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ABSTRACT

Education and Labor Market Consequences of Student Protests in Late 1970s and the Subsequent Military Coup in Turkey*

1970s witnessed violent, widespread, and highly-politicized student protests in Turkey. Small protests turned into bloody street clashes, the death toll exceeded 5,000, and a military coup came in - which resulted in mass arrests. Universities were at the center of the conflict and violence. We present a comprehensive empirical analysis of the education and labor market consequences of this political turmoil on cohorts directly exposed to educational disruptions. First, we document that the number of new admissions and graduates in post-secondary education declined significantly due to the turmoil. We report the decline in post-secondary graduation ratio to be around 6.6-7 percentage points for the exposed individuals. Second, we estimate a counterfactual wage distribution for the exposed cohorts using semi-parametric methods and check whether the turmoil affected the wage and occupation distributions. We find that the decline in educational attainment due to the turmoil pushed the exposed population toward medium- and low-income occupations, and compressed their wages toward the minimum wage. Finally, we use the unexpected decline in educational attainment as an IV to estimate returns to schooling. Our IV estimates suggest that the returns to an additional year of schooling range between 11.6-14 percent for men. In a heterogeneous-outcome framework, these IV estimates can be interpreted as the average causal effect of an additional year of schooling in post-secondary education.

JEL Classification: D74, J21, J31, I26

Keywords: student protests, political turmoil, returns to schooling, higher education, occupational shift

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1 Introduction

In 1960s and early 1970s, student movements concurrently grew in much of the world and became a global phenomenon.[1] In the US and Europe, these movements had declined significantly by mid-1970s (Barker, 2012), which was the time they just started to escalate in Turkey (Ahmad, 1993). Turkey experienced violent, widespread, and politically-motivated student protests in late 1970s followed by a military coup in 1980. During the peak years of the protests, clashes between youth groups on the political right and left turned extremely violent (Zurcher, 2004)—an average of 20 youths were killed each day on Turkey's streets and university campuses. After the coup, students were regularly snatched up in mass arrests.

In this paper, we characterize the education and labor market consequences of these dramatic events, which we interchangeably refer to as the "1978-1982 turmoil," the "political turmoil," or, shortly, the "turmoil" throughout the paper. We start with a detailed documentation of the impact of the turmoil on post-secondary education. Then, we estimate a counterfactual wage distribution for the exposed cohorts and discuss what would happen to wage and occupation distributions if the turmoil had not taken place. Finally, we use the unexpected decline in educational attainment during this episode to design an IV strategy for the purpose of estimating the causal effect of schooling on earnings.

Universities and other higher-education institutions were at the center of the conflict. The intensive violence adversely affected post-secondary educational attainment in Turkey during the turmoil period in several ways. First, new enrollments declined largely due to the closure of teacher-training institutes as a result of their links to student violence. Second, graduation rates declined following massive student dropouts related to security concerns. Finally, repression in the wake of the 1980 coup kept many from completing their education. Using the Turkish Household Labor Force Survey (HLFS), we document that male wage earners, with birth years from 1960 to 1965, had been the most adversely affected group from the turmoil. Specifically, the 1978-1982 turmoil led to around 6.6-7 percentage point decline in the probability of completing post-secondary education and a 0.2 year decline in average schooling for the exposed cohorts. The counterfactual analysis suggests that this educational decline led to a shift from high-income to low-income jobs/occupations.

We use the turmoil as a natural experiment affecting post-secondary education for particular birth cohorts and design an IV strategy to estimate returns to schooling. We find that the returns to an additional year of schooling range between 11.6-14 percent for men. Our IV estimates can be interpreted as the average causal effect of an additional year of schooling in post-secondary education for several reasons. First, the instrument only affects post-secondary education. Second, the individuals whose schooling attainment is changed by the instrument (i.e., the compliant sub-population) are at least 30 percent of all individuals in our sample. Third, those individuals affected by the 1978-1982 turmoil are not only the marginal individuals who are basically indifferent between going

[1] See, e.g., Samuelson (1968), Kazuko (1968), Flacks (1970), Rothman and Lichter (1978), Koopmans (1993), and Thomas (2002) for some background reading on student protests in different countries/contexts during this episode.

to college or not; they are also the dropouts in post-secondary education or the ones who would have at least a college degree if the turmoil had never happened. We also argue that the decline in earnings for the exposed cohorts is solely due to the decline in their post-secondary educational attainment, not due to other confounding factors such as permanent psychological effects.

The plan of the paper is as follows. Section 2 discusses the related literature. Section 3 provides detailed institutional and other background information about the student protests in late 1970s and the subsequent military coup in Turkey. Section 4 describes the data. Section 5 reports detailed evidence for the decline in post-secondary education due to the turmoil. Section 6 presents the IV estimates for returns to education along with an in-depth discussion of the main implications, extensions, and robustness checks. Section 7 documents the results for the counterfactual analysis of wage distributions and occupational shift. Section 8 concludes.

2 Literature Review

We organize our discussion of the relevant literature under four related but distinct topics. First, we place our paper into the literature using natural experiments affecting particular birth cohorts as instruments to estimate returns to schooling and other outcomes. Second, we summarize the recent estimates of returns to post-secondary education in the literature and compare our findings to these estimates through the lens of a developing country. Third, we argue how our paper can be related to the papers in the literature investigating the impact of major historical events on long-term human capital formation and growth potential. Finally, we discuss the contribution of our paper to the literature on Turkish labor markets.

There is a large literature aiming to obtain causal estimates of labor market returns to schooling using natural experiments exogenously affecting particular birth cohorts' school attainment in an IV setting. The most common example of such a natural experiment is a change in compulsory school laws, which typically exposes certain birth cohorts to extended compulsory schooling. In the second half of the twentieth century, many countries introduced major educational reforms that increased compulsory years of schooling. Numerous studies exploited these reforms to estimate returns to schooling in various countries and contexts.[2] Similar to these papers, our study also uses a natural experiment exogenously affecting school attainment of particular birth cohorts. Different from this literature, in our case, the exogenous variation in schooling comes from a political turmoil due to violent student protests and a military coup. We report a huge drop in post-secondary education for the exposed cohorts. In this sense, the closest paper to ours is Maurin and McNally (2008), who use the cohorts exposed to the famous May 1968 student riots in France as a natural experiment. Although the French student riots were very effective, they neither lasted long nor prevented students from continuing higher education due to violence. As a response to the riots, the

[2] Breakthrough papers in this literature include Angrist and Krueger (1991), Harmon and Walker (1995), Duflo (2001), Meghir and Palme (2005), Oreopoulos (2006b,a), Pischke and Von Wachter (2008), Aakvik, Salvanes, and Vaage (2010), Devereux and Hart (2010), and Stephens and Yang (2014). See also Fang, Eggleston, Rizzo, Rozelle, and Zeckhauser (2012), Sansani (2015), and Bell, Costa, and Machin (2016). Angrist and Krueger (1999), Acemoglu and Angrist (2000), Card (1999, 2001), and Psacharopoulos and Patrinos (2004) offer comprehensive surveys of the literature.

French government lowered the passing thresholds for critical exams, which increased post-secondary educational attainment for the exposed cohorts. So, the main difference between our paper and Maurin and McNally (2008) is that the student protests generated a decline in school attainment in Turkey, while the French riots increased education for the exposed cohorts. Both papers identify certain birth cohorts as "exposed," document the exogenous change in educational attainment, and then use an IV setup to estimate returns to schooling.

The literature using compulsory schooling reforms to estimate returns to schooling mostly focus on changes in years of compulsory education in primary and secondary education. In other words, the corresponding estimates can be interpreted as returns to additional years of schooling at relatively early stages of school education. Although the range of estimates reported in this literature is wide, there is an increasing number of recent studies finding very low (and even zero) returns.[3] Different from this literature, our estimates can be classified among the studies reporting returns to post-secondary schooling. The natural experiment that we study operates along the high school-college margin, i.e., the exposed cohorts contain the ones who are deciding to transition from high school to college and the ones who are already enrolled in college. Major papers in this literature include Kane and Rouse (1995), Card (1995), Lemieux and Card (2001), Belzil and Hansen (2002), Carneiro (2003), Maurin and McNally (2008), and Ost, Pan, and Webber (2018). While exogenous variation at the primary or secondary education is relatively easy to obtain (i.e., the compulsory education reforms), it is rather difficult to have natural experiments affecting post-secondary education. The Turkish student protests generated severe and dramatic outcomes because of the high level of violence and military coup following the protests. Hence, the turmoil affected directly the post-secondary school attainment, which magnifies the impact of conflict on long-term labor market outcomes and makes the political turmoil a viable natural experiment. We contribute this literature by introducing the idea that the exogenous nature of political instability due to student revolts and the resulting decline in school enrollment can be used in an IV setting to estimate returns to higher education.[4] Our estimates range between 11.4 and 14 percent for an additional year of post-secondary education, which is in the ball-park of typical estimates reported in the literature on returns to higher education. Most importantly, our estimates are very similar to those (around 14 percent) reported by Maurin and McNally (2008)—the case of French student riots. Our college-premium estimates range in the interval 50-58 percent, which are also in line with the typical estimates.

Our paper can also be related to the literature investigating the impact of major historical events on long-term economic outcomes. For example, there is a growing body of literature on the long-term consequences of Holocaust.[5] Similarly, the long-term effects of the World War II and the Vietnam War have also been studied and documented extensively.[6] The endogenous growth literature confirms that major historical events shaping the dynamics of human

[3] See Aydemir and Kirdar (2017) for a detailed discussion of the recent estimates.

[4] Other examples of natural experiments affecting post-secondary education include college-proximity exercises (which are highly controversial), veteran rehabilitation acts, and discontinuities in college admissions/dismissals.

[5] See, e.g., Waldinger (2010, 2012, 2016), Acemoglu, Hassan, and Robinson (2011), Grosfeld, Rodnyansky, and Zhuravskaya (2013), Akbulut-Yuksel and Yuksel (2015), and Pascali (2016).

[6] See Davis and Weinstein (2002), Brakman, Garretsen, and Schramm (2004), Ichino and Winter-Ebmer (2004), Miguel and Roland (2011), and Akbulut-Yuksel (2014).

capital formation and accumulation affect long-term growth prospects of countries.[7] Our paper also suggests that the violent students protests in late 1970s, which are followed by a military coup in 1980, significantly reduced post-secondary school attainment and, thus, inhibited growth potential in Turkey as observed from the leftward shift in the wage and occupation distributions.

With a few exceptions, research on evaluating the impact of education on earnings using an IV strategy (or other quasi-experimental designs) remains limited in Turkey. Torun (2018) and Aydemir and Kirdar (2017) exploit Turkey's compulsory schooling law of 1997 in their studies. The law introduced a continuous uninterrupted eight-year education in the same school rather than five years. Both studies use an indicator of whether birth cohorts are affected by the policy as an instrument. Torun (2018) and Aydemir and Kirdar (2017) find low returns to schooling estimates, about 2-3 percent for men, mainly because the 1997 law changes schooling distribution at the elementary school level (grades 6 through 8).[8] Our paper is one of the first papers estimating returns to higher education in Turkey. One exception is Torun and Tumen (2016), who use compulsory military service exemption—that reduces incentives to stay in college for the purpose of deferring military service—in Turkey as an IV and also report high returns to higher education for men.

The instrument that we propose can bring a new perspective in exploring the causal relationship between education and earnings—and also other socio-economic outcomes often explored in the literature such as health, crime, religiosity, and voting preferences. Moreover, since the students protests were common in many countries in 1960s and 1970s, a similar IV approach may be implemented also for other countries depending on the context.

3 Some Background: Student Protests and the Subsequent Coup

3.1 Emergence of civil conflict in Turkey from 1960 to 1980

The army has always played an outsized role in Turkish politics, ousting elected governments nearly every decade from 1960 to 1980. The 1960 coup marked the beginning of a new phase in Turkey. Ahmad (1993, 2003) and Zurcher (2004) emphasize that junior officers carried out the 1960 intervention against higher officials and it was Turkey's only successful military coup from outside of the army's hierarchical structure. After the military intervention, a new constitution was prepared before the free election in 1961. The new constitution was more liberal and people had more civil rights than ever before; universities had greater autonomy; students had the freedom to organize their own associations; workers had the right to strike. Turkey's new freedom enabled something unprecedented: ideological politics.

Left-wing politics started to emerge, especially on university campuses. Trade unionists founded the Workers' Party of Turkey. Zurcher (2004) argues that it forced the other parties to define themselves in ideological terms.

[7] See, e.g., Klenow and Rodriguez-Clare (2005).

[8] Other recent studies using the compulsory schooling law of 1997 as an instrument to investigate the causal relationship between education and other economic/social outcomes in Turkey include Gulesci and Meyersson (2013) and Cesur and Mocan (2018).

In contrast, the right was alarmed by this leftist presence and began to organize against it. Accordingly, Turkey's nationalist movement started to grow rapidly with the creation of the Nationalist Movement Party in 1969 (Erken, 2014).

With a push from the global events of 1968, Turkey's left became more extremist in the hopes of igniting a revolution. But the left's extremism was soon met and surpassed by the right, which generated conflict and violence (Zurcher, 2004). This violence created political instability that laid the groundwork for the coup. In March 1971, the army forced the elected government to step down and changed the constitution. Ahmad (1993, 2003) emphasize that they amended the constitution to strengthen the state against civil society; gained control of the universities to curb radicalism; and pacified trade unions after the dissolution of the Workers' Party. The left soon rallied around the Republican People's Party.

In 1973, the Republican People's Party won parliamentary elections and formed a coalition government with the National Salvation Party. Extremist right-wing parties criticized the government program that sought to heal the wounds left by the military regime. The formation of the coalition coincided with an uptick in right-wing extremist violence. According to Ahmad (1993, 2003), the aim of rightist violence was to decrease the left's potential by eroding support and causing chaos to create a climate for military intervention. Radical leftists responded with acts of violence to further increase instability. Political violence became a regular feature of daily life in Turkey, escalating and becoming more intense in late 1970s.

Figure (1) presents the total number of terrorist attacks used as a proxy for the civil conflict in Turkey from 1970 to 1985. The data source is the Global Terrorism Database (GTD), which defines "a terrorist attack as the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation." The data indicate that attacks declined after the 1971 intervention, but they increased again after 1974 and were most intense during the turmoil leading up to the 1980 coup.

