whether there exists a jump at *16 years old threshold*.

As implied by the strategy just described, we have to consider the bin size and the degree of the polynomial function that gives the link between the outcomes and *age in months*. Firstly, to draw the relevant figures in this setup, a bin size --the interval in which average values of outcomes are calculated-- should be chosen. A bin size should be narrow enough to remove the noisiness in data i.e. to visualize patterns clearly. Besides, it should be wide enough so that one does not lose any significant information. The best way is to try several bin sizes and make a visual comparison. A formal approach is not necessary in our design because the visual context does not reveal the precise effects on the outcomes. Yet, since we have monthly data for rating and outcomes, we do not have too much choice. In fact, we can use a bin size at least of one-month length. One-month, three-months or six-months can be tried. However, since we focus on the interval of 15-16 years olds, a wider bin size can lose some information. This is why we employ one-month length as the bin width in the visual analysis of RD design.[52] Secondly, for visual representation, we need to assume a certain degree for the polynomial link function relating the outcomes and age. Based on the scatter plots of average outcomes against *age in months*, we use a first-degree polynomial relation.

In Figure 5.1, we present the evolution of mean values of each outcome variable plotted against age in months for the males aged 15-16 years old in 2013. Moreover, we add the fitted lines relating outcomes and age in months to each graph. Before the policy change, individuals become entitled to get a higher minimum pay as they pass the threshold value of 16 years of age. Hence, any jump at this threshold can be viewed as the treatment effect in a conventional RD setting. To illustrate, consider the graph for being an employee in Panel A. The dot just to the left of the age threshold represents males who are 15 years and 11 months old, and the one just to the right includes the males of 16 years and 1 month of age. Then, any jump at the threshold value of 16 years shows how the share of male employee changes as they turn 16. Based on this, we perceive that raising the minimum pay based on

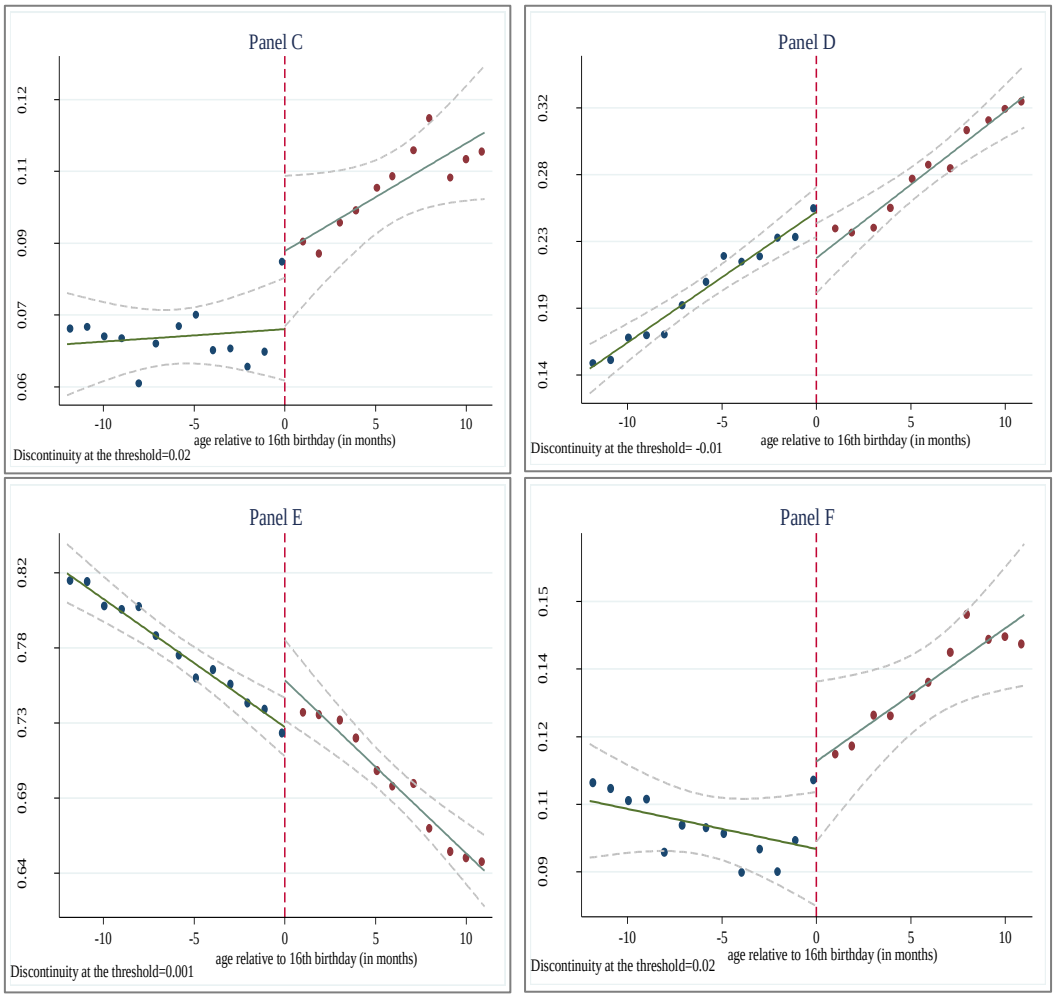
[52] We also try 2-months and 3-months bin size. The RD plots for employment outcome is provided as an example in Appendix A.

an age threshold would reduce employment outcomes for young males (Panel A and Panel B). Indeed, the discontinuity at the threshold is -0.01 pp (Panel A) for employee outcome and -0.02 pp (Panel B) for employed outcome. This illustrates that probability of being employee, for instance, is lowered by 0.01 pp at the age threshold. Similarly, we observe a negative effect for labour force participation because the discontinuity at this point is -0.01 pp (Panel D). On the other hand, we can infer positive effects for unemployed (Panel C), education (Panel E) and being neither in employment nor in education (Panel F) outcomes. To be more specific, the discontinuity at age threshold is 0.02 pp, 0.01 pp and 0.02 pp for these outcomes respectively.



Notes: *Age in months* is centered at *16 years old*, implying that any point on each side represents the distance to *16 years old* threshold (e.g., -5 corresponds to the observations who are 15 years and 7 months old).
Source: Own calculations using SILC.

Figure 5.1. Averages of Labour Market and Education Outcomes for Males (2013)



Notes: *Age in months* is centered at *16 years old*, implying that any point on each side represents the distance to *16 years old* threshold (e.g., -5 corresponds to the observations who are 15 years and 7 months old).
Source: Own calculations using SILC.

Figure 5.1. Averages of Labour Market and Education Outcomes for Males (2013) (contd')

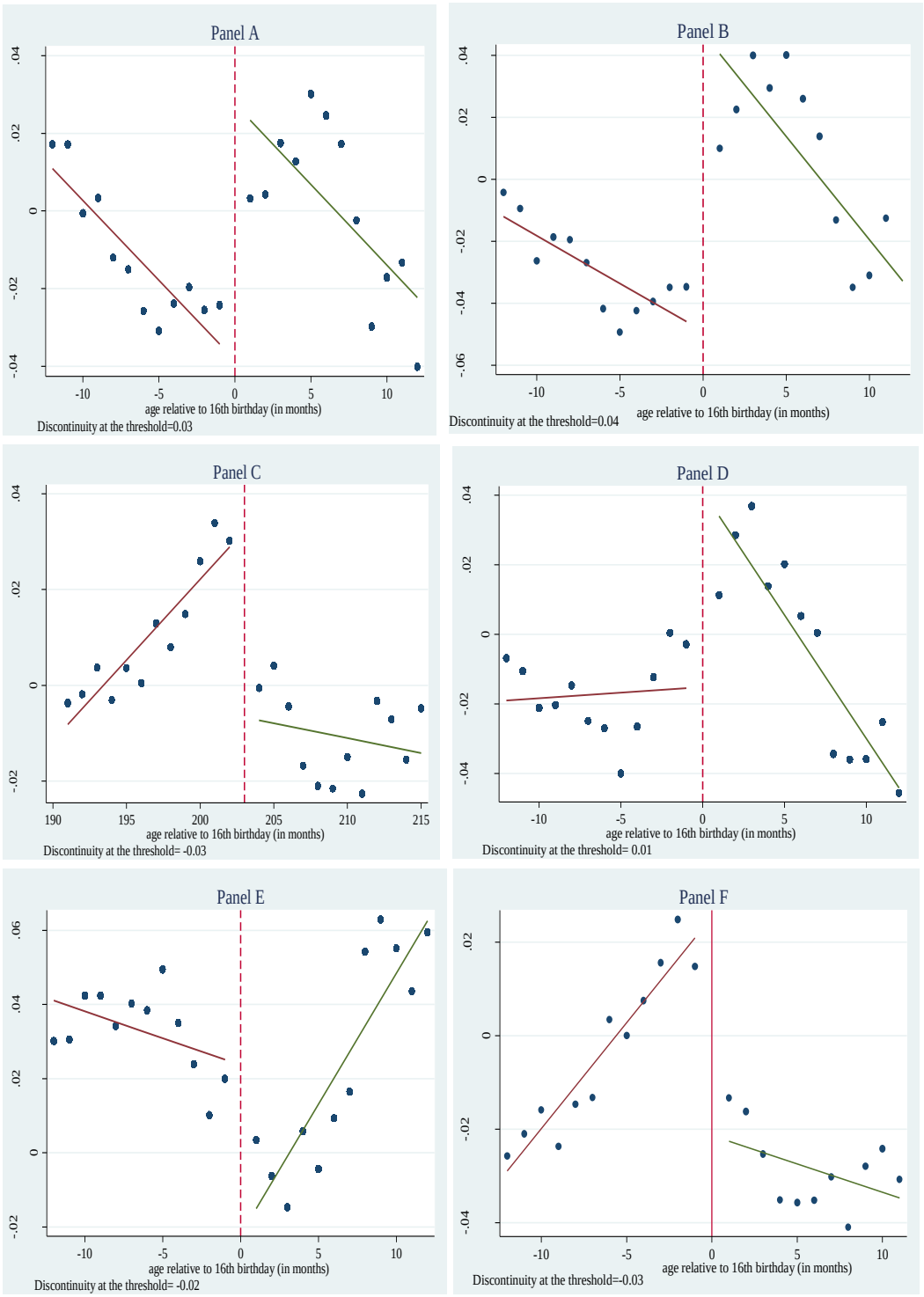
In Figure 5.2, we present the changes in the averages of labour market and education outcomes from 2013 to 2014, plotted against age in months.[53] All graphs in the figure are obtained for males aged between 15-16 years old. Each dot corresponds to the change in mean values of outcome for the age group represented by that dot.

[53] Figure 5.2 can be handled within diff-in-disc model. Hence, we can interpret them as comparing the discontinuities in 2013 and 2014. While Figure 5.1 illustrates the discontinuities for the outcomes in 2013, those in 2014 are available in Appendix A.

Since all the outcomes are binary, these values correspond to change in the proportion of persons who are in the relevant status. Because diff-in-disc setting is an extension of the usual RD design, the interpretation should carefully be made. For example, considering employee outcome (Panel A), we can observe that change in proportion of male employee increases suddenly at the threshold value of 16 years. In fact, it increases by 0.03 pp[54], but this indicates a negative effect on being employee for 15-year-old males. While the proportion of employee among 15 years and 11 months old males declines from 2013 to 2014, it increases among 16 years and 1 month old males. In other words, the relative chances of becoming an employee for 15-year-old males, who are exposed to higher minimum wage in 2014, declines. In Panel B, we observe again negative, but larger effect, for employed outcome. These adverse employment impacts are reasonable; due to elimination of the labour cost advantage for younger males, employers might substitute them for older males after the policy change.

Following the same logic, we can interpret the other graphs in Figure 5.2 similarly. Firstly, consider labour force participation outcome in Panel D. We observe that the impact on the participation of young males is in the same direction of employment effects. In fact, discontinuity at the threshold value of 16 years is 0.01 pp, indicating the change (from 2013 to 2014) in proportion of male labour force is 0.01 pp more as they turn 16. Similar to the above RD graphs, we perceive positive effects for unemployment (Panel C), education (Panel E) and neither in employment nor in education (Panel F) outcomes. Specifically, there is a sudden decline at the age threshold value of 16 years, by 0.03 pp, in the change in proportion of male unemployed. This downward jump signals that increase in minimum wage in 2014 exacerbates possibility of being unemployed for young males. That is, after being entitled to get a higher minimum pay and losing their jobs, some of 15-year-old males become unemployed. Besides, the discontinuity for education and neither in employment nor in education outcomes are -0.02 pp and -0.03 pp respectively.

[54] Magnitude of this jump is calculated by taking the difference of the change in the proportion of being employee in 15 years and 11 months old males from that in 16 years and 1 month old males.



Notes: *Age in months* is centered at 16 years old.
Source: Own calculations using SILC.

Figure 5.2. Changes in Averages of Labour Market and Education Outcomes for Males (2013-2014)

In short, the visual representation of our data makes us to expect negative effects of minimum pay policy on employment and labour force participation of young males, whereas positive effects on unemployment, education and neither in employment nor in education outcomes. Hence, as implied by the neoclassical model, the story might lie on the demand side of the market. Indeed, as the labour cost rises with a higher minimum pay employers would lay off some of the young males of 15-year-old. Moreover, while some of the displaced males try their chances in labour market and becoming unemployed, some find education more attracting.

5.2. Estimation Results

In this section, we present results of the models constructed in the previous chapter. First, we briefly report the results of the standard RD model. Then, we mention the findings of diff-in-disc model. In each model, we begin with the effects on labour market outcomes, and then, we move schooling outcomes. In particular, we ask the following questions: Does minimum wage affect chances of young males being an employed in Turkey? How does their tendency to participate in labour force change after being entitled to higher minimum pay? Do higher minimum wages exacerbate the youth unemployment among males? Does minimum wage encourage teenage males to attend school in Turkey? Is there any significant impact of the minimum pay policy on the share of young males, who are neither in employment nor in education?

5.2.1. Results for Standard RD Model

We estimate the equation 4.5 by using both logit and OLS for the males aged 15-16 years old in 2013. In all regressions, we include quarterly calendar time dummies and month of birth dummies as controls. Besides, we use two different bandwidths in these estimates. In the first one, we use an interval of one year around 16 years old threshold, and we use an interval of two years in the second one. In other words, the first sample consists of young males aged between 15 years and 6 months old

and 16 years and 6 months old. Young males of 15-16 years old constitutes the second sample of two years bandwidth. Here, the coefficient estimates for treatment dummy (β_1 in 4.5) produce the treatment effect at the threshold. Table 5.8 illustrates the results of $\hat{\beta}_1$ for each outcome variable. In the first two columns of the table, the logit estimate results are presented, and in the last two columns, the OLS results are shown. Due to the non-linearity of the logit estimates, estimated coefficients from these estimates cannot be interpreted as marginal effects. Thence, in this table we present estimated regression coefficients from logit estimates as "discrete change in probability".

Table 5.1. Estimation Results for Males of RD model (2013)

	Logit		OLS	
Probability of being…	Bandwidth: 1 year	Bandwidth: 2 years	Bandwidth: 1 year	Bandwidth: 2 years
Employee	-0.016***	-0.037***	-0.021**	-0.034***
	(0.007)	(0.009)	(0.008)	(0.007)
Employed	-0.026***	-0.048***	-0.030**	-0.047***
	(0.007)	(0.009)	(0.011)	(0.010)
Unemployed	0.022***	0.024***	0.021***	0.022***
	(0.003)	(0.003)	(0.003)	(0.002)
In Labour Force	-0.010	-0.027***	-0.009	-0.024**
	(0.010)	(0.008)	(0.010)	(0.009)
In Education	0.013	0.023***	0.012	0.021**
	(0.008)	(0.007)	(0.008)	(0.008)
Neither in Employment nor Education	0.018***	0.028***	0.018***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Observations	7,670	14,070	7,670	14,611

Notes: ***, ** and * refer to 1%, 5% and 10% significance levels, respectively.
Coefficients in the first two columns correspond to discrete change in probability. Standard errors are clustered with respect to age in months. Quarterly calendar time dummies are used (October, November and December is the reference).
Source: Own calculations using SILC.

5.2.1.1. Labour Market Outcomes

We start with employment outcomes. First and third rows of Table 5.1 show that the raise in minimum wage as young males turn 16 would reduce probabilities of being employee and being employed in Turkey. These findings are compatible with neoclassical view. Indeed, minimum wage would reduce the quantity of labour demanded, thereby contracting the number of young people employed. Notwithstanding high levels of informality among them, this is not a surprising result. In fact, the negative employment effects among youngsters are often found in developing economies (Broecke et al., 2015). Earning around minimum wages, young workers are more vulnerable to minimum wage policy in these economies. Similarly, in Turkey minimum wage appears to be a reference wage in the informal sector for 15-16 years old males (Figure 4.4 and Figure 4.5), thereby creating significantly negative effects.

There are several studies analyzing minimum wage effects on youth employment outcomes in Turkey. Papps (2012) finds that minimum wage reduces the probability of being employee in formal sectors for the teenagers under 30 years old in Turkey. Nonetheless, Gürcihan-Yüncüler and Yüncüler (2016) and Pelek (2015) do not find any significant influence on young individuals for being employee. Presumably, the discrepancy between results of these studies stems from the fact that each uses a different approach. For instance, while Pelek exploits the regional variation in Kaitz index to capture the employment effects, Papps employs a duration data analysis, which allows observing transitions among different states in the labour market. Nevertheless, since minimum wage is set at the national level in Turkey, the use of regional variation in Kaitz index as in Pelek's study might be misleading. Because regional Kaitz index represents average wage differences across regions, the minimum wage variable in each region can be correlated with employment rates. On the other hand, to examine the effects of minimum pay, Gürcihan-Yüncüler and Yüncüler follow a quasi-experimental methodology. However, unlike us, they focus on the youth aged 15-25 years old and the total number of paid workers so

that effects on males are insignificant. Besides, they agree that these findings can be regarded as surprising.

We might also point out that the studies on Turkey focus on young individuals older than 17 years old to detect the minimum wage effects. However, individuals above this age might behave differently regarding labour market and schooling choices. For instance, they have more experience in the labour market so that they have a greater tendency to stay in the market even after being fired due to minimum pay policy. Besides, employment subsidies provided only for workers who are 18 years old and over might affect preferences of the employers towards these workers. What is lost in terms of cost advantage via minimum pay might be compensated by other incentives offered for those above 18. Hence, the effects of minimum wage on the workers above 17 years old might differ from the effects on individuals aged 15-16 years old.

Next, we move to the unemployment outcome whose results are reported in the fifth row of Table 5.1. It illustrates that the probability of being unemployed raises by 0.02 pp among young with the rise in minimum wage. Studies on Turkey find either a positive (e.g. Akgeyik and Yavuz, 2006) or no (e.g. Korkmaz and Çoban, 2006) significant relationship between unemployment and minimum wage. Different from our study, they focus on the aggregate effects by using time-series analysis. The deficiencies of time-series methods in analyzing minimum wage effects are well established in literature (e.g. Kennan, 1995). Moreover, our findings regarding the positive effects on unemployment are in line with the expectations of two-sector model, suggesting that the hope of getting higher wages would create a queue for the formal jobs, and hence unemployment, which might persist (Mincer, 1976).Yet, we do not believe that this is the correct way of interpreting our results. This is because even if both formal and informal sectors are available for young males, a significant proportion of 15-16-year-old males are located in the latter one. Hence, when young males are laid off due to higher minimum pay, they probably become unemployed and look for informal jobs, not queue up for the formal ones. In fact,

according to HLFS, 78.5% of 15-year-old males search for jobs as ‘service or sales worker’ or jobs ‘in elementary occupations’, almost all of which are informal in 2014.

The final outcome variable in this part is the labour force participation. On the one hand, an increase in minimum pay might raise the number of young labour supplied, since the probability that their reservation wages fall below market wage increases. On the other hand, the decline in quantity of labour demanded in response to the rise in labour cost might discourage young people from looking for a job. The opposing effects makes it difficult to have an expectation in either direction. However, our results illustrate that the latter dominates in this case. Indeed, as shown in the seventh row of Table 5.1, minimum wage reduces labour force participation of young males in Turkey. There are several studies producing similar results for developing economies (e.g. Brochu and Green, 2013). Yet, the empirical literature on labour force participation effects of minimum wage is rather scant. In particular, only very few are on Turkey. To our knowledge, the only study analyzing the effects on the participation of young individuals in Turkey belongs to Bakış et al. (2015). In this study, similar to ours, they find a supportive evidence on the negative effects for 15-19 years old youth.

5.2.1.2. Education Outcomes

Based on the above findings in Table 5.1, we perceive that a higher minimum pay reduces the probability of being employed and being in labour force, whereas raises the probability of being unemployed for young males. Then, what happens to the ones who are out of labour market due to the minimum pay? An option for young males who are aged 15-16 years old is attending school when they expect a decline in job opportunities. In fact, human capital theory predicts that minimum wages might discourage teenagers from attending school through an increase in foregone earnings, i.e. opportunity cost of education. Nonetheless, this is conditional on the employment opportunities in the market. If minimum wage lowers the chances of

young individuals in getting a job, then cost of foregone work will decline instead. As this happens, minimum wage encourages youngsters attending school. Table 5.1 (ninth row) shows that an increase in minimum wage improves school participation of young males in Turkey. To our knowledge, in their unique study on this country, Bakış et al. (2015) also find positive effects on schooling of teenagers. Finally, we consider the outcome for being neither in employment nor in education for young males in Turkey. This outcome is important because if young males are discouraged from attending school when not employed, they might become a burden for policy makers. Table 5.1 (eleventh row) illustrates that a raise in minimum pay increases the probability of young males being neither in employment nor in education. These regression results are highly significant, thereby threatening youth minimum pay policy.

5.2.2. Results for Diff-in-Disc Model

The empirical model we construct within "diff-in-disc" design is given in 4.6. Since our design adds up DID dimension to RD setting, the coefficient of interest is now α_2. The idea is indeed very similar to DID framework. Within usual DID, coefficient of the interaction term of treatment and post-treatment dummies yields treatment effect. It provides an estimate for the relative change in outcomes of treatment and control groups before and after an exogenous change in policy. In our design, we have a similar approach because we investigate how the outcome values change as individuals turn 16 before and after the change in minimum wage policy in January 2014. The interaction of treatment dummy, D_i --depends on whether being under or above *16 years old age*, and, post-treatment dummy, Post, in equation 4.6 produces the effect we look for. Thence, we focus on the estimates of α_2. In particular, we provide $\widehat{\alpha}_2$ for labour market and education outcomes in this setting. Here, Table 5.2 reports the estimated coefficients of the interaction term, D*Post, in regression equation 4.6 for all outcomes. Besides, we use logit and OLS estimates for young males by using two bandwidths defined above. We also include calendar time and

month of birth dummies in each regression. Moreover, we interpret our results from logit estimates as the discrete change in probability.

5.2.2.1. Effects on Labour Market Outcomes

Firstly, consider the employability of young males. Similar to the above setting, we look at both paid work and employment in any type. Table 5.2 illustrates that 2014 policy change in the minimum pay would reduce the employment probabilities of young males who are below 16 years old, relative to those above it. In fact, as young males below 16 become entitled to a higher minimum pay, their chances in finding a job decline. This result is regardless of whether the young male is working at paid work, or being employed in any type. Estimation results presented in the Table 5.2 indicate that the impact of minimum pay policy would be more for the outcome of being employed when compared to outcome of being employee. Indeed, the change in the probability of being employee for males under 16 years old is between 0.01-0.03 pp less than the older males, after the policy change. Nonetheless, this impact is between 0.03 and 0.06 pp for the probability of being employed. Moreover, as in Table 5.2, disemployment effect gets stronger as we narrow the bandwidth around the age threshold. It should also be emphasized that the impact in the closer vicinity of the age threshold, -0.03 pp, is almost same as the discontinuity for employment outcome of males calculated in the previous section (Figure 5.2).[55] This is not a coincidence because the RD design acts as a randomized experiment around the discontinuity point when it is properly identified. Hence, a change in the mean outcomes just below and just above that point yields the treatment effect (Lee and Lemieux, 2010).

[55] We observe similar results from the estimation of our model using other outcomes as dependent variables. However, to save the space, we do not repeatedly mention the same result in the rest.

Table 5.2. Estimation Results for Males of Diff-in-Disc Model

	Logit		OLS	
Probability of being…	Bandwidth: 1 year	Bandwidth: 2 years	Bandwidth: 1 year	Bandwidth: 2 years
Employee	-0.034***	-0.012*	-0.034***	-0.009
	(0.004)	(0.006)	(0.004)	(0.007)
Employed	-0.057***	-0.033***	-0.059***	-0.028***
	(0.005)	(0.007)	(0.006)	(0.009)
Unemployed	0.032***	0.020**	0.028***	0.019***
	(0.007)	(0.005)	(0.006)	(0.005)
In Labour Force	-0.031***	-0.014*	-0.032***	-0.01
	(0.008)	(0.008)	(0.008)	(0.008)
In Education	0.027***	0.015*	0.025***	0.01
	(0.007)	(0.008)	(0.007)	(0.008)
Neither in Employment nor Education	0.036***	0.019***	0.034***	0.020***
	(0.006)	(0.006)	(0.006)	(0.006)
Number of observations	15,348	29,303	15,348	29,303

Notes: ***, ** and * refer to 1%, 5% and 10% significance levels, respectively.
Coefficients in the first two columns correspond to discrete change in probability. Standard errors are clustered with respect to age in months. Quarterly calendar time dummies are used (October, November and December is the reference).
Source: Own calculations using SILC.

Prior to change in minimum pay policy in January 2014, 15-year-old workers cost 14.2% cheaper on average[56] to employers, compared to 16-year-old counterparts in 2013.[57] This provided an advantage for the younger workers in terms of getting a job when competing with a candidate from older age group because their lower cost compensated for the productivity differentials. Nonetheless, when the policy was

[56] Since the minimum wage was determined biannually in 2013, this percentage refers to difference in the average cost within a year.

[57] It is important to point out that the employers do not involve differential costs as they fire young workers of different ages in the country. Otherwise, a substitution implied by our findings might not be possible.

introduced in 2014, they lost their labour cost advantage. This makes the employers to follow a job hiring process which is now not in favor of the 15-year-old workers. Indeed, as the cost advantage of 15-year-old males are eliminated, their chances in getting a job relative to 16-year-old workers decline, thereby making employers to substitute some of them for 16-year-old males.

Now, we move to the unemployment outcome whose results are given in Table 5.2. These findings imply that the unemployment probability of 15-year-old males rises with the 26.4%[58] increase in nominal minimum wage applied to the workers belonging to this age group in 2014. In fact, the change in the probability of being unemployed is 0.02-0.03 pp more for 15-year-old males than that of 16-year-old males, after the policy. The last outcome we analyze in this part is the labour force participation. Table 5.2 shows that the change in the probability of 15-year-old males being in the labour force is 0.01-0.03 pp less compared to 16-year-old males after the policy is introduced in 2014. In short, the impact of the policy is in line with the findings we obtain from the standard RD model in terms of the labour market outcomes.

