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ABSTRACT

Macroeconomic Conditions and Child Schooling in Turkey*

This paper examines the effects of macroeconomic shocks on child schooling in Turkey using household labor force surveys from 2005-2013. We use variation in local labor demand as an instrumental variable, particularly regional industry composition and national industry employment growth rates. The results demonstrate that child schooling is pro-cyclical in Turkey, with the most acute effects among children with less educated parents and living in rural areas. Finally, as hypothesized, we find asymmetric effects on child schooling based on skill composition of economic growth. Higher unemployment among unskilled workers increases schooling, whereas higher unemployment among skilled workers decreases schooling.

JEL Classification: J13, J24, O15
Keywords: schooling, unemployment, business cycles, Turkey

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1 Introduction

Education plays an important role in the success of individuals in the labor market, and has long term benefits for economic development. As the benefits of education accrue far in the future, human capital investments should be independent on transitory employment and income shocks. However, growing research suggests that schooling decisions are often affected by immediate economic factors, particularly by changes in macroeconomic and labor market conditions. The fact that economic downturns are more frequent and acute in developing countries, and households are more vulnerable due to weaker safety nets and financial constraints, highlights the importance of understanding the links between macroeconomic conditions and schooling in developing countries.

Because the effects of macroeconomic shocks on child schooling are confounding, the question is empirical in nature. On the one hand, economic downturns and weak labor markets lower the opportunity cost of schooling, generating a substitution effect that is expected to increase education (counter-cyclical). On the other hand, adverse economic shocks might reduce household income, thereby reducing child schooling whenever education is a normal good (pro-cyclical). In case of well-functioning credit markets, transitory economic shocks should generate only modest income effects on schooling, as schooling decisions are arguably a function of lifetime earnings. However, in the context of developing countries, households might face financial constraints, and adverse economic shocks might significantly reduce their ability to pay for schooling expenses. Economic downturns that specifically increase skilled unemployment may also lower lifetime expected returns to schooling, lowering the incentives for human capital investment. Thus, substitution and income effects are opposing, and the net effect of macroeconomic shocks is ambiguous.

Empirical evidence of the cyclicality of schooling in the context of developing countries is sparse and among the few existing papers, the findings are inconclusive and subject

to a number of econometric concerns (Section 2 below provides a detailed literature review). For example, Binder (1999) finds that education is generally counter-cyclical in Mexico using state-level tax revenues as proxies for macroeconomic conditions, whereas Duryea and Arends-Kuenning (2003) find that economic downturns do not reduce school attendance in Brazil using state-level wages as proxies for household income. While these studies represent important contributions to the literature, endogeneity in macroeconomic conditions associated with omitted variables and measurement error remain a concern and potential explanation for the inconclusive findings of the literature.

This paper has several contributions to the literature. First, this paper exploits exogenous variation in local labor demand as an instrumental variable (IV), thereby overcoming endogeneity concerns. In particular, we exploit labor demand shocks as measured by local labor demand index that generates exogenous variation in labor demand by exploiting variation in national industry-specific growth rates and baseline industry employment shares across regions (Bartik, 1991, Blanchard and Katz, 1992). The empirical analysis is based on a nationally-representative annual household labor force survey that contains information on a rich set of socioeconomic and demographic characteristics of the Turkish population spanning from 2005 to 2013. While detailed longitudinal data are uncommon in developing countries, the labor force survey in Turkey, similar to the Current Population Survey in the U.S., contains detailed information on labor market activity of adult individuals, such as labor force participation and occupation by economic sector.

Second, this paper divides the effects of labor demand shocks according to unskilled (e.g., agriculture) and skilled (e.g., high-tech manufacturing) labor demand shocks, as the effects of economic growth might depend on the skill bias of growth. In particular, economic growth biased toward unskilled labor would increase demand for unskilled workers, thereby increasing the opportunity cost of schooling and reducing education. On the other hand, economic growth biased toward skilled labor would increase demand

for skilled workers, thereby increasing the returns to schooling and increasing education. While this suggests that the degree, and even direction, of the effect of economic growth depends on the structure of growth, previous studies have abstracted from the sources of economic growth, at least studies focusing on developing countries. Economic growth in developing countries is often based on growth in sectors that are labor intensive, particularly unskilled-labor-intensive sectors, which highlights the importance of dividing the effects of labor demand shocks according to unskilled- and skilled-biased shocks when investigating the cyclicality of schooling. Moreover, understanding the differential effects of economic growth on education according to the sources of economic growth entails important policy implications as increasing education is often emphasized as an important rung in the ladder of economic development. Finally, because the results of the literature are mixed, dividing the effects according to the source of economic growth might serve to reconcile the findings of the literature.

Third, this is the first paper to explore the role of macroeconomic conditions in child schooling in Turkey, which has several characteristics that make it an interesting case study. Turkey has relatively low levels of education for an upper-middle income country. The average years of total schooling is 7.1 years among adult population, where 4 percent of adult male population and 15 percent of adult female population has no schooling (Barro and Lee, 2013). In addition, macroeconomic conditions and economic growth in particular have been highly volatile in Turkey, and consequently unemployment rates have varied widely over the 2005 to 2013 period. Finally, economic growth has been highly biased towards unskilled-labor-intensive sectors. For example, the share of unemployed workers with tertiary education in overall unemployment has increased from 11 percent in 2005 to 20 percent in 2013, with variation across regions ranging from 6 to 29 percent in 2013.[1]

This paper explores the effects of regional unemployment rates on child schooling

[1]Based on authors' calculations using the Labor Force Surveys.

using a sample consisting of 701,596 children aged between 6 and 14 that have parents that are "prime-age workers" (aged between 25 and 54), using exogenous variation in local labor demand shocks as an IV. We find that child schooling is pro-cyclical: a one percentage point increase in the unemployment rate reduces the probability of child school attendance by 5 percentage points, which corresponds to a 5% reduction relative to the mean. The results withstand several robustness checks, including (i) using employment-to-population ratios as an alternative to the unemployment rate; (ii) employing various alternative measures of the instrumental variable, including using alternative base years and the exclusion of spillover effects; and (iii) controlling for various covariates, such as lagged unemployment rates and birth order.

Consistent with the hypothesis that credit-constrained households would be more adversely impacted by negative economic shocks, we find that the results are more acute among children with less educated parents and living in rural areas. We also demonstrate that parental labor force participation could be a potential mechanism. In addition, we find suggestive evidence that the effects of macroeconomic conditions are persistent and not transitory as higher regional unemployment rates during childhood had adverse effects on long-run education and employment outcomes of young adults. Finally, consistent with our predictions, we find that higher unskilled unemployment rates increase schooling, whereas higher skilled unemployment rates decrease schooling. These findings show that the structure of economic growth in terms of its skill-specific labor demand is an important determinant of child schooling.

2 Background

2.1 Theory and Related Literature

Economic theory suggests that macroeconomic shocks generate substitution effects through changes in the relative price of schooling and income effects through changes in expected lifetime earnings or ability to pay in the presence of financial constraints. Dellas and Sakellaris (2003) argue that recessions reduce the opportunity cost of schooling, implying that schooling is counter-cyclical in the absence of borrowing constraints, as recessions are transitory in nature, and therefore, should not significantly bear on expected lifetime earnings. On the other hand, if expected to be protracted, recessions may alter expectations about returns to schooling or probability of employment, thereby reducing the benefit of schooling and implying a pro-cyclical effect on schooling. The reduction in household income during recessions also lowers the household's ability to pay for schooling, especially for financially constrained households with inadequate savings. This effect is particularly relevant for developing countries where incomes are low and credit markets are imperfect.[2] Thus, macroeconomic conditions have an ambiguous role in schooling outcomes.