On 5 April 1977, the two main parties agreed on an early election, sparking more intense political violence. The street terror peaked on the May Day (May 1st) 1977, four weeks before the election. The Confederation of Revolutionary Workers' Union organized a huge rally in Istanbul. Shots fired into the crowd killed 36 people and injured hundreds. Additionally, the 1977 election did not produce a strong and stable government because no party won a majority. As a result, Turkey experienced one of its darkest periods in terms of political instability and societal chaos. In July 1978, the government started to use the army due to internal security concerns. Despite the increasing use of force, the violence continued until the slaughter reached 20 victims a day in the late 1970s (Ahmad, 1993). From 1978 to 1980, 5,241 people were killed and 14,152 people wounded due to violence and political turmoil (Kaya, 1981).

The army took control in September 1980 and ruled until the general election of November 1983. The public welcomed the military intervention, and the army crushed almost all movements from the left and right to de-politicize urban youth (Ahmad, 1993). In the first three months after the coup, 30,000 people were arrested. After a year, the number was 122,600. By September 1982, 80,000 people were still under arrest, with 30,000 awaiting trial (Zurcher, 2004). Meanwhile, the number of terrorist attacks declined by 90 percent after the intervention [Figure (1)].

3.2 The role of institutions, schools, and students in the turmoil

Student protests in Turkey increased with a push from the global events of 1968. But Turkey's protests soon mutated into violence, and the incidence of these acts increased in late 1970s. University students were divided into two opposed groups, "rightists" and "leftists," and built their identities in opposition to each other (Neyzi, 2001). Educated youth saw themselves as the moving force of society and their main mission was to modernize the society (Neyzi, 2001; Zurcher, 2004). Youth violence played a key role in creating the political instability that led to the 1980 military intervention (Ahmad, 2003).

The intense violence seen during late 1970s adversely affected post-secondary educational attainment in Turkey through several channels. **First**, new enrollments in post-secondary education declined in the 1978-1979 school year, largely due to the closure of teacher-training institutes driven by their links to student violence [Figure (2)]. Based on the official (TURKSTAT) data, the decline in the number of students enrolled is 37,715.

Civil conflicts and student movements caused deep polarization in Turkey's higher education institutions. Although 11 new universities were established between 1970 and 1980 in major cities, university boards did not increase enrollment capacity enough to meet the demand for higher education. In this period, the higher education system was decentralized and there was no governing authority for higher education institutions. According to Dogramaci (1989), the lack of coordination among higher education institutions made it impossible to address national priorities. The government built academies, vocational schools, and teacher-training institutes that were affiliated with certain ministries. Yet, most violence among students was seen in those institutions (Binbasioglu, 2005; Tekeli, 2010), which led the government to close 41 institutions out of 64 in 1978. Students already enrolled in the closed institutions were allowed to complete their programs. A newspaper article covered this issue closely: "Administrators, teachers, and students in 35 teacher training institutions wanted to re-open the educational institutes. . . . in the joint statement, they argued that closure of educational institutions after attacks submit to the fascists" (Cumhuriyet, 1978). These institutions were directly affiliated with the Ministry of Education and, unlike universities, they were not protected by the constitution. Due to the closing of these institutions, enrollment declined by 37,715—eroding about 90 percent of the enrollment increase of 1973-1977.

After the 1980 coup, the Council of Higher Education was established as a governing board to plan, coordinate, and review the activities of Turkey's higher education institutions (Dogramaci, 1989). This central institution would also determine the enrollment capacity of post-secondary education institutions. Figure (2) indicates that enrollments started to increase right after 1982, when all ministry-affiliated higher education institutions were re-organized under the university system.

The **second** channel that adversely affected educational attainment was that graduation rates declined following massive student dropouts related to security concerns. Due to high death toll, many students canceled their registration in higher education institutions (Kaya, 1981). Some students were unable to finish education because they were injured or disabled during the turmoil. In addition, some families chose not to send their children to higher education in this period due to heightened risks. Courses were often suspended or canceled during this time. For instance, classes were canceled for 116 days in Ege University and for 421 days in Istanbul University—two of the largest universities in Turkey. The School of Dentistry in Hacettepe University was completely closed during the 1979-1980 academic year (Kaptan, 1986). Faculty offices and student dormitories were often turned into weapon warehouses and arsenals (Kaya, 1981; Kaptan, 1986), because the law on autonomy gave universities considerable immunity from police oversight (Gunter, 1989).

Finally, mass student arrests in the wake of the 1980 coup kept many from completing their education. According to a Turkish government report, by 1981, one year after the coup, 9,760 of the state's "captured terrorists" were students. Moreover, 57 percent of the state's 43,140 "captured terrorists" were of age 16-25 (and most were men). In addition to these channels, new enrollments in open education declined by 12,479 between 1977 and 1978.

4 Data

We use the Turkish Household Labor Force Survey (HLFS) in this study.[9] The Turkish Statistical Institute (TURKSTAT) has prepared and published the HLFS micro data in accordance with Eurostat's guidelines since 2004. As 2004 was a transition year, the earliest reliable wave is the 2005 wave. Our aim is to capture the labor market outcomes of the individuals exposed to the turmoil when they still belong to the core group in the labor market. The average wage for males is an increasing function of age; but, after age 51, it sharply falls and tends to be quite volatile [Figure (3)]. In addition, the number of wage observations goes down significantly after age 51, since older workers tend to leave the labor market due to early retirement, human capital depreciation, and other factors. To avoid loss of observations, we mainly focus on the 2005 wave of the survey. But, we also use 2004, 2006, 2007, and 2008 HLFS waves for reliability checks. The HLFS data set provides detailed information on age, highest level of education completed, labor market status, number of hours per week usually worked in the main job, earnings of individuals from the main job during the past month including any irregular payments like bonus and premiums, and main tasks/duties of individuals in the workplace.

The data set does not have direct information on labor market experience; thus, we use potential experience as proposed by Mincer (1974): $X = A - S - B$, where A is current age, S is years of schooling, and B is school-start age. The typical school-start age was 7 before 1980 in Turkey. Moreover, the HLFS does not directly report the years of schooling; instead, it reports the highest level of education completed.[10] However, Turkish Demographic

[9] HLFS is a nationally-representative micro-level data set compiled and published by the Turkish Statistical Institute. It is used to produce the official labor market statistics in Turkey.

[10] Note that, for the post-secondary degree, we only observe the category "college or above," which means that we cannot distinguish between individuals with 2-year college, 4-year college, and graduate degrees.

and Health Surveys (TDHS) contain information on both graduation and years of schooling. We estimate the mean years of schooling conditional on the highest completed schooling level by using the 2008 TDHS. We find that the average years of schooling is 0.14 years for illiterates, 1.68 years for literates with no degree, 5.09 years for primary school graduates, 8.34 years for elementary school graduates, 11.09 years for high school graduates, and 14.63 years for post-secondary school graduates.[11] Based on this information, in the HLFS, we use 0 years for illiterate people, 2 years for those who are literate with no degree, 5 years for primary school graduates, 8 years for elementary school graduates, 11 years for high-school graduates, and 15 years for post-secondary graduates.

The data set includes monthly wages—the average wage is 588 Turkish liras in the 2005 wave. Card (1999) emphasizes that the estimated coefficient of annual earnings could comprise the effect of schooling on hourly earnings, hours per week, and weeks per year. Also, in the US data, individuals with higher years of schooling tend to work more. In contrast, there is a negative correlation between schooling and the number of hours worked in Turkey [Table (1)]; as schooling increases, average hours worked in the main job fall. The pairwise correlation coefficient between hours worked and mean years of schooling is -0.3. Therefore, we choose hourly wages as the measure of labor income. We calculate hourly wages as the monthly wage in the main job divided by (52/12) and, then, by the number of hours per week usually worked in the main job.

In all regressions, we standardize log hourly wages at 26 years of potential experience because our treatment and comparison groups have different experience levels and explicitly controlling for experience in our regressions may create collinearity problem as we define the treatment-control groups based on ages (or birth cohorts). 26 years is the mean of potential experience of male wage earners for the age group 34-51. We estimate a log hourly wage equation separately for each educational status defined in the survey data for this group. These are no degree, primary (five-year), elementary (eight-year), high school, and post-secondary education graduates. Following Altonji, Bharadwaj, and Lange (2012), we include potential experience as a quartic function and, from these regressions, we compute the predicted log hourly wage for a common experience of 26 years and add the residual.

Table (2) provides some descriptive statistics for the 34-51 age group. Among this group, 63 percent have primary or elementary school degree, 14 percent have high school degree, and approximately 8 percent have a post-secondary degree. In addition, the employment rate is 54 percent, while the labor force participation rate is 58 percent.

5 Evidence for the Decline in Education

In this section, we argue that the turmoil generated a substantial decline in post-secondary education among the exposed population—the ones, especially males, born between 1960 and 1965. The decline in higher education as a consequence of a political turmoil in a developing country is a very interesting finding in its own. However, we do not stop at this point. In Section 6, we use this decline as a natural experiment and design an IV strategy based on exposed versus non-exposed cohorts to estimate the effect of post-secondary education on labor market earnings.

[11] In the TDHS exercise, we restrict our sample to individuals of age 37-54. A similar strategy is implemented by Aydemir and Kirdar (2017).

Finally, in Section 7, we show that the decline in post-secondary education during the turmoil had severe negative implications on adult wage and occupational distributions.

In addition to documenting the decline in post-secondary education, this section also provides a background analysis for determining the birth cohorts exposed and non-exposed to the turmoil, e.g., the treatment versus control groups, that will be used in the IV analysis. Although we carry out our baseline empirical analyses focusing on specific treatment and control cohorts, we relax these restrictions in Section 6.5, where we perform several robustness checks, and show that the qualitative nature of our baseline results is not overly sensitive to inclusion or exclusion of certain birth cohorts in defining the treatment and control groups. It should also be noted that the baseline analysis is performed using the 2005 wave of the HLFS data set, but the results are quite robust to including more HLFS waves into the analysis—as we show in Section 6.5.

Post-secondary education. Post-secondary school enrollment rates increased dramatically during the second half of the 20th century all over the world (Psacharopoulos, 1991). Turkey is no exception. However, in Turkey, enrollment and graduation rates in post-secondary education substantially declined between 1978 and 1982 due to the political turmoil. To analyze the trends in post-secondary education, we use the following regression model:

$$s_i = \alpha + \sum_{c=30}^{54} \beta_c d_{ic} + \boldsymbol{X}_i' \boldsymbol{\Pi} + \epsilon_i, \tag{5.1}$$

where s_i is a binary variable indicating whether individual i has a post-secondary degree, d_{ic} is an age dummy indicating whether individual i is c years old, $\boldsymbol{X}_i$ is a vector of covariates, and ϵ_i is an error term.

The age dummies cover the 30-55 age interval. As the vector of covariates, we use 26 NUTS2-level region-of-residence dummies, an urban/rural dummy, and a gender dummy. We omit age 55 in the regressions; therefore, each coefficient β_c can be interpreted as the probability of completing post-secondary education for the corresponding age relative to age 55. In a developing country, one would normally expect β_c to increase as age declines—in the absence of a negative shock on post-secondary education.

Figure (4) plots the estimated β_c's for the whole sample. The solid line shows the probability of completing post-secondary education, while the dashed lines indicate the 95-percent confidence interval. The substantial drop in post-secondary education between ages 40 and 45 is unacceptable from a developing country perspective and cannot be justified in the absence of a big negative shock affecting post-secondary educational outcomes for those cohorts. Figures (5) and (6) plot the estimated coefficients for men and women, respectively. Although the trends for completing post-secondary education look similar in both figures, the effect of the turmoil is much more pronounced for men than that for women. As a result, individuals of age 40-45 are marked as "exposed individuals" throughout the analysis. These individuals were born between years 1960-1965, and were about 13 to 18 years old as of 1978.[12]

[12] Figure (2) shows that first-year enrollments in higher education declined significantly for the first time in 1978 and remained low until 1982. This decline probably affected young adults of age 17 and 18 from 1978 to 1982. Therefore, the affected group was approximately from 13 to 18 years old in 1978, which is line with the findings reported in Figures (4)-(6). In addition, student dropouts related to security concerns and mass student arrests after the coup also affected the educational attainment in this age group. Based on these findings, we assert that men of age 40-45 (in the 2005 survey) were the ones most severely affected by the turmoil.

The 40-45 age group has 6 age categories. We construct a comparison group which also has 6 age categories: the 46-51 age group. We choose this older group as the comparison group for two main reasons. First, after the coup, the educational institutions had changed and many new universities were constructed; so, the younger birth cohorts cannot be used as a relevant comparison group. Second, older cohorts were exposed to similar political conditions except violence. Given a natural trend in a developing-country context, one would expect a higher post-secondary educational attainment for the 40-45 age group relative to the 46-51 age group. Figure (4) shows that the probability of completing post-secondary education for the exposed group is clearly less than that for the comparison group. Alternative age groups are used in Section 6.5 for robustness purposes.

Different levels of education. Next we compare the educational attainment of age groups 40-45 and 46-51 using the following regression model:

$$s_i = \alpha + \beta z_i + \boldsymbol{X}_i' \boldsymbol{\Pi} + \epsilon_i, \tag{5.2}$$

where s_i is a binary variable indicating whether individual i has graduated from a school (post-secondary, high school, elementary/primary school) or not, z_i is a dummy variable taking 1 if the individual i is in the age group 40-45 and 0 if 46-51, $\boldsymbol{X}_i$ is a vector of covariates, and ϵ_i is an error term.[13] The coefficient β can be interpreted as the gap between probability of graduation from school between age groups 40-45 and 46-51. One would normally expect β to be positive in the absence of a negative shock on education.

