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TURKEY DURING THE GREAT RECESSION:
A CASE OF PRO-CYCLICAL ENROLLMENT**

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Post-Compulsory Schooling of Youth in Turkey during the Great Recession: A Case of Pro-cyclical Enrollment

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Abstract

The impact of recessions on school enrollment is ambiguous. On one hand, recessions might increase the likelihood of enrollment due to decreasing opportunity costs of attending school. On the other hand, recessions might discourage enrollment due to reductions households have in funds available for education and deteriorating expectations about returns to education. In this paper, we empirically analyze how local unemployment rates affect enrollment decisions in Turkey during the period covering the Great Recession of 2008-2009. Our estimates show that the likelihood of enrollment in university undergraduate programs decreases during periods of and in regions experiencing higher unemployment, whereas the enrollment in high schools is not affected. This finding contradicts earlier findings of counter-cyclical enrollment in the context of developed countries. This contrast highlights the variations in the relative importance of the effect of income and expectations and in the potential long-term effects of recessions across countries. In particular, recessions might have longer-lasting negative effects in developing countries due to their adverse effect on human capital accumulation.

Keywords: The Great Recession, School enrollment, Human capital accumulation, Unemployment, Turkey

JEL codes: E24, E32, I20, J24

1. Introduction

The effect of recessions on school enrollment is ambiguous in theoretical terms. Human capital theory suggests that decisions about human capital investment are made by comparing the marginal costs and benefits of such investment (Becker 1975). The marginal costs of obtaining more schooling are the foregone wages that could have been otherwise earned in the labor market, and school-related expenses, such as tuition fees. The marginal benefit of attending school is the expected increase in wages that would be realized after obtaining the pursued educational credentials. Recessions potentially affect schooling decisions in two ways. The first is that during recessions it becomes more difficult to find jobs and the available jobs are poorly paid. Thus, the opportunity cost of education, which is foregone earnings, is lower during recessions. This leads to an increase in the likelihood of enrollment and is referred as the substitution effect. Secondly, average income declines during recessions, and financing education might become more difficult. This leads to lower likelihood of enrollment during recessions, and we refer to it as the income effect. In addition, expectations about returns to education might be also negatively affected during recessions. Even though the lower opportunity cost of education incentivizes enrollment, the depressed expectations about the benefits of that education potentially reduce this incentive. Thus, the net effect of recessions on enrollment depends on the relative strength of the combined effect of lower income and deteriorating expectations about returns to education compared to that of the substitution effect.

Given the ambiguous theoretical implications of recessions on enrollment, we conduct an empirical exploration of this relationship in the context of Turkey. To do so, we estimate a probit model of enrollment at various levels and in various types of studies beyond compulsory primary school by employing the Turkish Household Labor Force Survey (THLFS) data for the 2004-2012 period. This period covers the Great Recession of 2008-2009, which adversely affected many economies around the world, and Turkey was no exception. In particular, the real GDP per capita decreased by 6.0% (World Bank, 2021) and the unemployment rate increased by 3.1 percentage points in 2009 (TURKSTAT, 2021). In our empirical strategy, we use the regional and time variations in unemployment rates observed during that period as a measure of the severity of recessions. We assess the effect of higher unemployment on the likelihood of enrollment at various levels of education for young people in Turkey.

Our estimates show that the likelihood of enrollment in university undergraduate programs is lower for periods and regions with higher unemployment rates, whereas the likelihood of enrollment in general or vocational high schools are not affected. The adverse effect of unemployment on undergraduate enrollment is observed even after controlling for parental employment and income. This finding suggests that deteriorating expectations about returns to education and increasing risks of experiencing unemployment for parents are potential reasons for the estimated pro-cyclicality of undergraduate enrollment among youth in Turkey.

Most studies in the context of developed countries find that enrollment in high schools and universities increases during recessions when the unemployment rate is higher (i.e., enrollment is counter-cyclical). A number of studies analyze the effects of country-specific recessions in developing countries mostly on primary schooling, and they find mixed evidence about the cyclicity of enrollment. Our study contributes to this literature by analyzing the effect of the Great Recession on the likelihood of enrollment at various levels and in various types of schooling beyond compulsory primary level in a developing country, namely, Turkey. The relative importance of the contrasting effects of recessions on enrollment might be different across different settings. Indeed, our findings suggest that, unlike in developed countries, the negative income effect of the economic downturn and increasing pessimism about returns to education might outweigh the advantage of a lower opportunity cost of schooling during recessions in a country where the return to education is low (Aydemir and Kirdar 2017) and admission to university programs requires a lengthy and costly preparation process (Tansel and Bircan 2006).

Our finding of lower probability of enrollment in universities during times of higher unemployment has a number of negative implications. First, in the case of lower enrollment, the opportunity to expand human capital during economic downturns and, consequently, to achieve higher rates of economic growth in future is lost. Second, not increasing human capital during the periods of higher unemployment leads to a higher possibility of future labor-market scarring for the young. Scarring might occur because some human capital will be lost during long unemployment spells and not replacing that loss with further skill acquisitions may have longer lasting negative effects on the chances of finding a job.

This paper proceeds as follows. The next section discusses the relevant literature and explains the education system in Turkey. Section 3 describes data and empirical methodology; Section 4 discusses results; and Section 5 presents the conclusion.

2. Research Background

2.1 Literature

Most studies in the context of developed countries find that enrollment in post-secondary education is counter-cyclical (i.e., higher during the times of higher unemployment rate). For instance, Dellas and Sakellaris (2003) found that in response to a one percentage point increase in unemployment rate, enrollment among 18 to 22-year-olds increased by 2% between 1968 and 1988 in the United States. Betts and McFarland (1995) identified even larger impact of rising unemployment on enrollment in community colleges in the United States. Analyzing schooling and training decisions by using panel data, Mendez and Sepulveda (2012) also found a counter-cyclical relationship for schooling in the U.S. context. They also showed that self-financed training is counter-cyclical. Long (2014) found that the part-time college attendance increased in the United States during the Great Recession, particularly in regions that were severely affected. Barr and Turner (2015) also showed that enrollment in universities increased in the Great Recession period and was associated with generous unemployment benefit policies. Alessandrini (2018) analyzed Canadian data and found that the effects of high unemployment rates on enrollment is heterogeneous. In particular, she concludes that enrollment in universities rather than in community colleges increases in periods of high unemployment. In the context of the Great Recession, Adamopoulou and Tanzi (2017) found that the drop-out probability from university programs in Italy decreased with high unemployment rates. Studies analyzing enrollment in high schools in developed countries also found evidence for counter-cyclicity of enrollment (see Petrongolo and Segundo 2002 for Spain, Clark 2011 for the United Kingdom).