There are several reasons to expect that the cyclicality of child schooling depends on the composition of demand for unskilled and skilled labor. An economic downturn that disproportionately increases skilled unemployment would reduce the expected returns to schooling. Parents might thus invest less in the human capital of their children if the reduction in the future benefits implies that current cost of schooling is no longer justified. On the other hand, an economic downturn that disproportionately increases unskilled unemployment would reduce the opportunity cost of schooling as demand for

[2]The effect of imperfect credit markets might be less severe among households with children between the ages of 6-14 because, in contrast to higher education, primary education typically does not require borrowing.

unskilled labor would decline. From a policy perspective, an economic growth based on unskilled-labor-intensive sectors might lead to reductions in education, thereby increasing intergenerational transmission of poverty.

While the literature generally supports counter-cyclicality of schooling in developed countries, the empirical evidence is sparse and the findings are inconclusive in developing countries.[3] Using aggregate-level schooling data and state-level tax revenues, Binder (1999) finds that school attendance of children was lower during high-revenue times in Mexico. Using aggregate cross-country panel data for 88 countries, Flug et al. (1998) find a significant negative association between secondary school enrolment rates and employment volatility in low-income countries. However, aggregate data used in these studies do not allow to determine individual-level relationships and the possibility of omitted variables remains a concern. In a recent and rigorous study, Duryea and Arends-Kuenning (2003) estimate the effect of changing labor market conditions on child schooling and labor in urban Brazil. Using variation in wages across states over time, they find that economic downturns do not reduce school attendance because declining opportunity costs for children during labor market downturns offset the negative effect of reduced family income on child schooling. While using variation in state-level wages reduces the scope of omitted variable bias, it does not rule out the possibility of endogeneity in macroeconomic conditions associated with unobservables that are both correlated with changes in state-level wages and child schooling, and measurement error in state-level wages. Furthermore, existing studies in developing countries have not uncovered the role of skill composition in determining the cyclicality of schooling.

Because there are empirical challenges in identifying the effects of aggregate economic shocks and a lack of time-series data in developing countries, a growing literature has focused on exploring the effects of idiosyncratic shocks on child schooling.[4] Most studies

[3]Studies in developed countries include Dellas and Sakellaris (2003), Sievertsen (2016), McVicar and Rice (2001), Laeven and Popov (2016).

[4]See, for example, Jensen (2000) and Glick et al. (2016).

focus on household-specific shocks, such as employment loss or death of household head, and generally find that negative shocks reduce school attendance. However, it is difficult to determine whether these shocks are in fact unanticipated, or the extent to which unobserved factors drive the results. While a few provide causal evidence, households responses to aggregate and idiosyncratic shocks might be different as aggregate shocks have substitution effects in addition to income effects. Another strand of research has focused on the effects of bad economic times, particularly economic crisis. In general, economic crisis had small or no effects on schooling in Latin America, except for Mexico that experienced positive effects, and negative effects in Indonesia (McKenzie, 2003, Thomas et al., 2004). Perhaps, it is not that surprising that the results are mixed, as the severity of economic crisis in each country is different, and governments respond differently to their country-specific economic crisis. An important difference of this paper is that we are able to explore the causal effect of changes in local labor market conditions on investments in human capital. Moreover, exploring the overall effects of economic crisis masks the differential effects of changes in the demand for skilled and unskilled labor on child schooling. We document in this paper that the skill-bias of economic growth is an important determinant of cyclicality of child schooling in a developing country.

2.2 Institutional Background

Over the last two decades, Turkey has experienced macroeconomic instability.[5] While Turkey adopted an economic-development model that allowed for rapid economic growth following the recessions in 2001, unemployment has remained significantly high (Rodrik, 2012). There has been substantial fluctuations in unemployment rates, as discussed in the following sections, which permits identifying the effects of changes in macroeconomic

[5]Turkey suffered several financial crisis. From an empirical point of view, the timing of these crisis and the timing of available survey rounds do not allow for a solid identification strategy to directly analyze their effects.

conditions on child schooling. Furthermore, economic growth has been biased toward growth in unskilled-labor-intensive sectors. For example, the share of construction sector in GNP has increased from 3.6% in 2002 to 7.1% in 2016.[6]

There is also substantial variation in skilled and unskilled unemployment rates across sub-regions and within sub-regions over time. There are 26 sub-regions in Turkey, and we will use the term region and sub-region interchangeably for brevity.[7] In what follows, skilled labor is defined as an adult worker with at least some college, while unskilled labor is defined as an adult worker with at most a high school degree. Based on this definition, the ratio of skilled to unskilled unemployment rate varies widely across regions. For example, it ranges from 0.07 in the sub-region of Van to 0.40 in the sub-region of Ankara in 2013. Skilled unemployment rates in all regions have increased over the 2005 to 2013 period, except two regions that experienced slight reductions (sub-regions of Konya and Kastamonu). Trends in unskilled unemployment rates were more uneven, with some sub-regions recording substantial reductions (e.g., 29 percent in the sub-region of Balikesir) and other sub-regions recording substantial increases (e.g., 16 percent in the sub-region of Izmir). This variation is likely related to regional differences in economic activity, with unskilled-labor-intensive production experiencing larger reductions in unskilled unemployment rates.[8] There are of course other confounding factors that vary across sub-regions and over time, which are controlled for in the empirical analysis.

In Turkey, formal education consists of pre-school, primary, secondary, and higher education. Primary education consists of eight grades and covers children at the ages of 6-14. While the official primary school entry age is 6, most children enter primary schooling at the age of 7 (UNICEF, 2011). The first four years (grades 1-4) are considered

[6]Source: TURKSTAT, 2016. GDP in Chain Linked Volume by Kind of Economic Activity.

[7]There are 12 main regions in Turkey, which are divided into 26 sub-regions and 81 provinces based on geographic proximity (Table A.1). While the finest geographic units are provinces, the data do not allow us to exploit variation at the province level.

[8]For example, economic growth biased toward unskilled labor has led to a substantial reduction in unskilled unemployment rate by about 49 percent in the sub-region of Konya, where the main economic activity is agriculture.

the first-level primary school and cover children at the ages of 6-10, while the second four years (grades 5-8) are considered the second-level primary school and cover children at the ages of 11-14. While primary schooling is compulsory, a considerable percentage of primary school age children are out-of-school (UNICEF, 2011). For example, 8.39 percent of 6-10 years-old children and 8.24 percent of 11-14 years-old children in 2008 were not attending school.[9] Despite an overall improvement in primary school attendance (Table 1), there are significant regional and urban/rural disparities that persist over time. In general, primary school age children in rural areas and in Southeast, Middle East, and Northeast Anatolia have lower attendance rates (Figure 1). Furthermore, children in low-income households and with less educated parents are more likely not to attend primary schooling (UNICEF, 2012). Secondary and higher education levels are low: about 21% and 5% of the adult population (15+) completed secondary and tertiary education in 2010, respectively.[10]

While public schooling is widespread and primary education is tuition-free in public schools, the cost of primary education is still substantial due to high non-tuition based costs, such as various user-fees, textbooks, uniforms, and transportation costs, as well as the opportunity cost of foregone contributions to household income. In 2017, the upfront cost of starting primary school (e.g., financial contributions to parent-teacher associations and other school-based fees) varied between 605 TL and 835 TL, which was between 43% and 60% of the net (after tax) income of full-time, minimum-wage workers.[11] Moreover, average monthly educational expenses per student, including materials, uniforms and transportation, was 193 TL, which corresponded to about 13% of the net income of minimum wage workers (EBSAM, 2017). These costs are particularly acute and thus likely to affect household decision making given that roughly 1 in 3 children (less than

[9] The rates are similar to those provided by UNICEF.

[10] http://www.barrolee.com/.