Table (3) presents three sets of estimates from Equation (5.2). Column [1] displays the result for post-secondary degree, column [2] for only high school degree, and column [3] for only elementary/primary school degree. Column [1] shows that the probability of completing post-secondary education is 1.5 percentage points lower for the 40-45 age group. In contrast, the probabilities of graduation from elementary/primary school and high school increase significantly as expected—see columns [2] and [3]. However, the increase in the probability of graduation from high school is 4.5 percentage points, or about twice the increase in the probability of graduation from elementary/primary school. This suggests that those individuals affected from the protests would have normally gone to or completed a post-secondary education, but did not do so due to the 1978-1982 turmoil. So, the number of high school graduates increased more than it normally would, which implies that potential college graduates have remained as high school graduates as a consequence of the turmoil.

We also compare the age groups 46-51 and 52-57. The high school graduation probability is 2.9 percentage points higher for the 46-51 age group. The difference between 40-45/46-51 and 46-51/52-57 differences is 1.6 percentage points—approximately the percentage point decline in completing post-secondary education for the 40-45 age group. This tells us that the main group affected from the student protests were those who would have normally continued post-secondary education in the absence of the turmoil. Figures (7) and (8) confirm this point.

Years of schooling. We run a similar regression to visualize the trend for average years of schooling. The

[13] We use the same vector of covariates as in Equation (5.1).

estimated coefficients of age dummies are plotted in Figure (9). Based on an eyeball test, the trend is flatter for the 40-45 age group relative to the 34-39 and 46-51 age groups.

Probability of wage employment. We check whether the turmoil had any effect on the probability of wage employment. In the regression, the dependent variable is a dummy variable taking 1 if an individual is wage employed (regular employee or casual employee) and 0 otherwise (employer, self employed, or unpaid family worker). The sample includes all employed individuals. Figure (10) plots the estimated coefficients of age dummies. The trend is plausibly smooth over the age horizon; so, the turmoil had no effect on wage employment.[14]

Although the probability of being a wage-earner did not change, the school attainment among wage-earners of different age groups should have changed as a result of the turmoil. To test this conjecture, we estimate the probability of post-secondary educational attainment for wage earners (column [1]) and non-wage earners (column [2]), separately. Table (4) reports the results. The estimates clearly suggest that wage-earner men of age 40-45 are the ones whose post-secondary educational attainment have been affected the worst. We conclude that the group most affected from the turmoil is wage-earner men of age 40-45 (in the 2005 survey, with birth years from 1960 to 1965).

Wages. We assess whether the decline in post-secondary education for men of age 40-45 is reflected on earnings. We run a regression [similar to Equation (5.1)] in which the dependent variable is log hourly wage standardized to 26 years of experience—following Altonji, Bharadwaj, and Lange (2012). The estimated coefficients of ages are plotted in Figure (11) and, clearly, log hourly wages increase from age 50 to age 47 and begin to decline for younger cohorts, similar to the trend in post-secondary educational attainment in Figure (4). We run the same regression by restricting the data to men with at least a high school degree. The coefficients of age dummies for the 40-45 age group are negative and statistically significant [Figure (12)].

6 IV Estimates for Returns to Higher Education

The following Mincerian setting is often used to estimate the effect of education on wages:

$$w_i = \alpha + \beta s_i + \boldsymbol{X}_i' \boldsymbol{\Pi} + \epsilon_i, \tag{6.1}$$

where w_i is a measure of labor income, s_i is a measure of schooling, $\boldsymbol{X}_i$ is a vector of observables, and ϵ_i is an error term assumed to be independent of the explanatory variables (Griliches, 1977). In this setting, the causal effect of schooling on labor income may not be consistently estimated because of the omitted variables problem—also known as the ability bias. A possible solution to this problem is to use an IV, which requires an exclusion restriction, i.e., at least one observable covariate that affects labor income only through schooling.

In Section 5, we show in detail that post-secondary educational attainment declined significantly for individuals

[14]Similarly, the turmoil did not affect labor force participation, employment, and informal employment [see Section 7].

born between 1960 and 1965 due to the student protests in the late 1970s and the subsequent military coup. We also argue that we set the non-exposed cohort—the ones born between 1959 and 1954, i.e., the 46-51 age group in the 2005 HLFS wave—as the comparison group.[15] Therefore, we use the dummy variable z_i—taking 1 if the individual i belongs to age group 40-45 and 0 if s/he belongs to age group 46-51—as an IV for estimating the returns to education. In Section 6.5, we perform robustness checks using alternative age intervals as treatment and control groups.

In a heterogeneous-outcome framework, the IV method has the potential to estimate the average treatment effect (ATE) of schooling on earnings for the sub-group whose schooling attainment is changed by the instrument—i.e., the local average treatment effect (LATE) (Imbens and Angrist, 1994; Angrist, Imbens, and Rubin, 1996; Card, 2001). There are two key conditions [see Imbens and Angrist (1994)]. The first one is the existence of a valid instrument. Because an individual's year of birth—within a reasonably narrow year of birth interval—is randomly assigned and probably unrelated to individuals' innate ability, personal characteristics, or family characteristics, it seems reasonable to assert in our case that the wage decline for the 40-45 age group relative to the 46-51 age group is due to exposure to turmoil and the associated educational disruptions—after standardizing labor market experience and controlling for other observables. Thus, potential outcomes should be independent of the instrument and the exclusion restriction assumption should be satisfied. We show in Section 5 that the probability of completing post-secondary education is related to z_i in a non-trivial way. The second condition is monotonicity. This condition ensures that the instrument affects the post-secondary education in a monotonic way [Imbens and Angrist (1994); Angrist, Imbens, and Rubin (1996)]. We also document in detail that the 1978-1982 turmoil negatively affected all sub-samples of the relevant population, which suggests that the monotonicity condition should also be satisfied. Based on these assumptions, the IV estimates using z_i can be interpreted as the local average treatment effect for those who did not continue post-secondary education due to the 1978-1982 turmoil, but who would have normally had a post-secondary degree.

6.1 Psychological effects as a confounding factor? A test for instrument validity

One potential threat to instrument validity is the presence of other confounding variables, such as psychological factors, that would affect wages of exposed individuals independent from schooling outcomes. If confounding factors, other than schooling, influence the wages of the 40-45 age group due to the turmoil, one would observe this by looking at wages "within the same education group." The individuals affected from the turmoil are high school graduates, who could not complete their post-secondary education. To address this concern, we run a regression in which the dependent variable is log hourly wage standardized to 26 years of labor market experience and explanatory variables are the age dummies, dummies for region of residence, and an urban/rural dummy. The sample includes

[15] The 34-39 age group is not appropriate as they were subject to post-coup educational institutions, which enhanced post-secondary education opportunities. Table (6) reports summary statistics for three age groups: 34-39, 40-45, and 46-51. The 40-45 age group clearly has lower average log hourly wage, fewer average years of schooling, and lower average post-secondary educational attainment than the younger and older groups. Moreover, this group has a higher average high school graduation rates compared to other age groups.

male wage earners of age 40-51 with only a high school degree. The coefficients of ages are plotted in Figure (13). They lie almost on a straight line and none of the age coefficients are statistically significant. Therefore, the log hourly wages of high school graduates born between 1960-1965 (e.g., the exposed ones) are not statistically different from those of the non-exposed cohort. This finding suggests that there are no permanent psychological or other confounding effects of the political turmoil on wages.

As a side note, since we analyze wage earnings measured about 25 years after the 1978-1982 turmoil, any initial/temporary psychological effects should have vanished over time.

6.2 First-stage and reduced-form estimates for male wage earners

We run three different regressions based on the following equation:

$$s_i = \alpha + \beta z_i + \boldsymbol{X}_i' \boldsymbol{\Pi} + \epsilon_i, \tag{6.2}$$

where z_i is a dummy variable taking 1 if the individual i is of age 40-45 and 0 if 46-51, $\boldsymbol{X}_i$ is a vector of covariates, and ϵ_i is an error term.

In the first regression, the dependent variable, s_i, is a dummy indicating whether the individual has completed post-secondary education or not. In the second and third regressions, we use years of schooling and log hourly wages as the dependent variables, respectively. In all regressions, we focus on male wage earners of age 40-51 in the 2005 wave. The results are presented in Table (5). Columns [1] to [3] indicate that the probability of finishing post-secondary education is at least 6.6 percentage points lower for the treatment group relative to the control group. Similarly, years of schooling is also lower by 0.22-0.28 year—see columns [4]-[6]. The last three columns document the effect of the turmoil on wages. The corresponding estimates suggest that wages of men in the 40-45 sample is 2.6-3.5 percent lower than wages of men in the 46-51 sample. Yet, the coefficient of wage turns only marginally significant when we include region-of-residence and urban/rural dummies as control variables—in column [9].

The post-secondary educational attainment rate is 21.1 percent for male wage earners in the 46-51 sample. This rate is at least 6.6 percentage points lower for the 40-45 sample due to the turmoil. In other words, the post-secondary educational attainment of the treatment group is changed by the IV and the magnitude of change is at least 31 percent (6.6/21.1), which is substantial.[16]

6.3 Estimating returns to an additional year in school

The identifying assumptions are that (*i*) post-secondary educational attainment for the 40-45 sample would not be lower than that for the 46-51 sample in the absence of the political turmoil and (*ii*) the turmoil affects wages only through its impact on post-secondary educational attainment. Based on these assumptions, we use birth cohorts

[16] We assume in this calculation that the post-secondary education attainment rate for the 40-45 sample would have at least remained the same as the 46-51 sample, if the political turmoil had not occurred.

as IV to estimate the causal effect of additional years of schooling on wages. The first-stage and reduced-form of this IV estimations are presented in Table (5). The results suggest that the instrument has satisfactory explanatory power at the first stage.

Estimates for the returns to an additional year in school are presented in Table (7). The dependent variable is the log hourly wage standardized to 26 years of potential experience[17] and the sample is male wage earners of age 40-51. Panel A of Table (7) provides estimates for just-identified models, in which only one dummy variable—taking 1 for the 40-45 age group and 0 for 46-51—is used as the instrument. The first line presents OLS estimates of Equation (6.1). Column [1] indicates that the estimated return to schooling is 11.2 percent and is not affected by introducing region of residence and urban/rural dummies as control variables—see columns [2] and [3].

The second line of Panel A reports the 2SLS estimates. In column [1], there are no control variables and the point estimate, 12.7 percent, is slightly above the OLS estimate. The protests could be more widespread across some regions due to some unobserved factors that are possibly correlated with schooling and labor market outcomes. To capture this possibility, region-of-residence and urban/rural dummies are also included in the IV regressions. We find that including region-of-residence and urban/rural dummies as control variables (columns [2] and [3]) do not change the results significantly. The F-statistics on the excluded instruments in just-identified models exceed the Staiger and Stock (1997) rule of thumb of 10, suggesting that the weak instrument problem may not be a serious concern.

Panel B of Table (7) shows the results of the over-identified models, in which six age dummies within the age interval 40-45 are used as instruments. Using more instruments causes the F-statistics to fall below the Staiger and Stock (1997) critical values. To check the possibility of a weak instrument, we follow the suggestion of Angrist and Pischke (2008) and report limited-information maximum likelihood (LIML) estimates. Stock and Yogo (2005) and Angrist and Pischke (2008) argue that LIML is superior to 2SLS in weak-instruments cases. Our LIML estimates are almost identical to 2SLS, suggesting that the weak-instrument bias may not be a concern. In addition, high p-values of Hansen's test indicate that the null hypothesis of instrument validity is not rejected at conventional significance levels.

The individuals whose schooling levels are changed by the instrument are at least 31 percent of all individuals having post-secondary education in the 40-45 year-old male wage earners. The average treatment effect on the treated is a weighted average of the effects on always-takers and compliers (Angrist and Pischke, 2008). In addition, those individuals affected from the turmoil are not marginal individuals who are indifferent between going to university or not. Those affected were the dropouts in post-secondary education or the ones who would have attended to post-secondary education institutions if these events had never happened. Therefore, our estimates can be interpreted as a close approximation to the average causal effects of an additional year of schooling in post-secondary education.

[17]The results are almost the same when the log hourly wage is standardized to age rather than potential experience.

The convexity of the log wage regression function implies that marginal returns are increasing in the level of schooling. The instrument that we use only affects post-secondary education. Since different instruments may define different "effects" in a heterogeneous-outcome framework (Heckman, Lochner, and Todd, 2006), the findings of the current paper do not contradict with with low returns to elementary school grades of Torun (2018) and Aydemir and Kirdar (2017) in light of the evidence presented by Belzil and Hansen (2002). Thus, the log wage in Turkey may still be convex in schooling. Moreover, Carneiro (2003) shows that the return to education for the average student in college is systematically above the return to education for marginal individual in the US. This is also consistent with our results.

We repeat the same regressions with log monthly wage as the dependent variable instead of log hourly wage. The results are presented in Table (8). Because there is a negative correlation between hours worked and average years of schooling in Turkey, the returns to schooling for an additional year in these regressions are approximately 2-3 percentage points lower than the regressions with log hourly wage is used as the dependent variable. The 2SLS estimates in both regressions are slightly above the corresponding OLS estimates.

6.4 Estimating returns to post-secondary degree

To estimate the effect of getting a post-secondary degree versus a high school degree on wages among males, we define a binary variable d_i taking 1 if i has a post-secondary degree and 0 if high school. We calculate the average years of schooling for the post-secondary education as 4 years based on the 2008 TDHS. This suggests that the typical post-secondary education is 4-year college in Turkey. Therefore, our estimates can be interpreted as the returns to a 4-year college degree relative to a high school degree. The results are presented in Table (9). In all regressions, the dependent variable is the log hourly wage standardized to experience. The first row gives the OLS estimates. Column [1] shows that the returns to a 4-year college degree are 50 percent greater than those for a high school degree and this estimate is not affected by introducing region-of-residence and urban/rural dummies as control variables—see columns [2] and [3]. The second row of Table (9) presents the 2SLS estimates using only one instrument. In column [1], there is no control variable and the point estimate (58 percent) is slightly above the OLS estimate. Including region-of-residence and urban/rural dummies as control variables (columns [2] and [3]) again do not change the results significantly. Panel B presents the estimates with six age dummies in the 40-45 age interval as instruments in our 2SLS and LIML estimations. The results are very similar to the IV estimations using only one instrument. The first-stage F-statistics for all regressions are much higher than the Staiger and Stock (1997) rule of thumb of 10.