A related strand of the literature analyzes the relationship between enrollment and recessions in the context of developing countries mostly in Latin America, and their empirical findings are mixed. Most of these studies exploit variations in parental income or employment status resulting from the analyzed recession to understand its impact on school enrollment. For instance, Rucci (2003) studied Argentina between 1998 and 2002. She found that a decline in real household income during the recession has led to a decline in the probability of 12 to 17-year-olds attending

school. Schady (2004) studied the economic crisis of 1988-1992 in Peru and found no effect of crisis on school attendance but a positive effect on educational attainment. Skoufias and Parker (2006) analyzed the 1995 Mexico Peso crisis and showed that the school attendance of 12 to 19-year-old females was negatively affected by the head of the household's unemployment, yet there was no effect on the males of the same age group. On the other hand, in the same context, McKenzie (2003) found a counter-cyclical in enrollment in Mexico. Analyzing the effects of the 1998 economic crisis in Indonesia, Thomas et al. (2004) found that particularly poor households cut their spending on education in response to recession, and that this reduction adversely affected the enrollment of children with older siblings who were currently enrolled. Unlike these earlier studies, our paper focuses on the effects of a recession on enrollment during a more recent period and also analyzes enrollment in schooling beyond the compulsory levels.

A few studies analyze the effect of recessions on human capital accumulation with data from various countries. Heylen and Pozzi (2007) analyzed the effects of inflation crises on human capital accumulation in the 1970-2000 period for 86 countries. They found supporting evidence for counter-cyclical by analyzing the relationship between crises and changes in the stock of human capital which was measured by total years of schooling. Ayllon and Nollanberger (2021) analyzed the effect of higher unemployment rates on the likelihood of school enrollment for young people in 28 European countries during the Great Recession. Although their main result confirms the counter-cyclical enrollment patterns, they also state that university enrollment is pro-cyclical (i.e., lower during times of higher unemployment) for the lowest income bracket and for students from disadvantaged backgrounds. Ferreira and Schady (2009) in their survey article indicate that education outcomes are counter-cyclical in rich countries but pro-cyclical in poor countries, while results are mixed for middle income countries. All this evidence implies that the effect of crisis on enrollment might differ across countries. In developing countries, the income effect and changes in perception about returns to education might be more dominant than the substitution effect. Such conditions suggest a pro-cyclical enrollment pattern in times of recession. Our study directly tests this hypothesis in the context of Turkey, which is classified as an upper-middle income country by the World Bank.

Our paper also relates to studies analyzing determinants of schooling in Turkey. Most studies in this literature focus on primary schooling. For instance, Kirdar (2009) analyzed whether ethnic

disparities exist in enrollment of 8 to 15-year-olds, while Dayioglu et al. (2009) investigated the role of sibship size, birth order and sex composition in enrollment. Kirdar et al. (2015) also explored heterogeneities in the effect of the extension of the length of compulsory schooling to eight years on enrollment by gender and rural/urban residence. A few more recent studies focus on the effect of the increasing number of Turkish universities on enrollment. Polat (2017) explored heterogeneities in the effect of this expansion across regions, whereas Caner et al. (2019) focused on its effect by gender. Our study contributes to this literature by analyzing the impact of local labor market conditions, as measured by unemployment rates, on enrollment at high schools and universities.

2.2 The Education System in Turkey

Turkey used to rank below the OECD average as far as enrollment rates are concerned. For instance, in 2000, only 28% of the population of 15 to 19-year-olds were enrolled in Turkey (OECD, 2002). Several education reforms were enacted over time to increase the educational attainment of young citizens in Turkey. In particular, in 1997, the duration of compulsory schooling was extended from five to eight years along with the allocation of more resources to expand the enrollment capacity of schools (Aydemir and Kirdar 2017). The duration of compulsory schooling was extended once more in 2012 from eight to twelve years. As a result of these efforts, the enrollment rate in primary and secondary (high) schools has increased noticeably over time in Turkey and approached the OECD average.¹

Both public and private schooling options have long been available at all levels of schooling in Turkey, and the enrollment of students in primary and high schools is not subject to constraints on the supply side. For each student who wants to enroll in primary school (up to eight years since 1997), the Turkish government provides a place in a public school that is in the neighborhood where the student lives. In order to allocate places in high schools, the Turkish government organizes a centralized exam. Students who perform well in this exam are given a

¹ More specifically, 80% of the population of 5 to 14-year-olds were enrolled in primary school in Turkey as of 2000 following the 1997 compulsory schooling reform (OECD, 2002). This rate increased to 95% in 2015 and approached the OECD average of 98% (OECD, 2018). Enrollment at high schools has also increased considerably over time. In 2012, the last year before the extension of compulsory schooling to twelve years came into effect, the enrollment rate was 59% (OECD, 2014), and reached 71% in 2015 (OECD, 2018). However, despite this improvement, the enrollment rate of 15 to 19-year-olds was still lower than the OECD average for the corresponding age group, which was 85% as of 2015 (OECD, 2018).

chance to enroll in vocational high schools or general high schools that are specialized in certain subjects. The remaining students are provided with places in other general high schools.

Unlike primary and high schools, the enrollment capacity of universities in Turkey has been limited. Students are admitted to university programs based on their performance in a centralized exam. Before the exam, both public and private universities announce quotas for admissions to their programs. After the exam, students, based on their exam scores and the program quotas, send their preferences to the national placement center. The placement center ranks students according to their exam scores and places them into their most preferred programs subject to the availability of places. Students who therefore fail to perform sufficiently well in the exam cannot enroll in universities.

The costs of attendance differ between public and private universities. Although private universities have lower cut-off scores in the centralized entrance exam for admitting students, they charge significantly higher tuition fees. On the other hand, tuition fees are relatively lower at public universities, but admission to these universities requires a better performance in the entrance exam.² To be admitted to public universities, students have to be well prepared for the exam. As a consequence, private tutoring centers that prepare students for the exams have become prevalent, but these centers are expensive and usually out of reach for low-income households (Tansel and Bircan 2006).

The capacity of higher education system in Turkey has expanded over time. In 2004, Turkey had a total of 77 universities. From 2005 to 2015, 54 public universities, 48 private universities, and 14 private vocational higher education institutions were founded. According to data from the Council of Higher Education (CoHE), 720 thousand students were enrolled in the undergraduate programs of these newly-established universities in 2015. The enrollment capacity of existing universities has also increased over the same period. In 2005, 1 million 226 thousand students were enrolled in previously-established universities, while this number increased to 2 million 218 thousand students in 2015.³ Despite enormous expansion in the higher education system in

² Tuition fees in public universities were abolished in 2013.

³ We tabulate these statistics based on data obtained from the Information Management System of the CoHE, which provides the number of enrolled students at each university each year. We exclude the students enrolled at Anadolu University, because it operates remote-study programs that educate a large number of students. 1 million 667 thousand students were enrolled in undergraduate-level programs at Anadolu University in 2015, and the enrollment statistics are not given separately for their on-site and remote programs.

Turkey, the number of people taking the university entrance exam has been considerably larger than the number of available places. For instance, in 2015, according to statistics from the CoHE, approximately 2.1 million students took the exam of which only about 983 thousand were placed into either a public or private university. In sum, higher education system in Turkey can be described as a setup where the supply of enrollment slots is limited and admission to undergraduate programs requires a costly preparation process.