[11] Fees for starting primary school are legal and in accordance with national law (Kattan and Burnett, 2004). Net income of minimum-wage workers was 1,404 TL in 2017.

14 years old) live below the poverty line.[12] Furthermore, the TUIK Life Satisfaction Survey asks households their most important problems with respect to schooling, and educational costs consistently ranked the first as the most important problem (TUIK, 2014, 2015).

An important indirect cost of sending children to primary school is the opportunity cost of children's time (lost income from child labor and/or lost time for household chores). While data on child labor and wages are limited in Turkey, the Turkish Child Labor Survey conducted in 2012 provides some basic information on child labor and schooling (TUIK, 2014, 2012).[13] Among children aged 6-14 in 2012, 2.6% were engaged in economic activity ("employed children"), while 46.5% did household chores. Among employed children, around 79% were working to contribute to household income and economic activity and 18% were not attending school. Employed children tend to live in rural areas (73% of employed children) and work in the agricultural sector (68% worked the in agricultural sector, whereas 18% and 14% worked in the services and manufacturing sector, respectively). There are also gender differences in child labor: while 3.2% (41.4%) of boys at the ages of 6-14 were engaged in economic activity (household chores), 1.9% (51.7%) of girls were engaged in economic activity (household chores). Among the reasons for not attending school of children aged 6-14, the survey also demonstrates that 13% indicated that they cannot afford schooling, while another 13% indicated that school is not considered valuable, suggesting that both educational costs and expected benefits are important factors in the decision of school attendance.[14]

[12]Poverty rates for children at the ages of 0-5 and 6-13, measured as the proportion living below the poverty line (60% of median income) within total population of a particular age group, were approximately 32% between 2007 and 2013.

[13]While the survey is informative at a national-level, it lacks important household- and individual-level information, such as the geographic location and individual ages of surveyed children, which prevents investigating the effects of macroeconomic conditions on child labor.

[14]Based on authors' calculations using the Child Labor Survey in 2012.

3 Description of the Data

The main data used in this paper come from the 2004-2013 Turkish Household Labor Force Surveys (LFS hereafter), which are the primary source of individual-level data on labor market activity in Turkey (TUIK, 2013).[15] The LFS is a nationally representative, repeated cross-sectional survey that is conducted annually by the Turkish Statistics Institute. The survey includes information from more than 135,000 households (about 500,000 individuals) each year, and it contains a rich set of socioeconomic and demographic characteristics of the Turkish population. Importantly, similar to the Current Population Survey in the U.S., the LFS contains detailed information on labor market activity of respondents age 15 and over, such as labor force status and classifications of economic activity.

The sample of analysis includes 701,596 children at the ages of 6-14 (primary school age children) who have parents at the ages of 25-54 that are "prime-age workers".[16] The outcome of interest is school attendance of children at the time of the survey year, measured as a dummy variable that is equal to 1 if the child is attending school.[17]

3.1 Explanatory variables

This paper exploits variation across 26 sub-regions and within sub-regions over time in unemployment rates.[18] Thus, the key explanatory variable is the sub-region-by-year unemployment rate constructed using the LFS surveys, which is used as the primary proxy of macroeconomic conditions. The constructed rates match perfectly with the

[15] We restrict the sample to 2013 and prior years because data on individuals younger than 15 are excluded in subsequent years.

[16] The main investigation of the effect of macro conditions on the education of children relies on the 2005-2013 LFS dataset as we cannot construct a predicted employment growth (instrument) for 2004 due to lack of data at the sub-region level in 2003.

[17] School attendance was asked for individuals 5 and older; however, we exclude 5 years old children from the analysis since most do not attend school.

[18] Recall the data do not allow us to exploit the effect of unemployment rates at the lower geographical unit of provinces.

rates published online by the Turkish Statistics Institute, except for small rounding differences.[19] While unemployment rate is common indicator of macroeconomic conditions, the employment-to-population ratio is also considered to be a good indicator due to potential measurement error in the unemployment rates (Dehejia and Lleras-Muney, 2004). Thus, employment-to-population ratios in each region are used as an alternative measure in robustness checks.

The LFS survey data suggests that there is significant variation in unemployment rates across sub-regions and within sub-regions over time (Figure 2). For example, unemployment rates ranged from 5 percent in the sub-region of Konya to 21 percent in the sub-region of Mardin in 2013. Unemployment rates in the most populous regions of Istanbul, Ankara, and Izmir in 2013 are 11, 10, and 16 percent, respectively. Unemployment rates also varied widely over the 2005 to 2013 period.[20] For example, during the period of study, unemployment rate has decreased by 8 points in the sub-region of Malatya, while it has increased by 7 points in the sub-region of Sanliurfa.

The information on demographic factors related to child schooling are provided in the survey. We control for basic demographic characteristics, including an indicator variable for child gender (female), the number of siblings, and child age fixed effects. Because both child schooling and macroeconomic conditions might be correlated with demographic characteristics of a sub-region, we control for time-varying sub-region demographics. Specifically, time-varying sub-region demographic controls include the fraction of the population in a particular age group (15-25, 26-35, 36-45, 46-55, 56-65, and 66+) and the fraction of the population with some college. For example, sub-regions with more educated population might have greater child schooling and better labor market

[19]The correlation between the constructed and published rates are 0.99. Online rates are available at: www.tuik.gov.tr. The high correlation is expected as the variable is constructed using identical household-level data sets. The Turkish Statistics Institute does not report unemployment rates for skilled/unskilled workers, which we construct using the LFS surveys.

[20]The overall, between, and within (sub-regions) standard deviations in unemployment are 3.81, 3.08 and 2.33, respectively.

conditions. We also control for sub-region and year fixed effects and sub-region-specific time trends, which are discussed in details in the following section.

Table 1 presents descriptive statistics for the primary variables of interest by year. On average, children are 10 years old and have 2 siblings, and almost half of the children are females. Moreover, 92 percent of 6-14 years old children attend school and the average unemployment rate is 11 percent.

4 Empirical Methodology

The following baseline regression specification estimates the effect of macroeconomic conditions on child schooling:

$$S_{irt} = \beta U_{rt} + \delta X_{irt} + \alpha_r + \gamma_t + \epsilon_{irt} \tag{1}$$

where S_{irt} indicates whether a child i in sub-region r at time t attends school, U_{rt} is the sub-regional unemployment rate at time t, X is a vector of control variables, α_r and γ_t are sub-region and year fixed effects, and ϵ_{irt} is a random error term. The data allow us to capture the variation in local economic conditions at the sub-regional level (26 sub-regions).[21] Standard errors are clustered at the sub-regional level to allow for correlation of the error term within sub-regions. Sample weights are used to ensure that the results are nationally representative.

Sub-region fixed effects account for time-invariant differences across sub-regions, such as social norms and access to school. Year fixed effects account for common trends in child schooling, such as nationwide policy changes in education. The effect of sub-regional macroeconomic changes in Equation 1 is identified using within-sub-region variation in unemployment rates over time. However, the specification does not account for differential

[21] The results are robust to using region-level data. The details of TUIK statistical regions are provided in Table A.1.

time trends in child schooling across sub-regions. In order to account for unobservable factors correlated with education that vary linearly over time within sub-regions, the following specification includes a vector of sub-region-specific linear time trends ($\alpha_r T$):

$$S_{irt} = \beta U_{rt} + \delta X_{irt} + \alpha_r + \gamma_t + \alpha_r T + \epsilon_{irt} \tag{2}$$

Furthermore, the preferred specification adds time-varying sub-region demographic controls (X_{rt}) to Equation 2 to control for factors at the sub-regional level that are correlated with child schooling and local economic conditions.