6.5 Robustness checks

6.5.1 Correcting for missing wage data

The wage data in the HLFS contains missing values. About 2 percent of male individuals of age 40-51 did not report their wages, either because they started their current job within the survey month or did not want to disclose. We define a binary variable for male wage earners taking 1 if the wage data is missing and 0 otherwise. We regress this variable on age cohorts, 6 education dummies, 27 sub-major divisions of occupations, 26 NUTS2-level region-of-residence dummies, and an urban/rural dummy. We find that some variables are statistically significant, and thus the missing values may not be random.

Although the fraction of missing data in our sample is low and unlikely to affect our main results, we still re-estimate the sampling weights to adjust for missing wage values following the procedure introduced by Altonji, Bharadwaj, and Lange (2012) to check whether the results are robust to missing data. The comparison is presented in Table (10), which says that our estimates are robust to adjusting sample weights for missing data on wages.

6.5.2 Using alternative birth cohorts to define treatment and control groups

Table (11) presents the estimates for alternative definitions of treatment/control groups and compares those estimates with the baseline findings. Age 46 in our control group might also be partly affected from the turmoil. We drop this cohort and also narrow the age windows by dropping an additional cohort in each specification (41-45 versus 47-51; 42-45 versus 47-50; 43-45 versus 47-49). We include region of residence and urban/rural dummies as control variables in all regressions. Estimates for the returns to an additional year of schooling are similar to our baseline results. They are also slightly above the OLS estimates and the precision is slightly lower in only one specification (see column [2]). Estimates for the returns to college are highly significant and similar to our baseline estimates in terms of magnitude. Overall, our findings are robust to using alternative birth cohort specifications in defining the treatment and control groups.

6.5.3 Including more HLFS waves

As a final robustness check, we provide estimates based on four HLFS waves (2005-2008) rather than focusing only on the 2005 wave. From 2009, Turkey has gradually changed the HLFS's sampling addresses with a new national address database. In addition, as we go beyond the 2008 wave, individuals in our treatment and control groups get older and drop out of the core group in the labor market; thus, they start exhibiting non-standard labor market behavior. We focus on the 2005-2008 waves due to these two considerations. As we discuss in the data section, the average wage for men sharply falls and tends to be quite volatile after age 51; therefore, we drop the oldest cohort when we include a new wave. For example, treatment group is the 41-46 age group and control group is the 47-51 age group in the 2006 wave; thus, age 52 in the control group is dropped. Wages for different waves are adjusted to the 2005 prices using the CPI. The estimates are presented in Table (12). We include region of residence and urban/rural dummies as control variables in all regressions. Including more observations/waves allow for much higher precisions in the estimates. Moreover, the estimates are similar to our baseline findings especially in specifications with multiple instruments. Clearly, our results are also robust to the inclusion of more HLFS waves.

7 Counterfactual Wage Distribution and Occupational Shift

We implement the semi-parametric procedure developed by DiNardo, Fortin, and Lemieux (1996) to analyze the impact of the political turmoil on the wage distribution of men born between 1960-1965, i.e., the exposed individuals (the 40-45 sample of males). To be consistent with our baseline analysis, the 2005 wave of the HLFS is used in this exercise. We re-weight the 40-45 sample to have the same distribution of post-secondary education as the 46-51 sample. We then compare how labor income is distributed in the re-weighted (counterfactual) 40-45 sample versus the actual 40-45 sample. This comparison roughly demonstrates how the decline in post-secondary educational attainment due to the turmoil affected the density of wages in the treatment group. A formal description of how we formulate and implement the density estimation are presented in Appendix A.

We run a probit model, as in DiNardo, Fortin, and Lemieux (1996), to estimate the re-weighting function and plot the weighted kernel density estimates of the counterfactual [dotted line in Figure (14)] and the actual [solid line in Figure (14)] densities. We use log hourly wages standardized to 26 years of labor market experience for men—as in the previous sections. Both lines are superimposed in Figure (14).[18] The vertical line indicates the log minimum wage in 2005. It is calculated as the net monthly minimum wage (350 Turkish liras for 45 hours per week) divided by (52/12) and then by 45. Clearly, the minimum wage in Turkey compresses the lower tail of the density of the male wage earners. So, the distribution is twin-peaked, with the first peak settling around the minimum wage and the second peak appearing around 1.45 log wage value. The mean of the entire sample is approximately 1.01 in log terms.

The difference between actual and counterfactual densities represents the effect of the decline in post-secondary educational attainment—due to the political turmoil—on the distribution of wages for the 40-45 age group. Strikingly, the decline in post-secondary education pushed these individuals from the higher-income group toward the minimum-wage group. Those individuals who would have otherwise completed a post-secondary degree would have earned much more than their actual earnings if the turmoil had never occurred.

Next we explore the impact of the turmoil on the occupational structure. Before this analysis, we address the following question: does the turmoil affect other labor market outcomes such as labor force participation, employment, and labor informality? To answer this question, we run three regressions based on the following simple model:

$$s_i = \alpha + \sum_{c=34}^{50} \beta_c d_{ic} + \boldsymbol{X}_i' \boldsymbol{\Pi} + \epsilon_i, \tag{7.1}$$

[18] The STATA optimal bandwidth and Gaussian kernel function are chosen; but, note that the results are not sensitive to the choice of bandwidth and alternative kernel functions.

where s_i is a binary variable for labor market status, d_{ic} is a dummy variable indicating whether individual i is c years old, $\boldsymbol{X}_i$ is a vector of covariates, and ϵ_i is an error term. The HLFS data used in this analysis is restricted to men of age 34-51. In all regressions, we use region-of-residence dummies and an urban/rural dummy as the vector of covariates. Age 51 is the omitted age category.

The first regression is for labor force participation. The estimated coefficients of ages are plotted in Figure (15), which shows that the trend for labor force participation is smooth over the age horizon. Thus, the decline in post-secondary educational attainment did not affect labor force participation for men. The second and third regressions are for employment and formal employment (defined as being registered with the social security institution in the current job), respectively. The results are reported in Figures (16) and (17). Both figures point out that the decline in post-secondary educational attainment did not affect employment and formal employment. We conclude that the turmoil did not have any statistically significant effect on the main employment outcomes.

We show, however, that the turmoil largely affected the occupational structure in the labor market—as hinted by the counterfactual shift in wages. Our data set contains 27 sub-major divisions of occupations and they are classified according to International Standard Classification of Occupations (ISCO-88). We calculate the mean of log wage for each occupation for men and, then, we separately find the share of individuals in each occupation for three age groups (34-39, 40-45, and 46-51). We classify the occupations based on average log wage values and, accordingly, we construct five broad occupation groups. The first two groups can easily be defined, because they contain similar sub-major divisions. The occupations in the last three groups are in different majors. Thus, we classify them based on mean log wage values. The results are presented in Table (13).

The top group is corporate managers and professionals and their mean log wage value is over 1.5—approximately corresponding to the second peak of the distribution of wages in Figure (14). 12 percent of those in the 40-45 age group are within this category. This ratio is much less than the other two age groups—being nearly 7 percentage points lower than the 46-51 age group. This difference is consistent with the difference between actual and counterfactual wage density estimations. We observe that individuals in the 40-45 age group—i.e., the exposed ones—have less attractive jobs on average.

The second occupation group consists of technicians, associate professionals, and clerks. These occupations have less education requirements than the top group. The percentage of this group in the 40-45 age group is higher than the other two age groups and this result is also consistent with the counterfactual density estimation. The third and fourth groups have also confirmed the same result—as the percentages for the 40-45 sample are higher. If we combine the sub-major divisions whose mean log wage values between the minimum wage and 1.5 [the second peak in Figure (14)], the fractions of individuals in age groups 34-39, 40-45, and 46-51 become 68.7, 72.5, and 66.3, respectively. This suggests that the 40-45 age group have a higher fraction of low-pay occupations. Therefore, we conclude that the decline in post-secondary attainment led to a shift in occupations from high-pay to low-pay ones.

These findings suggest that violent political turmoils or other large-scale turbulent events affecting large fractions of the productive population may have permanent negative consequences on countries' growth potentials.

8 Concluding Remarks

Between 1978 and 1980, Turkey experienced violent student protests. Almost 20 youths were killed daily. Universities and other higher education institutes were at the center of the violence and conflict. This violence ultimately led to a military intervention in 1980, which came with additional arrests and suppression lasting several years. We document in detail that the political turmoil adversely affected post-secondary educational attainment in Turkey. Furthermore, we exploit the exogenous drop in the number of graduates and new admissions due to this turmoil (*i*) to estimate the causal effect of schooling on earnings using birth cohorts as IV and (*ii*) to document its long-term impact on wages and occupation structure.

We find that the group most severely affected by the turmoil is male wage earners with birth years from 1960 to 1965. These events led to a 6.6-7 percentage point decline in the probability of completing post-secondary education and a 0.22-0.28 decline in average years of schooling for the exposed cohorts. The decline in post-secondary educational attainment pushed the wage distribution to the left and led to a permanent shift in occupations from high-pay to low-pay ones. These findings also suggest that violent political turmoils can permanently erode a country's human capital and, therefore, can adversely affect long-term growth prospects.

Using birth cohorts as IV, we estimate the returns to education to range between 11.6-14 percent in Turkey. These estimates can be interpreted as the effect of an additional year of post-secondary education on labor market earnings. This is one of the first papers using the widespread student protests—almost globally took place in the second half of the twentieth century—as a source of exogenous change in school attainment to estimate returns to higher education. The long duration of the turmoil and high violence intensity jointly make the Turkish case a unique example of student protests with severe adverse effects on post-secondary education and long-term labor market outcomes.

References

Aakvik, A., K. G. Salvanes, and K. Vaage (2010): "Measuring Heterogeneity in the Returns to Education Using an Education Reform," *European Economic Review*, 54, 483–500.

Acemoglu, D. and J. D. Angrist (2000): "How Large Are Human-Capital Externalities? Evidence from Compulsory Schooling Laws," in *NBER Macroeconomics Annual*, NBER.

Acemoglu, D., T. A. Hassan, and J. A. Robinson (2011): "Social Structure and Development: A Legacy of the Holocaust in Russia," *Quarterly Journal of Economics*, 126, 895–946.

Ahmad, F. (1993): *The Making of Modern Turkey*, London, UK: Routledge.

——— (2003): *Turkey: The Quest for Identity*, Oxford, UK: Oneworld.

Akbulut-Yuksel, M. (2014): "Children of War: The Long-Run Effects of Large-Scale Physical Destruction and Warfare on Children," *Journal of Human Resources*, 49, 634–662.

Akbulut-Yuksel, M. and M. Yuksel (2015): "The Long-Term Direct and External Effects of Jewish Expulsions in Nazi Germany," *American Economic Journal: Economic Policy*, 7, 58–85.

Altonji, J. G., P. Bharadwaj, and F. Lange (2012): "Changes in the Characteristics of American Youth: Implications for Adult Outcomes," *Journal of Labor Economics*, 30, 783–828.

Angrist, J. D., G. W. Imbens, and D. B. Rubin (1996): "Identification and Causal Effects Using Instrumental Variables," *Journal of the American Statistical Association*, 91, 444–455.

Angrist, J. D. and A. B. Krueger (1991): "Does Compulsory Schooling Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 106, 976–1014.

——— (1999): "Empirical Strategies in Labor Economics," in *Handbook of Labor Economics*, ed. by O. Ashenfelter and D. Card, New York, NY: Elsevier, 1277–1397.

Angrist, J. D. and J.-S. Pischke (2008): *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton, NJ: Princeton University Press.

Aydemir, A. and M. G. Kirdar (2017): "Low Wage Returns to Schooling in a Developing Country: Evidence from a Major Policy Reform in Turkey," *Oxford Bulletin of Economics and Statistics*, 79, 1046–1086.

Barker, C. (2012): "Some Reflections on Student Movements of the 1960s and Early 1970s," *Revista Critica de Ciencias Sociais*, 81, 43–91.

Bell, B., R. Costa, and S. Machin (2016): "Crime, Compulsory Schooling Laws, and Education," *Economics of Education Review*, 54, 214–226.

Belzil, C. and J. Hansen (2002): "Unobserved Ability and the Return to Schooling," *Econometrica*, 70, 2075–2091.

Binbasioglu, C. (2005): *Turk Egitim Dusuncesi Tarihi: Egitim Kavram ve Uygulamalarinin Tarihsel Gelisimi*, Ankara: Ani.

Brakman, S., H. Garretsen, and M. Schramm (2004): "The Strategic Bombing of Cities in Germany in World War II and Its Impact on City Growth," *Journal of Economic Geography*, 4, 1–18.

Card, D. (1999): "The Causal Effect of Education on Earnings," in *Handbook of Labor Economics*, ed. by O. Ashenfelter and D. Card, New York, NY: Elsevier, vol. 5, 1801–1863.

——— (2001): "Estimating the Return to Schooling: Progress on Some Persistent Econometric Problems," *Econometrica*, 69, 1127–1160.

Card, D. E. (1995): "Using Geographic Variation in College Proximity to Estimate the Return to Schooling," in *Aspects of Labour Economics: Essays in Honour of John Vanderkamp*, ed. by L. Christofides, E. K. Grant, and R. Swindinsky, Toronto: University of Toronto Press.

Carneiro, P. M. (2003): "Heterogeneity in the Returns to Schooling: Implications for Policy Evaluation," Ph.D. thesis, University of Chicago.

Cesur, R. and N. Mocan (2018): "Education, Religion, and Voter Preference in a Muslim Country," *Journal of Population Economics*, 31, 1–44.

Cumhuriyet (1978): "Cumhuriyet Gazetesi Arsivi (Cumhuriyet Newspaper Archive)," https://www.cumhuriyetarsivi.com/secure/monitor/index2.xhtml.

Davis, D. and D. Weinstein (2002): "Bones, Bombs, and Break Points: The Geography of Economic Activity," *American Economic Review*, 92, 1269–1289.

Devereux, P. J. and R. A. Hart (2010): "Forced to be Rich? Returns to Compulsory Schooling in Britain," *Economic Journal*, 120, 1345–1364.

DiNardo, J. E., N. M. Fortin, and T. Lemieux (1996): "Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach," *Econometrica*, 64, 1001–1044.