3. Methodology

3.1 Data

We use the Turkish Household Labor Force Survey (THLFS) to analyze the relationship between local unemployment rates and school enrollment in Turkey. The THLFS collects information about labor-market-related activities from a cross-sectional sample of individuals each year. The THLFS samples have been representative at the level of NUTS-2 regions since 2004. The THLFS classifies each observed individual of age 15 or older in the data as either employed, unemployed, or not in the labor force. We use this classification to calculate the unemployment rates for various groups of interest in each NUTS-2 region. Since the extension of compulsory schooling to high school level came into effect in 2013 and tuition fees at public universities were abolished in the same year, we restrict our analysis to the period of 2004-2012.⁴

The THLFS collects information on whether each member of the surveyed household is currently attending school. If an individual is enrolled to a school, the type of school is recorded. The school categories in the data include primary schools, general and vocational high schools, remote studies, and undergraduate and graduate programs of universities. Since attendance to primary schools has been compulsory in Turkey since 1997 and the enrollment rate at that level has been very high during the sample period, we do not analyze the effect of unemployment on enrollment in primary schools.

In addition to labor market and schooling activities, the THLFS collects information on the demographic characteristics of individuals, including age, gender, marital status, and educational attainment as well as urban status and the region of their residency. We employ these as control

⁴ Our results are robust to using the THLFS data from the 2004-2013 period as well. Since the criteria for classification as unemployed were changed in the 2014 THLFS, we do not extend our analysis beyond 2013. See Demirci and Poyraz (2021) for a detailed review of revisions adopted in the 2014 and later waves of the THLFS.

variables in our analysis. The THLFS also provides a unique ID number for each household so that members of the same household can be identified. This information enables us to construct household-specific control variables. As explained in detail in the next section, these household-specific variables measure the age distribution of other household members. The THLFS also allows to identify father and mother of each observation if the child and his or her parents live in the same house. We use this information to measure employment status and wage income of parents. It is important to highlight that wage income is observed only for wage workers, and a significant portion of subjects (about 37% of workers in the analyzed sample period) work in non-wage jobs either as self-employed or as non-paid family workers in Turkey.

Lastly, individuals who live in dormitories are not observed in the THLFS. Thus, the THLFS shows the population of students, most of whom presumably attend universities in their home towns. Comparing the enrollment statistics between the CoHE and THLFS data, we infer that our analysis includes 66% of all students that were enrolled in university undergraduate programs.⁵ Analyzing enrollment patterns of this particular group of students is appropriate for our study because unemployment rates of a region capture the economic conditions that affect potential students and their families residing in that region. Indeed, Long (2014) imposed a similar restriction by excluding universities with a high share of out-of-state enrollment from her study to identify the effect of local economic conditions on university enrollment in the U.S. context.

3.2 Probit Model

We construct a probit model to explain the enrollment behavior of individuals. The dependent variable takes the value of one for individuals who are enrolled and zero for all other individuals in the relevant sample. We estimate parameters of the model separately for enrollment in general high schools, vocational high schools, and undergraduate programs of universities. We analyze enrollment in general and vocational high schools with a sample of individuals aged between 14 and 17 with an eight-year primary school or a middle school diploma.⁶ Moreover, the sample for enrollment in undergraduate programs comprise high school graduates aged between 18 and 24.

⁵ In the tabulations of the CoHE data, we combine the number of students who are enrolled in 2-year and 4-year programs at universities. We also exclude the statistics from Anadolu University because they have a very crowded remote study program as detailed in footnote 3.

⁶ The information of educational attainment in the THLFS data is recorded as the highest level of schooling completed. The school categories in the data include 1) five-year primary schools, 2) eight-year primary schools or middle schools, 3) general high schools, 4) vocational high schools, and 5) universities. Middle schools refer to

The key explanatory variable of interest in each model is the region- and time-specific unemployment rate. More specifically, we associate the unemployment rate in the NUTS-2 region of residence and the year of observation with each individual in the relevant sample. The unemployment rate in a particular region at a particular time is calculated as the ratio of the population of unemployed people to the population of those who are in the labor force (i.e., the sum of the population of employed and unemployed individuals) in that region at that time. We refer to the unemployment rate that is calculated based on the sample of all individuals aged 15 and older as “the overall unemployment rate”.

Several individual and household characteristics are included as control variables in explaining enrollment behavior. In particular, we employ age dummies and dummy variables indicating the gender and marital status of the observed individual as well as urban status of his or her residency as demographic determinants of enrollment in addition to measures of the age distribution of members of his or her household. More specifically, we employ the following age brackets to construct the age distribution in each household: those aged younger than 7, between 7 and 14, between 15 and 24, and older than 24. It is important to note that we calculate these household-specific characteristics by excluding the individual whose enrollment decision is being analyzed. These variables therefore capture the effect of other household members on the enrollment behavior of that individual.

In addition to these individual and household characteristics, we employ region fixed effects and year fixed effects as control variables. As highlighted in Aydemir and Yazici (2019) and Araci et al. (2021), major differences exist in the levels of development among regions in Turkey. The development level of a region might indicate the quality of education provided in the primary schools of that region, which might affect the likelihood of its residents’ enrollment in high school and beyond. Also, cultural attitudes about women’s role in society greatly differ across regions in Turkey. Thus, region fixed effects control for persistent differences in the enrollment rate across regions that might arise for the aforementioned reasons. In addition, year fixed effects account for annual nation-wide changes in the likelihood of enrollment, which might stem from changes in national policies, such as increasing public scholarships.

three-year education given after five-year primary schooling, which was abolished with the extension of compulsory schooling to eight years in 1997.

Lastly, in some specifications, we include employment status and wage income of parents as explanatory variables in regressions to control for socio-economic conditions of households. The analysis with these variables requires additional sample restrictions as detailed in Section 4, because these variables are observed only if the child and the parents live in the same household and the income variable is observed only for wage workers,

3.3 Summary Statistics

Figure 1 displays enrollment statistics of individuals in the sample based on the THFLS data throughout the 2004-2012 period. The population of 14 to 17-year-olds enrolled in general high schools has been stable at about 2 million annually with slight fluctuations during the period analyzed. On the other hand, the population of students enrolled in vocational high schools increased noticeably, from 338 thousand in 2004 to 1 million 273 thousand students in 2012. Similarly, the enrollment of 18 to 24-year-olds in undergraduate programs increased from 738 thousand to 1 million 66 thousand students in the same period. The right panel of Figure 1 displays the enrollment rates among individuals in the sample. The enrollment rate in general high schools declined from 63% in 2004 to 45% in 2012, whereas the enrollment in vocational high schools and in undergraduate programs increased respectively from 10% to 29% and from 23% to 35% in the same period.

While the enrollment at each level of schooling that we focus on follows mostly a secular trend over time, the unemployment rates have fluctuated in the sample period because of the Great Recession. Figure 2 tracks the unemployment rate in Turkey over the 2004-2012 period. The overall unemployment rate in Turkey has been about 10% on average in the period analyzed and peaked at 14.0% in the 2009 recession. The global financial crisis was the main reason for this spike in unemployment rate. Each region in Turkey was affected differently from this shock, presumably as a function of the dependency of the local economy on global conditions.