5.2.2.2. Effects on Education

Based on the above findings, we perceive that some young males, who are exposed to higher minimum pay, are laid off due to the decline in the quantity of demanded. After being displaced, some of the young males start to search for a new job. Yet, it does not happen for others. In particular, some of them move out of the labour force instead. Then, where do they go? Since we are focusing on the age group of 15-16 years old, it is straightforward to consider education as a choice. Moreover, the non-employed males might become neither in employment nor in education if they are not able to find a way back to school after the policy change in 2014. Hence,

[58] Since minimum wage is determined biannually in 2013 and 2014, this amount corresponds to the percentage change in average values of nominal minimum wage from 2013 to 2014.

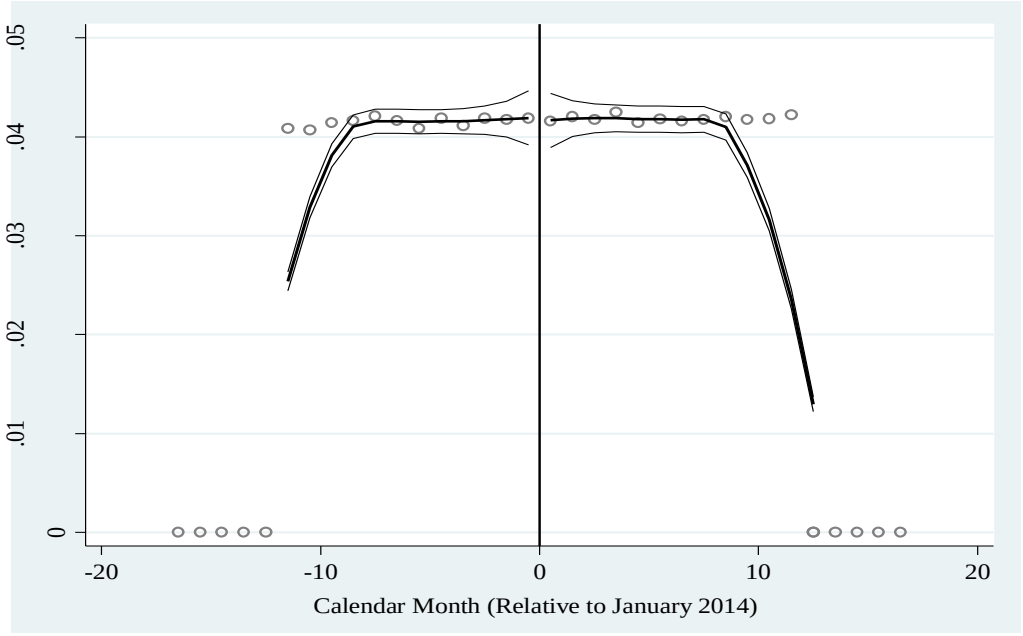
in this section, we analyze the effects on education and being neither in employment nor in education outcomes to complete the story.

Table 5.2 illustrates the estimation results of our model described by equation 4.6 when the dependent variable is being in education. According to Table 5.2, logit and OLS estimates indicate that the increase in the minimum wage encourages male teenagers towards education in Turkey. In fact, relative to 16-year-old counterparts, the change in the probability of 15-year-old males being in education is 0.01-0.03 pp more after the policy change in January 2014. Hence, we believe that some of the displaced males find a chance to place themselves in education. This is crucial regarding the policy if returnees are able to successfully complete their secondary education and raise their productivity. In this case, exiting to school in response to minimum wage policy might increase labour market efficiencies in future. On the other hand, if the displaced young males find a place out of education, then pushing them to a state in which they can be productive will require some costs. Besides, psychosocial problems associated with being out of employment and education might be costly for the country as a whole. In fact, young individuals who are neither in employment nor in education are more likely to be involved in crime and/or violence than their active counterparts (Henderson et al., 2017). Table 5.2 indicates that the change in the probability of 15-year-old males who are neither in employment nor in education are 0.02-0.04 pp less after the policy change compared to 16-year-old males.

5.3. Robustness Check: Alternative Model Specification

As discussed in chapter 4, we develop an alternative model to check the robustness of our results. The construction of this model is very similar to the original diff-in-disc model. Indeed, it is formed by using the fact that individuals under 16 years old become eligible to receive a higher minimum wage in the *first month of 2014.* Because they can be paid at a higher rate as soon as they pass a certain cut-off point in time, we can regard it as rating variable. That is, this model utilizes *calendar time*

in months as the rating, and *January 2014* as the cut-off value. Regarding the validity of RD in this model, teenagers might wait for policy change and sorting themselves accordingly to have higher wages. However, this seems unlikely. Neither teenagers nor employers had enough time to manipulate the treatment; because Minimum Wage Determination Commission announced the policy change at the end of the Commission meetings on December 31, 2013, and no prior discussions were made. Furthermore, McCrary density test provides no significant jump in the density of 15-year-old males in the first month of 2014, thereby removing the questions about manipulation in this setup (see Figure 5.3).



Notes: Based on McCrary (2008) density test.
The rating variable is calendar time in months, and the cut-off value January 2014.
Source: Own calculations using SILC.

Figure 5.3. Density of Males Aged 15 Years Old

Another concern for the RD validation is that nothing should exhibit discontinuity in January 2014. Even though no other significant amendment to the labour market or education system in Turkey was made in the first month of 2014, seasonality in

labour markets might invalidate this condition. This is because environments, to which labour market belongs, might fluctuate on a monthly basis so that the opportunities available in the market for 15-year-old teenagers change accordingly. Nonetheless, applying a similar DID setting as we apply in our diff-in-disc model, we might be able to eliminate such seasonality. In fact, we follow basic DID logic, but, in a different manner. In a conventional DID approach, some change, say, in policy occurring at one point in time is exploited such that this policy change affects only a group of individuals, while leaving another group, which are very alike, unaffected. Then, the comparison of affected and unaffected groups before and after the change would yield the impact of policy. In this model, however, it is not possible to make before-after comparison because we use 'time of change in policy' to determine the group that are affected by this policy. Still, it might be reasonable to make a comparison of the change in outcomes after January 2014 for the two groups: teenagers affected by policy and teenagers who are very similar to the affected group. This is what we do in this model. Instead of making a before-after comparison, we compare 15-year-old and 16-year-old males to analyze how the outcomes changed after January 2014 differently for these groups. This is indeed another diff-in-disc model of the form

$$y_i=\theta_1 Post+\theta_2(Time_i-d)+\theta_3 Post*(Time_i-d)+\rho_1 D_i+\rho_2 D_i*Post+u_i \quad (5.1)$$

Here, the variable definitions are as follows:

- y_i: Binary outcome variable on being employee, employed, unemployed, in labor force, in education, and neither in employment nor in education.
- Post: Post-treatment dummy, taking value of 1 if the calendar month is after 2014, January and 0 otherwise.
- Time: Calendar time in months.
- d: The cutoff value, which is January 2014.
- $Time_i$-d: The distance to cut-off variable.

- D_i: Treatment dummy, taking value of 1 if individual is less than 16 years and 0 month old in the relevant month of the survey and 0 otherwise.

Table 5.3. Estimation Results for the Alternative Model Specification

	Logit		OLS	
Probability of being…	Sample 1	Sample 2	Sample 1	Sample 2
Employee	-0.036***	-0.014**	-0.036***	-0.013*
	(0.007)	(0.005)	(0.01)	(0.007)
Employed	-0.058***	-0.034***	-0.06***	-0.031***
	(0.007)	(0.006)	(0.010)	(0.009)
Unemployed	0.026***	0.019***	0.024***	0.018***
	(0.006)	(0.003)	(0.005)	(0.003)
In Labour Force	-0.037***	-0.016***	-0.037***	-0.013*
	(0.008)	(0.006)	(0.009)	(0.007)
In Education	0.031***	0.017**	0.029***	0.010
	(0.007)	(0.006)	(0.007)	(0.007)
Neither in Employment nor Education	0.033***	0.019***	0.031***	0.021***
	(0.007)	(0.004)	(0.006)	(0.004)
Number of observations	15,348	29,303	15,348	29,303

Notes: ***, ** and * refer to 1%, 5% and 10% significance levels, respectively.
Coefficients in the first two columns correspond to discrete change in probability. Standard errors are clustered with respect to calendar months. Monthly calendar time dummies are used (December is the reference).
Sample 1: Treatment group is the young males of 15 years and 6 months old-15 years and 11 months old. Control group is young males of 16 years and 0 month old-16 years and 6 months old.
Sample 2: Treatment group is 15-year-old males. Control group is 16-year-old males.
Source: Own calculations using SILC.

Since equation 5.1 is constructed within diff-in-disc design, it includes conventional RD variables given by the first three terms, i.e. Post, $Time_i$-d, Post*($Time_i$-d) and

DID variables given by the last two terms, i.e. D_i and D_i*Post. Besides, we assume a linear relation between the outcomes and the rating. As in our models, additional covariates are not included in this model. Since we develop this alternative model with a diff-in-disc design, coefficient of interest is ρ_2. Our outcomes are the same as defined in section 5.1. Furthermore, we estimate this model for two samples. In each sample, we compare two groups of males. One is the treated males, who are affected by the policy change in 2014, and the other is the untreated males, who are not affected. In sample 1, treated group is aged between 15 years and 6 months old and 15 years and 11 months old; the untreated group is between 16 years and 0 month old and 16 years and 6 months old. In sample 2, we compare 15-year-old males with 16-year-old males as treatment and control groups, respectively.

Similar to our diff-in-disc model, we estimate equation 5.1 by using logit and OLS methods. The estimation results of this model are presented in Table 5.3. Based on these results, we can assert that the findings of the diff-in-disc model are robust to model specification. In fact, regardless of the estimation method, the sign of the impact of minimum pay on each outcome is same and the magnitudes are very close for the two models. For example, consider the employment outcome. The broader sample estimations for the employment outcome indicates that the difference in the probability of being employed between 15-year-old and 16-year-old males reduces by 0.03 pp just after the policy change. This impact becomes 0.06 if we compare narrower samples. We can observe similar effects for the other outcomes as well. Besides, the findings of alternative model provide slightly higher effects for each outcome. To illustrate, logit estimates of equation 5.1 for sample 1 implies that the difference between treated and untreated groups of males regarding the labour force participation probability is 0.04 pp less after 2014, January (Table 5.3). On the other hand, the corresponding effect implied by our primary model is a little bit less, 0.03 (Table 5.2).

5.4. Discreteness of the Rating Variable

In order to estimate the effects of the minimum wage policy on various outcomes, we construct models within the RD design. In this setting, we employ age as the rating variable, which we observe monthly in our data. Since age is not truly continuous, we cluster the standard errors of our regression estimates following the methodology proposed by Lee and Card (2008). Even though it is a frequently used approach, clustering of standard errors to ensure accuracy are sometimes subjected to criticism. For instance, Lee and Card assume random specification errors in their methodology. Unlike them, Kolesar and Rothe (2018) argue that specification bias might not be nonrandom because many data are created using i.i.d. sampling. This is why we discuss the discreteness of our rating in this section.

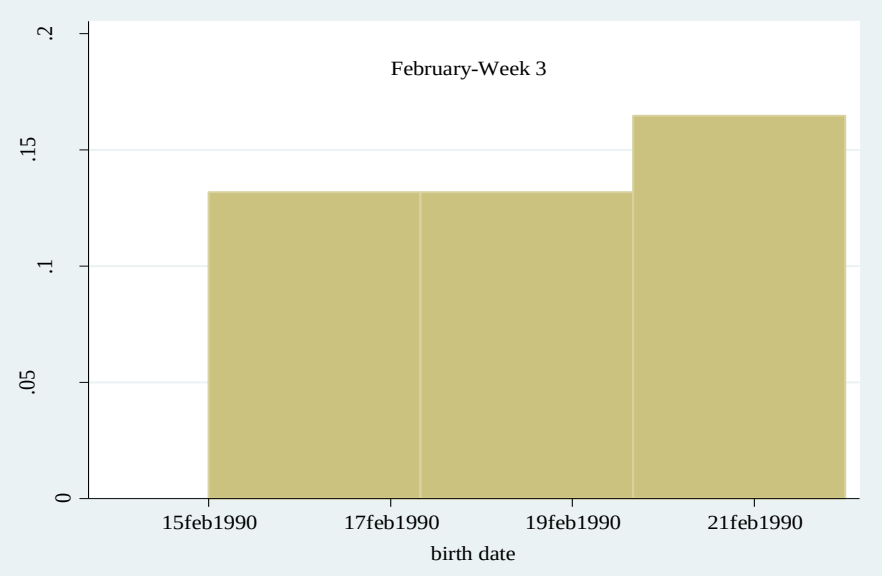
Our estimation methodology treat the rating, *age in months*, as a discrete variable. However, should it be regarded as such? The point is that within an RD setting like ours, a rating variable, which is not truly continuous, can sometimes be regarded as if it is not. In fact, if distance among support points are not wide near the threshold value, estimation bias of the treatment effect might be ignorable. Besides, the non-clustered standard error could be appropriate in that case. On the other hand, if these gaps were not sufficiently narrow, then estimation bias would not asymptotically converge to zero (Kolesar and Rothe, 2018). Hence, our question becomes whether these gaps are sufficiently narrow or not.

Because our rating variable is age, we deal with the issue resulting from measuring age in different scales. In fact, many studies utilizing RD as a quasi-experimental design use age as the rating variable (e.g. Lalive, 2008). Its widespread usage is because age is a variable that cannot easily be manipulated --a property required for a valid RD inference. On the other hand, these studies utilize age in different scales, mostly due to the nature of the data. Indeed, some studies employ age in years (e.g, Oreopoulos, 2006), some use age in months (e.g. Lalive, 2008) and some others use age in a narrower scale (e.g Dickens et al., 2014). Then, does exploiting different

scales of age make any difference to our study? We believe it does not, because the age distribution of males does not vary with the interval on which the distribution is obtained. To show this, we use data of Turkish Employment Agency, described at the beginning of this chapter. In fact, we plot the histogram of males (i) born in the same week of a month in a year, (ii) born in the same month of a year, (iii) born in the same year. Particularly, we consider males born in 1990, corresponding to 17-18 years old[59] at the registration date to the Agency. Figure 5.4 illustrates the histogram of males born in the third week of February[60] 1990. As seen, it represents almost a uniform distribution for the weekly data. Moreover, the shape of age distributions would almost remain same if we take either a monthly (Figure 5.5) or a yearly (Figure 5.6) interval. Hence, uniformity of age distributions might imply that using age in a weekly, a monthly or a yearly scale would not make any difference for our estimations. Besides, using a very similar experiment within RD setting, Dickens et al. (2014) show that using weekly, monthly or 6-weeks bin widths in estimating the effects of minimum wage does not change their results.

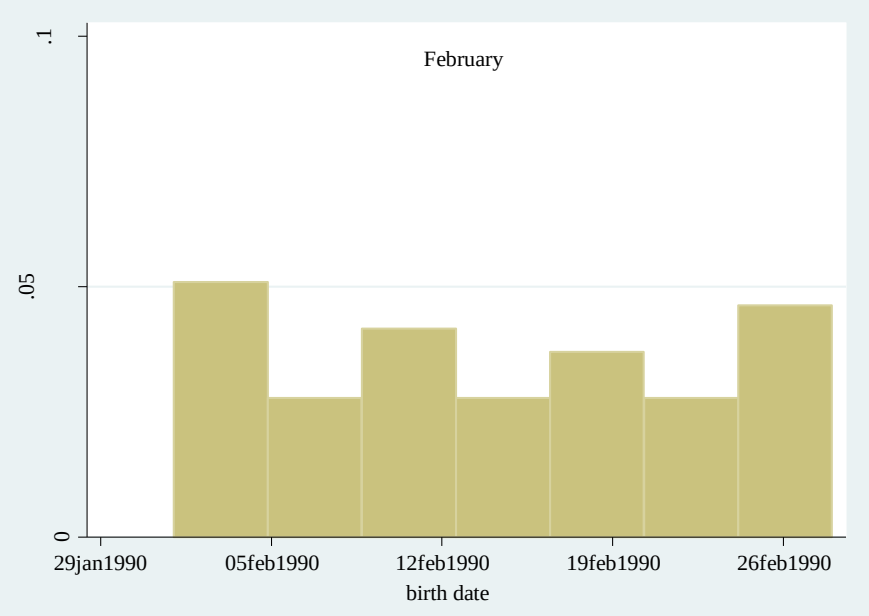
[59] Number of observations younger than this age group is relatively few so that we are not able to draw meaningful plots.

[60] We choose the month in which number of observations is one of the highest in data. However, the shape of distribution almost remain same for the other months expect January. Furthermore, taking any four weeks of a month does not change the shape for the weekly distribution.



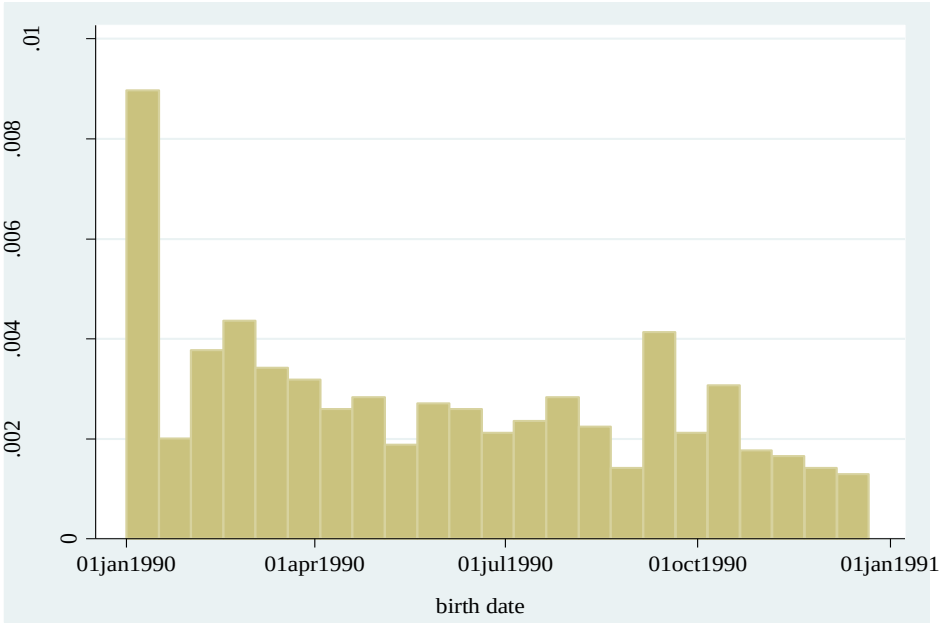
Source: Own calculations using Turkish Employment Agency data.

Figure 5.4. Histogram of Males Born on Each Day of the Third Week of January 1990



Source: Own calculations using Turkish Employment Agency data.

Figure 5.5. Histogram of Males Born in the Month of January 1990



Source: Own calculations using Turkish Employment Agency data.

Figure 5.6. Histogram of Males Born in 1990

Table 5.4. Estimation Results of Diff-in-Disc Model without Clustering

	Logit	
Probability of being…	Bandwidth of 1 year	Bandwidth of 2 years
Employee	-0.034***	-0.012*
	(0.008)	(0.006)
Employed	-0.057***	-0.033***
	(0.01)	(0.007)
Unemployed	0.032***	0.020***
	(0.011)	(0.007)
In Labour Force	-0.031**	-0.014
	(0.013)	(0.01)
In Education	0.027**	0.015
	(0.014)	(0.01)
Neither in Employment nor Education	0.036***	0.019***
	(0.012)	(0.008)
Number of Observations	15,348	29,303

Notes: ***, ** and * refer to 1%, 5% and 10% significance levels, respectively.
Coefficients correspond to discrete change in probability. Quarterly calendar time dummies are used (October, November and December is the reference).
Source: Own calculations using SILC.

Clustering of the standard errors might not be necessary when age in months is not regarded as if it is continuous. However, our results would remain similar as we attempt to make inference based on the non-clustered standard errors. Table 5.4 illustrates the results of logit regression estimates of our model in this case. It indicates that the standard errors are robust to clustering. In fact, we still have significant effects of the minimum wage on all outcome variables with similar magnitudes.

CHAPTER 6

CONCLUSION

A remedy or a curse? Being a policy instrument determining the least amount of pay an employer could possibly pay his/her workers, minimum wage is used to prevent workers from receiving very low wages, which is not enough to survive on. In that respect, such a policy might be influential in improving the wage distribution and alleviating poverty, especially among those who are earning very low wages. However, bringing about a wage increase, minimum wages might compel the employers to cut down their workforce. Even if the remaining workers enjoy higher wages, the displaced ones might suffer a lot. Besides, the workers with the least productive skills are more prone to such layoffs due to the minimum pay policy. In particular, young individuals are likely to be affected by such policies. Because they are underrepresented in many economies, once they are laid off it becomes difficult for them to find a new job. Within this context, it is crucial to find out the extent to which the minimum pay policy affects the youth.

Despite the extensive literature on this topic, a consensus is yet to be reached on its effects. In fact, whereas a multitude of studies ascertains the hazardous effects on the labour market, particularly for the youth, there are many others that seriously challenge these results. Besides, the research on developing economies is scant and the empirical findings is mixed perhaps because of the diverse nature of the labour markets. Indeed, these economies are characterized by high rates of informality and non-compliance. In such contexts, the minimum wage policy might not be relevant, as it cannot be applied to a certain portion of the labour market, thereby making it less influential. Notwithstanding the limited applicability, minimum wage can be a benchmark in setting the wages in the uncovered sectors. Being as a reference price, the minimum wage is argued to affect a significant part of society in developing

countries. In particular, whether it might be influential in labour markets of these economies is debated. Hence, the need of empirical research on these issues within a developing country context is still important today.

Turkey has a significant young population. However, this age group face difficulties in entering the labour market and being employed. Despite their low participation rates, youngsters have very high unemployment rates. Moreover, most of the young people who are lucky to find a job work without social security. Notwithstanding high informality, these workers usually earn around the minimum wage, thereby signaling a binding policy. Hence, if we encounter adverse labour market effects of the policy on young people, it might aggravate their unemployment and inactivity further. On the other hand, it might be influential in their schooling choices as well. Indeed, young males might be directed to school if the minimum pay policy pushes them out of the labour market.

In this thesis, we aim to shed light on how the minimum wage policy would affect the labour market and schooling outcomes of young males in Turkey. With this motive, we start with the theoretical discussions and the review of the empirical literature in chapter 2. The minimum wage policy has been the subject of theoretical debates for a long time. The neoclassical model that assumes competitive markets is at the heart of the debates. As an intervention to the price mechanism, it drives up the least amount of money paid to workers, thereby reducing the quantity demanded for labour. At the same time, higher wages attract more people to the labour markets. Hence, the neoclassical model implies a reduction in the number of workers hired and generation of unemployment. On the other hand, this model ignores the fact that a part of the labour market might not be covered by the minimum wage policy. If indeed a covered and an uncovered sector exist, worker flows among the affected and unaffected parts of labour market might change these results. Indeed, two-sector model suggests that if a worker is laid off due to the minimum pay policy in a certain sector, he/she might find a job in the uncovered sector. Thus, adverse employment effects might decline in total. Initial studies

relating the minimum wage and labour markets are in line with the models suggesting negative employment effects --either moderate or significant. Nonetheless, later empirical work seriously challenge earlier findings. Discussing the possibility of nonnegative effects on employment, Card and Krueger initiate *new minimum wage research*. This new era of research introduces different models, that might produce either no or positive effects of minimum wage. Among them, the most prominent ones are the monopsony model, efficiency wage model and search model. Based on these models, later studies sometimes find non-negative minimum wage effects on aggregate employment levels in many countries. However, when the studies focus on young population, the effects mostly turn to negative.

Following the theoretical and empirical discussions, we describe the institutional structure of the minimum pay policy in Turkey (Chapter 3). During 1989-2014, the minimum wage was determined according to age of workers in the country. Indeed, a single age cut-off identified the minimum pay policy. Workers under 16 years old were subject to lower amount of minimum pay than that of workers who were at and above this age cut-off. Furthermore, the differential in minimum pay among younger and older workers based on this rule declined over time until 1994. After 1994, it remained rather constant. Indeed, during 1994-2014, young workers were receiving nearly 15% lower minimum pay than older workers were. In 2014, age-based differentiation of the policy was removed, thereby shaping the current system of the country. As a result of this policy change, workers under 16 years of age experienced almost 15% increase in their real wages at the minimum in 2014.

Exploiting the change in minimum wage, we analyze the impacts of minimum wage on labour market and schooling outcomes of young males in Turkey. In this study, we exclude females because their labour market decisions might depend on social or cultural factors other than economic motives. Furthermore, due to their low participation rates, we have relatively fewer observations for the females in our data. We also focus on the males aged between 15-16 years old because (i) by law,

individuals under 15 years old cannot legally work in Turkey (ii) since the choice of college education becomes relevant for the young individuals who are at and above 17 years old, we restrict our estimates within a two-year interval around the cut-off value of 16 years old.

In chapter 4, we firstly examine the extent to which minimum wage is binding for males aged 15-16 years old in Turkey. It is because we expect that wages would be the driving force behind any probable labour market impact of the minimum pay policy. Furthermore, due to high rates of informal employment among the age group of interest in Turkey, this policy might be irrelevant for them unless it binds. In fact, according to HLFS, 90.5% of 15-year-old males and 84.2% of 16-year-old males were working without social security in 2013. Informality rates became 86.4% for the former group and 85.6% for the latter group in 2014. In parallel with high informality, 15-16-year-old males mostly earn below the minimum wage. Indeed, during 2009-2013, around 80% of the males aged 15-16 years old are paid below the minimum levels. After the change in policy in Turkey, this proportion declined to around 76% in 2014. Apart from receiving less than minimum pay, a significant portion of the male workers is located at the minimum wage level. We observe peaks around the minimum wage for young males, by looking at the Kernel density estimates of wage distributions in 2013 and 2014. Moreover, 7.3% of 15-year-old males and 9.1% of 16-year-old males were earning the minimum wage before policy change during 2009-2013. After the change in policy, the proportion of minimum wage earners among young males increased to 14.7% for 15-year-old workers and to 18.4% for 16-year-old workers in 2014. All these together indicate that the minimum wage binds to a certain extent for young males in Turkey. Hence, despite high informality, we might expect that minimum wage policy would affect the young males of interest. Furthermore, since many young workers are paid at the minimum level, minimum pay policy implicitly embraces lighthouse effects. That is, the policy would bind not only the workers in formal sectors, but also the workers in informal sectors.

Visual representation of data in chapter 5 suggests that the employment and labour force participation outcomes of young males are adversely affected by the minimum wage policy. Furthermore, the data demonstrates a deterioration of unemployment among young males at the threshold value of 16 years. We observe that the increase in minimum pay depending on this policy positively affect the schooling of young males while worsening their outcome for neither in employment nor in education. Later on in chapter 5, we introduce the empirical results of our model obtained from logit and OLS estimates of labour market and schooling outcomes for young males. First, we present the Regression Discontinuity (RD) model results, and then provide the results from difference-in-discontinuities (diff-in-disc) model. The findings of both models are parallel in terms of sign and magnitude of the minimum wage effects.