Identifying the effect of local economic conditions is challenging for a number of reasons. While the inclusion of sub-region and year fixed effects and a sub-region-specific time trend allays many endogeneity concerns, the presence of unobservable time variable factors that are correlated with unemployment rates and child schooling may bias the estimates. Another potential bias may be due to measurement error in the unemployment rates, especially during economic recessions. We use employment-to-population (EP) ratios as a robustness check to overcome the bias from measurement error (substitute U_{rt} with EP_{rt}); however, omitted variable bias remains a concern. There may be sub-region-level shocks that are correlated with both unemployment and schooling that we cannot directly observe or control in the empirical model.

In order to identify the causal effect of local economic conditions, we employ an instrumental variables estimation strategy that exploits exogenous variation in local labor demand shocks as an instrumental variable. Labor demand shocks are measured based on the index used by Bartik (1991) and Blanchard and Katz (1992). Specifically, we construct predicted employment growth rates using national industry-level employment growth rates weighted by baseline sub-regional-level employment shares as follows:

$$\hat{D}_{rt} = \sum_{k=1}^{K} \psi_{kr} G_{kt(-r)} \tag{3}$$

where k indexes industries and ψ_{kr} is the fraction of industry k employment in sub-region r to total employment in sub-region r in year 2004 (base year). $G_{kt(-r)}$ is the growth rate of national employment in industry k in year t, where the subscript $(-r)$ indicates that each sub-region's employment in industry k is excluded in calculating the national growth rate.[22] The index of predicted employment growth serves as an instrument for unemployment rates.

Because the weights (ψ_{kr}) are fixed over time, changes in employment do not reflect selective sorting of industries over the sample period. Moreover, variation over time is driven by changes in the national employment growth rates across industries, and thus is not associated with changes in sub-regional labor supply. If there is a concentration of employment in an industry in a specific region, then it might cause changes in national employment (Blanchard and Katz, 1992). Because the change in the national employment of each industry excludes each sub-region's employment growth, the measure removes the possible bias due to industry composition in a specific sub-region influencing changes in national employment growth. We use 18 industry categories to allow variation in the industry composition at baseline.[23]

[22] Following Aizer (2010), annual national employment growth excludes each sub-region's employment.

[23] Broader industry categories are constructed using the statistical classification of economic activities in the European Community (NACE REV.2): Agriculture, Forestry and Fishing; Mining and Quarrying; Construction; Low Tech Manufacturing; Basic Manufacturing; High Tech Manufacturing; Transportation; Telecommunications; Utilities; Wholesale Trade; Retail Trade; Finance, Insurance, and Real Estate; Management and Administrative Services; Personal Services; Entertainment and Recreation Services; Professional and Technical Services; Public Administration; Education and Health Services. Following Katz and Murphy (1992), manufacturing sector is divided into three categories as low tech, basic, and high tech manufacturing.

5 Effects of Macroeconomic Conditions on Schooling of Children

Table 2 presents the effect of unemployment on child school attendance using various OLS and IV specifications. All specifications control for child gender and number of siblings. Columns 1-3 present the OLS estimates. In particular, column 1 presents the OLS estimate controlling for all fixed effects, column 2 adds sub-region-specific linear time trends, and column 3 adds time-varying sub-region demographics. The OLS estimates suggest a negative correlation between unemployment and child education, and the coefficients are statistically significant at conventional significance levels, except in column 1. Consistent with previous studies, females are less likely to attend school and an increase in the number of siblings reduces the probability of school attendance.

Columns 4-6 present the IV estimates, and the first stage results are also provided at the bottom of Table 2. The results indicate that unemployment rates are significantly correlated with the demand index at the first stage. The magnitudes of F-statistics are greater than the Staiger and Stock (1997) threshold of 10, alleviating concerns about a weak instrument. Overall, IV estimates suggest that unemployment reduces the probability of child school attendance, and the coefficients are statistically significant at all conventional significance levels. The estimated effect in column 4 (-0.054) is slightly reduced after the inclusion of sub-region-specific linear time trends in column 5 (-0.052). Controlling for changes in sub-region demographics as well as sub-region-specific time trends further reduces the estimated effect to -0.048 in column 6. While column 6 is the preferred specification, the estimated effects are not statistically different across specifications 4-6. The estimated effect using the preferred specification in column 6 suggests that a one percentage point increase in the sub-regional unemployment rate reduces the probability of child school attendance by 5 percentage points, which corresponds to a 5%

reduction relative to the mean (0.92). The IV estimates exceed the OLS estimates in all specifications. The OLS estimates could be biased downward due to measurement error or omitted variable bias, as previously discussed.

The results demonstrate that schooling is pro-cyclical, suggesting that the income effect dominates the substitution effect. We also explore the reduced-form effect of labor demand shocks on child schooling. The result reported in column 1 of Table A.2 demonstrates consistent evidence that increases in labor demand increase the probability of child school attendance. More specifically, a one percentage point increase in labor demand index (or increase of 0.01 units) increases the probability of child school attendance by 0.08 percentage points, which corresponds to approximately 0.09 percent increase in child schooling at the mean.

We next explore the effect of local unemployment rates on parental labor force participation and heterogeneous effects by parental education and urban/rural residence. Parental labor force participation is a dummy variable indicating whether at least one of the parents (father or mother) is employed. The results presented in Table A.3 suggest that sub-regional unemployment rates reduce the probability of parental labor force participation.[24] Thus, reduced parental labor force participation could be a potential mechanism for income effect on child schooling. The results also suggest that the effect on labor force participation is higher for parents with less than high school education, implying that this channel may play a more important role for children with less educated parents.[25]

[24] While reduced labor force participation might reduce household income, we cannot explore the effects on household income due to lack of reliable data.

[25] Parental education refers to father's education.

5.1 Robustness Checks

We test the sensitivity of the results to using an alternative measure of macroeconomic conditions and employing various alternative measures of the instrumental variable. The results using the preferred specification are presented in Table 3. Column 1 presents the OLS estimates and columns 2-4 present the IV estimates. Table 3 also presents the first-stage coefficients with associated F-statistics and p-values. The first-stage results for all specifications confirm that there is a strong and statistically significant relationship between local macro conditions and labor demand.

First, to ensure that the results are not biased due to measurement error associated with unemployment rates, we use the employment-to-population ratio as a proxy for local macroeconomic conditions instead of unemployment rates. The results using the unemployment and employment-to-population ratios are presented in Panels A and B of Table 3, respectively. To facilitate comparison, column 2 of Panel A reports the effect of unemployment on child schooling using the preferred specification (Table 2, column 6). Using the employment-to-population ratio and identical instrument (IV-1) demonstrates that the results are consistent using an alternative measure of macroeconomic conditions.

Second, we check the robustness of the results to the choice of baseline year to rule out the possibility that the results are driven by industry-level or sub-region-level shocks in a particular year. To this end, we construct the instrument using 2005 as the base year rather than 2004 (IV-2).[26] Column 3 of Panels A and B demonstrate that the results are robust using the unemployment rate and employment-to-population ratio.

Finally, there might be spillover effects of macroeconomic conditions across sub-regions through changing employment opportunities for both adults and children in nearby sub-regions. Thus, we re-construct the instrument by excluding own-sub-region and adjacent sub-regions from national employment growth (IV-3). Column 4 demonstrates that the

[26] Estimations exclude observations from the 2005 LFS dataset.

estimated effect of unemployment is slightly reduced using the alternative instrument, while the sign and level of significance remain unchanged. This suggests that there are pro-cyclical spillover effects, but the differences in the estimated effects are not statistically different across specifications 2-4.

While this paper focuses on the impact of contemporaneous unemployment rates, the decisions of households to send a child to school might also depend on the economic conditions in the previous year. Specifically, expectations for lifetime earnings may be formed prior to the realization of contemporaneous labor market conditions. In order to check this possibility, we include one-lagged sub-regional unemployment rate as an additional control. The results are reported in Panel A of A.4, where column 1 is the effect using the preferred specification and column 2 adds one-lagged sub-regional unemployment rate. The results are robust and the difference in the effects is not statistically significant. Moreover, the results suggest no evidence of an effect of lagged unemployment rates on child schooling as the estimated effect is negligible and not statistically significant.