Dogramaci, I. (1989): *Higher Education in Turkey: Developments Since November 1981*, Ankara: Meteksan.

Duflo, E. (2001): "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment," *American Economic Review*, 91, 795–813.

Erken, A. (2014): "Ideological Construction of the Politics of Nationalism in Turkey: The Milliyetci Hareket Partisi (MHP), 1965–1980," *Nationalism & Ethnic Politics*, 20, 200–220.

Fang, H., K. N. Eggleston, J. A. Rizzo, S. Rozelle, and R. J. Zeckhauser (2012): "The Returns to Education in China: Evidence from the 1986 Compulsory Education Law," NBER WP#18189.

Flacks, R. (1970): "Social and Cultural Meanings of Student Revolt: Some Informal Comparative Observations," *Social Problems*, 17, 340–357.

Griliches, Z. (1977): "Estimating the Returns to Schooling: Some Econometric Problems," *Econometrica*, 45, 1–22.

Grosfeld, I., A. Rodnyansky, and E. Zhuravskaya (2013): "Persistent Antimarket Culture: A Legacy of the Pale of Settlement and of the Holocaust," *American Economic Journal: Economic Policy*, 5, 189–226.

Gulesci, S. and E. Meyersson (2013): "'For the Love of the Republic': Education, Secularism, and Empowerment," Bocconi University, IGIER WP#490.

Gunter, M. M. (1989): "Political Instability in Turkey During the 1970s," *Conflict Quarterly*, 9, 63–77.

Harmon, C. and I. Walker (1995): "Estimates of the Economic Return to Schooling for the United Kingdom," *American Economic Review*, 85, 1278–1286.

Heckman, J. J., L. J. Lochner, and P. E. Todd (2006): "Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond," in *Handbook of the Economics of Education*, ed. by E. A. Hanushek and F. Welch, New York: Elsevier, 307–458.

Ichino, A. and R. Winter-Ebmer (2004): "The Long-Run Educational Cost of World War II," *Journal of Labor Economics*, 22, 57–86.

Imbens, G. W. and J. D. Angrist (1994): "Identification and Estimation of Local Average Treatment Effects," *Econometrica*, 62, 467–476.

Kane, T. J. and C. E. Rouse (1995): "Labor Market Returns to Two- and Four-Year College," *American Economic Review*, 85, 600–614.

Kaptan, S. (1986): *Turkiye'de Yuksekogretim Reformu ve Insangucu Potansiyeli*, Ankara: State Planning Organization.

Kaya, Y. K. (1981): *Insan Yetistirme Duzenimiz*, Ankara: Erk Basimevi.

Kazuko, T. (1968): "The Japanese Student Movement I: Its Milieu," *Japan Quarterly*, 15, 430–456.

Klenow, P. J. and A. Rodriguez-Clare (2005): "Externalities and Growth," in *Handbook of Economic Growth*, ed. by P. Aghion and S. N. Durlauf, New York, NY: Elsevier.

Koopmans, R. (1993): "The Dynamics of Protest Waves: West Germany, 1965 to 1989," *American Sociological Review*, 58, 637–658.

Lemieux, T. and D. Card (2001): "Education, Earnings, and the "Canadian G. I. Bill"," *Canadian Journal of Economics*, 34, 313–344.

Maurin, E. and S. McNally (2008): "Vive la Révolution! Long-Term Educational Returns of 1968 to the Angry Students," *Journal of Labor Economics*, 26, 1–33.

Meghir, C. and M. Palme (2005): "Educational Reform, Ability, and Family Background," *American Economic Review*, 95, 414–424.

Miguel, E. and G. Roland (2011): "The Long Run Impact of Bombing Vietnam," *Journal of Development Economics*, 96, 1–15.

Mincer, J. (1974): *Schooling, Experience, and Earnings*, New York, NY: Columbia University Press.

Neyzi, L. (2001): "Object or Subject? The Paradox of 'Youth' in Turkey," *International Journal of Middle East Studies*, 33, 411–432.

Oreopoulos, P. (2006a): "The Compelling Effects of Compulsory Schooling: Evidence from Canada," *Canadian Journal of Economics*, 39, 22–52.

——— (2006b): "Estimating Average and Local Average Treatment Effects of Education When Compulsory Schooling Laws Really Matter," *American Economic Review*, 96, 152–175.

Ost, B., W. Pan, and D. Webber (2018): "The Returns to College Persistence for Marginal Students: Regression Discontinuity Evidence from University Dismissal Policies," *Journal of Labor Economics*, 36, 779–805.

Pascali, L. (2016): "Banks and Development: Jewish Communities in the Italian Renaissance and Current Economic Performance," *Review of Economics and Statistics*, 98, 140–158.

Pischke, J.-S. and T. Von Wachter (2008): "Zero Returns to Compulsory Schooling in Germany: Evidence and Interpretation," *Review of Economics and Statistics*, 90, 592–598.

Psacharopoulos, G. (1991): "Higher-Education in Developing-Countries—the Scenario of the Future," *Higher Education*, 21, 3–9.

Psacharopoulos, G. and H. A. Patrinos (2004): "Returns to Investment in Education: A Further Update," *Education Economics*, 12, 111–134.

Rothman, S. and R. Lichter (1978): "The Case of the Student Left," *Social Research*, 45, 535–610.

Samuelson, R. (1968): "French Student Revolt: An Account of the Origins and Objectives," *Science*, 160, 971–974.

Sansani, S. (2015): "The Differential Impact of Compulsory Schooling Laws on School Quality in the United States Segregated South," *Economics of Education Review*, 45, 64–75.

Staiger, D. and J. H. Stock (1997): "Instrumental Variables Regression with Weak Instruments," *Econometrica*, 65, 557–586.

Stephens, M. and D. Yang (2014): "Compulsory Education and the Benefits of Schooling," *American Economic Review*, 104, 1777–1792.

Stock, J. and M. Yogo (2005): "Testing for Weak Instruments in Linear IV Regression," in *Identification and Inference for Econometric Models*, ed. by D. W. K. Andrews, New York, NY: Cambridge University Press, 80–108.

Tekeli, I. (2010): *Tarihsel Baglami Icinde Turkiye'de Yuksekogretim ve YOK'un Tarihi*, Istanbul: Tarih Vakfi Yurt Yayinlari.

Thomas, N. (2002): "Challenging Myths of the 1960s: The Case of Student Protest in Britain," *Twentieth Century British History*, 13, 277–297.

Torun, H. (2018): "Compulsory Schooling and Early Labor Market Outcomes in a Middle-Income Country," *Journal of Labor Research*, forthcoming.

Torun, H. and S. Tumen (2016): "The Impact of Compulsory Military Service Exemption on Education and Labor Market Outcomes: Evidence from a Natural Experiment," *Economics of Education Review*, 54, 16–35.

Waldinger, F. (2010): "Quality Matters: The Expulsion of Professors and the Consequences for Ph.D. Student Outcomes in Nazi Germany," *Journal of Political Economy*, 118, 787–831.

——— (2012): "Peer Effects in Science: Evidence from the Dismissal of Scientists in Nazi Germany," *Review of Economic Studies*, 79, 838–861.

——— (2016): "Bombs, Brains, and Science: The Role of Human and Physical Capital for the Creation of Scientific Knowledge," *Review of Economics and Statistics*, 98, 811–831.

Zurcher, E. J. (2004): *Turkey: A Modern History*, London, UK: I. B. Tauris.

Appendix A Formal Description of Counterfactual Density Estimations

The actual and counterfactual density estimates are obtained by the kernel density estimator proposed by DiNardo, Fortin, and Lemieux (1996). Let $W_1, \ldots, W_n$ be a random sample of size n, with weights $\theta_1, \ldots, \theta_n$ drawn from some distribution with an unknown density f. Its kernel density estimator is defined as follows:

$$\hat{f}_h(w) = \sum_{i=1}^{n} \frac{\theta_i}{qh} K\left(\frac{w - W_i}{h}\right), \tag{A.1}$$

where $q = \sum_{i=1}^{n} \theta_i$, h is bandwidth, and $K(\cdot)$ is the kernel function. We choose the HLFS analytic sampling weights in the estimation, because weights are rescaled so that $\sum_{i=1}^{n} \theta_i = n$.[19]

We adopt the notations and notions introduced in the original paper by DiNardo, Fortin, and Lemieux (1996). Each individual observation belongs to a joint distribution $F(w, d, z)$; where w is wage, d corresponds to individual-level attributes, and z is a time variable. The joint distribution of wages and individual attributes at a point in time is the conditional distribution $F(w, d|z)$. In that case, the density of wages at a point in time, $f_z(w)$, can be defined as the integral of the density of wages conditional on individual attributes and a time z_w, $f(w|d, z_w)$, over the distribution of the individual attributes at time z_d, $F(d|z_d)$, as follows;

$$f_z(w) = \int_{d \in \Omega_d} dF(w, d|z_{w,d} = z) = \int_{d \in \Omega_d} f(w|d, z_w = z) dF(d|z_d = z) = f(w; z_w = z, z_d = z), \tag{A.2}$$

where Ω_d is the domain of individual-level attributes. To be consistent with our notation, z is a binary variable taking 1 for the 40-45 sample and 0 for the 46-51 sample. Thus, the expression $f(w; z_w = 1, z_d = 1)$ represents the actual density of wages in the 40-45 sample, whereas $f(w; z_w = 1, z_d = 0)$ represents the counterfactual density of wages in the 40-45 sample, if the characteristics of these workers are the same as the 46-51 sample without changing the wage schedule observed for the 40-45 sample.[20]

Under the assumption that conditional density $f(w|d, z_w = 1)$ does not depend on the distribution of attributes, the counterfactual density $f(w; z_w = 1, z_d = 0)$ can be written as

$$f(w; z_w = 1, z_d = 0) = \int_{d \in \Omega_d} f(w|d, z_w = 1) dF(d|z_d = 0) = \int_{d \in \Omega_d} f(w|d, z_w = 1) \psi_d(d) dF(d|z_d = 1), \tag{A.3}$$

where the re-weighting function is $\psi_d(d) = dF(d|z_d = 0)/dF(d|z_d = 1)$. As in Equation (A.3), the counterfactual density is obtained by re-weighting the actual density. The conditional density of wages may depend on the distribution of attributes due to non-random selection. Therefore, we assume that the distribution of the unobserved attributes conditional on the observed attribute d is the same for the two groups, which means that the difference between the cohorts in the distribution of d can account for any difference between the cohorts in the marginal distribution of the vector of unobserved skills (Altonji, Bharadwaj, and Lange, 2012).

[19] This ensures that the software version (STATA) of kernel density estimation is compatible with the estimator proposed by DiNardo, Fortin, and Lemieux (1996).

[20] The general equilibrium effects are ignored.

After estimating $\widehat{\psi}_d(d)$, the counterfactual density is estimated by the weighted kernel method as follows:

$$\hat{f}(w; z_w = 1, z_d = 0) = \sum_{i \in I_1} \frac{\theta_i}{qh} \widehat{\psi}_d(d) K\left(\frac{w - W_i}{h}\right), \tag{A.4}$$

where I_1 is the set of indices for individuals of age 40-45. We want to estimate the effects of the decline in post-secondary educational attainment; so, we are interested in whether the individual finishes post-secondary education or not. The difference between the actual and counterfactual densities indicates the effect of a decline in post-secondary educational attainment on the distribution of wages within the treatment group.

The re-weighting function $\psi_d(d) = dF(d|z_d = 0)/dF(d|z_d = 1)$, by applying the Bayes' rule, can be rewritten as follows:

$$\psi_d(d) = \frac{\mathbb{P}[z_d = 0|d]}{\mathbb{P}[z_d = 1|d]} \cdot \frac{\mathbb{P}[z_d = 1]}{\mathbb{P}[z_d = 0]}. \tag{A.5}$$

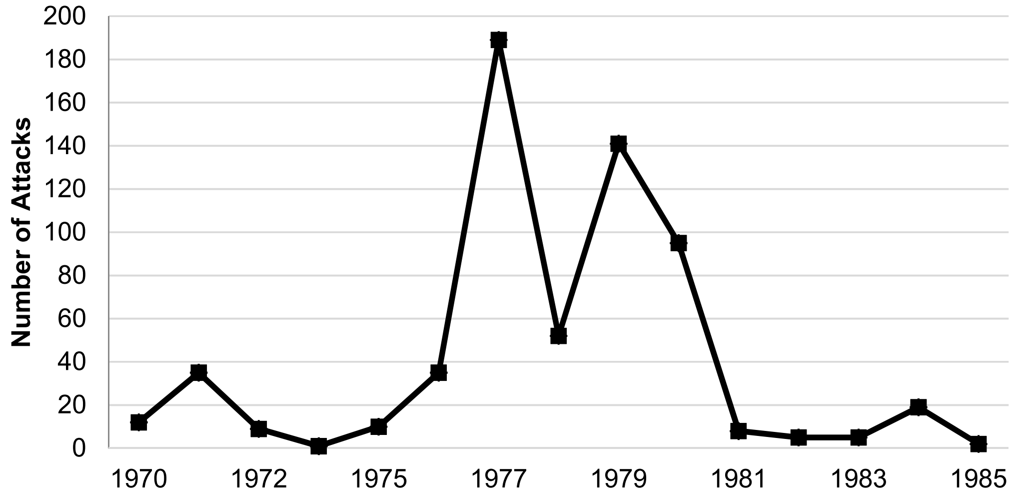

Figure 1: **Number of terrorist attacks in Turkey (1970-1985).** *Source:* National Consortium for the Study of Terrorism and Responses to Terrorism (START), 2016. Global Terrorism Database [GTD from 1970 to 1991]. Retrieved from https://www.start.umd.edu/Gtd.