According to diff-in-disc model estimates, we observe adverse effects on youth employment of the change in minimum pay policy. Indeed, relative to older males, change in the probability of being employee for males under 16 years old is 0.01-0.03 pp less after abandoning the age-based differentiation in 2014. When the employment is considered, the corresponding change in probability becomes 0.03-0.06 pp. That is, 26.4% increase in the nominal minimum wage reduces youth employment probability about 0.03-0.06 pp. These findings are in line with the previous research. For instance, Kreiner et al. (2017) show that 40% increase in minimum wage reduces youth employment by 15 pp in Denmark. Exploiting an increase in youth minimum wage, Pereira (2003) finds that it decreases employment of 18-19-year-old workers in Portugal. Yannelis (2014) provides close findings regarding the impact of minimum wage for the workers under 25 years old in Greece. In their influential study, Brown et al. (1982) find that the minimum pay harms youth employment in the US. The adverse employment impact is compatible with the neoclassical view suggesting that the impact of the minimum pay policy on the labour market is realized through the demand side. In our study, lower cost of younger workers compensated for the productivity differentials when compared to older workers before January 2014. The removal of age-differential in minimum

pay eliminates this labour cost advantage of the younger males in 2014. This would then cuts back the quantity of labour demanded, thereby reducing employability in the markets. In particular, some of the younger males aged 15-year-old might be substituted for the older ones.

The displaced males due to the increase in minimum pay might start to look for a new job. Indeed, diff-in-disc regression estimates illustrate that the change in the probability of 15-year-old males being unemployed is 0.02-0.03 pp more (relative to older males) after they are subject to a higher minimum wage in 2014. Several studies analyzing the impact of youth minimum wage produce similar findings on unemployment. Gorry (2013), for instance, finds that 30% increase in the minimum pay increases unemployment rate of 15-24-year-old individuals by 1.4 pp in US. Similarly, Yannelis (2014) show that a relative rise in minimum pay for the young workers under 25 years old results in higher unemployment rates in Greece. In their study on European Union countries, Christl et al. (2017) find that minimum wage harms unemployment rates among young individuals in Belgium, France, Greece and Netherlands. Higher unemployment figures followed by a higher minimum wage is also pointed out by the neoclassical theory.

Being subjected to higher minimum wage, some of the laid off young workers might move out of the labour force. We can assert this because employment effect of the policy change is more than its unemployment effect. In particular, our findings suggest that the change in the probability of being in labour force is 0.01-0.03 pp less for 15-year-old males after the increase in minimum wage compared to 16-year-old males. Theoretically, minimum wage can either increase or decrease labour force participation. On the one hand, higher wage rates available in the markets can attract more of young individuals towards the labour market. On the other hand, as fewer positions to be filled in the markets, the reduction in the chance of getting a job can reduce their participation. Then, the question on the labour force participation impact of the minimum pay policy becomes empirical. However, relatively fewer studies address labour force participation aspect of the minimum

wage impact for youth. For instance, similar to our findings, Wessel (2005) show that the minimum wage reduces the labour market participation of teenagers in US. Using data on Turkey, Bakış et al. (2015) also provide negative effects on the labour force participation probabilities of 15-19-year-old individuals.

Since education can be an option for a young male, he/she might consider attending school after being laid off. Our findings from both models are in line with it. Indeed, the change in probability of being in school for males under 16 years old is found to be 0.01-0.03 pp more after the increase in minimum pay, relative to older males. It implies that this change in the policy encourages young males towards school in Turkey. Human capital theory suggests that as long as the young individuals expect higher earnings in the future, netting out the forgone earnings today, the minimum pay policy can increase the schooling participation of them. Moreover, such policies can increase the productivity requirements of jobs, thereby attracting more youth into the schools with the hope of higher earnings associated with these jobs. There are empirical studies providing supportive evidence for this reasoning. For instance, Smith (2014) finds that minimum wage reduces the probability of school dropouts for teenagers in US.

After being exposed to higher minimum pay, some of the displaced young males might not prefer to attend school. Indeed, our findings show a positive impact on the young males of being neither in employment nor in education of the minimum wage. According to diff-in-disc model estimates, the change in the probability of males being neither in employment nor in education is 0.02-0.03 pp higher for the 15-year-olds when compared to 16-year-olds. Even though the relationship between minimum wage and this outcome variable is less studied in the empirical literature, there are studies producing positive effects for this relation. To illustrate, Neumark and Wascher (1995b) find that an increase in minimum amount of pay raises the proportion of young individuals who are neither in employment nor in education in US.

Policy implications and future research:

Minimum wages might be beneficial for improving the well-being of individuals, while enhancing the relative positions of the least skilled workers in a society. When the minimum amount of pay is moderate, countries might prevent many workers from being laid off. This is why minimum pay policy is widely utilized by governments around the world. Moreover, international organizations recommend well-designed policies to ensure labour is not exploited. However, the main drawback of this policy is its design. Indeed, how and who should we determine the least amount of wages? Should it be differentiated according to sectors, occupations, regions or age? If so, how should it be done? The answers, of course, are country-specific. It depends on both the labour market conditions and economic, social and cultural contexts. Still, certain aspects of the policy implementation are similar in many countries. One of them is application of lower rates to younger workers.

In Turkey, minimum wage is an important policy that can affect the youth aged 15-16 years in many respects because they can be either in school or in the labour market. Since higher amounts of minimum wage pushes some of them towards school, it can be used as a tool for improving their school enrollments. On the other hand, this study suggests that minimum pay policy increases the proportion of the young males who are neither in employment nor in education in the country. In other words, following the rise in youth minimum wage some of the youth tend to leave the employment but not for school. Therefore, to keep more of the young males in schools, other channels should be considered. In particular, the prevention of school dropouts is essential. Because school failure hinder students to continue their education, adopting policies to improve academic success and raising the education quality are necessary. For example, providing better learning environments and training more qualified teachers might contribute towards this end. Moreover, the coverage of conditional cash transfers for education can be extended to higher education to provide financial support to families allowing them to send their children to school.

The enrollment rates among young males at secondary level is relatively low in Turkey. Moreover, non-negligible numbers are in the labour market. Therefore, many young males aspire to find a job rather than participate in school. Once they drop-out from school returning and completing secondary education might be hard. Extending second chance programs might enable youngsters to go back to school though they might have failed before. On the other hand, even if all young people are encouraged to stay or return back to school, some of them cannot participate in education because they believe either that they would not be successful in school, or that they have to work to survive. In this case, apprenticeship programs might be supported to make them productive in the market.

Although many young males are paid at the minimum wage rates, they are mostly working without social security. Moreover, raise in minimum pay would improve wages of formal workers more. Therefore, increasing the compliance is important regarding the well-being of young workers, thereby contributing effectiveness of minimum pay policy. Formality among the young workers --as working with social security-- should be extended to raise compliance in Turkey. Indeed, strengthening audit system, and extending deterrent sanctions and awareness raising activities are crucial in reducing informal work.

This study shed lights on the impact of minimum wage policy on youth employment at the extensive margin in Turkey. In particular, our findings show that increasing minimum wage rate generates a reduction in youth employment. On the other hand, descriptive analysis show an increase in the average working hours of 15-year-old males after being entitled to higher minimum wage. That is, an improvement in the wages following the change in minimum pay policy might make some employers to force these males work longer hours to compensate the reduction in labour cost advantage in 2014. However, further analysis should be carried out on the impact of the policy at the intensive margin.

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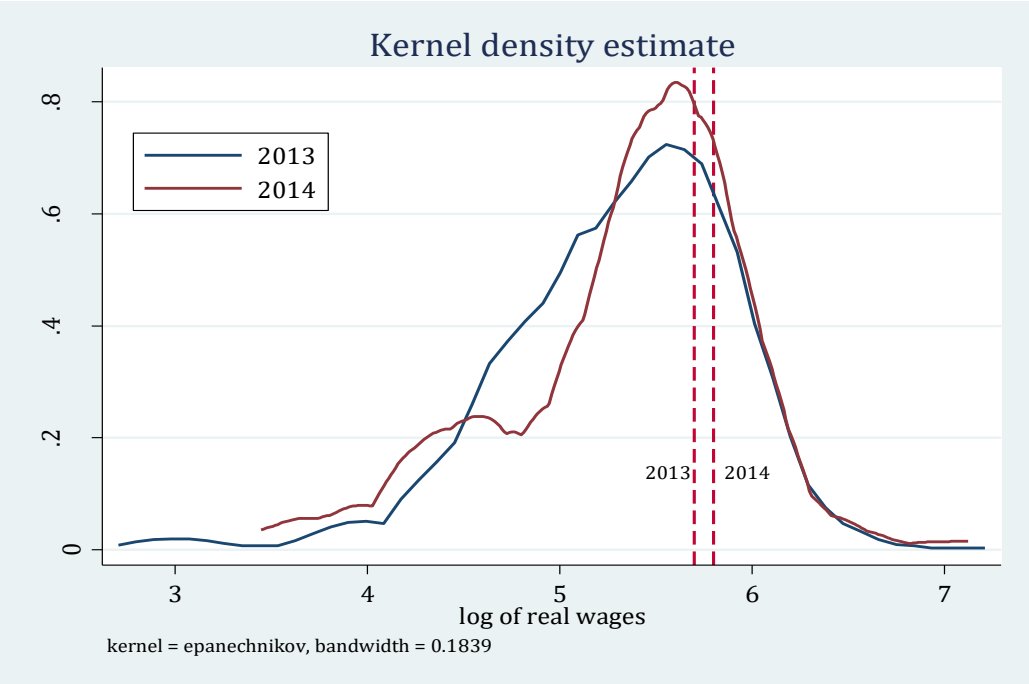
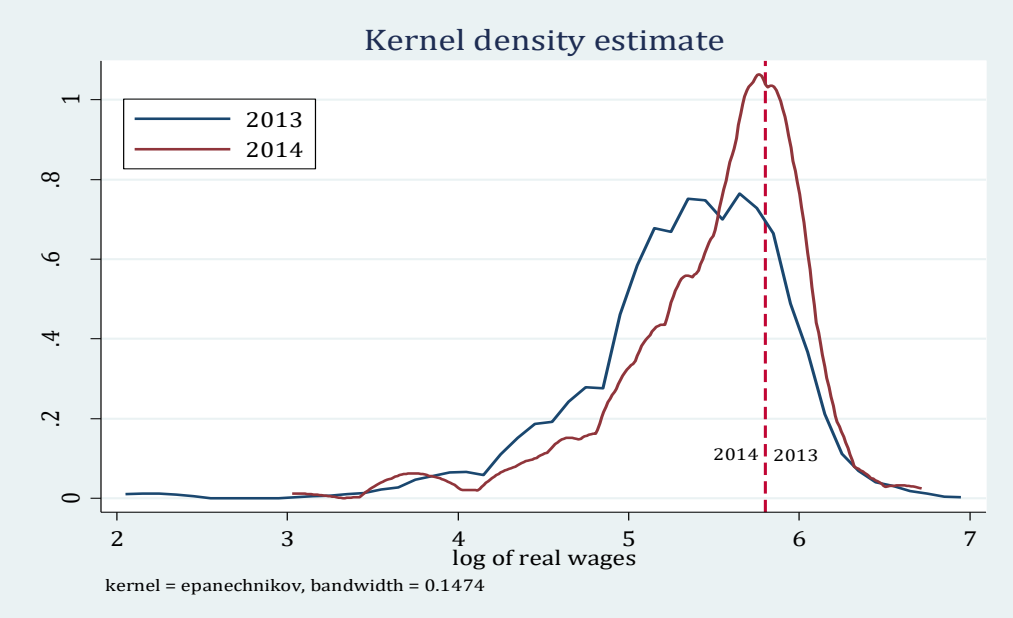
APPENDICES

A: FIGURES



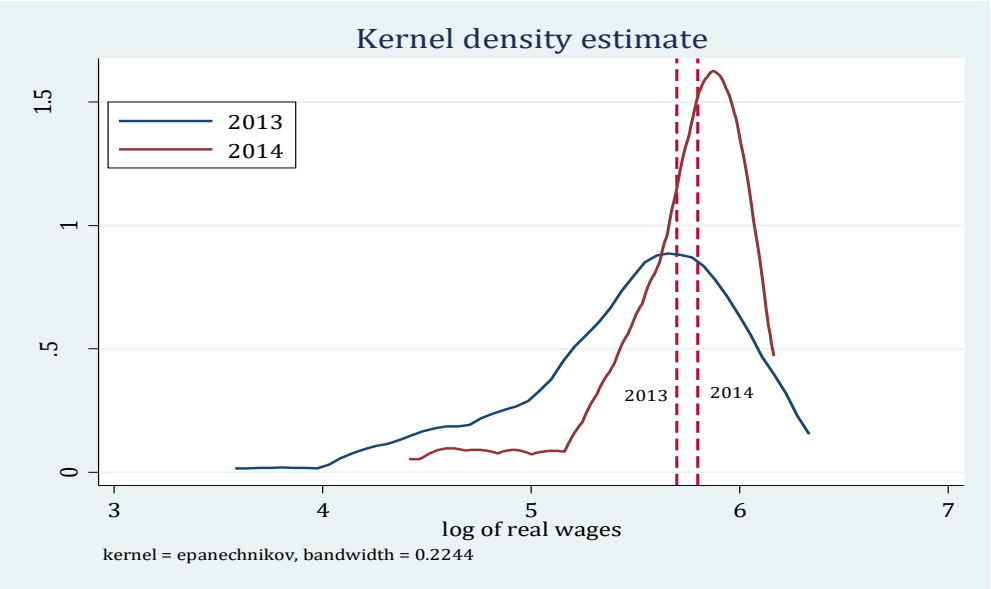
Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the average minimum wage in a year.
Source: Own calculations using 2013-2014 HLFS.

Figure A.1. Kernel Density Estimates of the Log of Real Monthly Wages in Informal Sector, 15-Year-Old Males (2013-2014)



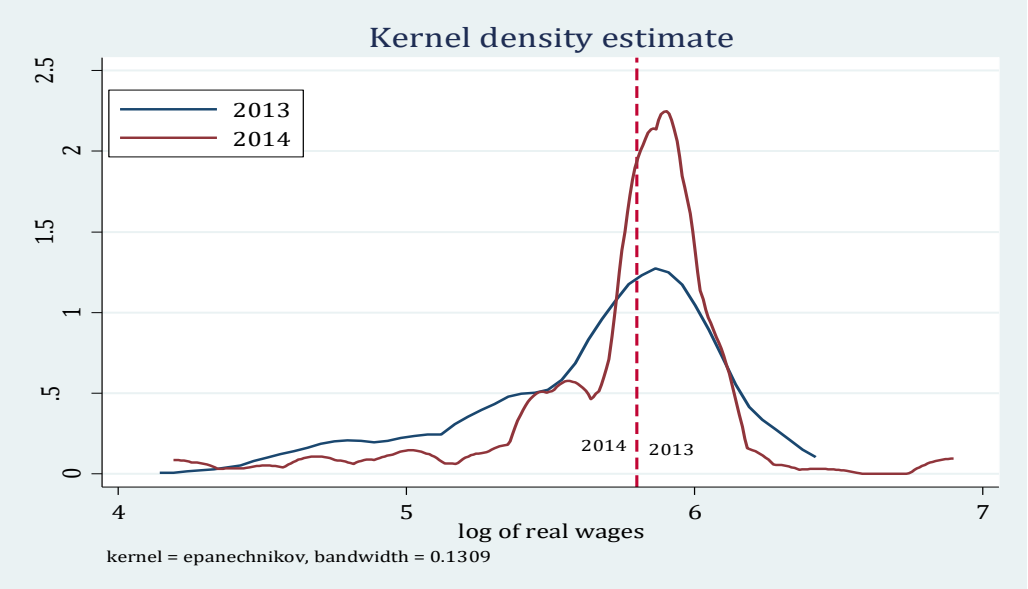
Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the average minimum wage in a year.
Source: Own calculations using 2013-2014 HLFS.

Figure A.2. Kernel Density Estimates of the Log of Real Monthly Wages in Informal Sector, 16-Year-Old Males (2013-2014)



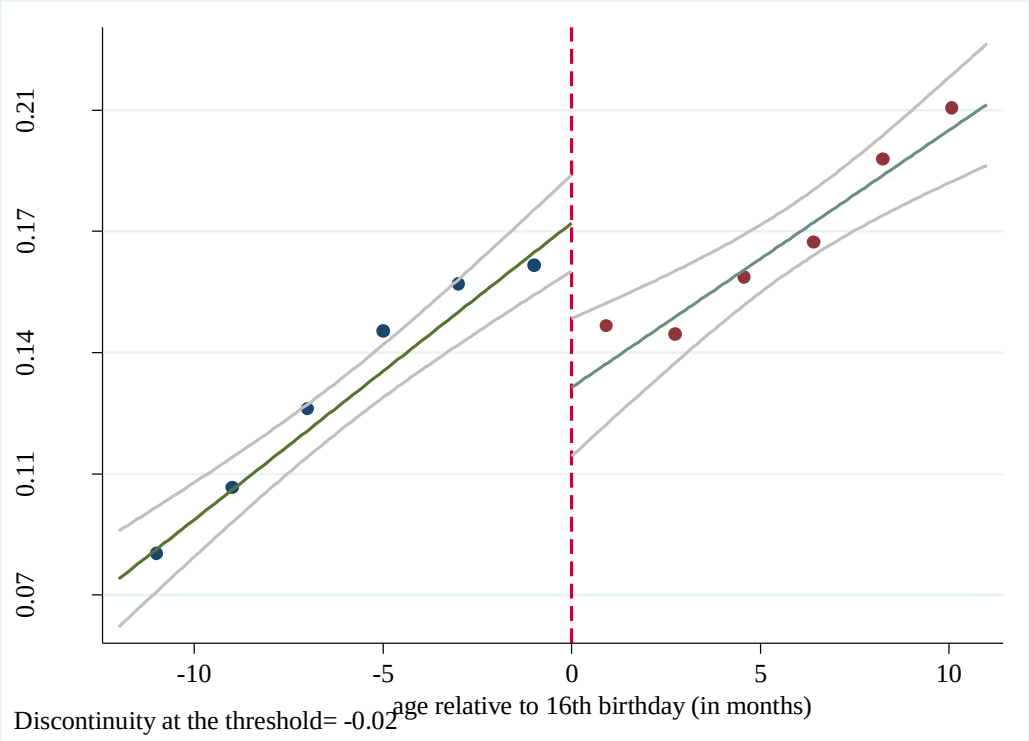
Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the average minimum wage in a year.
Source: Own calculations using 2013-2014 HLFS.

Figure A.3. Kernel Density Estimates of the Log of Real Monthly Wages in Formal Sector, 15-Year-Old Males (2013-2014)



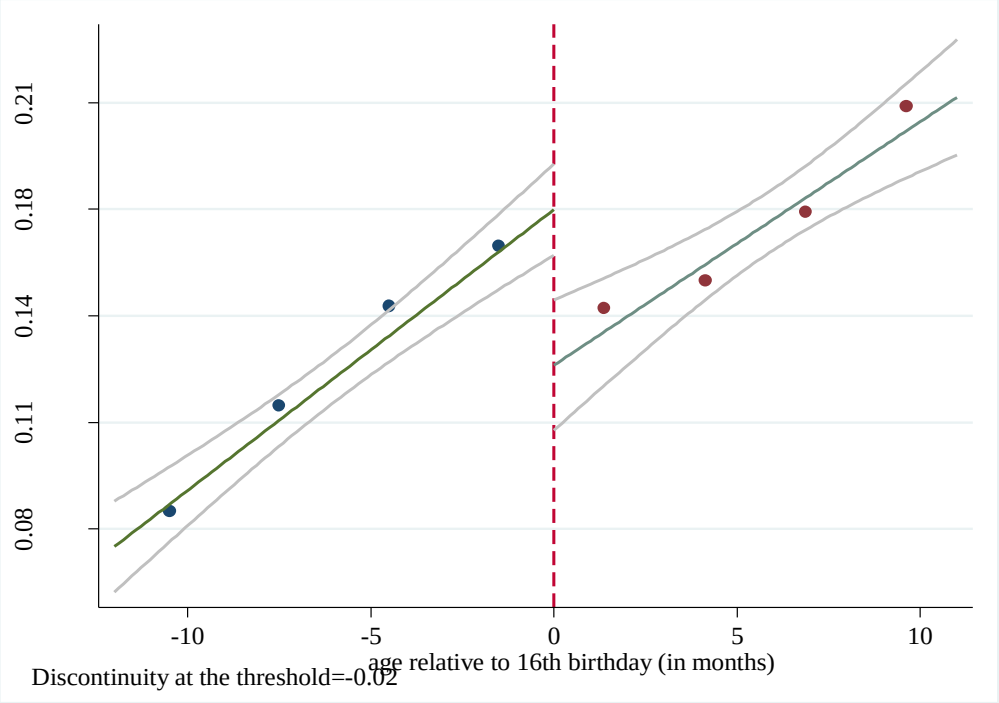
Notes: Workers do not attend school while working. Appropriate weights are used. Dashed lines refer to the average minimum wage in a year.
Source: Own calculations using 2013-2014 HLFS.

Figure A.4. Kernel Density Estimates of the Log of Real Monthly Wages in Formal Sector, 16-Year-Old Males (2013-2014)



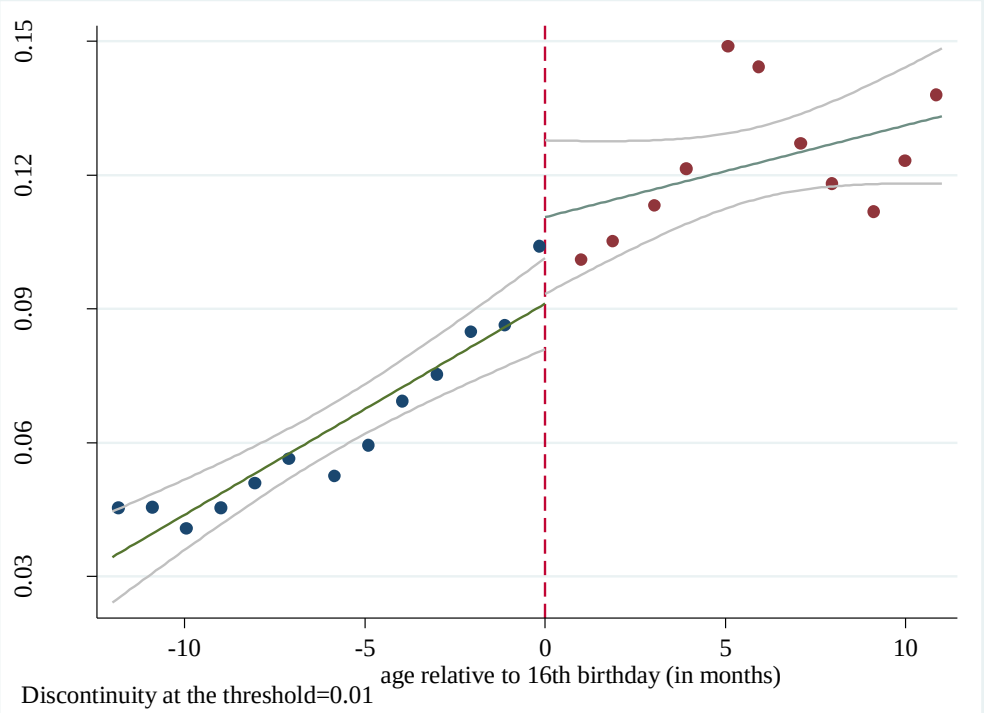
Source: Own calculations using SILC.

Figure A.5. Mean of Employed Males with Bin Size of 2-Months (2013)



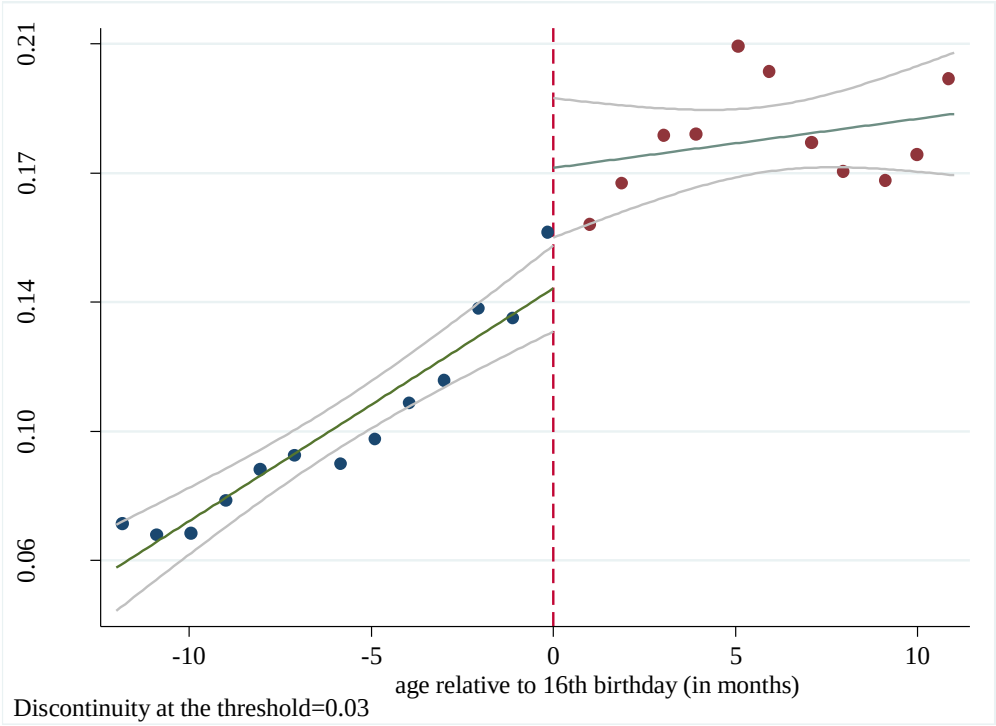
Source: Own calculations using SILC.