It is well-established that birth order is an important determinant of schooling (see Behrman and Taubman (1986); Strauss and Thomas (1995) among many others). As a robustness check, we include birth order as an additional control.[27] The results are reported in Panel A of A.4, where column 3 is the effect using the preferred specification and column 4 adds birth order. While there is a negative and small effect of birth order on child schooling, the effect of unemployment in column 4 is robust and not statistically different from the effect in column 3. Furthermore, the direct effect of labor demand on child school attendance also remains robust to controlling for lagged unemployment rate or birth order (Panel B of A.4).

[27] Sample size is reduced due to missing values in birth order.

5.2 Heterogeneous Effects

5.2.1 Age and Gender

Do the effects of macroeconomic conditions depend on the age or gender of children? On the one hand, older children might be more vulnerable to economic shocks as they have more labor market opportunities compared to younger children. Thus, the opportunity cost of schooling may be higher for older children. On the other hand, parents might choose to keep older children in school due to higher costs of schooling disruptions to an older child compared to a younger child. Exploring heterogeneous effects by age also provides indirect evidence on the effect of unemployment on the level of education. Recall that children at the ages of 6-10 are considered the first-level primary school age (grades 1-4) and children at the ages of 11-14 are considered the second-level primary school age (grades 5-8). Because school attendance at age 6 is primarily based on the decision when to enroll the child, we explore the effect for 6-years-old children separately, and we split the first- and second-level primary school ages into two similar size groups, resulting in subsamples of children in the following age groups: 6; 7-8; 9-10; 11-12; and 13-14. We estimate the effects using instrumental variables estimation and the preferred specification (similar to Table 2, column 6) for these subsamples.

The results presented in Panel A of Table 4 demonstrate that the effects for all age groups are negative and statistically significant. The insignificant effect for 6-years-old children suggests that unemployment does not alter the timing of enrollment decisions. The coefficients on the effects for children ages 7-8 and 9-10 are not statistically different from each other, suggesting that the effect among first-level primary school age children does not depend on age. Similarly, the coefficients on the effects for children ages 11-12 and 13-14 are not statistically different from each other, suggesting that the effect among second-level primary school age children does not depend on age. While the estimated effects for children ages 7-8 and 9-10 are slightly greater than the effects for children

ages 11-12 and 13-14, the differences in the effects are not statistically significant. These results provide indirect evidence that unemployment may not have substantial effect on the level of education.

We also explore heterogeneity in gender across different age groups. Panels B and C of Table 4 present the effects for boys and girls by age groups, respectively. While the effects tend to be slightly larger for boys, there are no significant differences across genders (within age groups) or across age groups (within genders), with the exception of the oldest age group. The largest effect is among boys ages 13-14, suggesting that older boys might be expected to work during economic downturns to contribute to household income.

5.2.2 Parental Education and Residence

Household responses to changes in macroeconomic conditions are likely to depend on many characteristics. In particular, credit constrained households and households with lower returns to education might be more affected by the economic downturns. This section explores whether the effect of unemployment on child schooling depends on parental education and urban/rural residence for children in different age groups. To this end, we split the sample into subsamples of children who have fathers (or mothers) with at least high school education and with less than high school education; who reside in rural and urban areas; and who are girls and boys. Table 5 presents the IV estimates for each subsample using the preferred specification with all controls.

The results in columns 1-4 demonstrate that the effect of unemployment is significant and higher in magnitude among children who have parents with less education. These results suggest that parents with higher education levels might be less credit constrained or generally more capable of coping with economic downturns, or their children might have higher expected returns to education. Thus, investments in human capital could be

an important public policy tool to mitigate the negative effects of economic downturns on child schooling. The results are insignificant for children with more educated parents.

We next compare the effect for children residing in rural areas to the effect for children residing in urban areas. The results in columns 5 and 6 demonstrate that unemployment negatively affects child school attendance both in urban and rural areas, with higher effects among children residing in rural areas. If households in rural areas are more credit constrained, as it is typically the case in developing countries, then the results suggest that improving access to credit in rural areas might mitigate the negative effects of economics downturns on human capital of children. In columns 7 and 8, we compare the effects by gender. The results show that boys are more affected than girls, although the difference is not statistically significant. Recall that this difference appears to be due to higher effects for 13-14 years-old boys.

We additionally explore heterogeneous effects using the reduced-form effect of labor demand index on child education. Similar to exploring heterogeneous effects of unemployment, we split the sample by parental education, urban/rural residence, and child gender. The results are presented in columns 2-9 of Table A.2. Consistent with heterogeneity in the effects of unemployment on child education, the results demonstrate that the effect of labor demand is higher among children with less educated parents and residing in rural areas.

6 Effects of Unskilled and Skilled Unemployment on Child Schooling

As discussed, we expect a priori that economic growth that is biased toward skilled labor to increase education through increases in the returns to schooling, while economic growth that is biased toward unskilled labor to reduce education through increases in the

opportunity cost of schooling. In that case, an increase in unskilled unemployment would increase child schooling, while an increase in skilled unemployment would reduce child schooling. Thus, the effects of economic growth on child schooling might depend on the structure of growth. In order to test this hypothesis, we explore the effects of unskilled and skilled unemployment using worker education as a proxy for unskilled and skilled labor. More specifically, unskilled unemployment is defined as the unemployment rate among individuals with at most a high school degree, while skilled unemployment is defined as the unemployment rate among individuals with at least some college. Similar to the previous analysis, we construct an instrumental variable based on predicted employment growth rates separately for skilled and unskilled labor:

$$\hat{D}_{rtg} = \sum_{k=1}^{K} \psi_{krg} G_{kt(-r)} \tag{4}$$

where, g indexes skill level (skilled/unskilled) and ψ_{krg} is the fraction of skilled or unskilled labor working in industry k in sub-region r in year 2004.

Table 6 presents the results, where columns 1-3 present the OLS estimates and columns 4-6 present the IV estimates that employ demand indices for skilled and unskilled labor as instrumental variables. As expected, the results demonstrate that economic growth generates asymmetric effects on child schooling: unskilled unemployment increases child school attendance, whereas skilled unemployment decreases it, and the effects are statistically significant at conventional significance levels.[28] Using our preferred estimation in column 6, a one percentage point increase in sub-regional unskilled unemployment increases the probability of child schooling by 0.3 percentage points and a one percentage point increase in sub-regional skilled unemployment reduces the probability of child schooling by 1.3 percentage points. These imply elasticities of about 0.03 and -0.03

[28]The results are robust to the inclusion of lagged unemployment rate and birth order (Panel C of A.4).

for unskilled and skilled unemployment at sample means.[29] The results highlight the importance of public policies that should be implemented to reduce the negative effects of growth in unskilled employment and reductions in skilled employment in Turkey.

As a robustness check, we construct a measure of skilled and unskilled labor demand based on type of occupation.[30] The rationale is that individuals may not work in occupations reflecting their level of skill (Autor and Handel, 2013). Following Katz and Margo (2014), we redefine skilled labor as individuals working in professional/technical, managerial/official, clerical occupations; and unskilled labor as individuals working in operative/unskilled/service and farm laborer occupations. The results are robust to this alternative instrument based on type of occupation (column 7).