To get a better sense of regional heterogeneity, Figure 3 displays unemployment rates in 2004 and 2009 across 26 NUTS-2 regions in Turkey. The figure shows a great deal of heterogeneity across regions. For example, in the year of 2004, as a low-unemployment region, Trabzon (marked as “TRB” in the figure) had a 6% unemployment rate, while as a high-unemployment region, Adana (marked as “ADN” in the figure) had a about 15% unemployment rate. Apparently, there was a noticeable variation in the effect of recession across regions. For

instance, in the recession year of 2009, the unemployment rate in the Trabzon Region stayed stable around 6%, whereas it increased to 22% in the Adana Region. Such region-specific variation over time in unemployment rates is crucial in identifying the effect of unemployment rates on enrollment in our empirical specification as we employ local unemployment rate as the explanatory variable of interest.

Table 1 provides summary statistics of variables used in the regression analysis. As described above, the sample is restricted to individuals aged between 14 and 17 for the analysis of high school enrollment and to those aged between 18 and 24 for the analysis of enrollment at undergraduate programs of universities. Also, since enrollment at each level of schooling is not possible without obtaining qualifications at lower levels, we restrict the sample to eight-year primary or middle school graduates for the analysis of high school enrollment and to high school graduates for the analysis of undergraduate enrollment.

As displayed in Table 1, the share of males is slightly larger than 50% in the sample for each level of schooling. The ratio of married individuals is negligible in the sample for high school enrollment, whereas it is about 12% in the sample for enrollment in undergraduate programs. As a result of sample restrictions by age, the sample for the analysis of high school enrollment comprises younger individuals. In particular, the average age of individuals in the sample of high school enrollment is 15.6, whereas it is 20.7 in the sample for enrollment in undergraduate programs. Most of the analyzed individuals, 70% of those in the high school sample and 81% of those in the undergraduate sample, reside in urban areas. The age composition of household members is similar across the samples of interest with slight differences. In particular, the number of peers (i.e., household members aged between 15 and 24) is larger in the sample for high school enrollment.

4. Results

4.1 Main Estimates

Table 2 presents coefficient estimates of the probit model described in the previous section. Each panel presents results for enrollment at a different level of schooling. Each column within a particular panel shows estimates from a specification with different control variables where the key independent variable of interest is the local unemployment rate. In particular, we control for region fixed effects and year fixed effects in the first column, add demographic characteristics in

the second column, and finally add household characteristics in the third column of each panel. Standard errors clustered at year-and-region level are reported in Table 2 as well.

Estimates show that changes in the unemployment rate do not affect enrollment in general high schools or vocational high schools. On the other hand, the higher unemployment rate decreases the likelihood of enrolling in undergraduate programs. This result holds for all specifications. The signs of estimated coefficients of other variables are mostly consistent with a priori expectations. Adding demographic and household characteristics improves the model fit considerably. For instance, the R-squared statistic in the regression for undergraduate enrollment increases from 0.034 to 0.170 in the third specification. Below, we briefly comment on these estimates from the third specification, which is our preferred model.

It is estimated that males are less likely to enroll in general high schools but more likely to enroll in vocational high schools and in undergraduate programs compared to females. Furthermore, married individuals are less likely to enroll, whereas individuals residing in urban areas are more likely to enroll at any level of schooling. An increase in the number of children aged younger than 7 in a household is expected to decrease the likelihood of enrollment because this might require allocating more time and financial resources for child care. We find such an effect at all levels of schooling. Similarly, an increase in the number of 7 to 14-years-olds attending compulsory primary schooling might decrease resources that could also be devoted to enrollment of older individuals in the household. Our empirical findings support this hypothesis as well. The expected effect of being a member of a household that comprises a large number of adults on enrollment is ambiguous. On one hand, a larger number of members at the age of enrollment in high schools or universities in a household might decrease resources for the enrollment of other members. On the other hand, the presence of many young adults in the household might generate positive peer effects such that all of the similarly aged members might want to attend school. The empirical findings are mixed across levels of schooling. For instance, a larger number of members aged between 15 and 24 in a household decreases the enrollment in general high schools and vocational high schools, but increases the enrollment in undergraduate programs. Meanwhile, a larger number of members older than 24 in a household increases enrollment in vocational high schools but decreases enrollment in undergraduate programs.

Table 3 presents results of the probit models that are estimated separately for each gender. All models in Table 3 include the full set of control variables (i.e., demographic and household characteristics as well as region and year fixed effects). Estimates show that an increase in the unemployment rate decreases the likelihood of attending undergraduate programs for both genders, but it does not affect the enrollment at general or vocational high schools for either gender. All other statistically significant coefficient estimates have the same signs for both genders.

Table 4 presents the marginal effects of unemployment rate on enrollment in undergraduate programs for different groups of individuals based on estimates made with the full set of control variables. The number that is reported in each row of the table shows the marginal effect that is obtained from a particular probit model. Marginal effects of unemployment rates on enrollment are calculated at the mean level of other control variables. We interpret the marginal effects initially for the full sample of interest (i.e., high school graduates aged between 18 and 24) and then for various subgroups. Estimates show that a one percentage point increase in the local unemployment rate decreases the probability of enrollment in undergraduate programs by 0.004. As shown in Figure 2, the unemployment rate increased by 3.1 percentage points in Turkey in the 2009 recession. Thus, the estimates imply that the recession lowered the probability of enrollment in undergraduate programs by 0.0124 on average in Turkey. The share of individuals who are enrolled in undergraduate programs in the sample was 0.281 during the analyzed sample period. This estimated marginal effect suggests that the 2009 recession lowered the enrollment in undergraduate programs by about 4.4% in Turkey (i.e., 0.0124 divided by 0.281). Results in Table 4 also show that the magnitude of the adverse effect is larger for females (0.005) compared to males (0.0032).

4.2 Potential Mechanisms

The estimated effect of the unemployment rate in our specification reflects the total impact of changes in three different factors: i) the opportunity cost of enrollment, ii) financial resources available for education, and iii) expectations about returns to education. In this subsection, we employ additional control variables with the purpose of separating out the role of each factor.

Using the youth unemployment rate as an additional control variable is one way to proceed to separate out the role of the opportunity cost of schooling (e.g., Petrongolo and Segundo 2002,

Clark 2011). However, in our setting, the correlation between the overall unemployment rate and the youth unemployment rate is 0.842. We therefore choose not to employ both variables as explanatory variables because of the high level of multicollinearity. Also, the youth unemployment rate is likely to be endogenous because it is determined as a result of the behavior of individuals analyzed in the sample. Indeed, as shown in the next section, the likelihood of being unemployed increased in times of higher unemployment among the individuals in the sample.