Figure A.6. Mean of Employed Males with Bin Size of 3-Months (2013)



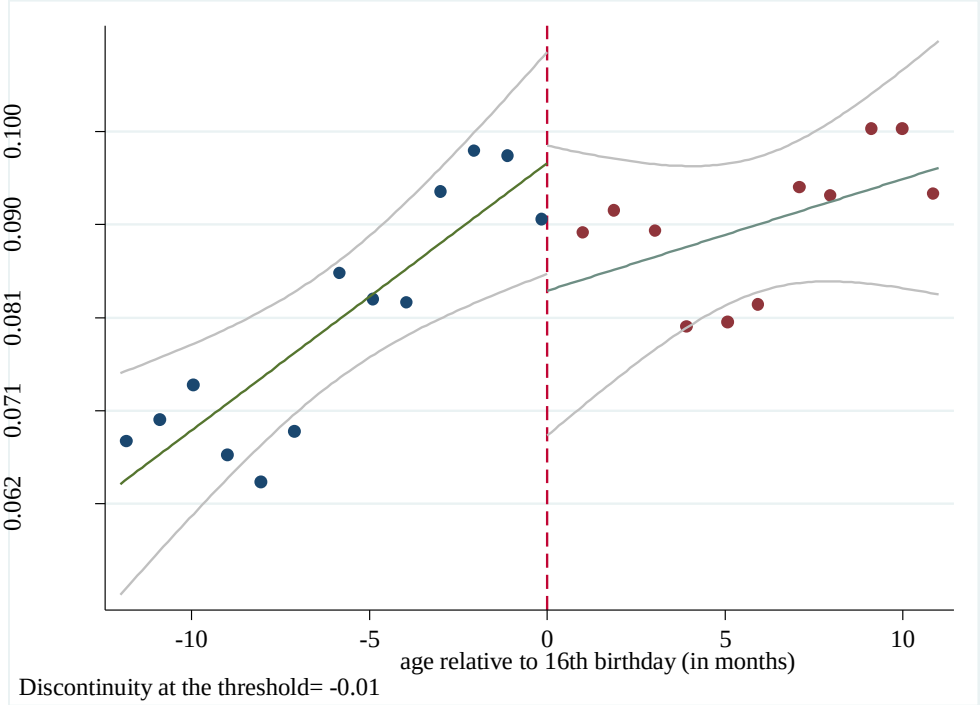
Source: Own calculations using SILC.

Figure A.7. Mean of Employee Males (2014)



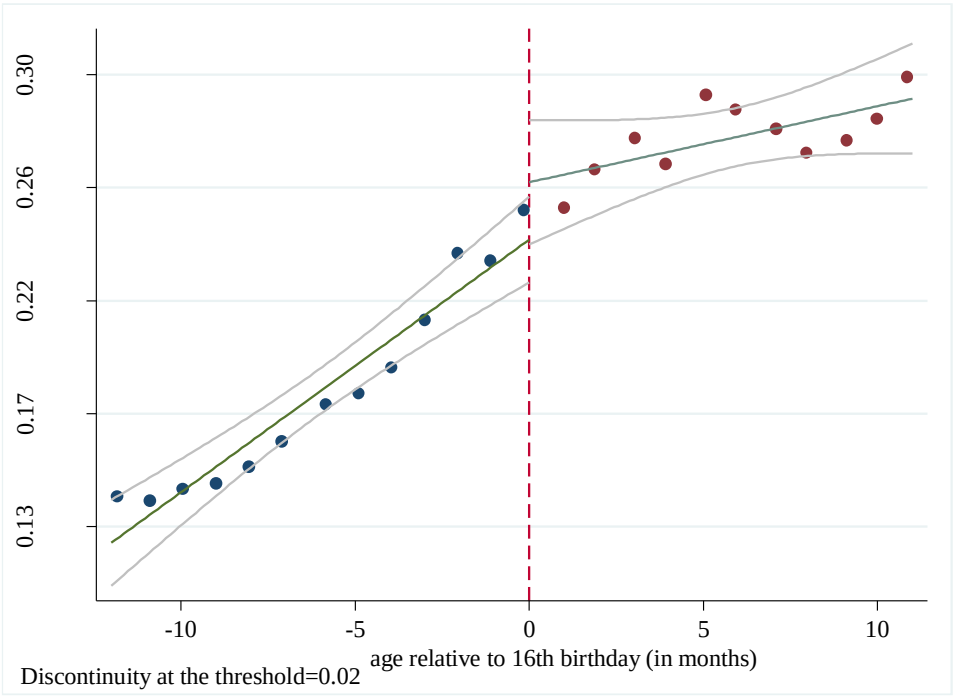
Source: Own calculations using SILC.

Figure A.8. Mean of Employed Males (2014)



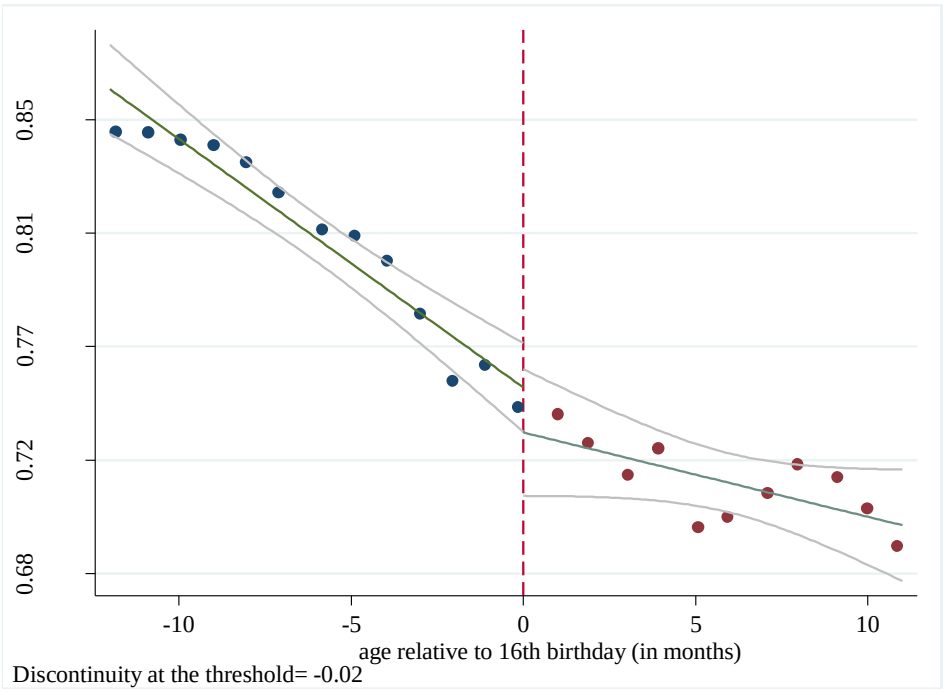
Source: Own calculations using SILC.

Figure A.9. Mean of Unemployed Males (2014)



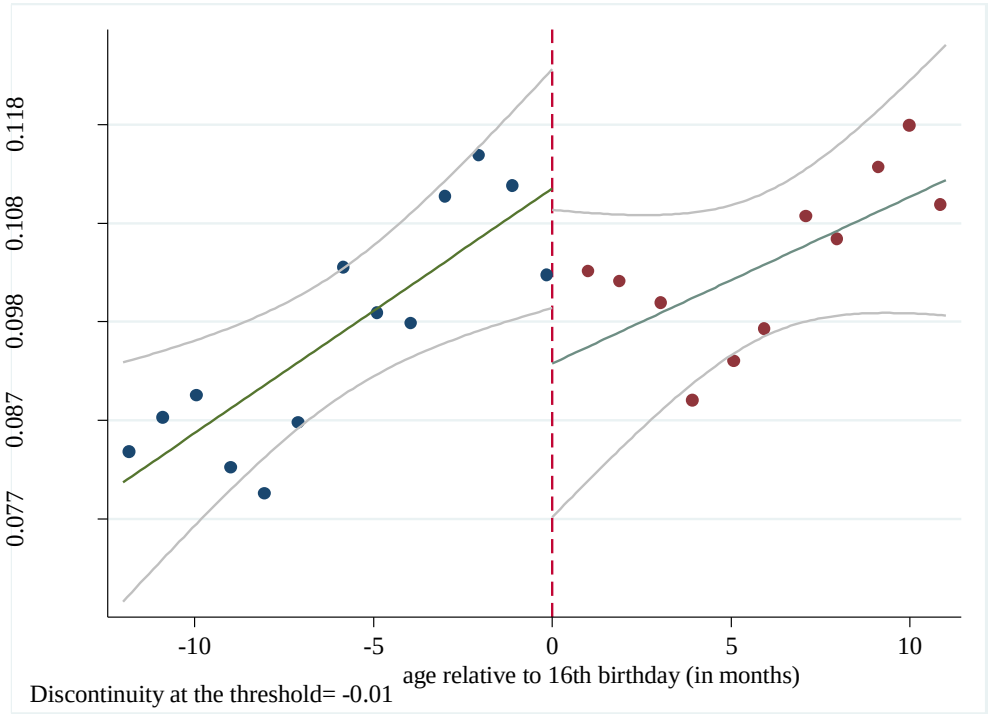
Source: Own calculations using SILC.

Figure A.10. Mean of Males in Labour Force (2014)



Source: Own calculations using SILC.

Figure A.11. Mean of Males in Education (2014)



Source: Own calculations using SILC.

Figure A.12. Mean of Males neither in Employment nor in Education (2014)

B: TABLES

Table B.1. Logit Estimation of RD Model: Employed, Employee (2013)

	Employed		Employee	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.026**	-0.048***	-0.016**	-0.037***
	(0.01)	(0.009)	(0.007)	(0.009)
Distance to Cut-off	0.006***	0.011***	0.004***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Treatment*Distance to Cut-off	-0.002	-0.005***	0.001	-0.008***
	(0.002)	(0.001)	(0.001)	(0.002)
Time Dummies				
Quarter 1	-0.011	0.028***	0.001	0.025***
	(0.008)	(0.011)	(0.008)	(0.008)
Quarter 2	0.022**	0.036***	0.035***	0.035***
	(0.009)	(0.010)	(0.008)	(0.009)
Quarter 3	0.095***	0.085***	0.078***	0.067***
	(0.009)	(0.007)	(0.008)	(0.008)
Month of birth				
January	-0.034***	-0.006	-0.058***	-0.033***
	(0.013)	(0.012)	(0.012)	(0.011)
February	-0.051***	-0.03*	-0.052***	-0.034***
	(0.020)	(0.017)	(0.012)	(0.013)
March	-0.076***	-0.028*	-0.043***	-0.007
	(0.015)	(0.015)	(0.013)	(0.012)
April	-0.027**	-0.007	-0.019**	-0.001
	(0.012)	(0.011)	(0.009)	(0.009)
May	-0.009	0.035**	-0.016**	0.028**
	(0.012)	(0.017)	(0.009)	(0.013)
June	-0.011	0.011	-0.013	0.016
	(0.014)	(0.017)	(0.010)	(0.014)
July	-0.035***	-0.004	0.005	0.029***
	(0.010)	(0.014)	(0.009)	(0.011)
August	-0.016	0.009	0.007	0.023**
	(0.011)	(0.011)	(0.011)	(0.009)
September	0.058***	0.056***	0.067***	0.068***
	(0.013)	(0.011)	(0.013)	(0.013)
October	-0.034**	-0.003	-0.015	0.009
	(0.015)	(0.015)	(0.010)	(0.011)
November	0.024*	0.038***	-0.016*	-0.005
	(0.014)	(0.010)	(0.010)	(0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.2. Logit Estimation of RD Model: Unemployed, in Labour Force (2013)

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	0.022*** (0.003)	0.024*** (0.003)	-0.01 (0.010)	-0.027*** (0.008)
Distance to Cut-off	-0.002*** (0.001)	0.000** <0.001	0.006*** (0.001)	0.010*** (0.001)
Treatment*Distance to Cut-off	0.004*** (0.001)	0.002*** <0.001	0.000 (0.002)	-0.002* (0.001)
Time Dummies				
Quarter 1	0.018*** (0.003)	0.013*** (0.003)	0.01** (0.005)	0.043*** (0.008)
Quarter 2	0.003 (0.005)	0.003 (0.003)	0.026*** (0.007)	0.040*** (0.009)
Quarter 3	0.001 (0.003)	0.001 (0.003)	0.099*** (0.007)	0.087*** (0.007)
Month of birth				
January	0.055*** (0.019)	0.044*** (0.009)	0.016* (0.009)	0.041*** (0.010)
February	-0.011 (0.009)	-0.020*** (0.006)	-0.063*** (0.010)	-0.048*** (0.018)
March	0.048*** (0.014)	0.034*** (0.007)	-0.040*** (0.014)	0.007 (0.015)
April	0.024* (0.013)	0.017*** (0.006)	-0.009 (0.014)	0.010 (0.010)
May	-0.03*** (0.007)	-0.024*** (0.006)	-0.035*** (0.011)	0.012 (0.016)
June	0.016 (0.010)	0.005 (0.006)	0.002 (0.011)	0.017 (0.017)
July	0.032** (0.014)	0.020*** (0.007)	-0.009 (0.008)	0.017 (0.015)
August	0.031** (0.014)	0.001 (0.008)	0.010 (0.011)	0.009 (0.013)
September	-0.026*** (0.006)	-0.016*** (0.006)	0.043*** (0.011)	0.043*** (0.011)
October	-0.04*** (0.007)	-0.046*** (0.004)	-0.069*** (0.015)	-0.045*** (0.014)
November	-0.008 (0.003)	-0.015** (0.007)	0.022 (0.017)	0.025** (0.012)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.3. Logit Estimation of RD Model: Education, Neither in Employment nor in Education (2013)

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	0.013 (0.008)	0.023*** (0.007)	0.018*** (0.004)	0.028*** (0.004)
Distance to Cut-off	-0.007*** (0.001)	-0.009*** <0.001	0.000 (0.001)	-0.002*** <0.001
Treatment*Distance to Cut-off	0.000 (0.002)	-0.001 (0.001)	0.004*** (0.001)	0.004*** (0.001)
Time Dummies				
Quarter 1	-0.013*** (0.003)	-0.041*** (0.008)	0.021*** (0.004)	0.013*** (0.004)
Quarter 2	-0.027*** (0.007)	-0.038*** (0.008)	0.004 (0.005)	0.001 (0.003)
Quarter 3	-0.109*** (0.006)	-0.094*** (0.007)	0.013** (0.005)	0.009* (0.005)
Month of birth				
January	-0.040*** (0.011)	-0.062*** (0.011)	0.096*** (0.027)	0.075*** (0.016)
February	0.040* (0.022)	0.026 (0.018)	0.026* (0.013)	0.007 (0.009)
March	-0.018 (0.015)	-0.057*** (0.014)	0.131*** (0.025)	0.095*** (0.013)
April	-0.008 (0.017)	-0.038** (0.015)	0.053*** (0.019)	0.053*** (0.011)
May	0.015 (0.013)	-0.030* (0.017)	-0.005 (0.013)	-0.006 (0.009)
June	-0.028** (0.011)	-0.046*** (0.013)	0.053*** (0.015)	0.041*** (0.012)
July	-0.025*** (0.009)	-0.057*** (0.015)	0.082*** (0.020)	0.068*** (0.013)
August	-0.031*** (0.010)	-0.029*** (0.011)	0.064*** (0.021)	0.023* (0.012)
September	-0.065*** (0.013)	-0.057*** (0.012)	-0.004 (0.013)	-0.005 (0.008)
October	0.041** (0.017)	0.019 (0.016)	-0.003 (0.010)	-0.020*** (0.006)
November	-0.048** (0.018)	-0.054*** (0.013)	0.025 (0.019)	0.015 (0.012)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.4. OLS Estimation of RD Model: Employed, Employee (2013)

	Employed		Employee	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	-0.030**	-0.047***	-0.021**	-0.034***
	(0.01)	(0.010)	(0.008)	(0.007)
Distance to Cut-off	0.008***	0.009***	0.007***	0.008***
	(0.001)	<0.001	(0.001)	<0.001
Treatment*Distance to Cut-off	-0.004	-0.002	0.004*	-0.003***
	(0.002)	(0.001)	(0.002)	(0.001)
Time Dummies				
Quarter 1	-0.009	0.025**	0.001	0.024***
	(0.008)	(0.009)	(0.004)	(0.006)
Quarter 2	0.019**	0.034***	0.028***	0.035***
	(0.009)	(0.008)	(0.006)	(0.006)
Quarter 3	0.093***	0.080***	0.070***	0.061***
	(0.009)	(0.006)	(0.006)	(0.005)
Month of birth				
January	-0.038**	-0.007	-0.063***	-0.031***
	(0.013)	(0.012)	(0.014)	(0.011)
February	-0.056**	-0.03*	-0.058***	-0.032**
	(0.020)	(0.017)	(0.014)	(0.012)
March	-0.083*	-0.028*	-0.047**	-0.008
	(0.015)	(0.016)	(0.016)	(0.011)
April	-0.029**	-0.009	-0.021*	-0.003
	(0.012)	(0.011)	(0.011)	(0.008)
May	-0.009	0.032*	-0.017*	0.025**
	(0.012)	(0.017)	(0.009)	(0.012)
June	-0.011	0.008	-0.015	0.013
	(0.014)	(0.017)	(0.011)	(0.013)
July	-0.038*	-0.005	0.005	0.028**
	(0.010)	(0.015)	(0.009)	(0.011)
August	-0.017	0.009	0.007	0.023**
	(0.011)	(0.011)	(0.012)	(0.009)
September	0.065*	0.058***	0.078*	0.070***
	(0.013)	(0.009)	(0.010)	(0.011)
October	-0.037**	-0.001	-0.018	0.013
	(0.015)	(0.014)	(0.011)	(0.010)
November	0.028*	0.038***	-0.020	-0.002
	(0.014)	(0.008)	(0.012)	(0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.5. OLS Estimation of RD Model: Unemployed, in Labour Force (2013)

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	0.021***	0.022***	-0.09	-0.024**
	(0.003)	(0.002)	(0.01)	(0.009)
Distance to Cut-off	-0.002**	0.000**	0.006***	0.009***
	(0.001)	<0.001	(0.001)	<0.001
Treatment*Distance to Cut-off	0.005***	0.002***	0.000	-0.001
	(0.001)	<0.001	(0.003)	(0.001)
Time Dummies				
Quarter 1	0.018***	0.013***	0.009**	0.039***
	(0.003)	(0.003)	(0.004)	(0.008)
Quarter 2	0.005	0.002	0.024***	0.037***
	(0.005)	(0.003)	(0.006)	(0.008)
Quarter 3	0.003	0.000	0.096***	0.081***
	(0.003)	(0.003)	(0.006)	(0.007)
Month of birth				
January	0.053***	0.046***	0.017*	0.040***
	(0.014)	(0.008)	(0.009)	(0.009)
February	-0.010	-0.019***	-0.063**	-0.046**
	(0.009)	(0.006)	(0.021)	(0.017)
March	0.043***	0.034***	-0.040**	0.006
	(0.009)	(0.006)	(0.015)	(0.015)
April	0.021**	0.017***	-0.007	0.010
	(0.010)	(0.005)	(0.014)	(0.010)
May	-0.026**	-0.022***	-0.034**	0.011
	(0.009)	(0.007)	(0.011)	(0.016)
June	0.013	0.005	0.003	0.016
	(0.008)	(0.005)	(0.011)	(0.017)
July	0.0329***	0.020***	-0.009	0.016
	(0.009)	(0.006)	(0.008)	(0.017)
August	0.028***	0.001	0.011	0.01
	(0.009)	(0.008)	(0.011)	(0.015)
September	-0.021**	-0.015**	0.045***	0.044***
	(0.008)	(0.007)	(0.010)	(0.012)
October	-0.033***	-0.042***	-0.07***	-0.04***
	(0.008)	(0.005)	(0.016)	(0.009)
November	-0.006	-0.014*	0.022	0.025**
	(0.012)	(0.008)	(0.017)	(0.011)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.6. OLS Estimation of RD Model: Education, Neither in Employment nor in Education (2013)

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	0.012 (0.008)	0.021** (0.008)	0.018*** (0.004)	0.025*** (0.004)
Distance to Cut-off	-0.007*** (0.001)	-0.008*** <0.001	0.001 (0.001)	-0.002*** <0.001
Treatment*Distance to Cut-off	0.000 (0.002)	-0.002** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Time Dummies				
Quarter 1	-0.012*** (0.003)	-0.038*** (0.008)	0.021*** (0.004)	0.013*** (0.003)
Quarter 2	-0.025*** (0.006)	-0.035*** (0.008)	0.006 (0.005)	0.001 (0.004)
Quarter 3	-0.106*** (0.005)	-0.088*** (0.007)	0.014** (0.004)	0.008* (0.004)
Month of birth				
January	-0.040*** (0.010)	-0.058*** (0.009)	0.078*** (0.016)	0.065*** (0.010)
February	0.038* (0.021)	0.023 (0.016)	0.019** (0.008)	0.006 (0.007)
March	-0.019 (0.015)	-0.053*** (0.013)	0.102*** (0.013)	0.081*** (0.008)
April	-0.01 (0.015)	-0.035** (0.014)	0.039*** (0.011)	0.044*** (0.008)
May	0.013 (0.012)	-0.028* (0.016)	-0.003 (0.010)	-0.004 (0.007)
June	-0.028** (0.01)	-0.042*** (0.012)	0.039*** (0.008)	0.034*** (0.008)
July	-0.025*** (0.008)	-0.053*** (0.014)	0.063*** (0.010)	0.058*** (0.007)
August	-0.031** (0.010)	-0.028*** (0.009)	0.048*** (0.010)	0.019** (0.009)
September	-0.064*** (0.012)	-0.055*** (0.010)	-0.002 (0.009)	-0.003 (0.007)
October	0.038** (0.017)	0.014 (0.014)	-0.001 (0.008)	-0.015** (0.006)
November	-0.047** (0.018)	-0.050*** (0.011)	0.019 (0.012)	0.013 (0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.7. Logit Estimation of Diff-in-Disc Model: Employed, Employee

	Employed		Employee	
	(1)	(2)	(1)	(2)
Treatment Dummy	0.041***	0.028***	0.029***	0.019***
	(0.009)	(0.006)	(0.008)	(0.005)
Distance to Cut-off	0.006***	0.004***	0.006***	0.003***
	(0.001)	<0.001	(0.001)	<0.001
Treatment*Distance to Cut-off	0.003*	0.006***	0.001	0.007***
	(0.002)	(0.001)	(0.002)	(0.001)
Post-treatment	0.019***	0.000	0.009***	-0.001
	(0.005)	(0.006)	(0.003)	(0.004)
Treatment*Post-treatment	-0.057***	-0.033***	-0.034***	-0.012*
	(0.005)	(0.007)	(0.004)	(0.006)
Time Dummies				
Quarter 1	0.011	0.022***	0.012*	0.016***
	(0.007)	(0.005)	(0.007)	(0.004)
Quarter 2	0.036***	0.036***	0.036***	0.033***
	(0.007)	(0.005)	(0.007)	(0.005)
Quarter 3	0.094***	0.083***	0.075***	0.066***
	(0.006)	(0.005)	(0.006)	(0.005)
Month of birth				
January	-0.023**	-0.007	-0.040***	-0.022**
	(0.009)	(0.008)	(0.010)	(0.008)
February	-0.041***	-0.026**	-0.028*	-0.012
	(0.015)	(0.011)	(0.015)	(0.011)
March	-0.037***	-0.006	-0.012	0.021**
	(0.011)	(0.009)	(0.009)	(0.011)
April	-0.016**	0.002	-0.011	0.013
	(0.008)	(0.006)	(0.007)	(0.008)
May	0.037***	0.049***	0.028***	0.044***
	(0.008)	(0.007)	(0.008)	(0.008)
June	-0.022**	0.000	-0.019***	0.018
	(0.01)	(0.01)	(0.006)	(0.013)
July	-0.023***	-0.007	0.005	0.025***
	(0.007)	(0.008)	(0.007)	(0.009)
August	-0.014	0.009	-0.005	0.020**
	(0.012)	(0.009)	(0.009)	(0.010)
September	0.055***	0.051***	0.051***	0.058***
	(0.008)	(0.008)	(0.011)	(0.010)
October	-0.022**	-0.007	-0.009	0.009
	(0.011)	(0.008)	(0.008)	(0.009)
November	0.035***	0.053***	-0.004	0.018**
	(0.013)	(0.009)	(0.008)	(0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.8 Logit Estimation of Diff-in-Disc Model: Unemployed, in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.019***	-0.014***	0.025***	0.014**
	(0.003)	(0.002)	(0.008)	(0.006)
Distance to Cut-off	0.001***	0.001***	0.006***	0.006***
	<0.001	<0.001	(0.001)	<0.001
Treatment*Distance to Cut-off	0.000	0.000	0.005***	0.005***
	<0.001	<0.001	(0.002)	(0.001)
Post-treatment	-0.007	-0.008***	0.015***	-0.005
	(0.004)	(0.002)	(0.005)	(0.007)
Treatment*Post-treatment	0.032***	0.020***	-0.031***	-0.014*
	(0.007)	(0.005)	(0.008)	(0.008)
Time Dummies				
Quarter 1	0.017***	0.009***	0.030***	0.033***
	(0.002)	(0.005)	(0.006)	(0.004)
Quarter 2	0.001	-0.006**	0.035***	0.030***
	(0.002)	(0.003)	(0.006)	(0.005)
Quarter 3	0.002	-0.006*	0.095***	0.076***
	(0.004)	(0.003)	(0.005)	(0.005)
Month of birth				
January	0.056***	0.041***	0.034***	0.040***
	(0.011)	(0.007)	(0.008)	(0.008)
February	-0.009	-0.016***	-0.048	-0.040***
	(0.01)	(0.005)	(0.011)	(0.009)
March	0.042***	0.032***	0.003	0.030***
	(0.009)	(0.006)	(0.012)	(0.009)
April	0.020	0.004	0.005	0.008
	(0.013)	(0.009)	(0.014)	(0.012)
May	-0.037***	-0.037***	0.009	0.014
	(0.006)	(0.003)	(0.01)	(0.009)
June	0.005	-0.001	-0.016**	0.002
	(0.009)	(0.006)	(0.008)	(0.011)
July	0.038***	0.014**	0.014	0.009
	(0.009)	(0.006)	(0.009)	(0.009)
August	0.025**	0.006	0.010	0.016**
	(0.01)	(0.007)	(0.008)	(0.008)
September	-0.005	-0.005	0.056***	0.049***
	(0.008)	(0.005)	(0.01)	(0.007)
October	-0.040***	-0.037***	-0.058***	-0.043***
	(0.006)	(0.005)	(0.01)	(0.008)
November	-0.005	-0.014**	0.035***	0.043***
	(0.009)	(0.006)	(0.011)	(0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.9. Logit Estimation of Diff-in-Disc Model: Education, Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	-0.026*** (0.007)	-0.014*** (0.005)	-0.017*** (0.003)	-0.012*** (0.003)
Distance to Cut-off	-0.007*** (0.001)	-0.006*** <0.001	0.001*** <0.001	0.002*** <0.001
Treatment*Distance to Cut-off	-0.004*** (0.002)	-0.004*** (0.001)	0.001 (0.001)	-0.001*** <0.001
Post-treatment	0.002 (0.004)	0.022*** (0.007)	-0.022*** (0.004)	-0.023*** (0.003)
Treatment*Post-treatment	0.027*** (0.007)	0.015* (0.008)	0.036*** (0.006)	0.019*** (0.006)
Time Dummies				
Quarter 1	-0.029*** (0.006)	-0.033*** (0.005)	0.018*** (0.003)	0.011*** (0.003)
Quarter 2	-0.033*** (0.006)	-0.029*** (0.004)	0.000 (0.003)	-0.006** (0.003)
Quarter 3	-0.101*** (0.005)	-0.083*** (0.005)	0.009** (0.004)	0.001 (0.004)
Month of birth				
January	-0.051*** (0.008)	-0.057*** (0.007)	0.088*** (0.013)	0.067*** (0.008)
February	0.031** (0.012)	0.024*** (0.009)	0.017 (0.011)	0.004 (0.006)
March	-0.036*** (0.014)	-0.063*** (0.009)	0.090*** (0.016)	0.075*** (0.009)
April	-0.023 (0.017)	-0.027* (0.015)	0.047** (0.018)	0.028** (0.013)
May	-0.023** (0.011)	-0.027*** (0.009)	-0.027*** (0.009)	-0.028*** (0.005)
June	0.003 (0.008)	-0.020** (0.009)	0.025** (0.011)	0.022*** (0.006)
July	-0.044*** (0.01)	-0.039*** (0.009)	0.080*** (0.012)	0.050*** (0.008)
August	-0.037*** (0.008)	-0.041*** (0.008)	0.062*** (0.012)	0.034*** (0.009)
September	-0.073*** (0.01)	-0.062*** (0.008)	0.015 (0.012)	0.007 (0.007)
October	0.036*** (0.011)	0.021** (0.009)	-0.015* (0.009)	-0.016*** (0.006)
November	-0.056*** (0.013)	-0.063*** (0.008)	0.021* (0.012)	0.006 (0.007)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.10. OLS Estimation of Diff-in-Disc Model: Employed, Employee