The effects of labor market conditions will generally be uneven across households. For example, higher skilled or educated households might be relatively more affected by skilled unemployment rates, whereas less skilled or educated households might be relatively more affected by unskilled unemployment rates. In addition, if schooling decisions are motivated by the opportunity cost of schooling in terms of foregone earnings of the child, and children in rural areas are more likely to work in the labor market, then households in rural areas would be more affected by unskilled unemployment rates. Table 7 presents the effects of unskilled and skilled unemployment on schooling for various subsamples of children. The results suggest that the effects of unskilled and skilled unemployment are higher among less educated households, and that schooling in more educated households is very irresponsive to changes in both unskilled and skilled unemployment rates.

Furthermore, the results demonstrate that the effect of unskilled unemployment is higher in rural areas, whereas the effect of skilled unemployment is higher in urban areas,

[29]Sample means for child school attendance, unskilled unemployment rate and skilled unemployment rate are 92%, 10% and 2%, respectively. While we cannot directly compare these elasticities to previous studies in developing countries, the elasticities of high-school enrollment and upper secondary education completion with respect to unemployment is estimated to be 0.05 in the US (Card and Lemieux, 2001), and 0.04 in Norway (Reiling and Strom, 2015).

[30]It is not possible to compute local unskilled and skilled unemployment rates by occupation due to missing occupational information for the unemployed.

though the latter difference is not statistically significant. One potential explanation for this finding is that households in urban areas are more likely to be employed in skilled occupations, such as manufacturing and services, whereas households in rural areas are more likely to be employed in unskilled occupations, such as agriculture. Finally, the results suggest that the effect of unskilled unemployment is relatively larger among boys, whereas the effect of skilled unemployment is relatively larger for girls, though the latter difference is not statistically significant. One potential explanation for this finding is that boys might be more likely to work in unskilled-labor-intensive sectors than girls.

Heterogeneity in the effects of labor market conditions on schooling across unskilled and skilled unemployment rates and across characteristics of the household and child gender has important policy implications in terms of designing policies that target specific subpopulations, specifically less educated households in rural areas, in order to alleviate the adverse impacts of economic downturns on human capital investment.

7 Long-term Effects

While we leave future research to investigate the long-term effects, we provide a tentative exploration of the long-term effects of unemployment on education attainment and labor market outcomes. The primary challenge is that the data are limited to the years 2005 to 2013, which is insufficient to study long-term effects. We restrict the analysis to individuals aged 18-20 in 2013–the age group for which we can observe years during childhood in the previous survey rounds. The independent variable of interest is a measure of sub-regional unemployment rates over the individual's childhood, which would correspond to the average unemployment rate between the ages of 9 and 14 among our sample of analysis.[31]

[31]Because we do not have sub-regional data for years prior to 2004, we cannot observe unemployment rates in a sub-region when the individual was younger than 9. For example, for an individual at the age of 18 in 2013, we can assign the average sub-regional unemployment rate over the 2004 to 2009 period

Table A.5 presents the long-term effects using average sub-regional unemployment rates during childhood. Because investigating long-term effects eliminates most of the temporal variation in macroeconomic conditions that are used to investigate contemporaneous relationships, we rely on OLS in estimating the effects on the probabilities of school attendance, high school completion, currently being employed, and being in the labor force in 2013. Consequently, we cannot conclude that the results represent causal effects on schooling.

Columns 1-3 of Panel A suggest that unemployment during childhood is negatively associated with the probability of school attendance. Because individuals at the age of 18 might be attending high school, we exclude them when exploring the effects on high school completion and labor market outcomes. The result on the probability of school attendance remains robust after excluding 18-year-olds in column 4. Columns 5-7 suggest that unemployment during childhood is negatively associated with the probability of completing high school, being employed, and participating in the labor market. Panels B and C present the results for males and females, suggesting that the long-run effects are higher for males than females. In sum, there is suggestive evidence that there are long-term effects of macroeconomic conditions in childhood on education and labor market outcomes.

8 Conclusion

This paper explores the effect of macroeconomic conditions on child schooling in the context of a developing country. Using a nationally-representative labor market survey conducted in Turkey in 2004-2013, we estimate the relationship between economic shocks, as measured by local unemployment rates, and child schooling, using an index

(when s/he was between the ages of 9 and 14). Similarly, for an individual at the age of 19 in 2013, we can assign the average sub-regional unemployment rate over the 2004 to 2008 period (when s/he was between the ages of 10 and 14), and so on.

for local labor demand shocks as an instrumental variable. We find that child schooling is pro-cyclical, and the IV estimates indicate that a one percentage point increase in the unemployment rate reduces the probability of child school attendance by 5 percentage points. The results remain robust to several robustness checks, including using alternative measures of unemployment rates (e.g., employment-to-population ratio), using alternative instrumental variables, and controlling for lagged unemployment rates and other covariates. We also find that reductions in parental labor force participation could be a potential mechanism linking aggregate shocks and child schooling. The results are consistent with the hypothesis that the effects are greater among credit-constrained households. Reduced-form estimates suggest that economic downturns significantly decrease child schooling, particularly for children that have parents with lower socioeconomic status.

We test the hypothesis that cyclicality of child schooling depends on the structure of growth. In particular, we investigate whether unskilled-labor biased growth decreases schooling, whereas skilled-labor biased growth increases schooling. To this end, we divide labor into skilled and unskilled labor using educational and occupational classifications. Consistent with our hypothesis, we find that schooling is positively related to the unemployment rate of unskilled workers, and negatively related to the unemployment rate of skilled workers.

The finding that macroeconomic conditions bear on parental decisions in child schooling has important policy implications as education has long-term socioeconomic repercussions, such as future earnings and health. Our findings suggest that policies that mitigate the adverse impacts of unemployment, such as unemployment insurance, might yield dividends in terms of educational and employment outcomes of future generation. The results also highlight the importance of reducing barriers to credit access as means to mitigate the adverse impacts of economic recessions on child schooling, particularly

in rural areas and among households with relatively less education. Finally, the finding that the relationship between education and economic growth depends on the structure of growth demonstrates that unskilled-labor biased growth might ultimately stall or plateau due to low levels of human capital growth, whereas skilled-labor biased growth might promote higher levels of growth in the long run. Moreover, this finding might be leveraged to reconcile the mixed results in the literature as studies generally abstract from the sources of growth.