To disentangle the role of changing expectations during recessions in our estimates, we employ the unemployment rate of 25 to 34-year-old college graduates in each region as an additional control variable. This unemployment rate observed at the time of enrollment and in the region of residency is likely to be a proxy for the expected unemployment rate after graduation.⁷ Table 5 displays coefficient estimates of this unemployment measure and that of the overall unemployment rate from the specifications with the full set of control variables. Although the effect of unemployment among young college graduates on enrollment in undergraduate programs is negative as expected, it is not statistically significant. A reason for this non-significant result might be multicollinearity as the correlation between the unemployment rate for college graduates and the overall unemployment rate is about 0.443. Also, the unemployment rate among college graduates might be a noisy measure of expectations, which might also explain the non-significance. On the other hand, estimates in Table 5 show that the effect of the overall unemployment rate remains to be negative and statistically significant after controlling for unemployment among young college graduates. We interpret this adverse relationship as evidence for the income effect.

In order to hold the income effect up to closer scrutiny, we next include more detailed measures of financial resources at the household level as additional control variables in the regression analysis. In particular, we use employment status and income of parents. Before presenting results from these specifications, it is important to highlight a caveat of this analysis. The analysis with these variables can be conducted only if the analyzed individuals in the sample live

⁷ We do not have any data on expectations of students about returns to education. Many studies showed that students and parents have misinformed information about returns to education (e.g., Jensen 2010). In our application, we choose the unemployment rate that recent graduates of the intended level of schooling currently experience in the labor market as a simple indicator of expected returns to the level of education pursued.

in the same house with their parents. The analysis with the wage variable requires additional restrictions because it is observed only if the parents have wage income. Thus, the sample analyzed in these models is a subset of the full sample.

Table 6 displays the coefficient estimates of the variables of interest from these probit models. Panel A in the table shows the results for the sample that consists of 18 to 24-year-old high school graduates who live in the same house with at least of one of their parents, whereas the sample in Panel B is restricted to individuals whose father's income is observed. In the first column of both panels in Table 6, we initially present the effect of the unemployment rate on undergraduate enrollment for individuals in the new samples without adding any of these new control variables. Despite having smaller number of observations compared to the previous analysis, the effect of the overall unemployment rate is still negative and statistically significant in these estimates. In the second column, we additionally control for the employment status of parents in Panel A and for the wage income of fathers in Panel B.⁸ Although these new variables are statistically significant and have the expected signs (i.e., the enrollment is increasing with parental employment and father income), the estimated effect of the overall unemployment gets slightly smaller compared to the estimates in the first column. In the third column of both panels, we add the unemployment rate among young (i.e., those aged between 25 and 34) college graduates as a proxy of expectations about returns to education into regressions. The estimated effect of the overall unemployment rate in this specification gets smaller but remains negative, especially in Panel B where the effect of unemployment among young college graduates is also negative and statistically significant.

Finding an adverse effect of the overall unemployment rate on undergraduate enrollment even after controlling for expectations and financial conditions of parents can be attributed to several factors. First, higher unemployment rate increases the risk of job loss and wage cuts. Increasing risks might adversely affect the enrollment despite the loss of employment or income being actually realized by parents. Second, the propensity of spending income on education might be different in times of recessions. If households cut their expenses on education more in response to changes in income in periods of high unemployment compared to the other periods, then the

⁸ Mother income is observed only for 5.6% of observations in the sample as only a small share of women was employed as wage workers in the data. For this reason, we do not include mother income as a control variable.

estimated effect of the unemployment rate would be capturing this differential response in recessions. Third, since the unemployment rate among young college graduates is a noisy proxy of expectations about returns to education, high levels of the overall unemployment rate might be partially capturing the effect of deteriorating expectations in our estimates.

4.3 Discussion

In this section, we discuss other related issues and some potential limitations of our analysis. First, we explore whether individuals in the sample engage in other activities more in times of recessions. To do so, we estimate the parameters of the same probit model for a different set of dependent variables. As displayed in Appendix Table 1, we find that higher unemployment rates increased the likelihood of participating in the labor force and being unemployed among individuals in our sample. These relations hold even after controlling for the employment status and income of parents.

Next, we explore enrollment in undergraduate programs for different age groups to understand whether the estimated decline in enrollment results from a reduction in new enrollments or from an increase in the likelihood of dropping out. Estimates show that the enrollment of 21 to 24-year-olds decreased in times of high unemployment rates for both genders, whereas the enrollment of 18 to 20-year-olds is not affected, except for females (Appendix Table 2). There might be two reasons behind finding adverse effects for the older group. First, in times of high unemployment, families might cut the expenses for the preparation of university exam for older students who have presumably failed the exam in their earlier attempts. Second, high unemployment rates might increase the likelihood of dropping out for individuals who were already enrolled in undergraduate programs. We do not observe the behavior of dropping out from university education, but we can infer it from the question about main activity during the year preceding the survey. In particular, we infer an individual as a university drop-out if the individual participated in school in the previous year of the survey, but was not enrolled by the time of the survey, and had a high school diploma as the highest educational attainment.⁹ Our estimates do not show a statistically significant relationship between unemployment rates and this measure of dropping out. This finding suggests that the estimated adverse effect of the

⁹ We do not analyze drop-out behavior of 18 to 20-year-olds because individuals in this age group who attended high schools in the previous year of the survey might be falsely classified as drop-out from university based on our inference strategy.

unemployment rate on enrollment for the older group of students (i.e., 21 to 24-year-olds) is likely to be due to a decline in their new enrollment.

As previously mentioned, the THLFS does not include individuals who live in dormitories. Thus, the impact of unemployment rates on enrollment of students who study at out-of-town universities while residing in dormitories is not captured in our analysis. Whether and how not observing this type of enrollment in the data biases our estimates is ambiguous. In one hand, university enrollment of this kind is expected to be more costly and, therefore, to be more adversely affected by recessions due to income effect. On the other hand, out-of-town universities might provide better quality options and higher payoffs to education. As a result, the likelihood of applicants choosing such programs might increase in times of higher unemployment. To get a better sense of potential bias in our estimates due to this issue, we conduct a robustness check by classifying regions as either with low or with high shares of out-of-town enrollment according to the administrative report provided by CoHE.¹⁰ Estimates show that the effects of higher unemployment rates on enrollment are negative and have similar magnitudes for both types of regions. This finding suggests that not being able to analyze out-of-town enrollment does not bias our results.

Lastly, the capacity of Turkish universities has expanded considerably during the analyzed period as detailed in Section 2. A potential concern is that not controlling for this expansion in regressions might bias the results if changes in the enrollment capacity of local universities are correlated with local unemployment rates. However, examination of institutional details of this expansion suggests that the capacity of universities was increased as a part of a long-term plan targeting regional development and redistribution (Polat 2017) rather than as a quick response to deteriorating economic conditions due to the Great Recession. Nonetheless, as a robustness exercise, we measure the capacity of local universities from regional enrollment statistics

¹⁰ CoHE (2019) provides the fraction of newly enrolled students who originated from each province and were placed into out-of-town universities based on the placement outcomes of the university entry exam in 2018. Using this information, we classified regions into two groups: those with low shares of students preferring out-of-town universities and those with high shares of students preferring out-of-town universities. The former group consists of the NUTS-2 regions of Istanbul, Tekirdag, Kocaeli, Ankara, Konya, Kirikkale, Kayseri, Zonguldak, Trabzon, Erzurum, and Malatya, with the Istanbul Region having the lowest share of residents preferring out-of-town universities.