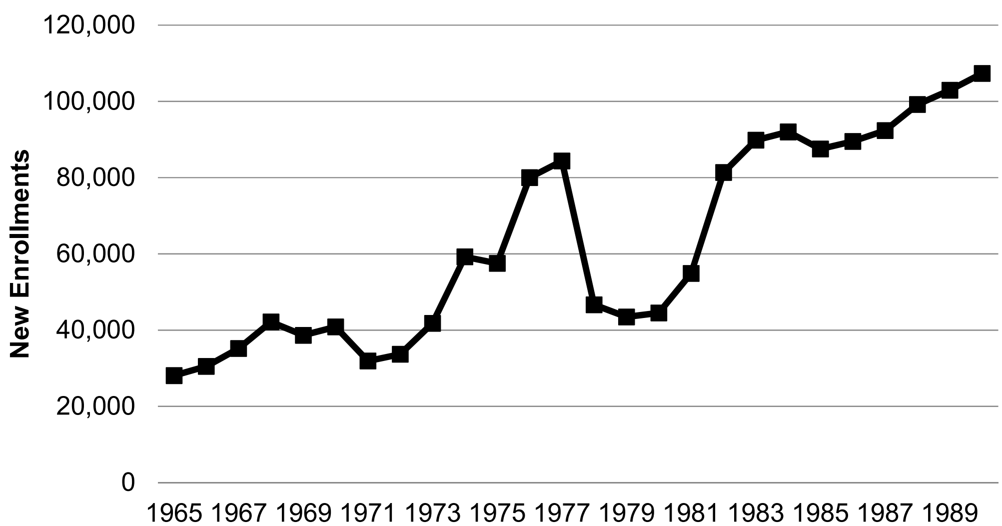

Figure 2: **New enrollments in all higher-education institutions in Turkey (1965-1990).** *Source:* Authors' calculations based on National Education Statistics compiled by TURKSTAT and Academic Year Higher Education Statistics compiled by OSYM.

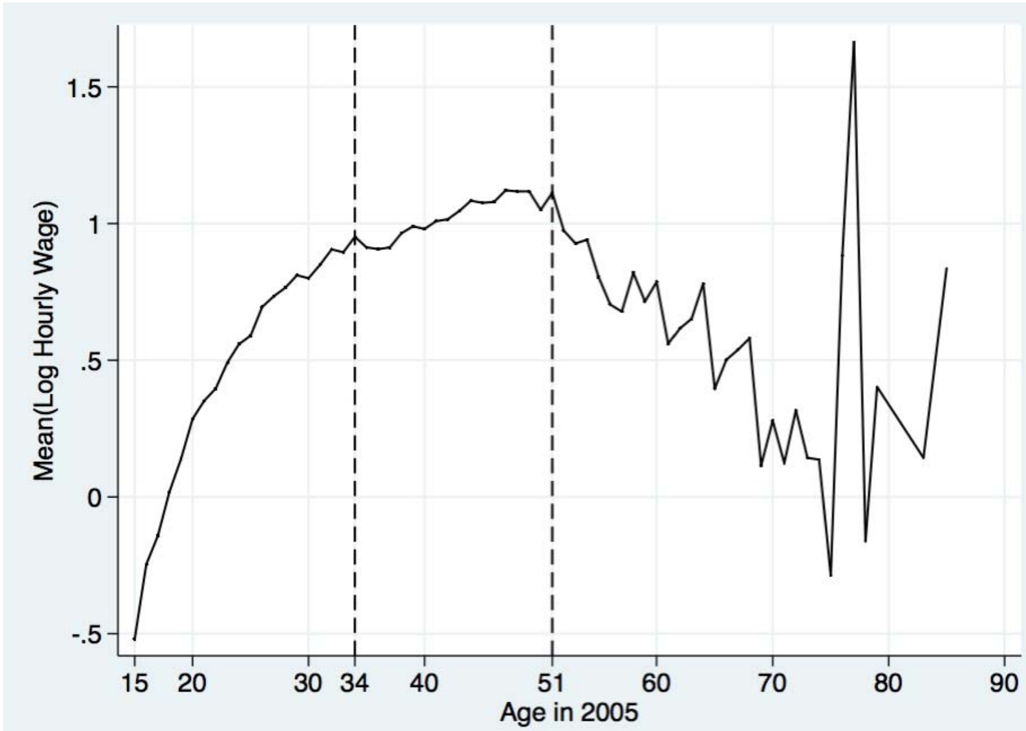

Figure 3: **Average log hourly wages for men by age.** *Source:* Authors' calculations based on the 2005 Turkish HLFS.

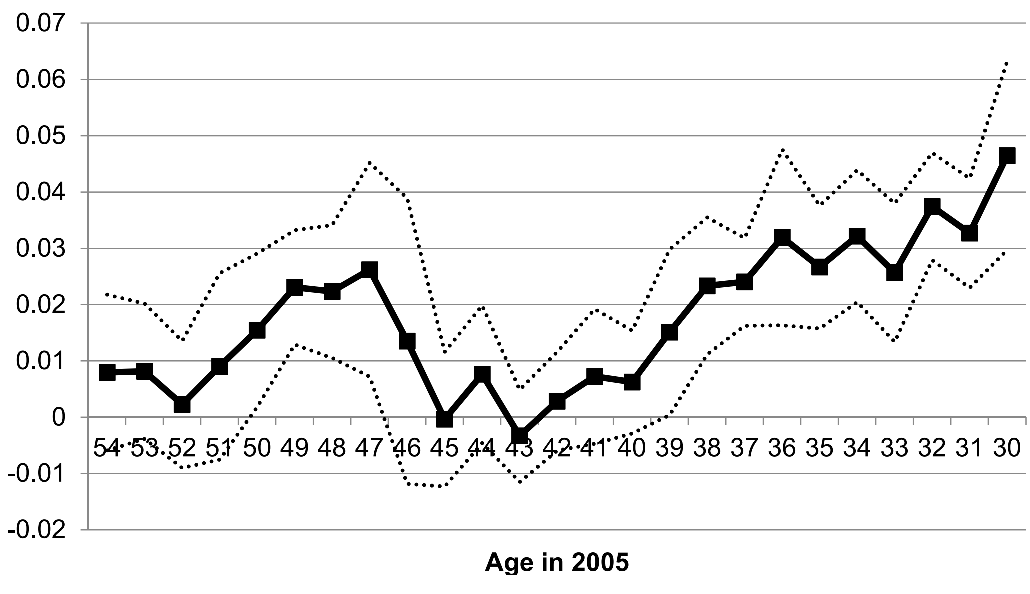

Figure 4: **Coefficients of age dummies – Probability of completing post-secondary education.** The specification includes region of residence, urban/rural, and gender dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

Figure 5: **Coefficients of age dummies – Probability of completing post-secondary education (men).** The specification includes region of residence and urban/rural dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

Figure 6: **Coefficients of age dummies – Probability of completing post-secondary education (women).** The specification includes region of residence and urban/rural dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

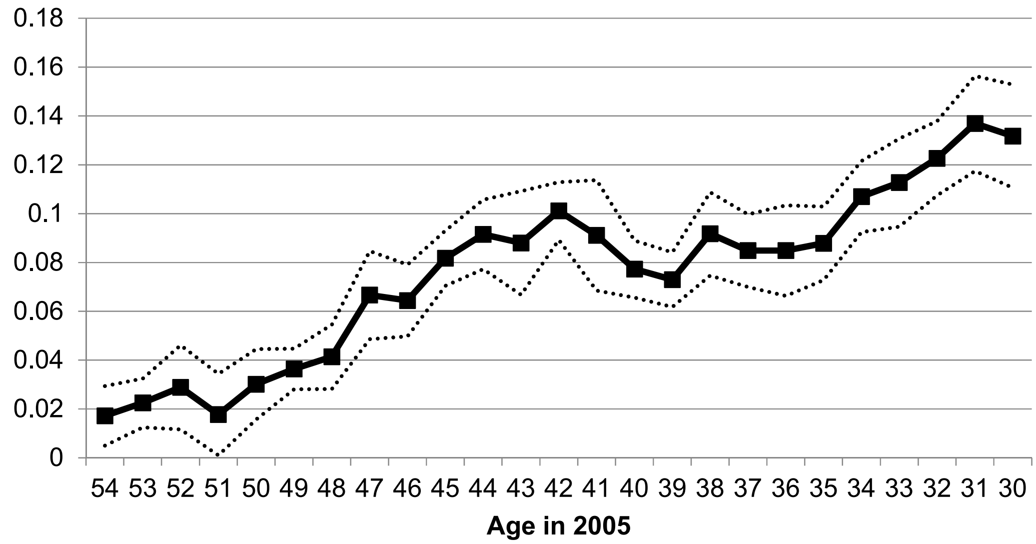

Figure 7: **Coefficients of age dummies – Probability of high school graduation.** The specification includes region of residence, urban/rural, and gender dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

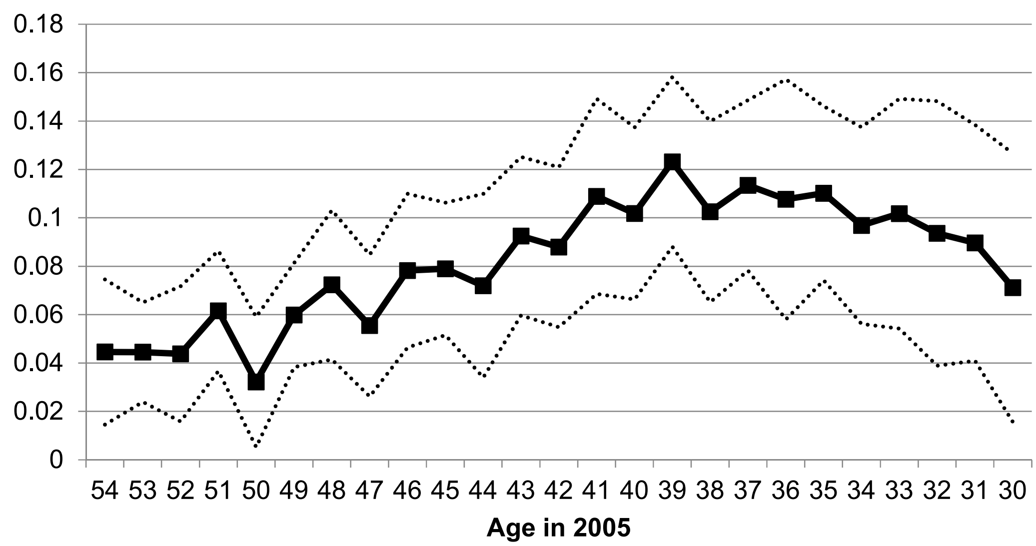

Figure 8: **Coefficients of age dummies – Probability of graduation from elementary/primary school.** The specification includes region of residence, urban/rural, and gender dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

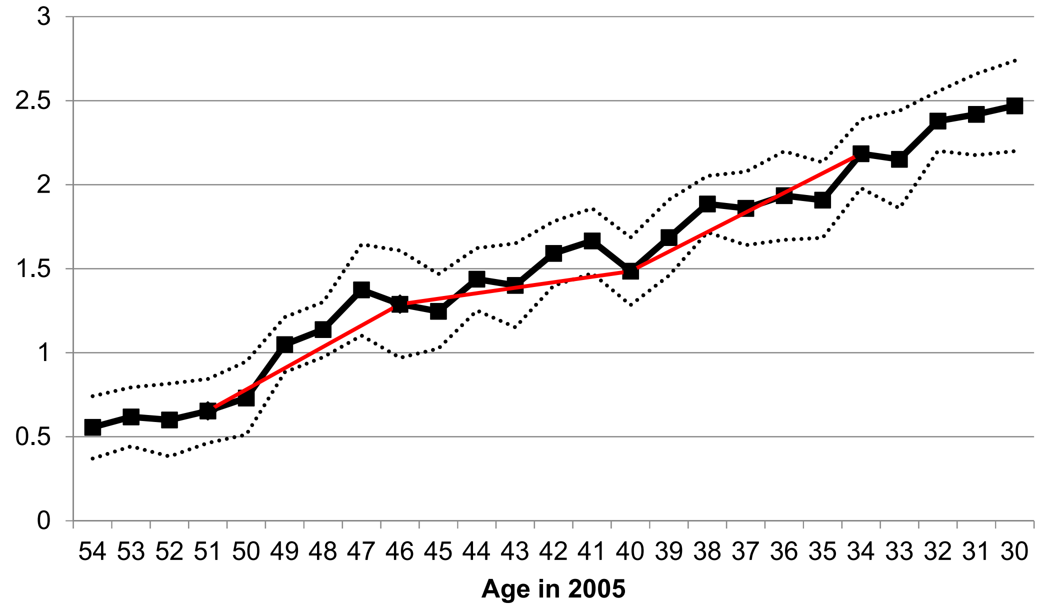

Figure 9: **Coefficients of age dummies – Years of schooling.** The specification includes region of residence, urban/rural, and gender dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

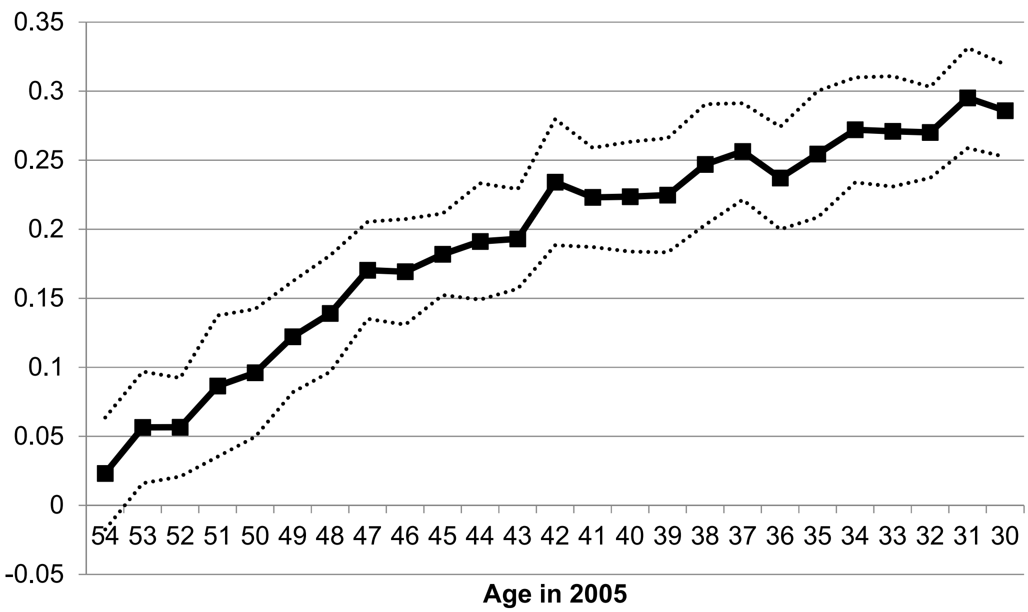

Figure 10: **Coefficients of age dummies – Probability of wage employment.** The specification includes region of residence, urban/rural, and gender dummies. Age 55 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