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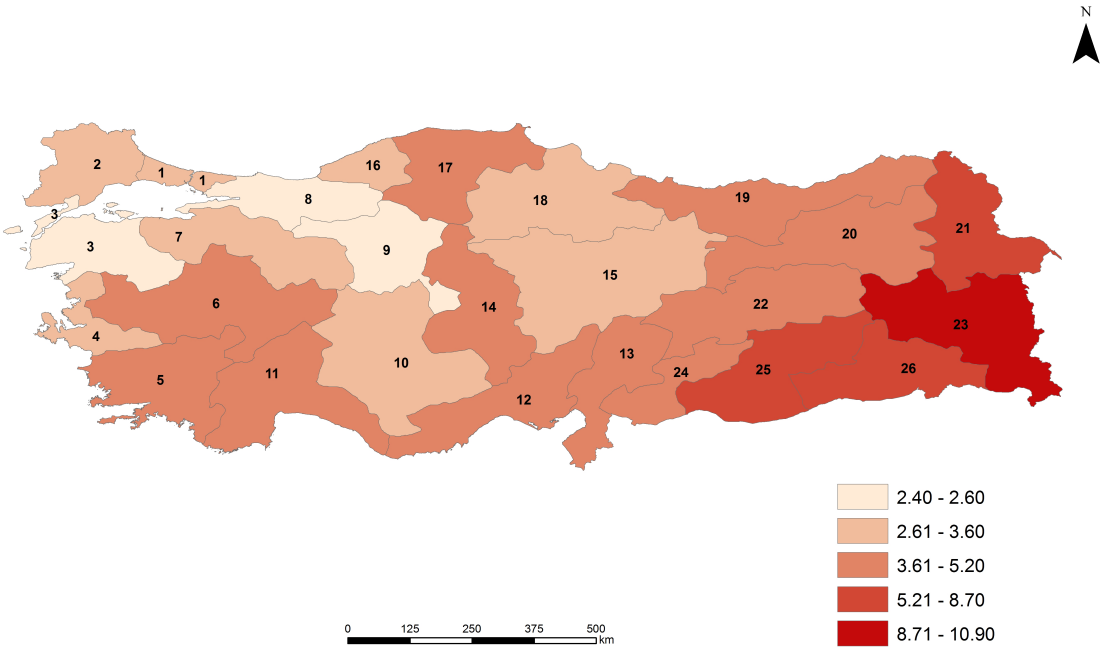
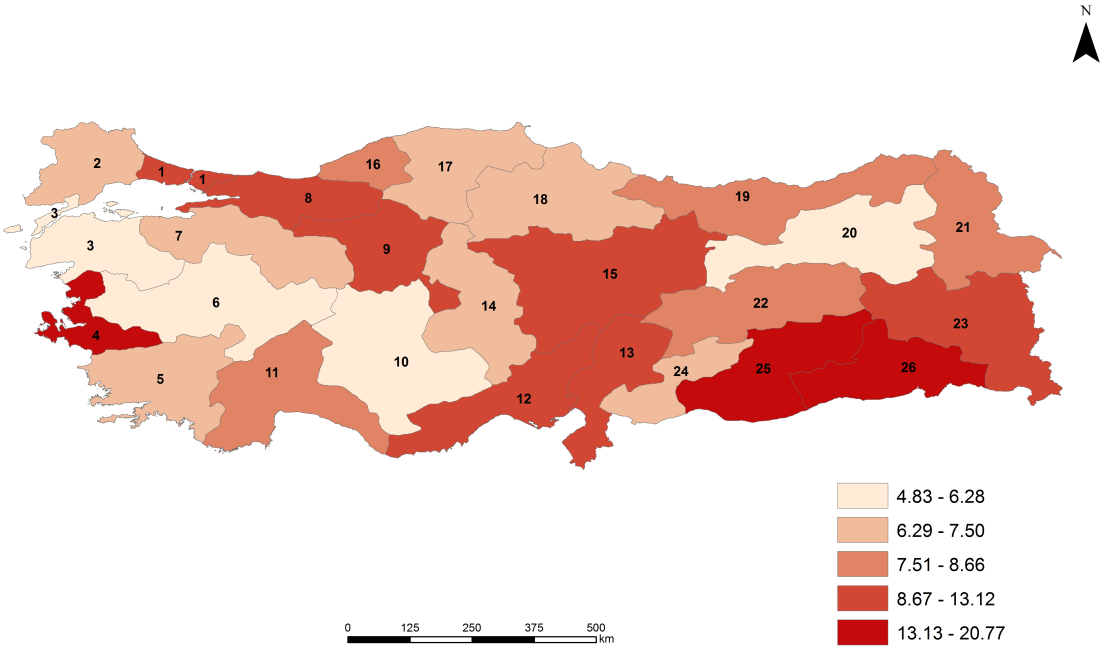
9 Figures

Figure 1: Percentage of children not attending school at the sub-region level in 2013



Notes: The map represents authors' calculations based on Turkish Household Labor Force Survey in 2013. Percentage of children at the ages of 6-14 that are not attending school are presented. Sub-region borders for Turkey are obtained from ArcGIS Geodata DIVA-GIS. The values are classified using the natural breaks method of ArcGIS. The sub-regions are defined in Table A.1.

Figure 2: Unemployment rates at the sub-region level in 2013



Notes: The map represents authors' calculations based on Turkish Household Labor Force Survey in 2013. Unemployment rates at the sub-region level are presented. Sub-region borders for Turkey are obtained from ArcGIS Geodata DIVA-GIS. The values are classified using the natural breaks method of ArcGIS. The names of the sub-regions are defined in Table A.1.

10 Tables

Table 1: Descriptive statistics

Year	Cohort Size	School Attendance	Unemployment Rate	Child Age	Female	Number of Siblings
2005	81,156	0.89	10.94	9.96	0.49	2.25
2006	81,019	0.90	10.71	9.94	0.49	2.22
2007	78,105	0.91	11.06	9.95	0.49	2.16
2008	77,243	0.92	11.63	9.98	0.49	2.15
2009	79,728	0.92	14.50	10.03	0.49	2.17
2010	80,063	0.93	12.10	10.06	0.49	2.13
2011	77,117	0.93	10.00	10.04	0.49	2.11
2012	74,880	0.94	9.47	10.01	0.49	2.09
2013	72,285	0.96	10.28	9.97	0.49	2.07
All	701,596	0.92	11.19	9.99	0.49	2.15

Notes: Weighted means by survey weights. Cohort Size: number of 6-14 years old children; School Attendance: percent of children attending school; Unemployment Rate: average sub-regional unemployment rate; Child Age: average age of children; Female: percent of female children; Number of Siblings: average number of siblings in a household.

Table 2: Effect of unemployment on child school attendance

	OLS			IV		
	[1]	[2]	[3]	[4]	[5]	[6]
Dependent Variable: Child School Attendance						
Unemployment rate	-0.000	-0.001***	-0.001**	-0.054***	-0.052***	-0.048**
	(0.000)	(0.000)	(0.000)	(0.015)	(0.018)	(0.019)
Female	-0.012**	-0.012**	-0.012**	-0.016***	-0.016***	-0.016***
	(0.005)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)
Number of siblings	-0.012***	-0.012***	-0.012***	-0.013***	-0.013***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
First stage						
Demand index				-1.956***	-1.699***	-1.592***
				(0.202)	(0.188)	(0.184)
F-statistics				94.157	81.716	74.923
p-value				0.000	0.000	0.000
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trends	No	Yes	Yes	No	Yes	Yes
Time-varying sub-region demographics	No	No	Yes	No	No	Yes
Number of observations	701,596	701,596	701,596	701,596	701,596	701,596

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Time-varying sub-region demographic controls include the fraction of the population in a particular age group (15-25, 26-35, 36-45, 46-55, 56-65, and 66+) and the fraction of the population with some college. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Robustness checks–Effect of unemployment on child school attendance

	OLS [1]	IV-1 [2]	IV-2 [3]	IV-3 [4]
Dependent Variable: Child School Attendance				
Panel A: Unemployment rate	-0.001**	-0.048**	-0.041**	-0.035**
	(0.000)	(0.019)	(0.020)	(0.013)
First-stage				
Demand index		-1.592***	-1.824***	-1.638***
		(0.184)	(0.237)	(0.153)
F-statistics		74.923	59.389	114.480
p-value		0.000	0.000	0.000
Panel B: Employment-to-population ratio	0.001**	0.041*	0.045*	0.043**
	(0.000)	(0.024)	(0.024)	(0.019)
First-stage				
Demand index		1.395***	1.392***	1.159***
		(0.202)	(0.194)	(0.143)
F-statistics		47.836	51.271	66.085
p-value		0.000	0.000	0.000
Year fixed effects	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes
Sub-region specific time trends	Yes	Yes	Yes	Yes
Time-varying sub-region demographics	Yes	Yes	Yes	Yes
Number of observations	701,596	701,596	620,440	701,596

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender and number of siblings. IV-1: main instrument; IV-2: instrument using 2005 as the base year; IV-3: instrument excluding sub-region and adjacent sub-regions from the national employment. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Effects of unemployment on child school attendance by age groups and gender