	Employed		Employee	
	(1)	(2)	(1)	(2)
Treatment Dummy	0.043***	0.021***	0.030***	0.011***
	(0.01)	(0.006)	(0.008)	(0.005)
Distance to Cut-off	0.006***	0.005***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	<0.001
Treatment*Distance to Cut-off	0.003	0.003***	0.002	0.002***
	(0.002)	(0.001)	(0.002)	(0.001)
Post-treatment	0.021***	0.001	0.011**	-0.001***
	(0.006)	(0.008)	(0.004)	(0.006)
Treatment*Post-treatment	-0.059***	-0.028***	-0.034***	-0.009***
	(0.006)	(0.009)	(0.005)	(0.007)
Time Dummies				
Quarter 1	0.009*	0.020***	0.009**	0.016***
	(0.005)	(0.004)	(0.004)	(0.003)
Quarter 2	0.030***	0.033***	0.028***	0.031***
	(0.006)	(0.005)	(0.005)	(0.004)
Quarter 3	0.088***	0.079***	0.068***	0.062***
	(0.006)	(0.005)	(0.005)	(0.004)
Month of birth				
January	-0.024**	-0.007	-0.040***	-0.020**
	(0.01)	(0.007)	(0.010)	(0.008)
February	-0.041**	-0.025**	-0.028*	-0.011
	(0.016)	(0.01)	(0.015)	(0.01)
March	-0.035**	-0.007	-0.009	0.017**
	(0.014)	(0.009)	(0.010)	(0.008)
April	-0.012	0.000	-0.007	0.010
	(0.008)	(0.006)	(0.007)	(0.006)
May	0.042***	0.047***	0.033***	0.040***
	(0.008)	(0.008)	(0.008)	(0.007)
June	-0.020*	0.001	-0.018**	0.015
	(0.011)	(0.01)	(0.008)	(0.011)
July	-0.023**	-0.008	0.006	0.023**
	(0.008)	(0.009)	(0.007)	(0.009)
August	-0.013	0.009	-0.005	0.019**
	(0.013)	(0.009)	(0.008)	(0.009)
September	0.059***	0.053***	0.055***	0.059***
	(0.007)	(0.008)	(0.008)	(0.009)
October	-0.023*	-0.005	-0.009	0.011
	(0.012)	(0.008)	(0.009)	(0.008)
November	0.037**	0.054***	-0.004	0.018**
	(0.013)	(0.008)	(0.009)	(0.006)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.11. OLS Estimation of Diff-in-Disc Model: Unemployed, in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.019***	-0.014***	0.023**	0.008
	(0.003)	(0.002)	(0.009)	(0.006)
Distance to Cut-off	0.001***	0.001***	0.007***	0.007***
	<0.001	<0.001	(0.001)	<0.001
Treatment*Distance to Cut-off	0.000	0.000	0.003*	0.002***
	<0.001	<0.001	(0.002)	(0.001)
Post-treatment	-0.007	-0.009***	0.016***	-0.006
	(0.004)	(0.003)	(0.005)	(0.008)
Treatment*Post-treatment	0.028***	0.019***	-0.031***	-0.01
	(0.006)	(0.005)	(0.008)	(0.008)
Time Dummies				
Quarter 1	0.017***	0.009**	0.027***	0.03***
	(0.002)	(0.003)	(0.005)	(0.004)
Quarter 2	0.002	-0.006**	0.032***	0.027***
	(0.002)	(0.003)	(0.005)	(0.004)
Quarter 3	0.002	-0.006*	0.090***	0.072***
	(0.003)	(0.003)	(0.005)	(0.005)
Month of birth				
January	0.055***	0.044***	0.035***	0.039***
	(0.008)	(0.006)	(0.008)	(0.008)
February	-0.008	-0.015***	-0.046***	-0.038***
	(0.008)	(0.005)	(0.011)	(0.009)
March	0.039***	0.033***	0.006	0.029***
	(0.007)	(0.006)	(0.012)	(0.008)
April	0.018	0.004	0.008	0.007
	(0.012)	(0.009)	(0.013)	(0.012)
May	-0.032***	-0.035***	0.011	0.013
	(0.007)	(0.005)	(0.01)	(0.009)
June	0.005	-0.001	-0.015*	0.001
	(0.008)	(0.006)	(0.008)	(0.011)
July	0.036***	0.014**	0.015	0.008
	(0.006)	(0.006)	(0.009)	(0.009)
August	0.023**	0.006	0.011	0.016*
	(0.008)	(0.007)	(0.008)	(0.008)
September	-0.004	-0.005	0.057***	0.049***
	(0.008)	(0.005)	(0.01)	(0.007)
October	-0.034***	-0.035***	-0.056***	-0.038***
	(0.007)	(0.005)	(0.01)	(0.008)
November	-0.004	-0.013**	0.035***	0.042***
	(0.009)	(0.006)	(0.011)	(0.008)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.12. OLS Estimation of Diff-in-Disc Model: Education, Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	-0.024**	-0.008	-0.019***	-0.013***
	(0.008)	(0.006)	(0.003)	(0.003)
Distance to Cut-off	-0.007***	-0.007***	0.001***	0.002***
	(0.001)	<0.001	<0.001	<0.001
Treatment*Distance to Cut-off	-0.003*	-0.001**	0.000	-0.001***
	(0.002)	(0.001)	(0.001)	<0.001
Post-treatment	0.002	0.024***	-0.023***	-0.025***
	(0.004)	(0.008)	(0.004)	(0.003)
Treatment*Post-treatment	0.025***	0.008*	0.034***	0.02***
	(0.007)	(0.008)	(0.006)	(0.006)
Time Dummies				
Quarter 1	-0.027***	-0.031***	0.018***	0.011***
	(0.005)	(0.004)	(0.003)	(0.003)
Quarter 2	-0.030***	-0.027***	0.000	-0.006**
	(0.006)	(0.004)	(0.003)	(0.003)
Quarter 3	-0.97***	-0.079***	0.008**	0.000
	(0.004)	(0.005)	(0.004)	(0.004)
Month of birth				
January	-0.05***	-0.053***	0.074***	0.061***
	(0.007)	(0.006)	(0.013)	(0.005)
February	0.028**	0.022**	0.013	0.003
	(0.012)	(0.009)	(0.011)	(0.005)
March	-0.037**	-0.059***	0.072***	0.066***
	(0.013)	(0.009)	(0.016)	(0.007)
April	-0.024	-0.025*	0.036**	0.024**
	(0.015)	(0.014)	(0.018)	(0.011)
May	-0.023**	-0.025***	-0.019**	-0.022***
	(0.01)	(0.009)	(0.009)	(0.005)
June	0.001	-0.017*	0.019**	0.019***
	(0.008)	(0.009)	(0.011)	(0.005)
July	-0.043***	-0.036***	0.065***	0.044***
	(0.009)	(0.009)	(0.012)	(0.006)
August	-0.036***	-0.038***	0.049***	0.029***
	(0.008)	(0.008)	(0.012)	(0.007)
September	-0.071***	-0.059***	0.011	0.006
	(0.008)	(0.008)	(0.012)	(0.006)
October	0.033**	0.017*	-0.010*	-0.013**
	(0.011)	(0.009)	(0.009)	(0.005)
November	-0.054***	-0.059***	0.016*	0.005
	(0.012)	(0.008)	(0.012)	(0.006)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.13. Logit Estimation of Alternative Diff-in-Disc Model: Employed, Employee

	Employee		Employed	
	(1)	(2)	(1)	(2)
Post-treatment	0.014***	0.016***	0.036***	0.027***
	(0.005)	(0.002)	(0.006)	(0.003)
Distance to Cut-off	0.001***	-0.002***	0.001***	-0.002***
	<0.001	<0.001	<0.001	<0.001
Post-treatment*Distance to Cut-off	-0.002***	0.002***	-0.006***	0.001**
	(0.001)	<0.001	(0.001)	<0.001
Treatment Dummy	-0.012	-0.050***	-0.009	-0.056***
	(0.007)	(0.003)	(0.006)	(0.003)
Treatment* Post-treatment	-0.036***	-0.014***	-0.058***	-0.034***
	(0.007)	(0.005)	(0.007)	(0.006)
Time Dummies				
January	0.022***	0.022***	0.017***	0.017***
	(0.001)	(0.002)	(0.003)	(0.001)
February	0.021***	0.014***	0.011**	0.009***
	(0.006)	(0.003)	(0.005)	(0.002)
March	0.024***	0.014***	0.012***	0.009***
	(0.003)	(0.002)	(0.004)	(0.002)
April	0.022***	0.017***	0.013	0.010***
	(0.006)	(0.003)	(0.009)	(0.003)
May	0.047***	0.031***	0.036***	0.022***
	(0.006)	(0.004)	(0.004)	(0.003)
June	0.086***	0.066***	0.081***	0.062***
	(0.007)	(0.003)	(0.006)	(0.002)
July	0.134***	0.105***	0.147***	0.116***
	(0.005)	(0.003)	(0.01)	(0.002)
August	0.112***	0.091***	0.130***	0.105***
	(0.004)	(0.006)	(0.005)	(0.004)
September	0.056***	0.040***	0.065***	0.043***
	(0.002)	(0.002)	(0.004)	(0.001)
October	0.026***	0.017***	0.028***	0.015***
	(0.002)	(0.003)	(0.003)	(0.002)
November	0.013***	0.006***	0.014***	0.005***
	(0.001)	(0.002)	(0.004)	(0.001)
Month of birth				
January	-0.041***	-0.024***	-0.025***	-0.008
	(0.008)	(0.004)	(0.008)	(0.005)
February	-0.029***	-0.014	-0.043***	-0.028***
	(0.011)	(0.009)	(0.015)	(0.008)
March	-0.009	0.018**	-0.035***	-0.008
	(0.008)	(0.009)	(0.009)	(0.008)
April	-0.011	0.011	-0.017*	0.000
	(0.007)	(0.007)	(0.01)	(0.007)
May	0.027**	0.043***	0.036**	0.047***
	(0.013)	(0.01)	(0.014)	(0.011)

Table B.13. Logit Estimation of Alternative Diff-in-Disc Model: Employed, Employee (contd')

	Employee		Employed	
	(1)	**(2)**	**(1)**	**(2)**
June	-0.019***	0.014	-0.022**	-0.003
	(0.007)	(0.01)	(0.01)	(0.011)
July	0.004	0.023**	-0.023	-0.009
	(0.007)	(0.007)	(0.01)	(0.007)
August	-0.003	0.018**	-0.011	0.007
	(0.008)	(0.008)	(0.011)	(0.008)
September	0.054***	0.063***	0.058***	0.055***
	(0.009)	(0.01)	(0.008)	(0.008)
October	-0.005	0.011	-0.017	-0.006
	(0.008)	(0.008)	(0.012)	(0.009)
November	-0.002	0.019***	0.037***	0.054***
	(0.008)	(0.007)	(0.008)	(0.008)

(1): Sample 1
(2): Sample 2

Table B.14. Logit Estimation of Alternative Diff-in-Disc Model: Unemployed, in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Post-treatment	-0.012***	-0.020***	0.020***	0.002
	(0.003)	(0.003)	(0.005)	(0.002)
Distance to Cut-off	0.001***	0.000***	0.002***	-0.002***
	<0.001	<0.001	<0.001	<0.001
Post-treatment*Distance to Cut-off	0.000***	0.001***	-0.005***	0.002***
	<0.001	<0.001	(0.001)	<0.001
Treatment Dummy	-0.022	-0.029***	-0.030***	-0.087***
	(0.004)	(0.002)	(0.006)	(0.004)
Treatment* Post-treatment	0.026***	0.019***	-0.037***	-0.016***
	(0.006)	(0.003)	(0.008)	(0.006)
Time Dummies				
January	0.022***	0.014***	0.040***	0.034***
	(0.001)	(0.002)	(0.005)	(0.001)
February	0.023***	0.019***	0.037***	0.032***
	(0.002)	(0.005)	(0.008)	(0.004)
March	0.016***	0.012***	0.029***	0.024***
	(0.002)	(0.003)	(0.006)	(0.003)
April	0.012***	0.006**	0.025***	0.018***
	(0.003)	(0.003)	(0.006)	(0.002)
May	0.001	-0.003	0.035***	0.020***
	(0.002)	(0.002)	(0.004)	(0.004)
June	-0.006***	-0.008**	0.069***	0.052***
	(0.001)	(0.004)	(0.008)	(0.003)
July	-0.001	-0.005*	0.134***	0.106***
	(0.001)	(0.003)	(0.013)	(0.005)
August	0.002	-0.006*	0.121***	0.094***
	(0.002)	(0.003)	(0.009)	(0.002)
September	0.002	-0.005***	0.060***	0.034***
	(0.003)	(0.001)	(0.006)	(0.001)
October	-0.003*	-0.003	0.022***	0.010***
	(0.001)	(0.003)	(0.005)	(0.003)
November	-0.005***	-0.002	0.006	0.002
	(0.001)	(0.001)	(0.005)	(0.002)
Month of birth				
January	0.056***	0.041***	0.033***	0.039***
	(0.012)	(0.005)	(0.007)	(0.007)
February	-0.008	-0.016***	-0.050***	-0.042***
	(0.008)	(0.004)	(0.013)	(0.009)
March	0.043***	0.033***	0.006	0.028**
	(0.012)	(0.005)	(0.012)	(0.011)
April	0.020	0.004	0.004	0.007
	(0.015)	(0.007)	(0.012)	(0.011)
May	-0.037***	-0.036***	0.009	0.014
	(0.009)	(0.004)	(0.012)	(0.01)

Table B.14. Logit Estimation of Alternative Diff-in-Disc Model: Unemployed, in Labour Force (contd')

	Unemployed		In Labour Force	
	(1)	**(2)**	**(1)**	**(2)**
June	0.006 (0.01)	-0.001 (0.005)	-0.016* (0.009)	0.000 (0.013)
July	0.038*** (0.012)	0.014*** (0.005)	0.014* (0.008)	0.008 (0.008)
August	0.024** (0.01)	0.006 (0.005)	0.012 (0.01)	0.014 (0.011)
September	-0.005 (0.008)	-0.005 (0.004)	0.058*** (0.007)	0.051*** (0.009)
October	-0.041*** (0.007)	-0.037*** (0.005)	-0.055*** (0.01)	-0.042*** (0.008)
November	-0.006 (0.01)	-0.014*** (0.004)	0.036*** (0.009)	0.043*** (0.009)

(1): Sample 1
(2): Sample 2

Table B.15. Logit Estimation of Alternative Diff-in-Disc Model: Education, Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Post-treatment	-0.015***	-0.003	-0.019***	-0.024***
	(0.005)	(0.002)	(0.004)	(0.004)
Distance to Cut-off	-0.001***	0.003***	0.000***	0.000***
	<0.001	<0.001	<0.001	<0.001
Post-treatment*Distance to Cut-off	0.004***	-0.002***	0.000***	0.001***
	(0.001)	<0.001	<0.001	(0.001)
Treatment Dummy	0.031***	0.084***	-0.023	-0.027**
	(0.005)	(0.004)	(0.004)	(0.003)
Treatment* Post-treatment	0.031***	0.017**	0.033***	0.019***
	(0.007)	(0.004)	(0.007)	(0.004)
Time Dummies				
January	-0.024***	-0.018***	0.008***	0.002
	(0.004)	(0.001)	(0.001)	(0.002)
February	-0.024***	-0.016***	0.013***	0.008
	(0.008)	(0.004)	(0.003)	(0.005)
March	-0.016***	-0.011***	0.006**	0.003
	(0.005)	(0.002)	(0.002)	(0.004)
April	-0.012**	-0.006***	0.002	-0.003
	(0.006)	(0.002)	(0.003)	(0.003)
May	-0.023***	-0.008***	-0.008***	-0.011***
	(0.004)	(0.002)	(0.002)	(0.002)
June	-0.057***	-0.042***	-0.014***	-0.014***
	(0.007)	(0.002)	(0.001)	(0.004)
July	-0.131***	-0.105***	0.000	-0.002
	(0.013)	(0.004)	(0.002)	(0.004)
August	-0.123***	-0.096***	0.007	-0.001
	(0.011)	(0.003)	(0.006)	(0.005)
September	-0.054***	-0.031***	-0.002	-0.007***
	(0.006)	(0.002)	(0.003)	(0.002)
October	-0.015**	-0.007**	-0.008**	-0.006
	(0.006)	(0.003)	(0.003)	(0.004)
November	-0.002	0.000	-0.008***	-0.003*
	(0.005)	(0.001)	(0.001)	(0.002)
Month of birth				
January	-0.050***	-0.055***	0.087***	0.066***
	(0.006)	(0.007)	(0.015)	(0.006)

Table B.15. Logit Estimation of Alternative Diff-in-Disc Model: Education, Neither in Employment nor in Education (contd')

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
February	0.032**	0.025***	0.017	0.004
	(0.015)	(0.009)	(0.011)	(0.005)
March	-0.040***	-0.061***	0.092***	0.075***
	(0.009)	(0.012)	(0.017)	(0.008)
April	-0.023	-0.026*	0.048**	0.028**
	(0.014)	(0.015)	(0.019)	(0.011)
May	-0.023**	-0.027**	-0.026**	-0.027***
	(0.011)	(0.011)	(0.015)	(0.007)
June	0.002	-0.017	0.026*	0.022***
	(0.011)	(0.013)	(0.015)	(0.007)
July	-0.044***	-0.038***	0.080***	0.051***
	(0.008)	(0.008)	(0.014)	(0.007)
August	-0.039***	-0.038***	0.061***	0.034***
	(0.01)	(0.011)	(0.011)	(0.008)
September	-0.075***	-0.064***	0.015	0.007
	(0.009)	(0.01)	(0.011)	(0.005)
October	0.033***	0.020**	-0.015	-0.016***
	(0.011)	(0.009)	(0.010)	(0.005)
November	-0.057***	-0.062***	0.020*	0.006
	(0.008)	(0.008)	(0.011)	(0.005)

(1): Sample 1
(2): Sample 2

Table B.16. OLS Estimation of Alternative Diff-in-Disc Model: Employee and Employed

	Employee		Employed	
	(1)	(2)	(1)	(2)
Post-treatment	0.011* (0.006)	0.016*** (0.004)	0.032*** (0.006)	0.027*** (0.004)
Distance to Cut-off	0.001*** <0.001	-0.002*** <0.001	0.001*** <0.001	-0.002*** <0.001
Post-treatment*Distance to Cut-off	-0.001* (0.001)	0.002*** <0.001	-0.004*** (0.001)	0.001*** <0.001
Treatment Dummy	-0.011 (0.007)	-0.051*** (0.003)	-0.008 (0.006)	-0.057*** (0.003)
Treatment* Post-treatment	-0.036*** (0.01)	-0.013* (0.007)	-0.06*** (0.01)	-0.031*** (0.008)
Time Dummies				
January	0.014*** (0.002)	0.015*** (0.001)	0.011** (0.005)	0.013*** (0.001)
February	0.015*** (0.005)	0.008*** (0.002)	0.008 (0.007)	0.006*** (0.001)
March	0.016*** (0.002)	0.009*** (0.001)	0.007 (0.005)	0.006*** (0.001)
April	0.014*** (0.004)	0.011*** (0.002)	0.008 (0.008)	0.007** (0.003)
May	0.032*** (0.004)	0.023*** (0.003)	0.027*** (0.005)	0.018*** (0.002)
June	0.062*** (0.006)	0.051*** (0.001)	0.065*** (0.006)	0.053*** (0.001)
July	0.102*** (0.002)	0.085*** (0.001)	0.123*** (0.011)	0.102*** (0.003)
August	0.084*** (0.002)	0.072*** (0.005)	0.107*** (0.007)	0.091*** (0.002)
September	0.041*** (0.002)	0.029*** (0.001)	0.051*** (0.004)	0.035*** (0.001)
October	0.018*** (0.002)	0.012*** (0.002)	0.021*** (0.004)	0.011*** (0.001)
November	0.008*** (0.002)	0.004*** (0.001)	0.009* (0.005)	0.004*** <0.001
Month of birth				
January	-0.040*** (0.009)	-0.02*** (0.004)	-0.024** (0.008)	-0.007 (0.005)
February	-0.028** (0.012)	-0.012 (0.008)	-0.042** (0.015)	-0.026*** (0.008)
March	-0.006 (0.01)	0.016** (0.007)	-0.033*** (0.009)	-0.008 (0.008)
April	-0.007 (0.008)	0.010 (0.006)	-0.013 (0.01)	0.000 (0.007)

Table B.16. OLS Estimation of Alternative Diff-in-Disc Model: Employee and Employed (contd')

	Employee		Employed	
	(1)	(2)	(1)	(2)
May	0.034**	0.041***	0.042*	0.048***
	(0.012)	(0.008)	(0.014)	(0.01)
June	-0.017**	0.014	-0.020*	-0.003
	(0.007)	(0.09)	(0.01)	(0.011)
July	0.007	0.023***	-0.022*	-0.008
	(0.007)	(0.007)	(0.01)	(0.008)
August	-0.003	0.017**	-0.011	0.007
	(0.008)	(0.007)	(0.011)	(0.008)
September	0.057***	0.06***	0.061***	0.055***
	(0.01)	(0.008)	(0.008)	(0.008)
October	-0.006	0.01	-0.019	-0.006
	(0.008)	(0.007)	(0.012)	(0.009)
November	-0.003	0.017***	0.038***	0.053***
	(0.008)	(0.006)	(0.008)	(0.008)

(1): Sample 1
(2): Sample 2

Table B.17. OLS Estimation of Alternative Diff-in-Disc Model: Unemployed and in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Post-treatment	-0.013*** (0.003)	-0.022*** (0.003)	0.019*** (0.005)	0.003 (0.003)
Distance to Cut-off	0.001*** <0.001	0.000*** <0.001	0.002*** <0.001	-0.002*** <0.001
Post-treatment*Distance to Cut-off	0.000 <0.001	0.002*** <0.001	-0.004*** (0.001)	0.002*** <0.001
Treatment Dummy	-0.021*** (0.004)	-0.029*** (0.002)	-0.030*** (0.006)	-0.088*** (0.003)
Treatment* Post-treatment	0.024*** (0.005)	0.018*** (0.003)	-0.037*** (0.009)	-0.013* (0.007)
Time Dummies				
January	0.022*** (0.001)	0.015*** (0.001)	0.036*** (0.005)	0.031*** (0.001)
February	0.024*** (0.002)	0.018*** (0.004)	0.034*** (0.007)	0.028*** (0.004)
March	0.016*** (0.002)	0.012*** (0.003)	0.026*** (0.005)	0.021*** (0.002)
April	0.013*** (0.003)	0.006** (0.003)	0.023*** (0.006)	0.015*** (0.002)
May	0.003 (0.002)	-0.002 (0.002)	0.031*** (0.004)	0.017*** (0.003)
June	-0.005*** (0.001)	-0.007** (0.003)	0.062*** (0.007)	0.047*** (0.003)
July	-0.001 (0.002)	-0.004 (0.003)	0.124*** (0.012)	0.099*** (0.005)
August	0.003 (0.002)	-0.005 (0.003)	0.11*** (0.009)	0.087*** (0.002)
September	0.003 (0.003)	-0.005*** (0.001)	0.053*** (0.005)	0.031*** (0.001)
October	-0.003* (0.001)	-0.003 (0.003)	0.018*** (0.005)	0.009*** (0.003)
November	-0.005*** (0.001)	-0.002 (0.001)	0.005 (0.005)	0.002 (0.002)
Month of birth				
January	0.055*** (0.008)	0.043*** (0.004)	0.034*** (0.007)	0.039*** (0.007)
February	-0.008 (0.008)	-0.015*** (0.005)	-0.047*** (0.013)	-0.039*** (0.009)
March	0.039*** (0.009)	0.034*** (0.005)	0.008 (0.012)	0.028** (0.011)
April	0.018 (0.013)	0.004 (0.007)	0.007 (0.012)	0.007 (0.011)

Table B.17. OLS Estimation of Alternative Diff-in-Disc Model: Unemployed and in Labour Force (contd')

	Unemployed		In Labour Force	
	(1)	**(2)**	**(1)**	**(2)**
May	-0.031***	-0.034***	0.011	0.014
	(0.01)	(0.005)	(0.012)	(0.009)
June	0.005	-0.001	-0.014	0.000
	(0.009)	(0.005)	(0.009)	(0.013)
July	0.035***	0.015**	0.015*	0.008
	(0.009)	(0.005)	(0.008)	(0.007)
August	0.022***	0.006	0.012	0.014
	(0.08)	(0.005)	(0.01)	(0.01)
September	-0.004	-0.005	0.058***	0.051***
	(0.007)	(0.004)	(0.007)	(0.008)
October	-0.036***	-0.035***	-0.053***	-0.04***
	(0.008)	(0.005)	(0.01)	(0.007)
November	-0.005	-0.013***	0.036***	0.042***
	(0.009)	(0.004)	(0.009)	(0.009)