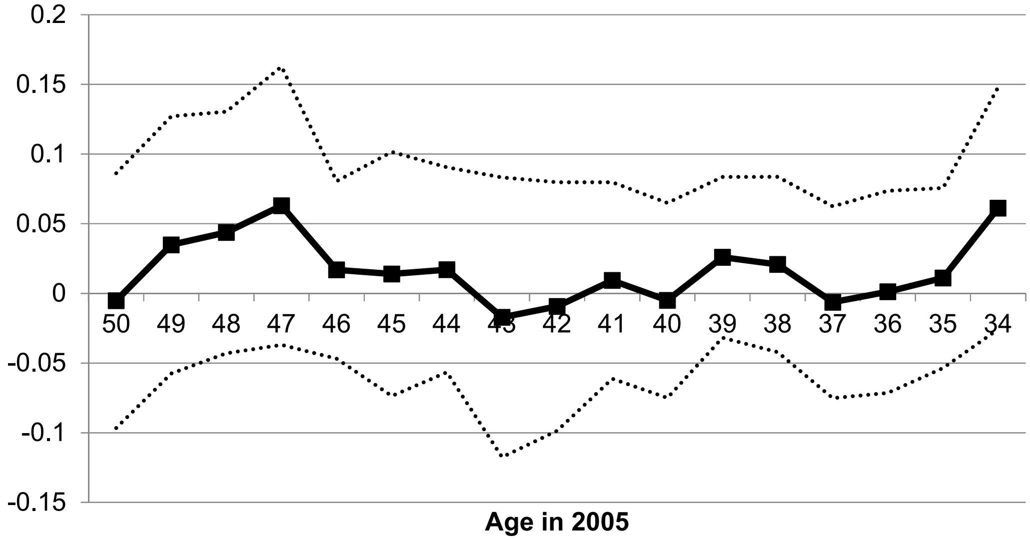

Figure 11: **Coefficients of age dummies – Log hourly wages (men).**The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

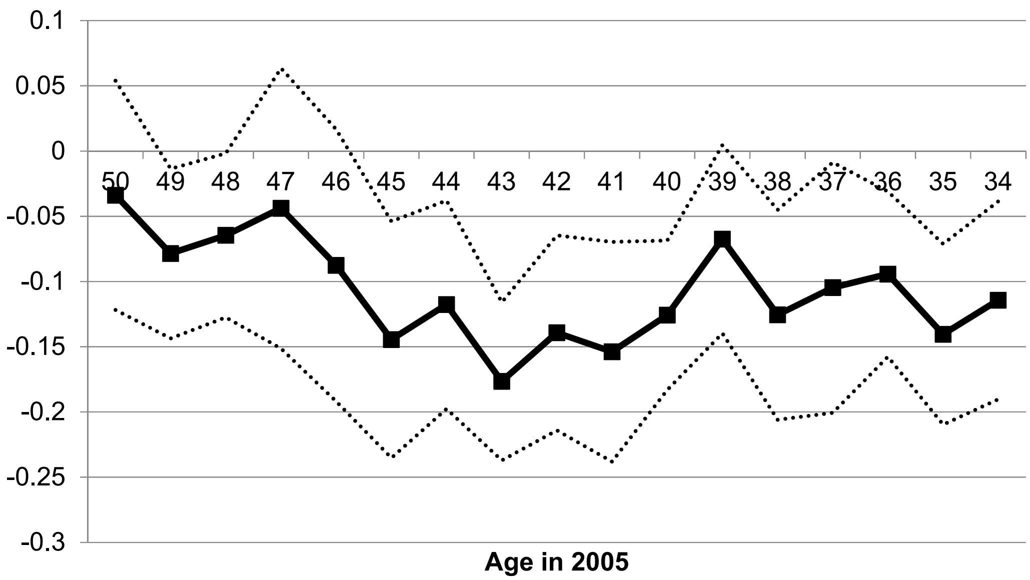

Figure 12: **Coefficients of age dummies – Log hourly wages for men with at least a high school degree.** The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

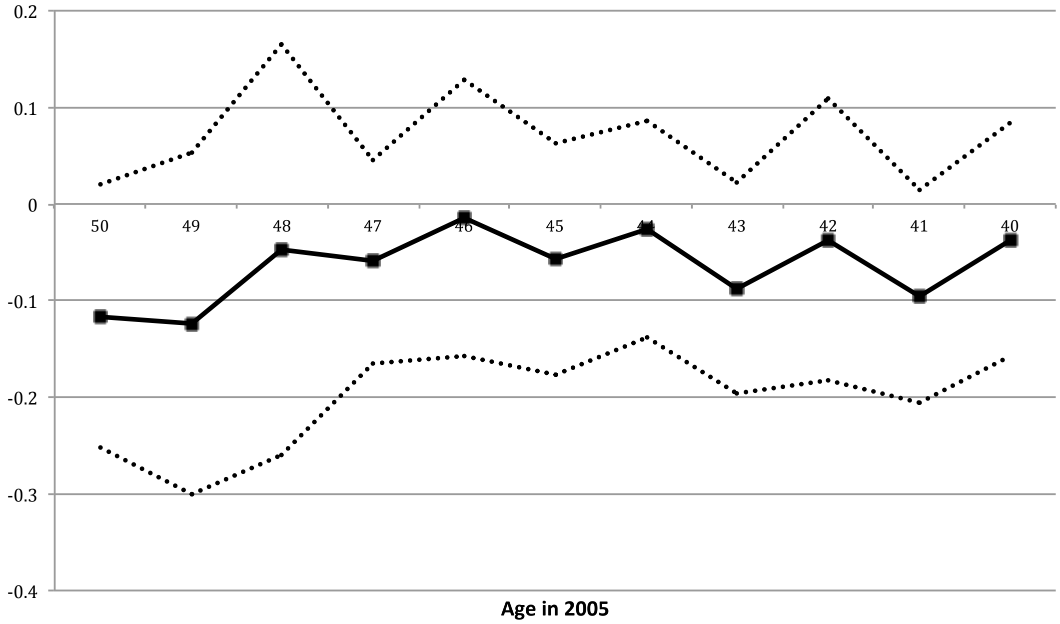

Figure 13: **Coefficients of age dummies – Log hourly wages for male wage earners having only a high school degree.** The sample includes male wage earners aged 40-51 having only high school degree. Log hourly wage is standardized to experience 26 years. The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

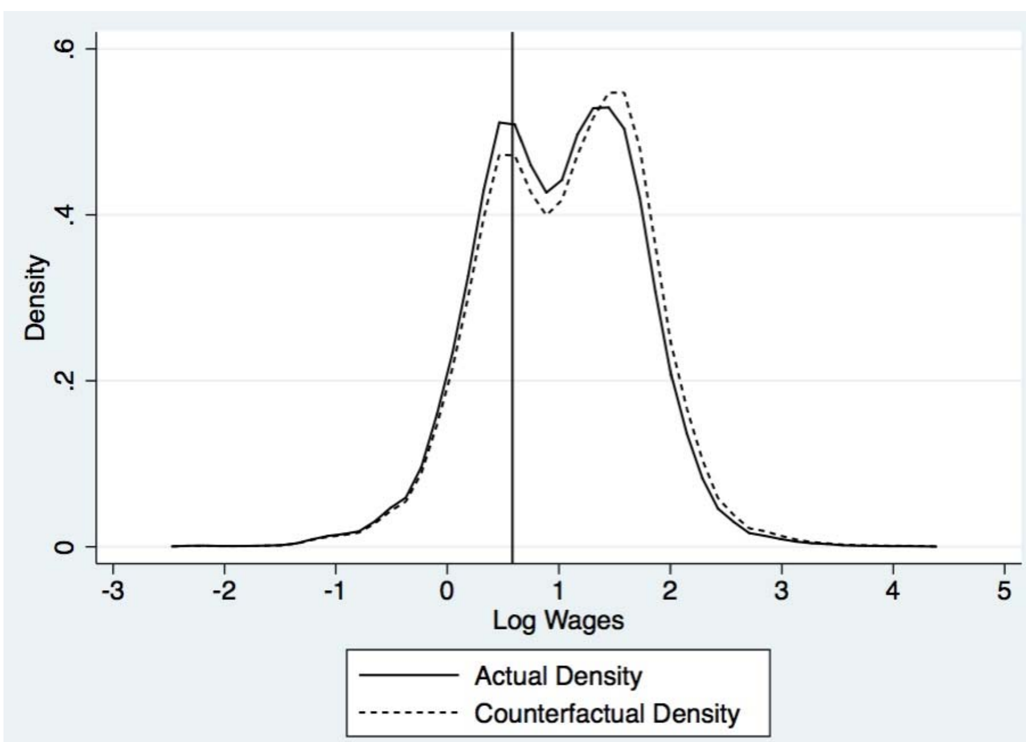

Figure 14: **Actual and counterfactual density of log wages for male individuals in the 40-45 age group.** The sample includes male wage earners of age 40-51. Observations are weighted using the sampling weights so that the results are nationally representative.

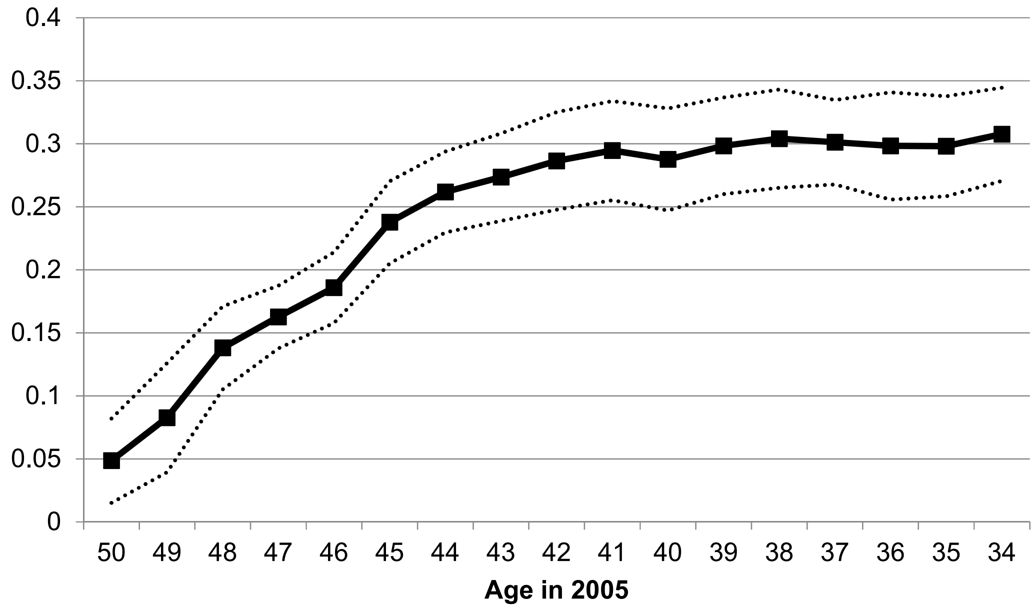

Figure 15: **Coefficients of age dummies – Probability of being in the labor force.** The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

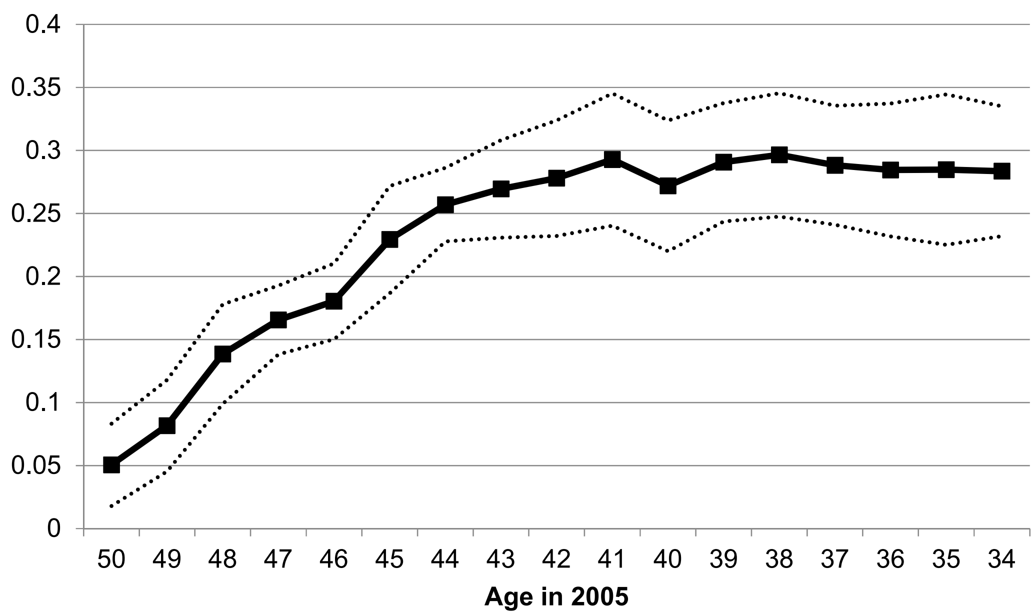

Figure 16: **Coefficients of age dummies – Probability of being employed.** The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

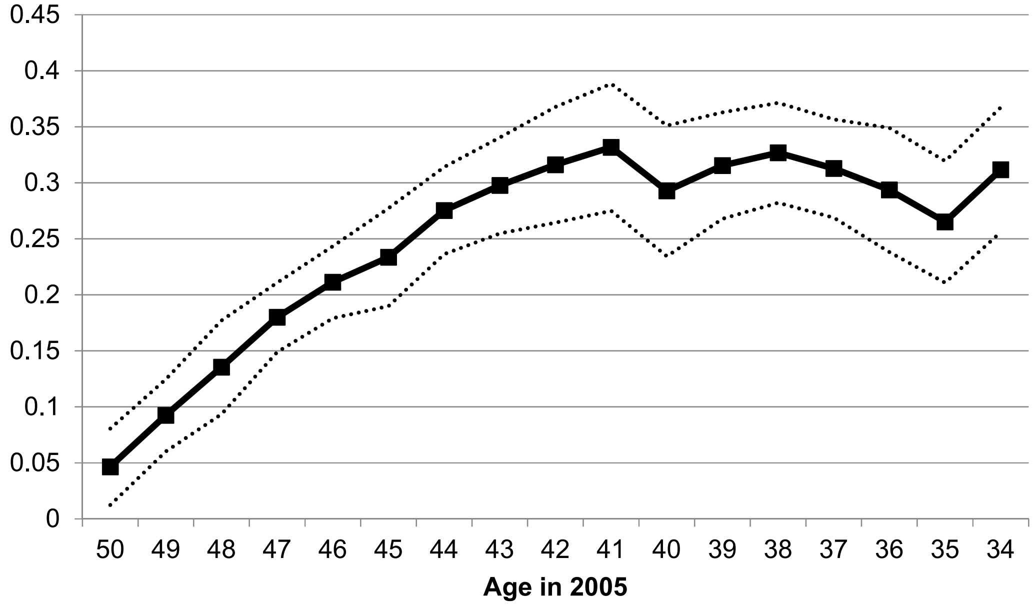

Figure 17: **Coefficients of age dummies – Probability of being formally employed.** The specification includes region of residence and urban/rural dummies. Age 51 is the omitted age category. Observations are weighted using the sampling weights so that the results are nationally representative. Dashed lines indicate the 95-percent confidence interval based on standard errors clustered at region level.