(including both in-town and out-of-town students) from the CoHE data, then we use it as a control variable in the analysis and find similar results (Appendix Table 4).¹¹

5. Conclusion

Recessions have opposing effects on enrollment. Decreasing income, fewer resources allocated to educational expenses, and deteriorating expectations about returns to education are expected to affect enrollment adversely. On the other hand, lower opportunity cost of education during recessions incentivizes enrollment due to the substitution effect. In this paper we assess the effect of higher unemployment rates on the likelihood of enrollment at various levels of education among young people in Turkey during a period including the Great Recession of 2008-2009. We find that enrollment in universities for undergraduate-level studies decreases with higher unemployment rates in Turkey, while enrollment at high school is not affected.

This result is in contrast to previous studies that point out positive effects of higher unemployment rates on high school and university enrollment, mostly in the context of developed countries. Institutional differences across developing and developed countries might explain this discrepancy. For instance, the enrollment capacity of universities has been limited in many developing countries and the admission is conditional on success in centralized entrance exams that require costly preparation (Tansel and Bircan, 2006). In times of recessions, households are likely to cut their expenses for preparation for the entrance exam, which would lower the number of first-time enrollments of university students. Indeed, Dasgupta and Ihsan Ajwad (2011) show that families reduced education spending for children in Turkey during the Great Recession. Also, enrolled students in developing countries are more likely to experience difficulties in paying their school-related expenses in recessions because of the lower income levels of their parents and limited access to financing opportunities such as education loans compared to students in developed countries. Such financial disadvantages might increase the likelihood of dropping out. In addition, returns to education might be lower and more uncertain in developing countries. For instance, Aydemir and Kirdar (2017) show that the return to an extra year of schooling is low, especially for men in Turkey. Furthermore, during recessions,

¹¹ The CoHE provides enrollment statistics by levels of study in each university. Since some two-year programs of particular universities are located in other cities, tabulating regional enrollment data as the sum of university-level statistics may be subject to some measurement errors. For that reason, we prefer not to present these results as the main specification in the text.

people are likely to lower their expectations about returns to education, which would also hinder potential investment in education.

Our finding of lower enrollment in universities in response to higher unemployment in Turkey has important implications regarding the effects of recessions in developing countries. Declining human capital investment due to lower enrollment might hinder the long-term growth performance of these countries. Moreover, not replacing depreciated skills with more education during times of unemployment reduces future access to available jobs and might cause persistently high unemployment rates. These negative implications are concerning especially in the context of the current global economic crisis associated with the Covid-19 pandemic. Unemployment rates have spiked to unprecedented levels in many countries and the incomes of those who work in the service sector in particular have been affected very adversely. In addition, online education brought some extra costs to households along with rising concerns about its quality. In such circumstances, the negative effects of recessions on enrollment might increase in significance, and policy makers should pay attention to such adverse implications.

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Disclosure statement

The authors declare that there is no conflict of interest.

A data availability statement

The data that support the findings of this study are available from the Turkish Statistical Institute. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from <https://web.tuik.gov.tr/en> with the permission of the Turkish Statistical Institute.

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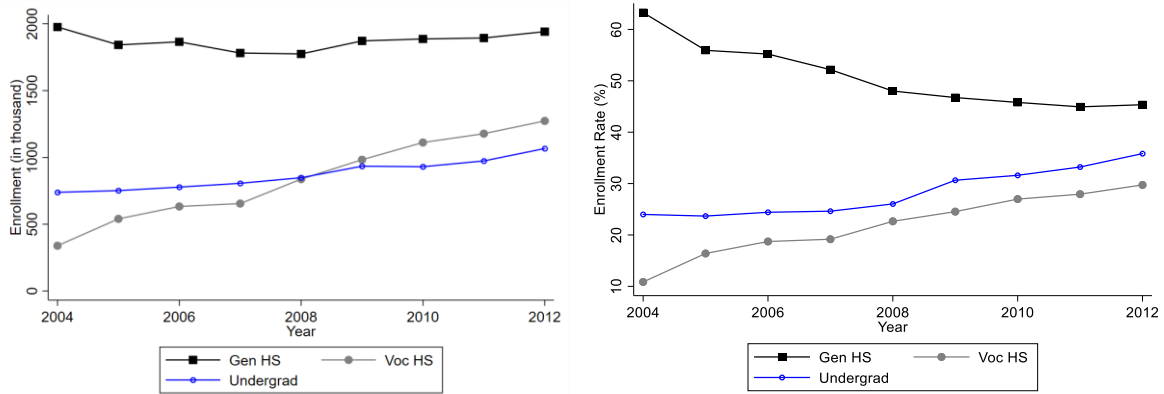
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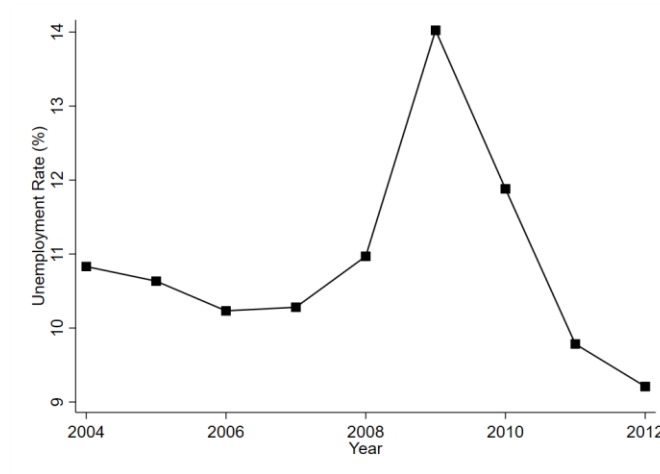
FIGURES

Figure 1: Enrollment in Turkey



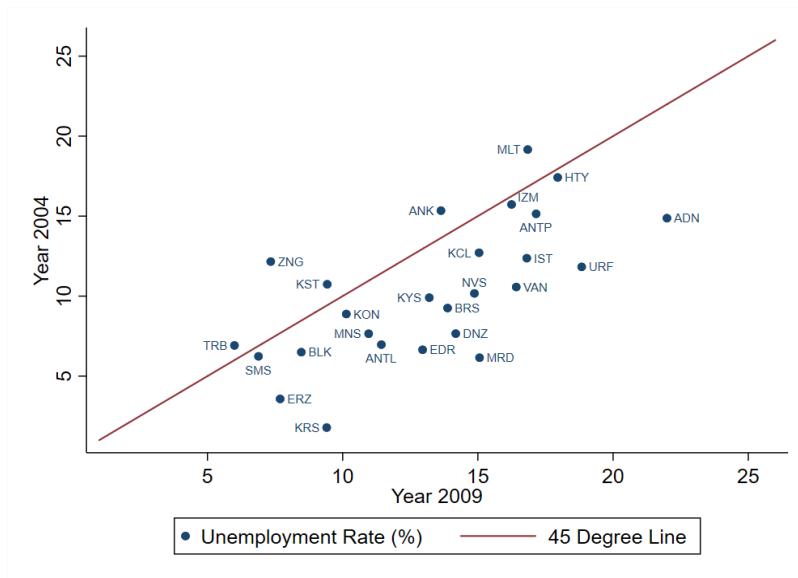
Notes: Authors' tabulations based on the 2004-2012 THLFS. The statistics for enrollment in general and vocational high schools are calculated based on the sample of eight-year primary school or middle school graduates aged between 14 and 17. The statistics for enrollment in undergraduate programs of universities are calculated based on the sample of high school graduates aged between 18 and 24.