(1): Sample 1
(2): Sample 2

Table B.18. OLS Estimation of Alternative Diff-in-Disc Model: Education and Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Post-treatment	-0.012**	-0.001	-0.02***	-0.026***
	(0.006)	(0.003)	(0.004)	(0.004)
Distance to Cut-off	-0.001***	0.003***	0.000***	0.001***
	<0.001	<0.001	<0.001	<0.001
Post-treatment*Distance to Cut-off	0.004***	-0.002***	0.001	0.001**
	(0.001)	<0.001	<0.001	<0.001
Treatment Dummy	0.032***	0.087***	-0.024***	-0.029***
	(0.005)	(0.003)	(0.004)	(0.003)
Treatment* Post-treatment	0.029***	0.01	0.031***	0.021***
	(0.007)	(0.007)	(0.006)	(0.004)
Time Dummies				
January	-0.021***	-0.016***	0.01***	0.003
	(0.005)	(0.002)	(0.002)	(0.002)
February	-0.022**	-0.014***	0.013***	0.008*
	(0.008)	(0.004)	(0.003)	(0.005)
March	-0.014**	-0.01***	0.006**	0.004
	(0.006)	(0.003)	(0.002)	(0.003)
April	-0.011	-0.004*	0.002	-0.002
	(0.006)	(0.003)	(0.004)	(0.003)
May	-0.02***	-0.006**	-0.007**	-0.011***
	(0.005)	(0.002)	(0.003)	(0.002)
June	-0.052***	-0.039***	-0.013***	-0.014***
	(0.007)	(0.003)	(0.001)	(0.003)
July	-0.124***	-0.100***	0.001	-0.002
	(0.014)	(0.006)	(0.003)	(0.004)
August	-0.114***	-0.091***	0.008	-0.001
	(0.012)	(0.004)	(0.006)	(0.005)
September	-0.049***	-0.029***	-0.001	-0.007***
	(0.005)	(0.002)	(0.003)	(0.002)
October	-0.013**	-0.005	-0.008**	-0.006
	(0.006)	(0.003)	(0.004)	(0.004)
November	-0.001	0.000	-0.008***	-0.003*
	(0.006)	(0.002)	(0.001)	(0.002)
Month of birth				
January	-0.049***	-0.053***	0.073***	0.061***
	(0.006)	(0.007)	(0.009)	(0.004)
February	0.029**	0.023***	0.013	0.003
	(0.014)	(0.009)	(0.008)	(0.005)
March	-0.040***	-0.058***	0.073***	0.066***
	(0.008)	(0.012)	(0.01)	(0.006)
April	-0.024	-0.024*	0.037**	0.024**
	(0.013)	(0.015)	(0.013)	(0.009)

Table B.18. OLS Estimation of Alternative Diff-in-Disc Model: Education and Neither in Employment nor in Education (contd')

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
May	-0.024**	-0.026**	-0.018**	-0.022***
	(0.01)	(0.011)	(0.01)	(0.006)
June	0.000	-0.016	0.019*	0.019***
	(0.01)	(0.013)	(0.01)	(0.006)
July	-0.043***	-0.036***	0.065***	0.045***
	(0.007)	(0.008)	(0.008)	(0.006)
August	-0.037***	-0.036***	0.049***	0.029***
	(0.01)	(0.011)	(0.008)	(0.006)
September	-0.072***	-0.061***	0.011	0.006
	(0.008)	(0.01)	(0.008)	(0.004)
October	0.03***	0.018**	-0.011	-0.012**
	(0.011)	(0.009)	(0.008)	(0.005)
November	-0.054***	-0.058***	0.016*	0.005
	(0.008)	(0.008)	(0.008)	(0.004)

(1): Sample 1
(2): Sample 2

Table B.19. Logit Estimation of Diff-in-Disc Model without Clustering: Employed and Employee

	Employed		Employee	
	(1)	(2)	(1)	(2)
Treatment Dummy	0.041***	0.028***	0.029**	0.019**
	(0.014)	(0.009)	(0.011)	(0.008)
Distance to Cut-off	0.006***	0.004***	0.006***	0.003***
	(0.002)	(0.001)	(0.002)	(0.001)
Treatment*Distance to Cut-off	0.003	0.006***	0.001	0.007***
	(0.003)	(0.001)	(0.003)	(0.001)
Post-treatment	0.019**	0.000	0.009	-0.001
	(0.007)	(0.005)	(0.006)	(0.004)
Treatment*Post-treatment	-0.057***	-0.033***	-0.034***	-0.012*
	(0.01)	(0.007)	(0.008)	(0.006)
Time Dummies				
Quarter 1	0.01	0.022***	0.012	0.016***
	(0.009)	(0.006)	(0.008)	(0.006)
Quarter 2	0.036***	0.036***	0.036***	0.033***
	(0.009)	(0.007)	(0.008)	(0.006)
Quarter 3	0.094***	0.083***	0.075***	0.066***
	(0.01)	(0.007)	(0.009)	(0.006)
Month of birth				
January	-0.023***	-0.007	-0.040***	-0.022**
	(0.014)	(0.011)	(0.010)	(0.008)
February	-0.041**	-0.026*	-0.028**	-0.012
	(0.014)	(0.011)	(0.011)	(0.009)
March	-0.037**	-0.006	-0.012	0.021*
	(0.014)	(0.012)	(0.013)	(0.012)
April	-0.016	0.002	-0.011	0.013
	(0.015)	(0.012)	(0.013)	(0.011)
May	0.037**	0.049***	0.028*	0.044***
	(0.018)	(0.014)	(0.015)	(0.012)
June	-0.022	0.000	-0.019	0.018
	(0.015)	(0.012)	(0.012)	(0.011)
July	-0.023	-0.007	0.005	0.025**
	(0.014)	(0.011)	(0.013)	(0.011)
August	-0.014	0.009	-0.005	0.020*
	(0.015)	(0.012)	(0.013)	(0.011)
September	0.055***	0.051***	0.051***	0.058***
	(0.02)	(0.014)	(0.018)	(0.014)
October	-0.022	-0.007	-0.009	0.009
	(0.015)	(0.011)	(0.013)	(0.011)
November	0.035*	0.053***	-0.004	0.018
	(0.019)	(0.015)	(0.014)	(0.012)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.20. Logit Estimation of Diff-in-Disc Model without Clustering: Unemployed and in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.019* (0.01)	-0.014* (0.007)	0.025 (0.016)	0.014 (0.011)
Distance to Cut-off	0.001 (0.001)	0.001** (0.001)	0.006*** (0.002)	0.006*** (0.001)
Treatment*Distance to Cut-off	0.000 (0.003)	0.000 (0.001)	0.005 (0.004)	0.005*** (0.002)
Post-treatment	-0.007 (0.006)	-0.008* (0.004)	0.015*** (0.009)	-0.005 (0.006)
Treatment*Post-treatment	0.032*** (0.011)	0.020*** (0.007)	-0.031** (0.013)	-0.014 (0.01)
Time Dummies				
Quarter 1	0.017*** (0.007)	0.009** (0.005)	0.030*** (0.01)	0.033*** (0.007)
Quarter 2	0.001 (0.007)	-0.006 (0.004)	0.035*** (0.01)	0.030*** (0.007)
Quarter 3	0.002 (0.006)	-0.006 (0.004)	0.095*** (0.011)	0.076*** (0.008)
Month of birth				
January	0.056*** (0.017)	0.041*** (0.011)	0.034* (0.019)	0.040*** (0.014)
February	-0.009 (0.013)	-0.016* (0.008)	-0.048*** (0.018)	-0.040*** (0.013)
March	0.042** (0.016)	0.032*** (0.012)	0.003 (0.02)	0.030* (0.015)
April	0.020 (0.018)	0.004 (0.01)	0.005 (0.02)	0.008 (0.015)
May	-0.037*** (0.016)	-0.037*** (0.007)	0.009 (0.02)	0.014 (0.014)
June	0.005 (0.01)	-0.001 (0.009)	-0.016 (0.019)	0.002 (0.015)
July	0.038** (0.014)	0.014 (0.01)	0.014 (0.02)	0.009 (0.014)
August	0.025 (0.016)	0.006 (0.01)	0.010 (0.02)	0.016 (0.015)
September	-0.005 (0.014)	-0.005 (0.009)	0.056** (0.022)	0.049*** (0.016)
October	-0.040*** (0.009)	-0.037*** (0.007)	-0.058*** (0.017)	-0.043*** (0.013)
November	-0.005 (0.014)	-0.014 (0.009)	0.035 (0.022)	0.043*** (0.016)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.21. Logit Estimation of Diff-in-Disc Model without Clustering: Education and Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.026 (0.016)	-0.014 (0.011)	-0.017 (0.011)	-0.012 (0.008)
Distance to Cut-off	-0.007*** (0.002)	-0.006*** (0.001)	0.001 (0.002)	0.002*** (0.001)
Treatment*Distance to Cut-off	-0.004 (0.004)	-0.004** (0.002)	0.001 (0.003)	-0.001 (0.001)
Post-treatment	0.002 (0.009)	0.022*** (0.007)	-0.022*** (0.007)	-0.023*** (0.005)
Treatment*Post-treatment	0.027** (0.014)	0.015 (0.01)	0.036*** (0.012)	0.019** (0.008)
Time Dummies				
Quarter 1	-0.029*** (0.011)	-0.033*** (0.008)	0.018** (0.007)	0.011** (0.005)
Quarter 2	-0.033*** (0.011)	-0.029*** (0.008)	0.000 (0.007)	-0.006 (0.005)
Quarter 3	-0.101*** (0.011)	-0.083*** (0.008)	0.009 (0.007)	0.001 (0.005)
Month of birth				
January	-0.051** (0.02)	-0.057*** (0.015)	0.088*** (0.021)	0.067*** (0.014)
February	0.031 (0.02)	0.024* (0.015)	0.017 (0.018)	0.004 (0.012)
March	-0.036 (0.022)	-0.063*** (0.017)	0.090*** (0.024)	0.075*** (0.016)
April	-0.023 (0.022)	-0.027* (0.016)	0.047** (0.021)	0.028** (0.013)
May	-0.023 (0.021)	-0.027* (0.015)	-0.027** (0.014)	-0.028*** (0.009)
June	0.003 (0.021)	-0.020 (0.016)	0.025 (0.019)	0.022* (0.013)
July	-0.044** (0.022)	-0.039** (0.016)	0.080*** (0.022)	0.050*** (0.014)
August	-0.037* (0.022)	-0.041** (0.016)	0.062*** (0.022)	0.034** (0.013)
September	-0.073*** (0.024)	-0.062*** (0.017)	0.015 (0.018)	0.007 (0.012)
October	0.036** (0.019)	0.021 (0.014)	-0.015 (0.015)	-0.016 (0.01)
November	-0.056** (0.024)	-0.063*** (0.017)	0.021 (0.019)	0.006 (0.012)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.22. OLS Estimation of Diff-in-Disc Model with Moulton Correction: Employee and Employed

	Employed		Employee	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	0.043***	0.021***	0.030***	0.011**
	(0.007)	(0.006)	(0.007)	(0.005)
Distance to Cut-off	0.006***	0.005***	0.005***	0.004***
	(0.002)	(0.001)	(0.003)	(0.001)
Treatment*Distance to Cut-off	0.003	0.003**	0.002	0.002**
	(0.003)	(0.001)	(0.003)	(0.001)
Post-treatment	0.021**	0.001	0.011	-0.001***
	(0.008)	(0.006)	(0.007)	(0.005)
Treatment*Post-treatment	-0.059***	-0.028***	-0.034***	-0.009
	(0.011)	(0.008)	(0.01)	(0.007)
Time Dummies				
Quarter 1	0.009	0.020***	0.009	0.016***
	(0.008)	(0.006)	(0.007)	(0.005)
Quarter 2	0.030***	0.033***	0.028***	0.031***
	(0.005)	(0.004)	(0.005)	(0.004)
Quarter 3	0.088***	0.079***	0.068***	0.062***
	(0.004)	(0.004)	(0.005)	(0.003)
Month of birth				
January	-0.024	-0.007	-0.040***	-0.020**
	(0.015)	(0.011)	(0.013)	(0.009)
February	-0.041**	-0.025**	-0.028*	-0.011
	(0.017)	(0.012)	(0.014)	(0.01)
March	-0.035**	-0.007	-0.009	0.017*
	(0.017)	(0.012)	(0.014)	(0.01)
April	-0.012	0.000	-0.007	0.010
	(0.017)	(0.012)	(0.014)	(0.01)
May	0.042**	0.047***	0.033**	0.040***
	(0.016)	(0.011)	(0.014)	(0.01)
June	-0.020	0.001	-0.018	0.015
	(0.017)	(0.012)	(0.014)	(0.01)
July	-0.023	-0.008	0.006	0.023**
	(0.016)	(0.011)	(0.013)	(0.009)
August	-0.013	0.009	-0.005	0.019*
	(0.017)	(0.012)	(0.014)	(0.01)
September	0.059***	0.053***	0.055***	0.059***
	(0.017)	(0.012)	(0.014)	(0.01)
October	-0.023	-0.005	-0.009	0.011
	(0.016)	(0.008)	(0.014)	(0.01)
November	0.037**	0.054***	-0.004	0.018*
	(0.016)	(0.012)	(0.014)	(0.01)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.23. OLS Estimation of Diff-in-Disc Model with Moulton Correction: Unemployed and in Labour Force

	Unemployed		In Labour Force	
	(1)	(2)	(1)	(2)
Treatment Dummy	-0.019***	-0.014***	0.023**	0.008
	(0.002)	(0.003)	(0.007)	(0.005)
Distance to Cut-off	0.001	0.001**	0.007***	0.007***
	(0.002)	(0.001)	(0.002)	(0.001)
Treatment*Distance to Cut-off	0.000	0.000	0.003	0.002*
	(0.002)	(0.001)	(0.004)	(0.001)
Post-treatment	-0.007	-0.009*	0.016	-0.006
	(0.006)	(0.004)	(0.009)	(0.007)
Treatment*Post-treatment	0.028***	0.019***	-0.032**	-0.01
	(0.009)	(0.006)	(0.014)	(0.01)
Time Dummies				
Quarter 1	0.017**	0.009*	0.027**	0.03***
	(0.006)	(0.005)	(0.01)	(0.007)
Quarter 2	0.002	-0.006**	0.032***	0.027***
	(0.003)	(0.003)	(0.006)	(0.004)
Quarter 3	0.002	-0.006***	0.090***	0.072***
	(0.001)	(0.002)	(0.004)	(0.003)
Month of birth				
January	0.055***	0.044***	0.035*	0.039***
	(0.012)	(0.009)	(0.018)	(0.013)
February	-0.008	-0.015	-0.046**	-0.038***
	(0.013)	(0.009)	(0.02)	(0.014)
March	0.039***	0.033***	0.006	0.029***
	(0.013)	(0.009)	(0.02)	(0.014)
April	0.018	0.004	0.008	0.007
	(0.013)	(0.009)	(0.02)	(0.014)
May	-0.032**	-0.035***	0.011	0.013
	(0.013)	(0.009)	(0.019)	(0.014)
June	0.005	-0.001	-0.015*	0.001
	(0.013)	(0.009)	(0.02)	(0.014)
July	0.036**	0.014	0.015	0.008
	(0.013)	(0.009)	(0.019)	(0.014)
August	0.023*	0.006	0.011	0.016*
	(0.013)	(0.009)	(0.02)	(0.014)
September	-0.004	-0.005	0.057**	0.049***
	(0.013)	(0.01)	(0.02)	(0.014)
October	-0.034**	-0.035***	-0.056**	-0.038***
	(0.013)	(0.009)	(0.02)	(0.014)
November	-0.004	-0.013	0.035	0.042***
	(0.013)	(0.01)	(0.021)	(0.013)

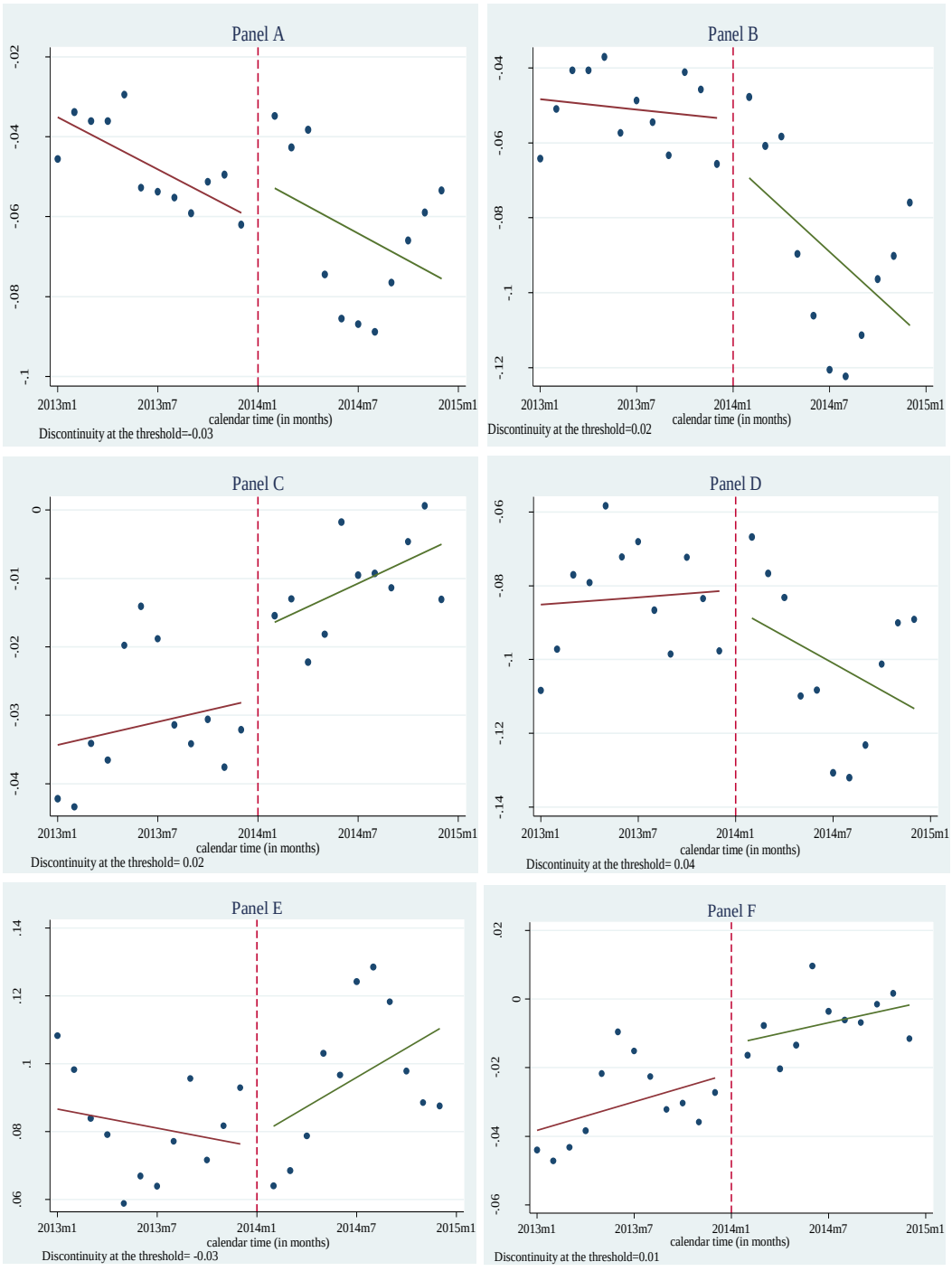
(1): Bandwidth 1 year
(2): Bandwidth 2 years

Table B.24. OLS Estimation of Diff-in-Disc Model with Moulton Correction: Education and Neither in Employment nor in Education

	Education		Neither in Employment nor in Education	
	(1)	**(2)**	**(1)**	**(2)**
Treatment Dummy	-0.024* (0.007)	-0.008 (0.005)	-0.019*** (0.003)	-0.013*** (0.003)
Distance to Cut-off	-0.007* (0.002)	-0.007*** (0.001)	0.001 (0.002)	0.002*** (0.001)
Treatment*Distance to Cut-off	-0.003 (0.004)	-0.001 (0.001)	0.000 (0.003)	-0.001 (0.001)
Post-treatment	0.002 (0.01)	0.024*** (0.007)	-0.023*** (0.007)	-0.025*** (0.005)
Treatment*Post-treatment	0.025* (0.014)	0.008 (0.01)	0.034*** (0.01)	0.02** (0.007)
Time Dummies				
Quarter 1	-0.027** (0.01)	-0.031*** (0.007)	0.018** (0.007)	0.011** (0.005)
Quarter 2	-0.030*** (0.006)	-0.027*** (0.004)	0.000 (0.004)	-0.006* (0.003)
Quarter 3	-0.97*** (0.005)	-0.079*** (0.003)	0.008*** (0.002)	0.000 (0.002)
Month of birth				
January	-0.05** (0.019)	-0.053*** (0.013)	0.074*** (0.013)	0.061*** (0.01)
February	0.028 (0.02)	0.022 (0.014)	0.013 (0.014)	0.003 (0.01)
March	-0.037* (0.021)	-0.059*** (0.015)	0.072*** (0.015)	0.066*** (0.011)
April	-0.024 (0.02)	-0.025 (0.014)	0.036** (0.014)	0.024** (0.01)
May	-0.023 (0.02)	-0.025* (0.014)	-0.019 (0.014)	-0.022** (0.01)
June	0.001 (0.02)	-0.017 (0.015)	0.019 (0.014)	0.019* (0.011)
July	-0.043** (0.02)	-0.036** (0.014)	0.065*** (0.014)	0.044*** (0.01)
August	-0.036* (0.02)	-0.038** (0.014)	0.049*** (0.014)	0.029** (0.011)
September	-0.071*** (0.021)	-0.059*** (0.015)	0.011 (0.014)	0.006 (0.01)
October	0.033 (0.02)	0.017 (0.014)	-0.010 (0.015)	-0.013** (0.011)
November	-0.054** (0.021)	-0.059*** (0.015)	0.016 (0.014)	0.005 (0.01)

(1): Bandwidth 1 year
(2): Bandwidth 2 years

C: OUTCOME TRENDS WITHIN ALTERNATIVE MODEL



Source: Own calculations using SILC.

Figure C.1. Change in Averages of Labour Market and Education Outcomes for 15-year-old Males Relative to 16-year-old Males

In Figure C.1, we present the SILC data within the alternative model. In fact, this Figure contains the graphs plotting labour market and education variables against calendar time in months during January 2013-December 2014. Note that the minimum wage change occurred in January 2014. Here, the changes in average outcomes are obtained by taking the differences between 15-year-old males and 16-year-old males. To illustrate, consider the unemployment outcome of young males available in Panel C. The dot just left to the discontinuity point represents the proportion of 15-year-old unemployed males minus proportion of 16-year-old unemployed males in the last month of 2013. Besides, in this context, rightward movement along the rating variable indicates what happens to the relative position of 15-year-old males, compared to their 16-year-old counterparts, as time passes. In particular, the incidence of unemployment among 15-year-old males gets worse over time, when compared to 16-year-old males. Moreover, we observe 0.02 pp increase in January 2014, thereby implying a deteriorating effect on unemployment due to minimum wage. On the other hand, unlike Figure 5.2, Figure C.1 does not reveal negative effects at the threshold value on either employee (Panel A), employment (Panel B) or labour force participation (Panel D) of young males. However, we still observe some negative effects on these variables in later months of 2014. In fact, the proportion of 15-year-old male employees, relative to 16-year-old males, starts to decline as of February 2014. The declining trend also continues for six months during the year. Moreover, we observe a very similar pattern for the employment and labour force participation phenomenon. It seems that there exists a delay in the realization of minimum wage effects. In fact, the response of employers to changes in labour cost might not be immediate because adjustment takes some time (Borjas, 2016). In addition to employment and labour force participation outcomes, adjustment in the participation to formal education of 15-year-old males is realized with a month of delay after the change in policy (Panel E). In fact, the share of 15-year-old males who are in formal education increases after February 2014. Finally, similar to Figure 5.2, we observe an increase in being neither in employment nor in education outcome as in Panel F.

D: INTERNATIONAL ANCHORS OF MINIMUM WAGE IN TURKEY

Article 90 of the Turkish Constitution declares, “International agreements duly put into effect have the force of law. No appeal to the Constitutional Court shall be made with regard to these agreements, because they are unconstitutional” (Grand National Assembly of Turkey, 2018). This Article binds the country in accepting the standards of minimum wage enforcements set by international agreements signed.

ILO adopted three Conventions on minimum wage. In fact, it adopted Minimum Wage Fixing Machinery Convention No. 26 in 1928, the Minimum Wage Fixing Machinery (Agriculture) Convention No. 99 in 1951 and the Minimum Wage Fixing Convention No. 131 in 1970. Turkey ratified two of them (Aydın, 2014). In 1970, Turkey ratified Convention No. 99 aiming to reduce the wage gap between agricultural and industrial workers. Signing the Convention, states would undertake to apply minimum wages to workers employed in agricultural undertakings and related occupations. On the other hand, states ratifying Convention No. 99 are free to determine to which jobs minimum wage should be applied (ILO, 2014). Moreover, Turkey ratified Convention No. 26 in 1973 (ILO, 2018). A member state ratifying Convention No. 26 shall undertake to fix minimum wages for the workers employed in manufacture and commerce in which no arrangements exist for effective regulation of wages and wages are exceptionally low (Article 1). Furthermore, this Convention leaves the states free to choose the trades in which minimum wage should be applied. In 1970, ILO adopted Convention No. 131 proposing to apply the minimum wage schemes to all workers. Yet, Article 3 entails the ratifying countries to take the needs of workers and their families into account while fixing minimum wages. Since the minimum wage in Turkey is not determined based on the needs of family, this Convention has not been ratified by the country (Akgül, 2016).

In addition, regarding the minimum wage, Turkey signed Universal Declaration of Human Rights in 1948 and European Social Charter in 1989. Nonetheless, as Clause 1 of Article 4 in European Social Charter declares contracting parties would undertake “to recognise the right of workers to a remuneration such as will give them and their families a decent standard of living”, Turkey did not sign this Clause.

E: CURRICULUM VITAE

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RESEARCH AND TEACHING INTEREST

Research Interest: Microeconomics, Econometrics, Labour Market, Econometrics, Education, Social Research, Social Policy

Teaching Interest: Labour Economics

EDUCATION

M.Sc., London School of Economics and Political Science, Social Policy Research, 2013.

M.S., Middle East Technical University, Economics, 2008.

B.S., Middle East Technical University, Mathematics, 2006.

Minor Program, Middle East Technical University, International Economics, 2008

FELLOWSHIPS AND AWARDS

METU Graduate Performance Award: Performance Award for the Most Successful Student in the PhD Program, Ankara, 2014.

The Loch Exhibition Prize: Dissertation Prize for the overall merit in MSc in Social Policy, London School of Economics and Political Science, London, UK, 2013.

Graduate Scholarship: National Scholarship for MSc in Economy, the Scientific and Technological Research Council of Turkey (TUBITAK), Ankara, 2006-2008.

PROFESSIONAL EXPERIENCE

Senior Expert, Presidency of Strategy and Budget, 2007-present.

RESEARCH AND PUBLICATIONS

[1] "Does Unemployment Insurance Affect Unemployment Duration?: Evidence from Turkey using Regression Discontinuity Approach" London School of Economics and Political Science, London, UK, 2013.