Average hours worked in the main bob by educational attainment in the sample of wage earners in Turkey

Educational attainment	# of observations	Mean
No schooling	3,305	55.3
Primary school (5 years)	26,065	55.5
Elementary school (8 years)	11,046	54.9
High school	19,498	51.8
Post-secondary degree	13,396	44.1

Table 1: **Source:** Authors' calculations based on the 2005 HLFS. Observations are weighted using the sampling weights so that the results are nationally representative.

Descriptive statistics for individuals of age 34-51

Variables	Mean
Primary or elementary sch. grad. rate	0.63
High sch. grad. rate	0.14
Post-secondary sch. grad. rate	0.08
Years of schooling	6.36
Labor force participation	0.58
Employment rate	0.54
Sample size	115,410

Table 2: Observations are weighted using the sampling weights so that the results are nationally representative.

Difference in the probability of graduation between the 40-45 and 46-51 age groups

	Dependent variable		
	Post-secondary	**High school**	**Primary/Elementary**
	Degree==1 Otherwise==0	Degree==1 Otherwise==0	Degree==1 Otherwise==0
	[1]	[2]	[3]
Age 40-45	-0.0148***	0.0450***	0.0325***
	(0.0051)	(0.0027)	(0.0092)
# of obs.	74,903	74,903	74,903
R^2	0.0364	0.0375	0.0524

Table 3: The specification includes 26 NUTS2 region of residence, urban/rural and gender dummies. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

The effect of the turmoil on the probability of completing post-secondary education

	Dependent variable: Post-secondary degree==1; Otherwise==0					
	Total		**Men**		**Women**	
	[1]	[2]	[1]	[2]	[1]	[2]
Age 40-45	-0.0587***	-0.0084**	-0.0664***	-0.0102	-0.0147	-0.0031
	(0.0075)	(0.0034)	(0.0114)	(0.0065)	(0.0247)	(0.0053)
# of obs.	18,730	18,852	15,827	12,798	2,903	6,054
R^2	0.0476	0.0570	0.0298	0.0474	0.0780	0.1077

Table 4: Region of residence and urban/rural dummies are included in all regressions. A gender dummy is also included for the total sample estimations. Columns [1] and [2] in each of the three separate regressions present results for wage earners and non-wage earners, respectively. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

The effect of the turmoil on the probability of completing post-secondary education, years of schooling, and wage

	Dependent variable								
	Post-secondary degree			**Years of schooling**			**Log hourly wage**		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Instrument (z_i)	-0.0696***	-0.0690***	-0.0664***	-0.2765***	-0.2575***	-0.2233**	-0.0351**	-0.0329*	-0.0259
	(0.0117)	(0.0119)	(0.0114)	(0.0914)	(0.0915)	(0.0881)	(0.0162)	(0.0164)	(0.0162)
Region of residence	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Urban/rural status	No	No	Yes	No	No	Yes	No	No	Yes
# of observations	15,827	15,827	15,827	15,827	15,827	15,827	15,827	15,827	15,827

Table 5: The sample includes male wage earners aged 40-51. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Comparisons of age groups
for male wage earners

	[1]	[2]	[3]	[4]	[5]
Age 34-39	10,774	1.023	8.363	0.166	0.228
Age 40-45	10,105	1.002	8.198	0.142	0.243
Age 46-51	5,722	1.037	8.475	0.211	0.195

Table 6: Columns [1] - number of observations; Column [2] - mean log hourly wage, Column [3] - mean years of schooling; Column [4] - mean post-secondary attainment rate; Column [5] - mean high school completion rate. Observations are weighted using the sampling weights so that the results are nationally representative.

OLS and 2SLS estimates of the returns to education

	Dependent variable: Log hourly wage		
	[1]	[2]	[3]
Panel A: Just-identified models			
OLS	0.1123***	0.1125***	0.1110***
	(0.0045)	(0.0041)	(0.0039)
2SLS	0.1271**	0.1278**	0.1161*
	(0.0537)	(0.0592)	(0.0673)
Cragg-Donald Wald F-statistics	17.74	15.68	11.97
(Excluded instrument)			
Panel B: Over-Identified Models			
2SLS	0.1331***	0.1382**	0.1281**
	(0.0477)	(0.0566)	(0.0641)
LIML	0.1341***	0.1399**	0.1295*
	(0.0498)	(0.0604)	(0.0691)
Cragg-Donald Wald F-statistics	3.60	3.05	2.41
(Excluded instrument)			
P-Value Hansen's Test	0.91	0.88	0.92
Region of residence	No	Yes	Yes
Urban/rural status	No	No	Yes
# of observations	15,827	15,827	15,827

Table 7: The sample includes male wage earners aged 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

OLS and 2SLS estimates of the returns to education

	Dependent variable: Log monthly wage		
	[1]	[2]	[3]
Panel A: Just-identified models			
OLS	0.0829***	0.0837***	0.0820***
	(0.0028)	(0.0023)	(0.0021)
2SLS	0.0981**	0.1036**	0.0912
	(0.0447)	(0.0510)	(0.0578)
Cragg-Donald Wald F-Statistics	17.74	15.68	11.97
(Excluded instrument)			
Panel B: Over-identified models			
2SLS	0.1022***	0.1111**	0.1002*
	(0.0390)	(0.0484)	(0.0552)
LIML	0.1053**	0.1142**	0.1028
	(0.0451)	(0.0540)	(0.0631)
Cragg-Donald Wald F-Statistics	3.60	3.05	2.41
(Excluded instrument)			
P-Value Hansen's Test	0.52	0.80	0.84
Region of residence	No	Yes	Yes
Urban/rural status	No	No	Yes
# of Observations	15,827	15,827	15,827

Table 8: The sample includes male wage earners aged 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

OLS and 2SLS estimates of the returns to college

	Dependent variable: Log hourly wage		
	[1]	[2]	[3]
Panel A: Just-identified models			
OLS	0.5022***	0.5062***	0.5025***
	(0.0320)	(0.0304)	(0.0311)
2SLS	0.5795***	0.5790***	0.5716***
	(0.0965)	(0.0935)	(0.0935)
Cragg-Donald Wald F-Statistics	139.54	142.56	140.13
(Excluded instrument)			
Panel B: Over-identified models			
2SLS	0.5688***	0.5659***	0.5588***
	(0.0887)	(0.0855)	(0.0841)
LIML	0.5704***	0.5676***	0.5605***
	(0.0908)	(0.0880)	(0.0865)
Cragg-Donald Wald F-Statistics	25.01	25.51	25.15
(Excluded instrument)			
P-Value Hansen's Test	0.87	0.80	0.80
Region of residence	No	Yes	Yes
Urban/rural status	No	No	Yes
# of observations	6,309	6,309	6,309

Table 9: The sample includes male wage earners aged 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

OLS and 2SLS estimates of the returns to education with adjusted missing wages

	Dependent variable: Log hourly wage			
	Additional years of schooling		**Post-secondary education**	
	With missing values	Adjusted for missing values	With missing values	Adjusted for missing values
	[1]	[2]	[3]	[4]
Panel A: Just-identified models				
OLS	0.1110***	0.1112***	0.5025***	0.5037***
	(0.0039)	(0.0039)	(0.0311)	(0.0310)
2SLS	0.1161*	0.1119	0.5716***	0.5744***
	(0.0673)	(0.0709)	(0.0935)	(0.0935)
Cragg-Donald Wald F-Statistics	11.97	11.03	140.13	
(Excluded instrument)				
Panel B: Over-identified models				
2SLS	0.1281**	0.1255*	0.5588***	0.5601***
	(0.0641)	(0.0310)	(0.0841)	(0.0837)
LIML	0.1295*	0.1268*	0.5605***	0.5618***
	(0.0691)	(0.0726)	(0.0865)	(0.0861)
Cragg-Donald Wald F-Statistics	2.41	2.25	25.15	25.04
(Excluded instrument)				
P-Value Hansen's Test	0.92	0.91	0.80	0.80
Region of residence	Yes	Yes	Yes	Yes
Urban/rural status	Yes	Yes	Yes	Yes
# of observations	15,827	15,827	6,309	6,309

Table 10: The sample includes male wage earners aged 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

OLS and 2SLS estimates of the returns to education with different samples

	Dependent variable: Log hourly wage							
	Additional years of schooling				Post-secondary education			
	40-45 46-51 [1]	41-45 47-51 [2]	42-45 47-50 [3]	43-45 47-49 [4]	40-45 46-51 [5]	41-45 47-51 [6]	42-45 47-50 [7]	43-45 47-49 [8]
Panel A: Just-identified models								
OLS	0.1110***	0.1106***	0.1117***	0.1108***	0.5025***	0.5145***	0.5152***	0.5105***
	(0.0039)	(0.0037)	(0.0037)	(0.0038)	(0.0311)	(0.0333)	(0.0367)	(0.0342)
2SLS	0.1161*	0.1370	0.1280*	0.1116*	0.5716***	0.5148***	0.4698***	0.4855***
	(0.0673)	(0.0895)	(0.0758)	(0.0637)	(0.0935)	(0.0690)	(0.0802)	(0.1016)
Cragg-Donald Wald F-Statistics	11.97	7.40	10.19	16.13	140.13	181.59	144.01	94.10
(Excluded instrument)								
Panel B: Over-identified models								
2SLS	0.1281**	0.1499*	0.1384**	0.1192**	0.5588***	0.5078***	0.4774***	0.5039***
	(0.0641)	(0.0839)	(0.0699)	(0.0578)	(0.0841)	(0.0716)	(0.0827)	(0.1032)
LIML	0.1295*	0.1532*	0.1404*	0.1194**	0.5605***	0.5076***	0.4767***	0.5037***
	(0.0691)	(0.0909)	(0.0749)	(0.0594)	(0.0865)	(0.0731)	(0.0840)	(0.1053)
Cragg-Donald Wald F-Statistics	2.41	1.88	3.00	5.93	25.15	37.43	36.65	31.97
(Excluded instrument)								
P-Value Hansen's Test	0.92	0.92	0.80	0.80	0.80	0.72	0.71	0.61
Region of residence	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Urban/rural status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	15,827	12,604	10,126	7,502	6,309	5,042	4,093	3,088

Table 11: The sample includes male wage earners of age 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

OLS and 2SLS estimates of the returns to education using more HLFS waves

	Dependent variable: Log hourly wage			
	Additional years of schooling		Post-secondary education	
	2005	2005-2008	2005	2005-2008
	[1]	[2]	[3]	[4]
Panel A: Just-identified models				
OLS	0.1110***	0.1115***	0.5025***	0.5373***
	(0.0039)	(0.0024)	(0.0311)	(0.0305)
2SLS	0.1161*	0.1081**	0.5716***	0.4997***
	(0.0673)	(0.0517)	(0.0935)	(0.0733)
Cragg-Donald Wald F-Statistics	11.97	42.49	140.13	301.86
(Excluded instrument)				
Panel B: Over-identified models				
2SLS	0.1281**	0.1203***	0.5588***	0.5354***
	(0.0641)	(0.0424)	(0.0841)	(0.0801)
LIML	0.1295*	0.1216**	0.5605***	0.5353***
	(0.0691)	(0.0486)	(0.0865)	(0.0812)
Cragg-Donald Wald F-Statistics	2.41	9.02	25.15	55.76
(Excluded instrument)				
P-Value Hansen's Test	0.92	0.74	0.80	0.81
Region of residence	Yes	Yes	Yes	Yes
Urban/rural status	Yes	Yes	Yes	Yes
# of observations	15,827	53,867	6,309	21,717

Table 12: The sample includes male wage earners of age 40-51. In just-identified models, a dummy for individuals of age 40-45 is used as instrument. In over-identified models, six age dummies in the 40-45 age group are used as instruments. Observations are weighted using the sampling weights so that the results are nationally representative. Standard errors, clustered at region level, are reported in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Classification of occupations and their percentages in age groups

		Percentage in age group		
ISCO-88 codes	Classification	34-39	40-45	46-51
12, 21, 22, 23, 24	Corp. managers and professionals (1.53<log wage<2.07)	13.73	12.00	18.68
31, 32, 33, 34, 41, 42	Technicians, assoc. professionals & clerks (1.29<log wage<1.45)	15.12	17.39	16.66
11, 13, 51, 72, 81	Average wage earners (0.92<log wage<1.10)	20.32	20.72	18.40
71, 73, 82, 83, 91	Between min. wage & av. wage (0.69<log wage<0.87)	33.29	34.37	31.28
52, 61, 62, 74, 92, 93	Approx. less than min. wage (log wage<0.61)	17.54	15.52	14.98

Table 13: Log (hourly) wages in this table are the means in the corresponding broadly-defined occupation group.