Figure 2: Unemployment Rate in Turkey



Notes: Authors' tabulations based on the 2004-2012 THLFS. The figure displays the national level unemployment rate among all individuals.

Figure 3: Heterogeneity in Unemployment across NUTS-2 Regions in Turkey



Notes: Authors' tabulations based on the 2004 and 2009 THLFS. Each dot displays the unemployment rate in the associated year and region.

TABLES

Table 1: Summary Statistics

	High Schools	Undergraduate Programs
Number of observations	250,760	182,586
Demographic characteristics		
% Male	51.7%	52.8%
% Married	1.3%	12.8%
Mean Age	15.6	20.7
% Urban	70.5%	80.9%
The composition of households: The number of		
Individuals younger than 7	0.705	0.809
Individuals aged between 7 and 14	0.312	0.201
Individuals aged between 15 and 24	0.889	0.370
Individuals older than 24	0.801	0.937

Notes: The 2004-2012 THLFS. Each column displays summary statistics for a different sample of individuals. The sample for high school enrollment includes eight-year primary school or middle school graduates aged between 14 and 17. The sample for enrollment in undergraduate programs consists of high school graduates aged between 18 and 24.

Table 2: Estimates of the Probit Model of Enrollment

	General High Schools			Vocational High Schools			Undergraduate Programs		
Unemployment rate (%)	-0.004 (0.0033)	-0.0045 (0.0034)	-0.0031 (0.0033)	0.0052 (0.0042)	0.0051 (0.0042)	0.0054 (0.0043)	-0.0095** (0.0044)	-0.0111** (0.0050)	-0.0134*** (0.0049)
Male		-0.0840*** (0.0131)	-0.0978*** (0.0136)		0.1841*** (0.0118)	0.1794*** (0.0119)		0.1041*** (0.0000)	0.0771*** (0.0110)
Married		-0.7823*** (0.0374)	-0.7894*** (0.0387)		-0.6329*** (0.0439)	-0.6278*** (0.0437)		-1.3976*** (0.0317)	-1.6004*** (0.0360)
Urban		0.3452*** (0.0133)	0.3096*** (0.0131)		0.1879*** (0.0164)	0.0150*** (0.0053)		0.5577*** (0.0220)	0.4308*** (0.0201)
Individuals younger than 7			-0.1080*** (0.0075)			-0.0569*** (0.0073)			-0.1612*** (0.0185)
Individuals aged between 7 and 14			-0.1149*** (0.0054)			-0.0324*** (0.0051)			-0.1367*** (0.0093)
Individuals aged between 15 and 24			-0.1399*** (0.0069)			-0.0214*** (0.0053)			0.0407*** (0.0130)
Individuals older than 24			0.0069 (0.0048)			0.0150*** (0.0053)			-0.3295*** (0.0099)
Age Dummies		x	x		x	x		x	x
Region fixed effects	x	x	x	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x	x	x	x
R-squared	0.023	0.042	0.056	0.055	0.065	0.066	0.034	0.121	0.170
N	250,760	250,760	250,760	250,760	250,760	250,760	182,586	182,586	182,586

Notes: The 2004-2012 THLFS. Each column displays coefficient estimates of the probit model of enrollment in the specified type of schooling for a particular set of explanatory variables. Standard errors clustered at year-and-region level are reported in paranthesis. See notes to Table 1 for sample restrictions that are adopted in each panel.

Table 3: Estimates of the Probit Model of Enrollment by Gender

	General High Schools		Vocational High Schools		Undergraduate Programs	
	Male	Female	Male	Female	Male	Female
Unemployment rate (%)	-0.006 (0.0041)	0.0016 (0.0035)	0.0048 (0.0047)	0.0056 (0.0047)	-0.0097* (0.0052)	-0.0189*** (0.0059)
Married	-0.1629*** (0.0534)	-1.0890*** (0.0463)	-0.2714*** (0.0693)	-0.8363*** (0.0548)	-1.4141*** (0.0440)	-1.6788*** (0.0448)
Urban	0.2695*** (0.0146)	0.3629*** (0.0191)	0.1088*** (0.0184)	0.2636*** (0.0202)	0.4562*** (0.0217)	0.3918*** (0.0310)
Individuals younger than 7	-0.0789*** (0.0091)	-0.1496*** (0.0098)	-0.0728*** (0.0098)	-0.0354*** (0.0097)	-0.1219*** (0.0217)	-0.2101*** (0.0263)
Individuals aged between 7 and 14	-0.1097*** (0.0063)	-0.1254*** (0.0068)	-0.0424*** (0.0064)	-0.0199*** (0.0072)	-0.1279*** (0.0115)	-0.1506*** (0.0137)
Individuals aged between 15 and 24	-0.1199*** (0.0076)	-0.1679*** (0.0084)	-0.0378*** (0.0064)	-0.0006 (0.0074)	0.0472*** (0.0147)	0.0254* (0.0137)
Individuals older than 24	0.0091 (0.0067)	0.0022 (0.0077)	0.0246*** (0.0075)	0.0044 (0.0080)	-0.3504*** (0.0110)	-0.3002*** (0.0123)
Age Dummies	X	X	X	X	X	X
Region fixed effects	X	X	X	X	X	X
Year fixed effects	X	X	X	X	X	X
R-squared	0.0571	0.065	0.0741	0.0573	0.1553	0.1867
N	129,765	120,995	129,765	120,995	96,438	86,148

Notes: The 2004-2012 THLFS. Each column displays coefficient estimates of the probit model of enrollment in the specified type of schooling by people of the specified gender. Standard errors clustered at year-and-region level are reported in paranthesis. See notes to Table 1 for sample restrictions that are adopted in each panel.

Table 4: Marginal Effects of Unemployment on the Likelihood of Enrollment in Undergraduate Programs

	Marginal Effect	S.E.
Full Sample	-0.0040***	(0.0015)
Males	-0.0032*	(0.0017)
Females	-0.0050***	(0.0016)
Parental Employment Sample	-0.0055***	(0.0013)
Father Income Sample	-0.0049***	(0.0018)

Notes: The 2004-2012 THLFS. Each row displays the marginal effect of the unemployment rate on the probability of enrollment in undergraduate programs for the sample of individuals specified in the associated row. Each regression controls for region fixed effects, year fixed effects, age dummies, and demographic and household characteristics displayed in Table 2. Regressions additionally control for employment status of parents in the parental employment sample and for log of father income in the father income sample. The marginal effects are calculated at the mean level of other control variables.