[2] "Is Turkish Labor Market Structure Appropriate for Regional Minimum Wage?" (with S. Demir Şeker), Ministry of Development, 2013.
[3] "Evaluation of Unemployment Insurance System in terms of Coverage, Unemployment and Employment Durations in Turkey", Ministry of Development, Ankara, 2012.

[4] *National Youth Employment Action Plan*, Employment Agency and International Labor Organization, Ankara, 2011.

[5] *Millennium Development Goals Report Turkey,* State Planning Organization and UNDP, 2010.

[6] "Recent Trends in Female Labor Force Participation in Turkey", (with M. Aran, , S. Capar, D. Sanalmis, and A. Uraz), World Bank and Turkey State Planning Organization, Ankara, 2009.

REPORTS CONTRIBUTED

[1] "Creating Good Jobs in Turkey", World Bank, (forthcoming).

[2] "Turkey Managing Labor Market Through The Economic Cycle", World Bank and Ministry of Development, No: 70130, 2013.

INTERNATIONAL MEETINGS, WORKSHOPS AND CONFERENCES

[1] Assessing the Turkish Labor Market, World Bank, participant, Ankara, Turkey, 11 May 2018.

[2] Employment, Labour and Social Affairs Committee, OECD, delegate, Paris, France, 7-8 November 2017.

[3] Realizing Harmonization Policies in Turkey Workshop, World Bank & Directorate General of Migration and Management of Turkey, participant, Ankara, Turkey, 19-20 July 2017.

[4] World Humanitarian Summit, UN, participant, Istanbul, Turkey, 23-24 May 2016.

[5] Impact Analysis of Employment Subsidies in Turkey Project, Member of Working Group, Ministry of Labor and Social Security, Ankara, Turkey, 2013-2016

[6] More and Better Jobs for Women: Women's Empowerment through Decent Work in Turkey Project, ILO, Member of National Technical Team, February 2013-June 2016.

[7] e-skills for Jobs in Europe: Measuring Progress and Moving Ahead Workshop, Brussels, Belgium, March 2014.

[8] The Economic and Development Review Committee (EDRC) Meeting on "Overview of 2014 Economic Survey of Turkey", Undersecretariat of Treasury, Ankara, Turkey, 2013.

[9] National Employment Strategy and Action Plan of Turkey: Workshops, Contributing editor of the Report, Antalya and Ankara, Turkey, 2009-2012.

[10] Steering Committee of Increasing Quality of Public Employment Services in Turkey, Member, Ankara, Turkey, January 2012.

[11] Labor Market Network, Speaker, Bahcesehir University, Economic and Social Research Center, Istanbul, Turkey, December 2011.

[12] Technical Assistance for Potential Operation and Grant Beneficiaries Project Study Visit, (financed under European Union Instrument for Pre-Accession Assistance Fund), Budapest, Hungary, November 2011.

[13] Activation Policies for Unemployed and Informal Employers Workshop, World Bank, Ankara, Turkey, April 2011.

[14] World Bank's Social Protection and Labor Strategy 2012-2022 Consultation Meeting, World Bank, Ankara, Turkey, April 2011.

[15] National Economy Symposium: Crisis and Unemployment, Speaker, Hacettepe University, Ankara, Turkey, December 2010.

[16] Decent Work for All: National Youth Employment Program and Pilot Implementation in Antalya Workshop, Speaker, Antalya, Turkey, September 2010.

[17] Access to Finance and Investment Readiness for Women Entrepreneurs Workshop, Speaker, Brussels, Belgium, March 2010.

[18] 4th Disable Council: Employment Chapter, Reporter, Ministry of Family and Social Policy of Turkey, Ankara, Turkey, November 2009.

[19] World Bank and IMF Annual Meetings Media Workshop, Speaker, Istanbul, Turkey, September 2009.

[20] Impact Evaluation of Public Employment Services Workshop, World Bank, Ankara, Turkey, April 2009.

[21] SPO and World Bank Brainstorming on Social Policy, Speaker, Ankara, Turkey, October 2008.

[22] Joint Portfolio Performance Review Workshop, World Bank, Ankara, Turkey, September 2007.

[23] 45th Social Development Commission of the United Nations, Delegate of Turkey, New York, US, February 2008.

[24] Workshop on Growth and Employment, World Bank, Ankara, Turkey, November 2007.

COMPUTER SKILLS

C programming, STATA, SPSS, Amos, ANSWER Tree, Eviews, Matlab, R Studio

F: TURKISH SUMMARY/TÜRKÇE ÖZET

ASGARİ ÜCRETİN GENÇLERDE İŞGÜCÜ PİYASASI VE OKULLAŞMA ÇIKTILARI ÜZERİNDEKİ ETKİLERİ: TÜRKİYE ÖRNEĞİ

Çalışmanın Amacı ve Motivasyonu:

Çare mi yoksa talihsizlik mi? İşverenlerin çalışanlarına ödediği ücretlerin en düşük düzeyini belirlemeye yönelik bir sosyal politika aracı olarak kullanılan asgari ücret, çalışanların asgari bir yaşam standardına kavuşmalarına yetmeyecek kadar düşük ücret almalarının önüne geçmek amacıyla kullanılmaktadır. Bundan hareketle, söz konusu politika, özellikle en düşük düzeyde ücret alan çalışanlar için olmak üzere, gelir dağılımının iyileştirilmesi ve yoksulluğun azaltılmasında etkili olabilmektedir. Ancak, ücret artışına bağlı maliyet artışları işverenleri işgücü taleplerini kısmaya zorlayabilmektir. Bu durumda, çalışmaya devam edenler daha yüksek ücretlere sahip olsa dahi, işinden olanlar ciddi gelir kayıpları ile karşı karşıya kalmaktadır. Bunun yanı sıra, düşük nitelikli çalışanlar asgari ücretin yaratacağı iş kayıplarına karşı daha kırılgandır. Özellikle de genç nüfus bu tarz politikalardan daha fazla etkilenmektedir. Pek çok ülkede gençler işgücü piyasasında daha az yer aldığından, bir kere işsiz kaldıklarında yeniden işgücüne dönmeleri ve işe yerleşmeleri daha zor olmaktadır. Bu çerçevede, asgari ücret politikasının genç istihdamını ve işgücünü ne derece etkilediğini anlamak kritik önem taşımaktadır.

Yaygın kullanımı ve potansiyel faydalarına rağmen, asgari ücret pek çok ülkede etkin tasarlanamamıştır. Bunun en temel nedenlerinden bir tanesi, asgari ücretin etkileri hakkında görüş birliğinin sağlanamamış olmasıdır. Bugün, asgari ücret üzerine yapılan çok sayıdaki çalışmada hala asgari ücretin, bilhassa istihdam üzerindeki, etkileri tartışılmaktadır. Mevcut durumda bu çalışmalarda çoğunlukla şu sorulara cevap arandığı görülmektedir: Asgari ücretin istihdam üzerinde anlamlı

bir etkisi var mı? Varsa, bu etkinin yönü ve büyüklüğü nedir? Asgari ücret kalıcı bir işsizlik yaratır mı? Asgari ücret insanları işgücü piyasasına girmeye teşvik eder mi? Bu sorular kısmen cevaplanmış olsa da ampirik ve teorik yazında henüz görüş birliği sağlanamamıştır.

Neo-klasik teori, ücretlerde taban düzeyini belirlediğinden asgari ücretin istihdamı azaltacağını ve aynı anda iradi işsizliğe neden olacağını öngörmektedir. Bunun arkasında yatan temel mantık ise şu şekildedir: Asgari ücretle birlikte artan işgücü maliyetleri nedeniyle işverenler talep ettikleri çalışan sayısını aşağıya çekmektedir. Diğer yandan, piyasa ücretlerindeki artış daha önce piyasada aktif olmayan bireyleri işgücü piyasasına çekerek, bu kişileri iş aramaya teşvik etmektedir. Talep edilen çalışan sayısındaki azalma ile işgücü arz sayısındaki artış piyasada işsizliğin ortaya çıkmasına neden olmaktadır. Asgari ücret üzerine yapılan ilk çalışmalar da neo-klasik teorinin öngörülerini desteklemektedir. Nitekim bu alandaki ilk çalışmalar asgari ücret uygulamalarının istihdam düzeyini olumsuz yönde etkilediğini ileri sürerek, asgari ücretin etkisinin hangi yönde olduğundan ziyade, bu negatif etkinin büyüklüğüne odaklanmışlardır.

Zamanla daha iyi yöntemlerin kullanılması ve daha nitelikli verinin elde edilmesi ile birlikte asgari ücret yazını, yapılan ilk çalışmaları sorgulamaya başlamıştır. Card ve Krueger'in 1994 yılındaki öncü çalışması ilk kez asgari ücretin istihdamı pozitif yönde etkileyebileceğini ortaya koyarak yeni bir dönemi başlatmıştır. Yazarlar New Jersey'de hazır yemek sektöründe yapılan asgari ücret artışının bu bölgede genç istihdamını nasıl etkilediğini incelemişlerdir. Çalışmada önceki pek çok çalışmadan farklı olarak, asgari ücret artışını getiren politika sonrasında gençlerde istihdamın arttığı bulunmuştur. Bu çalışmayı takip eden çalışmalarda da bu yönlü bir etkinin varlığı tartışılmış ve zaman zaman bunu destekler bulgulara rastlanmıştır. Ampirik yazındaki bu gelişmeye teorik yazın da eşlik etmiştir. 1990'ların ortalarından sonra iktisat teorisi asgari ücretin istihdamı artırmasına olanak veren modeller ortaya koymuştur. Bunların en başında işgücü piyasasında tek alıcının olduğunu öngören monopsonist piyasa modelleri yer almaktadır. Bu modele göre asgari ücretle birlikte

artan piyasa ücretleri işgücü talebini azaltmayabileceğinden, asgari ücret istihdamı olumsuz yönde etkilemeyebilir. Nitekim asgari ücret politikasının uygulanmadığı durumda monopsonist işveren çalışanlarına marjinal verimlilik değerlerinin altında ücret ödediğinden, asgari ücreti takiben artan ücretler ortalama işgücü maliyetlerini artırsa da çalışan kişi sayısını azaltmayabilir. Hatta asgari ücret sonrasında talep edilen işgücü sayısının artması da çalışan sayısını artırarak, asgari ücret ve istihdam arasında pozitif yönlü bir ilişki yaratabilir.

Bunun gibi, etkin ücret modeli ile iş arama modeli de asgari ücret uygulamasının istihdamı olumlu etkileyebileceğini savunan modeller arasında yer almaktadır. Etkin ücret modeli, neo-klasik modelden farklı olarak, ücretlerin yalnızca istihdam edilen kişi sayısını değil, aynı zamanda çalışanların verimlilik düzeyini de etkilediği görüşüne dayanmaktadır. Bu durumda, işverenler daha fazla ücret ödemek suretiyle çalışanlarının verimliliğini artırabilir. Böyle olunca da asgari ücret uygulamasının piyasadaki ücret düzeyini artırması istihdamı olumlu şekilde etkiler. Benzer şekilde, iş arama modeli de asgari ücretin istihdama zarar vermediğini öngörmektedir. Bu modele göre işgücü piyasasındaki friksiyonlar, asgari ücretin istihdamı azaltmasını engellemektedir. İş arama modelinde, piyasadaki çalışan-açık iş eşleşmesi sadece talep taraflı belirlenmemektedir. Dolayısıyla, asgari ücretle birlikte artan işgücü arzı piyasada olumlu etki yaratabilir. Nitekim asgari ücret uygulamasına geçilmesiyle birlikte, işverenlerin talep ettikleri çalışan sayısındaki azalma, işgücü arzındaki artış tarafından baskılandığında toplam istihdamda artış gözlenebilir.

Teorik yazındaki tartışmalara paralel olarak son dönemlerde yapılan çalışmalar da asgari ücretin işgücü piyasasını pek çok şekilde etkileyebileceğine yönelik bulgular ortaya koymuştur. Halen bu alanda çok sayıda çalışma yapılmasına rağmen, asgari ücretin etkileri konusunda ampirik yazında mutabakata varılamamıştır. Bununla birlikte, yapılan çoğu çalışma gelişmiş ülkelere odaklanmaktadır. Gelişmekte olan ülkeler için ise asgari ücret yazını göreli daha zayıf olup, bulgular daha çeşitlidir. Gelişmekte olan ülkeler için ortaya çıkan bu durumun temel nedeni de, bu ülkelerde kayıt dışılığın yaygın olması ve pek çok firmanın asgari ücrete uymamasıdır. Böyle

bir çerçevede, işgücü piyasasının belli bir kısmına uygulanamayacağından, asgari ücret politikalarının bu ülkelerdeki etkisinin zayıf olacağı değerlendirilebilir. Diğer yandan, yapılan çalışmalarda bu öngörünün aksine gelişmekte olan ülkelerde asgari ücretin etkilerinin daha fazla olabileceği ortaya konulmuştur. İlk kez Mincer (1976) tarafından ortaya konulan iki sektör (kapsanan ve kapsanmayan sektörler) modeli, asgari ücretin uygulanmadığı sektörlerde de etkili olabileceğini öne sürmektedir. İki sektör modeline göre, asgari ücret uygulaması kapsanmayan sektörlerde ücret düzeyini azaltırken, istihdamı artırmaktadır. Bu durumun ortaya çıkmasında işgücü haraketliliği etkilidir. Asgari ücretin kapsanan sektörlerde uygulanmaya başlaması ile bu sektörlerde çalışan sayısındaki talep azalışı, iş kayıplarına neden olmaktadır. İşini kaybeden bireyler kapsanmayan sektörlerde iş bulma ihtimalinin daha fazla olması nedeniyle, bu sektörlere geçiş yapabilir. Kapsanmayan sektörlerde işgücü arzının artması da istihdam artışına neden olmaktadır. Bu durumda, asgari ücretin toplam istihdam üzerindeki etkisi net değildir çünkü asgari ücretle birlikte kapsanan sektörde istihdam düzeyi azalmasına rağmen, kapsanmayan sektörde istihdam artışı olmuştur. İki sektör modeli asgari ücretin toplam istihdamı olumlu ya da olumsuz etkileyebileceğini söylerken, bu uygulamanın kapsanmayan sektörlerde ücretleri azaltacağını öngörür. Diğer yandan, bu alanda yapılan çalışmalarda, asgari ücretin kapsanmayan sektörlerde de ortalama ücret artışına neden olabileceği ortaya konulmuştur. Özellikle pek çok gelişmekte olan ülkede asgari ücret, uygulanmadığı sektörlerde de bir referans ücreti görevini görerek, sadece kapsanan sektörde değil, kapsanmayan sektörlerde de ortalama ücretleri artırmaktadır.

Asgari ücretin kapsanmayan sektörlerde görünmeyen bir taban etkisi yaratabilmesi, Türkiye gibi gelişmekte olan ülkelerde asgari ücretin etkilerinin detaylı analizinin yapılması ihtiyacını ortaya koymaktadır. Türkiye'de asgari ücret iş akdi ile çalışan herkesi kapsamasına rağmen, kayıt dışılığın yüksek oluşu bu uygulamanın etki alanını sınırlandırmaktadır. Nitekim 2016 yılında ülkede ücretli çalışan erkeklerin % 17,7'si bir sosyal güvenlik kuruluşuna kayıtlı değildir. Bununla birlikte, kayıt dışılık genç kesimde daha yaygındır. Örneğin, kayıt dışı istihdam oranı 2016 yılında 15-19 yaş grubu erkeklerde % 67,5, 15-16 yaş grubu erkeklerde ise % 90,8'dir.

Kayıt dışılığın yüksek olmasına rağmen, çalışanların çoğu asgari ücret üzerinden kazanç sağlamaktadır. Nitekim Sosyal Güvenlik Kurumu verilerine göre, 2016 yılında ücretli çalışan erkeklerin % 40,4'ü için asgari ücret üzerinden prim ödenmiştir. Bununla birlikte, Hanehalkı İşgücü Anketi'ne (HİA) göre, aynı yılda 15-19 yaş grubu ücretli çalışan erkeklerin % 29,1'i asgari ücretli iken, 15-16 yaş grubunda bu oran % 12,9'dur. Dolayısıyla, Türkiye'de asgari ücret uygulamasının genç işgücü üzerinde ne gibi etkiler yaratacağının belirlenmesi önemlidir, çünkü yüksek kayıt dışılığa rağmen, gençlerin ciddi bir kısmı asgari ücretle çalışmaktadır.

Türkiye'de nüfusun önemli bir bölümünü gençler oluşturmaktadır. Nitekim 2016 yılsonu itibarıyla 40 milyonluk erkek nüfusunun 3,4 milyonu 15-19 yaş grubunda yer almaktadır. Buna ilaveten, ülkedeki genç nüfus işgücü piyasasına girmede pek çok zorlukla karşılaşmaktadır. Nitekim ülkede genç nüfusun işsizlik oranı yüksek, işgücüne katılma oranları ise düşüktür. Örneğin, 2016 yılında Türkiye'de 15-19 yaş grubu erkeklerde işsizlik oranı % 15,7 iken, bu erkeklerde işgücüne katılma oranı sadece % 37,1'dir. Gençler, diğer yaş gruplarına göre, işgücünde göreli olarak daha az yer aldığından, Türkiye'de 2014 yılına kadar uzun bir süre boyunca, gençler için daha düşük asgari ücret uygulanmıştır. Benzer bir gerekçe ile pek çok ülkede bunun gibi uygulamalara yer verilmektedir. Finlandiya, Şile, Belçika, İrlanda, Hollanda, Yeni Zelanda, Fransa ve Avustralya asgari ücreti yaşa göre kademelendiren ve genç kesim için daha düşük asgari ücret uygulayan ülkelerden bazılarıdır (ILO, 2014).

Asgari ücretin yaşa göre ayrıştırılması verimlilik açısından da gerekçelendirilebilir. Gençlerin genellikle nüfusun diğer kesimlerine göre daha az verimli olması, gençler için daha düşük ücret ödenmesini gerektirebilir. Diğer yandan, bu alanda yapılan çalışmalar gençlerin asgari ücret uygulamalarından ülke geneline ve nüfusun diğer kesimlerine göre daha fazla etkilendiğini ortaya koymaktadır. Aslında genç nüfus asgari ücret politikalarına karşı daha kırılgandır çünkü genç nüfusun işgücü piyasası ile bağı nispi olarak zayıftır. Mesela, asgari ücret uygulaması ile birlikte işverenler genç çalışanları işten çıkarıp, yerlerine daha yaşlı bireylerden deneyimli, eğitimli ve nitelikli gördükleri çalışanları işe alabilirler. Bu ikame etkisi, gençlerin işgücü

piyasası ile zayıf olan bağlarını daha fazla kopabilir. Bu sebeple de politika yapıcılar asgari ücret uygulamalarında yaşa göre farklılaştırma yapılabilmektedir.
Yukarıda da bahsedildiği gibi, ampirik literatür asgari ücretin istihdam üzerindeki etkileri açısından bugün hala görüş birliği sağlayamamıştır. Bu durum teorik olarak monopsonist piyasa modelleri gibi modellerle açıklanabilse de, bu durumun ortaya çıkmasında yapılan çalışmaların genellikle toplam istihdama odaklanması etkili olmaktadır. Diğer yandan, asgari ücret istihdam edilenler içerisinde bir ikame etkisi yaratabilir. Bu durumda, asgari ücret istihdam edilenlerin yaş dağılımını değiştirse de toplam istihdamda cüzi bir etki yaratabilir. Asgari ücretin işgücü maliyetlerinde yarattığı artış işverenleri daha az nitelikli gençler yerine daha nitelikli yaşlı bireyleri işe almaya iterse, toplam istihdamda değişim gözlenmeyebilir. Bunun nedeni de genç istihdamının azalırken, daha yaşlı bireylerin daha fazla istihdam edilmesidir. Dolayısıyla, asgari ücret çalışmalarında yaşa göre analizlerin yapılması önemlidir.

Asgari ücretin genç nüfus üzerindeki etkileri çalışılırken, bu politikaların gençlerde eğitim tercihlerini de önemli şekilde etkileyebileceği dikkate alınmalıdır. Bireylerin eğitim tercihleri iktisat yazınında temel olarak beşeri sermaye teorisine dayandırılır. Buna göre, genç bireyler eğitimle ilgili kararlarında maliyet ve fayda karşılaştırması yapar. Örneğin, bir yıllık bir eğitimin bugünkü maliyeti, fırsat maliyeti dahil olmak üzere, bir yıllık bu ilave eğitimin gelecekteki getirisinin bugünkü değerinden daha az ise, birey bu eğitime yatırım yapmayı tercih eder. Böylelikle bu birey bir yıl daha okulda kalmış olur. Bu çerçevede, asgari ücret uygulamaları eğitim tercihini çeşitli şekillerde etkileyebilir. Asgari ücret politikaları düşük ücretli bireylerin ortalama ücretlerini artırırsa, eğitimin fırsat maliyeti artacağından, genç bireyler eğitime daha az yatırım yapmayı tercih edebilir. Bu durum bazı gençlerin daha az okula gideceği anlamına gelir ki bu da asgari ücretle okullaşma arasında negatif bir korelasyona neden olur. Bu durum literatürde "fiyat etkisi" olarak bilinmektedir. Diğer yandan, asgari ücret iş olanaklarını azaltırsa, gidilmeyen işin fırsat maliyeti artmak yerine azalabilir. Bu da fiyat etkisinin tersi yönde etki etmesine neden olur. Buna ilaveten, asgari ücretin okullaşma üzerinde "gelir etkisi" yaratabileceği de bilinmektedir. Eğitimin normal bir mal olduğu düşünülürse, asgari ücretin gençlerin yaşadıkları

hanelerde toplam gelir düzeyini artırması, eğitime olan talebi de artıracaktır. Bütün bunlardan hareketle, asgari ücretin gençler üzerine olan etkileri çalışılırken, bu uygulamanın gençlerde eğitimi tercihlerini ne şekilde etkilediğinin araştırılması önemlidir.

Genel olarak bu çalışma, asgari ücretin Türkiye'deki genç erkekler üzerinde işgücü piyasası ve eğitim çıktılarını nasıl etkilediğini analiz etmeyi amaçlamaktadır. Bu doğrultuda, çalışmada şu sorulara cevap aranmıştır:

- Türkiye'de asgari ücret politikası genç erkeklerin istihdam düzeyini anlamlı bir şekilde etkilemekte midir? Eğer anlamlı bir etki var ise, bu etkinin yönü ve büyüklüğü nedir?
- Asgari ücret genç erkeklerde işsizliğin daha fazla olmasına katkı sağlar mı?
- Asgari ücret artışı genç erkekleri işgücü piyasasına girmeye teşvik edebilir mi?
- Asgari ücret politikalarının genç erkeklerin okullaşma durumları üzerinde anlamlı bir etkisi var mıdır? Eğer bu etki anlamlı ise, bu etkinin yönü nedir? Türkiye'de asgari ücret artışı gençleri okuldan koparıp, işgücü piyasasına iter mi? Ya da, ülkedeki genç erkeklerin daha fazla okullaşmasına mı neden olur?
- Asgari ücret uygulaması genç erkeklerin ne eğitimde ne de istihdamda olma durumlarını etkiler mi? Eğer etkilerse, bu etki ne yöndedir?

Çalışmanın Önemi ve Kısıtlamaları:

Daha önce bahsedildiği gibi, asgari ücret politikalarının özellikle istihdam edilenler üzerindeki etkileri gerek teorik gerekse ampirik literatürde halen tartışılmaktadır. Buna ilaveten, asgari ücretin etkilerinin Türkiye gibi gelişmekte olan ülkelerde daha farklı olabileceği bilinmektedir. Bu durum, bu ülkelerde işgücü piyasasının yapısal olarak gelişmiş ülkelere göre daha farklı olmasından ileri gelmektedir. Yüksek kayıt dışılık ve yaygın olarak asgari ücret uygulamasına uymama durumu asgari ücretin etkisini tamamen ortadan kaldırabilir. Diğer yandan, asgari ücretin uygulanmadığı

piyasalar için bir referans fiyatı olarak görülmesi, bu ülkelerde etkinin beklenenin aksine anlamlı olmasına neden olabilir. Dolayısıyla, asgari ücretin gelişmekte olan ülkeler için değerlendirilmesi önemini korumaktadır. Ancak, asgari ücret yazını bu ülkelerden ziyade gelişmiş ülkelere odaklanmıştır. Ayrıca, gelişmiş ülkeler için de asgari ücretin etkileri konusunda görüş birliği mevcut değildir. Bu sebeple, asgari ücretin Türkiye'deki etkileri yönünde ampirik bulgu sağlayarak, çalışma literatüre katkı sağlamaktadır.

Pek çok gelişmekte olan ülkede gençler işgücü piyasasında daha az yer almaktadır. Bu ülkelerde gençlerin işsizlik oranı yüksek, işgücüne katılım oranları ise düşüktür. Örneğin, 2016 yılında Latin Amerika ve Karayipler'de erkeklerde işsizlik oranı % 7 iken, bu oran 15-24 yaş grubu genç erkeklerde % 15,3'e çıkmaktadır. Dolayısıyla, bu kesimin işgücü piyasasında sömürülmesine engel olurken, piyasaya girişlerini de kolaylaştıracak politikaların uygulanması önemlidir. Asgari ücret de bu anlamda etkili olabilecek bir politikadır. Ancak, genç nüfus üzerinde çok yönlü etkileri olan bu politikanın etkin bir şekilde tasarlanabilmesi için, gençler üzerindeki etkilerinin önceden bilinmesi önem taşımaktadır. Bu çalışma da, asgari ücretin genç erkekleri nasıl etkileyeceğini farklı çıktılar üzerinden ortaya koyarak, ampirik literatüre katkı vermektedir.

Yukarıda değinildiği gibi, genç nüfus için eğitim önemli bir seçenektir. Türkiye'de de gençlerin büyük bir kısmı ortaöğretime devam etmektedir. Nitekim, 2015/2016 eğitim yılında erkeklerde ortaokul okullaşma oranı % 82,7 olup, aynı dönemde 14-17 yaş grubu erkeklerde okullaşma oranı ise % 85,1'dir. Türkiye'de yasal olarak izin verilen minimum çalışma yaşının 15 olduğu düşünüldüğünde, bu ülkede 15-17 yaş grubu erkekler eğitimde ya da işgücünde olabilir. Bu açıdan, Türkiye'deki asgari ücret uygulamasının etkileri analiz edilirken, asgari ücretin eğitim tercihlerini nasıl ve ne yönde etkileyeceğini araştırmak önem arz etmektedir. Çalışma da, asgari ücret yazınındaki pek çok çalışmadan farklı olarak, asgari ücret politikalarının gençlerin eğitim çıktılarını nasıl etkileyeceğini incelediğinden, literatüre katkı sağlayacaktır.

Bu çalışma, asgari ücret politikasının gençler üzerindeki etkisini araştırırken erkek nüfusa odaklanmaktadır. Bunun sebebi ise, işgücüne ve istihdama katılım açısından genç kadınların genç erkeklerden farklı davranışlar sergileyebileceğidir. Özellikle, sosyal ve kültürel faktörler genç kadınların bu davranışlarında ekonomik faktörlere göre daha etkili olabilir. Buna ilaveten, genç kadınların okullaşma kararları sosyal ve kültürel faktörlerden daha fazla etkilenebilir. Mesela, Türkiye'nin güney ve doğu bölgelerinde yaşayan aileler genellikle kızlarının okula gitmesi konusunda daha tutucudur. Bu sebeple de Türkiye'de asgari ücretin gençler üzerindeki etkileri analiz edilirken, asgari ücretin genç kadınları nasıl etkileyeceğini tartışabilmek için farklı model ve yönetmelere ihtiyaç duyulmaktadır.

Türkiye'de Asgari Ücret Uygulamaları ve 2014 Yılındaki Politika Değişikliği

Daha önce çeşitli girişimler olmasına rağmen, Türkiye'de asgari ücret uygulaması ilk olarak 1951 yılında hayata geçirilmiştir. Bu tarihten itibaren, ülkede asgari ücret 1967 yılına kadar sektör ve bölge bazında belirlenmiştir. Daha sonra ise, 1967-1974 döneminde asgari ücret ülke geneli için belirlenmiş olmakla birlikte, 1969, 1972, 1973 ve 1974 yıllarında bölge ve yaşa göre ayrıştırılmıştır. Akabinde, 1989 yılına kadar, asgari ücret miktarı farklı yaş grupları için sektörel düzeyde belirlenmiştir. 1989 yılında ise sektörel farklılaştırmaya son verilmiştir. Aslında 2014 yılına kadar asgari ücret sadece yaşa bağlı olarak belirlenmiştir. Nitekim, asgari ücrette 16 yaşa göre bir ayrım yapılmış ve 16 yaşını doldurmamış çalışanlar için asgari ücret daha düşük belirlenmiştir. Buna ilaveten, 16 yaşın altı ve üstündeki çalışanlar arasındaki asgari ücret farkı 1994 yılına kadar sürekli bir azalma eğilimi göstermiştir. Bu fark, 1994 yılından sonra görece durağan seyir sergilemiştir. Aslında 1994-2014 yılları arasında 16 yaşını doldurmamış çalışanların aldığı asgari ücret, 16 yaşını doldurmuş çalışanların aldığı miktarın yaklaşık % 15'i kadar azdır. Asgari ücretin yaşa göre ayrıştırılmasına ilişkin uygulama 2014 yılında ortadan kaldırılmış ve asgari ücret politikası bugünkü şeklini almıştır. Bugün Türkiye'de asgari ücret, kamu kurumları ile işçi ve işveren konfederasyonlarının temsilcilerinden oluşan Asgari Ücret Tespit Komisyonu tarafından belirlenmektedir. Bu Komisyon asgari ücreti çalışanların

günlük kalori ihtiyacı, (mevcut olması halinde) geçim endeksleri ve gıda enflasyonu çerçevesinde belirlemektedir.

Yukarıda bahsedildiği gibi, Türkiye'de asgari ücret faklı şekillerde uygulanmış olsa da bu çalışmada 2014 yılında yapılan politika değişikliği esas alınmıştır. 2014 yılına kadar asgari ücrette tek bir yaş ayrımı kullanılmıştır: 16 yaşını doldurmuşlar ve 16 yaşını doldurmamış çalışanlar. Fakat Asgari Ücret Tespit Komisyonunun 2013 yılı Aralık ayında yaptığı toplantılar neticesinde oy çokluğu ile bu ayrımın kalkması kararı alınmıştır. Komisyonun bu kararını o dönemin şartları doğrultusunda ansızın verilen bir karar olarak değerlendirmek mümkündür. Nitekim bu kararın öncesinde, yaş ayrımının kaldırılmasına ilişkin herhangi bir tartışma gündeme gelmemiştir. Bu kararla birlikte, 1 Ocak 2014 tarihinden itibaren ülke geneli için bir tek asgari ücret belirlenmeye başlanmıştır. Aynı zamanda, ülkedeki bu politika değişikliği 16 yaşını doldurmamış çalışanlar için uygulanan asgari ücrette nominal olarak % 20,7'lik bir artış meydana getirmiştir. Reel olarak bakıldığında ise, bu artış oranı % 14,3 olarak gerçekleşmiştir. Aynı dönmede 16 yaşını doldurmuş bireyler için ödenen reel asgari ücret miktarında ise % 0,3'lük bir azalma görülmüştür. 2014 yılı Ocak ayında 16 yaşını doldurmamış çalışanalar için belirlenen asgari ücretteki bu ciddi artış işgücü maliyetlerine de yansımıştır. Nitekim aynı dönemde 16 yaşını doldurmamışlar için asgari ücretli çalışanın maliyeti % 14,1 oranında artmıştır.

Çalışmada Kullanılan Veri Seti ve Yöntem:

Çalışmada kullanılan temel veri seti Gelir ve Yaşam Koşulları Anketi'dir (GYKA). Bu anket Türkiye İstatistik Kurumu tarafından yıllık olarak derlenmekte olup, ülke geneli için veri üretmeye uygun olacak şekilde tasarlanmıştır. Anket, gelir dağılımı, yoksulluk ve sosyal içerme gibi konularda veri üretmeye yöneliktir. Bu bağlamda, anket demografi, sağlık, konut, işgücü durumu ve hane gelirlerine ilişkin çok sayıda soru içermektedir. Buna ilaveten, anketteki sorular hanedeki bütün bireylere sorulsa da, işgücü durumuna ilişkin sorular yalnızca 15 ve üzeri yaştaki fertlere sorulmaktadır.

GYKA hem panel hem de kesit veri üretecek şekilde tasarlanmış olup, bu çalışmada dört yıllık rotasyondan oluşan panel veri seti kullanılmıştır. Anketin panel verisinde bireylerin bir önceki yıla ilişkin aylık faaliyet durumu yer almaktadır. Böylelikle, 15 ve üzeri yaştaki her bir ferdin 48 aylık faaliyet durumunu görmek mümkündür. Buna ilaveten, yine panel veri setinde bireyin yaş durumu aylık olarak mevcuttur. Bireylerin aylık yaş durumu ve faaliyet durumu bu çalışmada yapılan analizlerin temelini oluşturmaktadır. Aslında, fertlerin aylık faaliyet durumu kullanılarak altı tane çıktı göstergesi oluşturulmuştur. Bunlar ücretli çalışan olma, istihdamda olma, işsiz olma, işgücünde olma, eğitimde olma ve ne eğitimde ne de istihdam olma durumlarına ilişkin kukla değişkenlerdir. Bu çıktı göstergeleri kullanılarak da asgari ücretteki politika değişikliğinin genç erkeklerde işgücü ve eğitim durumlarını nasıl etkilendiği incelenmiştir.

Bu çalışmada 2014 yılında Türkiye'de yapılan politika değişikliği kullanıldığı için, değişikliğin öncesi ve sonrasındaki yılları kapsayan 2012-2015 GYKA panel verisi esas alınmıştır. Aslında, burada yapılan analizlerde söz konusu veri setinin 2014 ve 2015 yılları kullanılmıştır. Verideki aylık faaliyet durumu bir önceki yıla karşılık geldiğinden, bu yılları kullanmak bize bireylerin 2013 ve 2014 yıllarındaki faaliyet durumlarını görmeye olanak sağlamıştır.

Bu çalışmanın tasarımı Regresyon Süreksizlik (RS) yöntemine dayanmaktadır. RS, sürekli bir değişkene ilişkin bireylere ait değerlerin önceden belirlenmiş bir kesme değerinin altında ya da üstünde olma durumuna göre adayların bir müdahaleye atanması halinde kullanılabilir. Bu durumda, belirlenmiş kesme değerinin hemen altında ve hemen üstünde olan bireyler müdahaleye neredeyse rassal olarak atanmış gibi görülür. Bundan hareketle, kesme değerinin hemen altında ve hemen üstündeki kişilerin ortalama çıktı değerlerinin karşılaştırılması müdahalenin nedensel etkisini gösterir. 2014 yılından önce çalışanların yaş durumuna göre daha az ya da daha çok asgari ücret alması, bu çalışmada RS analizinin kullanılmasına imkân sağlamıştır. Nitekim 2014 yılı Ocak ayından önce asgari ücret çalışanların 16 yaşını doldurma durumlarına göre belirlenmiştir. Bireyler 16 yaşını doldurdukları anda daha yüksek

asgari ücret almaya hak kazandığından, asgari ücretin etkilerini bu analizi yaparak incelemek mümkün olmuştur. RS yöntemi için, bu çalışmada aylık yaş "sıralama değişkeni", 16 yaş ise "kesme değeri" olarak kullanılmıştır.

RS yönteminin yansız tahminler üretebilmesi için, bazı koşulsallıkların sağlanması gereklidir. İlk olarak, sıralama değişkeninde manipülasyon yapılmaması önemlidir. Eğer bireyler müdahaleden yararlanabilmek için sıralama değişkenin aldığı değeri değiştirebiliyorsa, bu müdahalenin de etkilerini değiştirecektir. Çalışmada ise aylık yaş sıralama değişkeni olarak kullanılmış olup, kişilerin manipüle etmesi mümkün değildir. Diğer yandan, manipülasyonu formel olarak da test etmek mümkündür. Bu çalışmada kullanılan McCrary Yoğunluk Testi, bireylerin 16 yaş kesme değeri etrafında düzgün dağıldığını göstererek manipülasyonun olmadığına işaret etmiştir. Buna ilaveten, kesme değerinin sıralama değişkenine dışsal olması ve müdahalenin sadece bireylerin sıralama değişkenine bağlı olması gerekir. Asgari ücret politikası değerlendirildiğinde ise bu iki koşulun da sağlandığı görülmektedir. Son olarak, RS'nin yansız tahminler verebilmesi için müdahale durumundan başka hiçbir şeyin sıralama değişkenine göre değişmemesi önemlidir. Bundan hareketle de, çalışmada analiz edilen yaş grubu 15-16 olarak sınırlandırılmıştır. Bu sınırlamanın iki nedeni vardır. Birincisi, istihdam teşvikleri için 18 yaşını doldurmak bir ölçüt olduğundan, 18 yaş altı ve üstü bireylerin davranışları çok farklı olabilir. İkincisi de, 17 yaş için, 15-16 yaş grubundan farklı olarak, yükseköğretim bir seçenek olabilir. Bu da benzer bir problem yaratacağından, çalışmada 17 yaş grubu da hariç tutulmuştur.

Çalışmada kullanılan bir diğer yöntem süreksizliklerin farkı yöntemidir. Bu yöntem, RS'nin farkların farkı metodu ile birleştirilmesine dayanmaktadır. Süreksizliklerin farkı yönteminin kullanılmasındaki neden sıralama değişkenin aylık yaş olmasıdır. Yaş değişkeni aylık olarak tanımlandığında, beceri düzeyi gibi bazı gözlenemeyen kirletici etkenler ortaya çıkabilir. Bu faktörlerin kesme değerinde müdahaleden ayrı bir sıçrama yaratması da müdahalenin etkisini değiştirebilir. Diğer yandan, çalışmada kullanılan süreksizliklerin farkı yöntemi ile asgari ücret politikasının değiştiği 2014 yılı Ocak ayının önce/sonra karşılaştırması

yapılarak, bu tarz bir etkileşimin önüne geçmek mümkün olmuştur. Aslında, 2014 yılı Ocak ayı öncesinde ve sonrasındaki süreksizliklerin karşılaştırılması, bu politika değişikliğinin 16 yaşını doldurmamış bireyler için etkilerini görmeye imkân sağlamıştır.

Asgari Ücretin Bağlayıcılığı:

Çalışmada Türkiye'deki asgari ücret uygulamasının 15-16 yaş grubu erkekleri ne derece bağladığı analiz edilmiştir. Bunun analizin yapılmasındaki temel neden ise asgari ücretin işgücü piyasasında bir etki yaratacaksa, bu etkinin ücretler üzerinden olacağının beklenmesidir. Bununla birlikte, söz konusu yaş grubundaki erkeklerde görülen yüksek kayıt dışı istihdam oranları, asgari ücretin bu kesimi bağlamaması halinde, politikanın etkisini anlamsız kılabilir. Nitekim HİA'ya göre, 2013 yılında 15 yaş grubu erkeklerin % 90,5'i, 16 yaş grubu erkeklerin ise % 84,2'si bir sosyal güvenlik kuruluşuna kayıtlı olmadan çalışmaktadır. Kayıt dışı istihdam oranı 2014 yılına gelindiğinde ilk grupta % 86,4 olurken, ikinci grupta % 85,6 olarak gerçekleşmiştir. Yüksek kayıt dışı istihdam oranlarına paralel olarak, 15-16 yaş grubunda erkeklerin büyük bir çoğunluğunun asgari ücretin altında ücrete sahip olduğu görülmektedir. Aslında, Türkiye'de 2009-2013 döneminde 15-16 yaş grubundaki erkeklerin yaklaşık % 80'i asgari ücretten daha az ücret elde etmektedir. Asgari ücrette 2014 yılındaki politika değişikliğinden sonra, asgari ücretin altında çalışan erkeklerin oranı bu kesimde yaklaşık % 76'ya düşmüştür. Bunun yanı sıra, erkek çalışanların önemli bir bölümü asgari ücretten kazanç sağlamaktadır. Kernel yoğunluk tahminlerine göre ücret dağılımının bu yaş kesiminde 2013 ve 2014 yılları için asgari ücret ve civarında zirve yaptığı görülmektedir. Buna ilaveten, 2009-2013 döneminde, 15 yaş grubu erkeklerde çalışanların % 7,3'ü asgari ücret elde ederken, 16 yaş grubu erkeklerin ise % 9,1'i asgari ücretlidir. Politika değişikliğinden sonra, 2014 yılında asgari ücretle çalışan erkeklerin oranı 15 yaş grubunda % 14,7'ye, 16 yaş grubunda ise % 18,4'e yükselmiştir. Bütün bunlar, 15-16 yaş grubu erkeklerde yüksek kayıt dışı istihdam oranlarına rağmen asgari ücretin bağlayıcı olabileceğine işaret etmektedir. Dolayısıyla, asgari ücretin bu yaş aralığındaki erkeklerde anlamlı

bir etki yaratacağı da beklenebilir. Ayrıca, ilgili yaş grubunda pek çok erkek asgari ücretli olduğundan, "deniz feneri etkisinden" söz etmek mümkündür. Yani, asgari ücret sadece kayıtlı çalışan erkekleri değil, ülkede kayıt dışı çalışan genç erkekleri de bağlamaktadır.

Verinin Görsel Sunumu ve Model Sonuçları:

RS yöntemini kullanan ampirik çalışmalarda yapılan analizler çoğunlukla verinin görsel olarak incelenmesi ile başlar. Bunun nedeni de, sıralama değişkeni üzerinde kesme noktası civarında çıktı değişkenleri için herhangi bir sıçrama görülmemesi halinde müdahalenin etkili olmayabileceğidir. Ayrıca, veriyi görsel olarak irdeleme söz konusu müdahalenin ilgili değişkeni ne yönde ve ne kadar etkileyeceğine dair ipucu vermektedir. Bu amaçla da, çalışmada öncelikle işgücü piyasası ve eğitime ilişkin çıktı değişkenlerinin ortalama değerleri 15-16 yaş aralığındaki her bir aylık yaş grubu için hesaplanmış ve bu ortalama çıktı değerleri yaşa göre çizdirilmiştir. Standart RS kapsamında veri görsel olarak incelendiğinde, asgari ücrette politika değişikliği yapılmadan önce erkekler için ücretli çalışan olma, istihdamda olma ve işgücünde olma durumlarında 16 yaş kesme noktasında 2013 yılı için aşağı yönlü sıçramalar gözlenmiştir. Bu sıçramalar, 16 yaş sınırını geçer geçmez alınabilecek asgari ücretteki artışın erkeklerde ücretli çalışan olma, çalışan olma ve işgücünde olma durumlarını negatif yönde etkilediğine işaret eder. Bunun yanı sıra, standart RS'nin görsel analizinde işsiz olma durumu için 16 yaş kesme noktasında yukarı yönlü bir sıçrama gözlenmiştir. Bu da, asgari ücret artışının genç erkekler için işsiz olma durumunu artırabileceğini göstermektedir. Verinin eğitim çıktıları açısından görsel analizi ise, asgari ücret artışının erkek bireyleri eğitime teşvik ederken, ne eğitimde ne de istihdamda olma durumlarını kötüleştirdiğini göstermektedir.

Veri seti süreksizliklerin farkı modeli çerçevesinde de görsel olarak incelenmiştir. Bu amaçla, 15-16 yaş aralığındaki her bir aylık yaş grubu için erkeklerin ortalama çıktı değerlerinin 2013-2014 yılları arasındaki değişimine bakılmıştır. Bu modelin, standart RS'den farkı kontrol ve deney gruplarının farklı olmasıdır. Standart RS'de

deney grubu 16 yaş ve üzerindeki bireyler iken, süreksizliklerin farkı modelinde 16 yaşını doldurmayan bireylerdir. Bu nedenle, süreksizliklerin farkı modelinde görsel olarak tespit edilen yukarı yönlü sıçramalar asgari ücret artışının negatif etkisine, aşağı yönlü sıçramalar da bu artışın pozitif etkisine işaret eder. Bundan hareketle, süreksizliklerin farkı modelinin görsel analizinde, ücretli çalışan olma, çalışan olma ve işgücünde olma durumları için yukarı yönlü; işsiz olma, eğitimde olma ve ne eğitimde ne de istihdamda olma durumları için aşağı yönlü sıçramalar görülmüştür. Yani, 2014 yılı Ocak ayında asgari ücretteki artışın ücretli çalışan olma, istihdamda olma ve işgücünde olma durumlarını olumsuz etkilerken, eğitimde olma, işsiz olma ve ne eğitimde ne de istihdamda olma durumlarını pozitif etkilediği söylenebilir.

Çalışmada RS kapsamında iki model tahmin edilmiştir. İlki standart RS, ikincisi ise süreksizliklerin farkı modeli. Söz konusu modeller, logit ve en küçük kareler (EKK) yöntemleri ile tahmin edilmiştir. Bu model tahminlerinde, doğum ayı ve takvim zamanı (çeyreklik) için kukla değişkenler kullanılmıştır. Diğer yandan, modellere ilave bağımsız değişken eklenmemiştir. Bunun nedeni, kullanılan GYKA'da yaş ve faaliyet durumu haricinde aylık bazda değişen değişkenlerin olmamasıdır. Ayrıca, iş tecrübesi, meslek gibi değişkenler aylık olarak mevcut olsa bile, bunlar bireylerin faaliyet durumları için dışsal etkiler olmadığından, bunların model tahminlerinde kullanılması her durumda uygun olmayacaktır. Zaten ilave değişkenler, RS modeli için yansız ve tutarlı tahminler elde etmede gerekli değildir.

Bu model tahminleri asgari ücretin etkileri açısından incelendiğinde, standart RS ve süreksizliklerin farkı modellerinin çok benzer sonuçlar verdiği görülmektedir. Ayrıca, bu modellerin tahminlerinde logit ya da EKK yöntemlerinin kullanılması durumu değiştirmemiştir. Bu doğrultuda, süreksizliklerin farkı modeli tahminlerine göre, asgari ücretteki politika değişikliği genç erkeklerde istihdamı olumsuz yönde etkilemiştir. 2014 yılında asgari ücretteki yaş farkının kaldırılmasının ardından, 16 yaşın altındaki erkeklerde, 16 yaşını doldurmuş olanlara göre, ücretli çalışan olma olasılığındaki değişim 0,01-0,03 puan daha az olmuştur. İstihdamda olma olasılığı için ise, değişim 0,03-0,06 puan daha azdır. Yani, asgari ücrette yapılan % 26,4'lük

nominal artış, bu politikadan etkilenen erkeklerde istihdam edilme olasılığını göreli 0,03-0,06 puan azaltmıştır. Genç istihdamındaki bu negatif etki daha önce yapılmış çalışmalarla da örtüşmektedir. Örneğin, Danimarka için Kreiner ve arkadaşlarının (2017) yaptığı çalışmada, asgari ücrette yapılan % 40'lık artışın, gençlerde istihdam oranını 15 puan azalttığı görülmüştür. Pereira (2013) da çalışmasında, Portekiz'de asgari ücret artışının 18-19 yaş grubu istihdamını azalttığını bulmuştur. Yannelis (2014) çalışmasında Yunanistan'da asgari ücretin 25 yaş altı gençlerde benzer bir istihdam etkisi yarattığını bulmuştur. Bunun yanı sıra, Brown ve arkadaşlarının (1982) çok sayıda referans alan çalışması ise Amerika'da asgari ücret artışının genç istihdamını olumsuz yönde etkilediğini ifade eder. Bu negatif yönlü etki neo-klasik modelle uyumludur. Klasik görüş asgari ücretin işgücü piyasası üzerindeki etkisinin talep üzerinden gerçekleştiğini savunur. Bu çalışmada, 2014 yılından önce asgari ücretin daha genç yaş grubunda göreli daha az uygulanması, bu kesimin verimlilik farklarını telafi eden bir unsur iken, söz konusu farklılığının 2014 yılında ortadan kaldırılması işverenler için bu maliyet avantajını elimine etmiştir. Bu da söz konusu kesim için talep edilen çalışan sayısını azaltarak, istihdam edilebilirliği azaltmıştır. Özellikle, 15 yaş grubu erkek çalışanlardan bazıları, nispi olarak yaşlı bireylerle yer değiştirilmiş olabilir.

Asgari ücret sebebiyle işinden olan erkekler, asgari ücret artışı sonrasında yeniden iş aramaya başlamış olabilir. Aslında, süreksizliklerin farkı modeli tahminlerine göre, 2014 yılında 15 yaş grubundaki erkeklerin işsiz olma olasılığı, göreli yaşlı erkeklere göre, 0,02-0,03 puan daha fazla değişmiştir. Bu alanda yapılan pek çok çalışmada da ücretin genç işsizliği üzerinde benzer bir etki yarattığı görülmüştür. Mesela, Gorry (2013) çalışmasında asgari ücretteki % 30'luk bir artışın 15-24 yaş grubunda işsizlik oranını 1,4 puan artırdığını ortaya koymuştur. Benzer şekilde, Yannelis (2014) 25 yaşın altındaki bireyler için asgari ücretin göreli daha fazla artmasının, bu kesimde işsizlik oranını artırdığını bulmuştur. Christl ve arkadaşları (2017) Avrupa Birliği ülkelerine yönelik çalışmalarında, asgari ücretin gençlerde işsizlik oranını Belçika, Fransa, Yunanistan ve Hollanda'da artırdığını ortaya koymuştur. Görüldüğü gibi, çalışmamızda asgari ücretin genç işsizliğini artırdığına

ilişkin elde ettiğimiz bulgular gelişmiş ülkeler için yapılan çalışmaların bulgularına paraleldir. Diğer yandan, Türkiye üzerine olması sebebiyle, bu çalışmanın gelişmekte olan ülkelere yönelik asgari ücret yazınına katkı sağlaması beklenmektedir. Asgari ücret artışını takiben gençlerde işsizliğin kötüleşmesi durumu neo-klasik yaklaşımla da uyumludur.

2014 yılındaki politika değişikliğinin ardından işini kaybeden erkeklerden bazıları yeniden iş ararken, bazılarının da işgücü piyasası dışına itilmesi muhtemeldir. Hatta çalışmanın bulgularına göre, işsizlik üzerindeki etki istihdam üzerindeki etkinden daha az olduğundan, işgücüne katılım üzerinde böyle bir etki beklenebilir. Aslında, süreksizliklerin farkı model sonuçlarına göre 2014 yılındaki asgari ücret artışından sonra 15 yaşındaki erkeklerin işgücüne katılma olasılığındaki değişimin, 16 yaşındaki erkeklere göre, 0,01-0,03 puan daha az olduğu görülmektedir. Teorik olarak asgari ücretin işgücüne katılımı artırması ya da azaltması beklenebilir. Bir taraftan, ücretlerin artması daha fazla genci piyasaya çekerken, diğer taraftan, işe alımların azalması kişilerin istihdam edilme şansını azalttığı için gençlerin işgücüne katılımları azalabilir. Bu sebeple asgari ücretin işgücüne katılma durumu üzerindeki etkisi ampirik çalışmalarla ortaya konulabilir. Ancak, çok az sayıda çalışma bu etkiyi incelemiştir. Bu çalışmanın bulgularına benzer şekilde, Wessel (2005) asgari ücret artışının gençlerde işgücüne katılma olasılığını azalttığını bulmuştur. Ayrıca, Bakış ve arkadaşları (2015) da Türkiye'de asgari ücretin 15-19 yaş grubunda işgücüne katılımı olumsuz yönde etkilediğini ortaya koymuştur.

Çalışmada ele alınan 15-16 yaş grubundaki erkekler için eğitim önemli bir seçenek olduğundan, işinden olan erkeklerden bazılarının eğitime yönelmesi beklenebilir. Aslında, süreksizliklerin farkı modeli de bu beklentiyi doğrulamaktadır. Nitekim 2014 yılında 16 yaşını doldurmamış erkeklerin eğitimde olma olasılıklarındaki değişim, 16 yaşını doldurmuş erkeklere göre, 0,01-0,03 puan daha fazladır. Beşeri sermaye teorisi, asgari ücretin gelecek için göreli yüksek ücret beklentisi yaratarak, gençlerde eğitime yönelik yatırımları artırabileceğini öngörür. Buna ilaveten, asgari ücret artışı işlerin verimlilik gerekliliklerini de artırabilir. Bu durumda gençler daha

fazla eğitimde kalarak bu gereklilikleri karşılamayı ve dolayısıyla yüksek ücretlerle çalışmayı isteyebilir. Böyle olunca asgari ücretle eğitim arasında yine pozitif yönlü bir ilişki ortaya çıkar. Literatürde ise asgari ücret ve eğitim arasında pozitif bir ilişki olduğunu bulan çalışmalar mevcuttur. Örneğin, Smith (2014) çalışmasında asgari ücretin Amerika'da gençler için okul terk olasılıklarını azalttığını bulmuştur.

Diğer yandan, işini kaybeden 15 yaşındaki erkekler için okula dönüş bir seçenek olsa da, bu erkeklerin bazıları okula gitmeyi düşünmeyebilir. Nitekim, bu çalışma asgari ücret artışının genç erkeklerde ne eğitimde ne de istihdamda olma olasılığını artırdığını göstermiştir. Aslında 2014 yılında 15 yaşındaki erkeklerin ne eğitimde ne de istihdam olma olasılığındaki değişim, 16 yaş grubu erkeklere göre, 0,02-0,03 puan daha fazladır. Asgari ücret yazını ne eğitimde ne de istihdamda olma durumuna yönelik fazla bir bulgu sağlamadığından, bu çalışmanın bu alanda katkı vermesi beklenmektedir.

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