Table 5: Estimates of the Probit Model of Undergraduate Enrollment:
Controlling for Expectations

	All	Male	Female
Unemployment rate (%)	-0.0119** (0.0052)	-0.0099* (0.0056)	-0.0151** (0.0062)
Unemployment rate of 25 to 34-Year- Old College Graduates (%)	-0.0029 (0.0037)	0.0006 (0.0037)	-0.0071 (0.0047)
Demographic Characteristics	X	X	X
Household Composition	X	X	X
Age Dummies	X	X	X
Region fixed effects	X	X	X
Year fixed effects	X	X	X
R-squared	0.1697	0.1553	0.1868
N	182,586	96,438	86,148

Notes: The 2004-2012 THLFS. Each column displays coefficient estimates of the probit model of undergraduate enrollment by the specified type of gender. Standard errors clustered at year-and-region level are reported in paranthesis. See notes to Table 1 for sample restrictions that are adopted.

Table 6: Estimates of the Probit Model of Undergraduate Enrollment: Controlling for Parental Characteristics

Panel A: Parental Employment Sample	(1)	(2)	(3)
Unemployment rate (%)	-0.0186*** (0.0044)	-0.0181*** (0.0044)	-0.0167*** (0.0047)
Unemployment rate of 25 to 34-Year-Old College Graduates (%)			-0.0027 (0.0031)
Father Employment		0.0787*** (0.0123)	0.0787*** (0.0123)
Mother Employment		0.0434** (0.0195)	0.0435** (0.0195)
R-squared	0.0861	0.0869	0.0869
N	143,339	143,339	143,339
Panel B: Father Income Sample	(1)	(2)	(3)
Unemployment rate (%)	-0.0165*** (0.0056)	-0.0153*** (0.0057)	-0.0107* (0.0058)
Unemployment rate of 25 to 34-Year-Old College Graduates (%)			-0.0093** (0.0040)
Log of Father Income		0.4011*** (0.0284)	0.4007*** (0.0284)
R-squared	0.0763	0.0965	0.0967
N	46,411	46,411	46,411

Notes: The 2004-2012 THLFS. Each column in each panel displays coefficient estimates of the probit model of undergraduate enrollment for a particular set of explanatory variables. Standard errors clustered at year-and-region level are reported in paranthesis. In addition to adopting sample restrictions described in Table 1, the sample is further restricted to individuals living in the same house with their parents in Panel A and to those who have information about their father's income in Panel B (i.e., if the individual lives in the same house with their father and the father has wage employment).

APPENDIX TABLES

Appendix Table A1: Estimates of the Probit Model of Labor Market Activities

Dependent Variable:	Sample:	Full	Parental Employment	Father Income
Labor Force Participation		0.0121*** (0.0045)	0.0171*** (0.0047)	0.0212*** (0.0060)
Employed		-0.0110*** (0.0038)	-0.0077* (0.0040)	-0.0057 (0.0054)
Unemployed		0.0397*** (0.0043)	0.0406*** (0.0044)	0.0427*** (0.0063)

Notes: The 2004-2012 THLFS. Each cell displays coefficient estimates of the unemployment rate from the probit model of the specified type of dependent variable for the specified sample of individuals. Each regression controls for region fixed effects, year fixed effects, age dummies, and demographic and household characteristics displayed in Table 2. Regressions additionally control for employment status of parents in the second column and for log of father income in the third column. Standard errors clustered at year-and-region level are reported in paranthesis.

Appendix Table A2: Estimates of the Probit Model of Enrollment and Dropping out

	Sample:	All	Male	Female
Dependent Variable:				
Enrollment of 18-20 Age Olds		-0.0071 (0.0047)	-0.0043 (0.0056)	-0.0106** (0.0054)
Enrollment of 21-24 Age Olds		-0.0174*** (0.0062)	-0.0120* (0.0066)	-0.0267*** (0.0079)
Drop-out of 21-24 Age Olds		0.0051 (0.0068)	0.0114 (0.0083)	-0.0029 (0.0083)

Notes: The 2004-2012 THLFS. Each cell displays coefficient estimates of the unemployment rate from the probit model of the specified type of dependent variable and gender. Drop-out is inferred from the variable describing main activity in the previous year. Each regression controls for region fixed effects, year fixed effects, age dummies, and demographic and household characteristics displayed in Table 2. Standard errors clustered at year-and-region level are reported in paranthesis.

Appendix Table A3: Undergraduate Enrollment by Region Types

	Sample:	Full	Parental Employment	Father Income
<hr/> Panel A: Probit Estimates <hr/>				
Low Share of Out-of-Town Enrollment		-0.0129* (0.0078)	-0.0207*** (0.0063)	-0.0132 (0.0091)
High Share of Out-of-Town Enrollment		-0.0122** (0.0059)	-0.0155*** (0.0057)	-0.0153** (0.0072)
<hr/> Panel B: Marginal Effects <hr/>				
Low Share of Out-of-Town Enrollment		-0.0042* (0.0025)	-0.0069*** (0.0021)	-0.0046 (0.0031)
High Share of Out-of-Town Enrollment		-0.0033** (0.0016)	-0.0040*** (0.0015)	-0.0043** (0.0021)

Notes: The 2004-2012 THLFS. Each cell in Panel A displays coefficient estimates of the unemployment rate from the probit model of undergraduate enrollment for the specified type of regions and the sample of individuals, whereas each cell in Panel B displays the marginal effects of unemployment rate for the corresponding group. Each regression controls for region fixed effects, year fixed effects, age dummies, and demographic and household characteristics displayed in Table 2. Regressions additionally control for employment status of parents in the second column and for log of father income in the third column. Standard errors clustered by year and regions are reported in parentheses. The marginal effects are calculated at the mean level of other control variables.

Appendix Table A4: Robustness of Marginal Effects to Controlling
for Enrollment Capacity of Universities

	Marginal Effect	S.E.
Full Sample	-0.0034**	(0.0015)
Males	-0.0025	(0.0017)
Females	-0.0045***	(0.0016)
Parental Employment Sample	-0.0052***	(0.0014)
Father Income Sample	-0.0055***	(0.0019)

Notes: The 2004-2012 THLFS. Each row displays the marginal effect of the unemployment rate on the probability of enrollment in undergraduate programs for the sample of individuals specified in the associated row. Each regression controls for region fixed effects, year fixed effects, age dummies, and demographic and household characteristics displayed in Table 2. Regressions additionally control for employment status of mother and father in the parental employment sample and for log income of father in the father income sample. Additionally, each regression controls for the number of occupied enrollment quotas in undergraduate programs of universities in each region. The marginal effects are calculated at the mean level of other control variables.