	Age 6	Ages 7-8	Ages 9-10	Ages 11-12	Ages 13-14
	[1]	[2]	[3]	[4]	[5]
Dependent Variable: Child School Attendance					
Panel A: All children	-0.013	-0.063*	-0.057***	-0.054**	-0.050*
	(0.031)	(0.038)	(0.022)	(0.022)	(0.030)
Number of observations	72,736	154,791	158,766	160,173	155,130
Panel B: Boys	-0.010	-0.065*	-0.055**	-0.056**	-0.075**
	(0.041)	(0.039)	(0.023)	(0.025)	(0.038)
Number of observations	37,470	79,535	81,262	81,714	78,707
Panel C: Girls	-0.023	-0.054*	-0.060*	-0.052*	-0.033
	(0.047)	(0.030)	(0.036)	(0.031)	(0.045)
Number of observations	35,266	75,256	77,504	78,459	76,423
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trend	Yes	Yes	Yes	Yes	Yes
Time-varying sub-region demographics	Yes	Yes	Yes	Yes	Yes

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender and number of siblings in Panel A, while regressions control for number of siblings in Panels B and C. The main instrument based on Equation 3 is used in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Heterogeneous effects of unemployment on child school attendance

	Father Less Than High School	Father High School or More	Mother Less Than High School	Mother High School or More	Rural	Urban	Boys	Girls
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dependent Variable: Child School Attendance								
Unemployment rate	-0.130**	-0.000	-0.114**	0.003	-0.077**	-0.041*	-0.058**	-0.041*
	(0.060)	(0.009)	(0.047)	(0.010)	(0.030)	(0.025)	(0.029)	(0.024)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying sub-region demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	479,708	221,888	597,303	104,293	225,068	476,528	358,688	342,908

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender (except in columns 7-8) and number of siblings. The main instrument based on Equation 3 is used in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Effects of unskilled and skilled unemployment (UE) on child school attendance

	OLS			IV			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Dependent Variable: Child School Attendance							
Unskilled UE	0.002**	0.001***	0.001***	0.003**	0.003**	0.003***	0.005***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Skilled UE	-0.009**	-0.003*	-0.003*	-0.018***	-0.014**	-0.013**	-0.017***
	(0.004)	(0.002)	(0.002)	(0.004)	(0.006)	(0.005)	(0.005)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trend	No	Yes	Yes	No	Yes	Yes	Yes
Time-varying sub-region demographics	No	No	Yes	No	No	Yes	Yes
Number of observations	701,596	701,596	701,596	701,596	701,596	701,596	701,596

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender and number of siblings. Columns 4-6 construct the instrument based on worker education, while Column 7 constructs the instrument based on type of occupation. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Heterogeneous effects of unskilled and skilled unemployment (UE) on child school attendance

	Father Less Than High School	Father High School or More	Mother Less Than High School	Mother High School or More	Rural	Urban	Boys	Girls
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Dependent Variable: Child School Attendance								
Unskilled UE	0.005***	-0.001	0.003**	0.000	0.009***	0.000	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.001)	(0.001)	(0.002)
Skilled UE	-0.015**	-0.001	-0.015***	-0.001	-0.010	-0.013**	-0.011*	-0.016**
	(0.006)	(0.009)	(0.006)	(0.015)	(0.014)	(0.006)	(0.007)	(0.008)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying sub-region demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	479,708	221,888	597,303	104,293	225,068	476,528	358,688	342,908

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender (except in columns 7-8) and number of siblings. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A Appendix Tables

Table A.1: Statistical regions of Turkey

	Sub-region (Level 2): Provinces	Region (Level 1)
1	Istanbul: Istanbul	Istanbul
2	Tekirdag: Tekirdag-Edirne-Kirklareli	West Marmara
3	Balikesir: Balikesir-Canakkale	West Marmara
4	Izmir: Izmir	Agean
5	Aydin: Aydin-Denizli-Mugla	Agean
6	Manisa: Manisa-Afyonkarahisar-Kutahya-Usak	Agean
7	Bursa: Bursa-Eskisehir-Bilecik	East Marmara
8	Kocaeli: Kocaeli-Sakarya-Duzce-Bolu-Yalova	East Marmara
9	Ankara: Ankara	West Anatolia
10	Konya: Konya-Karaman	West Anatolia
11	Antalya: Antalya-Isparta-Burdur	Mediterranean
12	Adana: Adana-Mersin	Mediterranean
13	Hatay: Hatay-Kahramanmaras-Osmaniye	Mediterranean
14	Kirikkale: Kirikkale-Aksaray-Nigde-Nevsehir-Kirsehir	Central Anatolia
15	Kayseri: Kayseri-Sivas-Yozgat	Central Anatolia
16	Zonguldak: Zonguldak-Karabuk-Bartin	West Black Sea
17	Kastamonu: Kastamonu-Cankiri-Sinop	West Black Sea
18	Samsun: Samsun-Tokat-Corum-Amasya	West Black Sea
19	Trabzon: Trabzon-Ordu-Giresun-Rize-Artvin-Gumushane	East Black Sea
20	Erzurum: Erzurum-Erzincan-Bayburt	North-east Anatolia
21	Agri: Agri-Kars-Igdir-Ardahan	North-east Anatolia
22	Malatya: Malatya-Elazig-Bingol-Tunceli	Central-east Anatolia
23	Van: Van-Mus-Bitlis-Hakkari	Central-east Anatolia
24	Gaziantep: Gaziantep-Adiyaman-Kilis	South-east Anatolia
25	Sanliurfa: Sanliurfa-Diyarbakir	South-east Anatolia
26	Mardin: Mardin-Batman-Sirnak-Siirt	South-east Anatolia

Notes: Statistical regions in Turkey are established by the Turkish Statistical Agency (TUIK). Sub-regions (Level 2) comprise multiple provinces based on population size and geographic proximity. For example, most populous provinces (e.g., Istanbul) form their own sub-regions, whereas smaller provinces (e.g., Trabzon) are combined with other provinces to form a sub-region. Column 1 presents sub-regions and provinces that form the sub-regions, while column 2 presents regions (larger geographical unit). Turkish Labor Force Surveys record location of individuals at the level of sub-region and region.

Table A.2: Effect of labor demand on child school attendance

	All	Father Less Than High School	Father High School or More	Mother Less Than High School	Mother High School or More	Rural	Urban	Boys	Girls
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Dependent Variable: Child School Attendance									
Demand Index	0.077***	0.103***	-0.002	0.096***	-0.025	0.193***	0.057*	0.080**	0.075*
	(0.029)	(0.037)	(0.046)	(0.032)	(0.067)	(0.060)	(0.034)	(0.038)	(0.044)
Number of observations	701,596	479,708	221,888	597,303	104,293	225,068	476,528	358,688	342,908

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender (except in columns 8-9), number of siblings, year and sub-region fixed effects, age fixed effects, sub-region specific time trend, and time-varying sub-region demographics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Effects of unemployment rate on parental labor force participation

	OLS	IV				
	All	All	Less Than High School	High School or More	Rural	Urban
	[1]	[2]	[3]	[4]	[5]	[6]
Dependent Variable: Parental Labor Force Participation						
Unemployment rate	-0.005***	-0.080***	-0.120*	-0.054***	-0.079**	-0.089***
	(0.001)	(0.026)	(0.063)	(0.015)	(0.032)	(0.016)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sub-region specific time trend	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying sub-region demographics	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	666,662	666,662	485,397	181,265	213,823	452,839

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender and number of siblings. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: Effects of unemployment on child school attendance with controls for lagged unemployment rate (UE) or birth order

	Lagged UE			Birth Order	
	[1]	[2]		[3]	[4]
Dependent Variable: Child School Attendance					
Panel A: IV					
UE	-0.048**	-0.049**	UE	-0.048**	-0.047**
	(0.019)	(0.025)		(0.019)	(0.019)
Lagged UE		-0.002	Birth order		-0.008***
		(0.002)			(0.000)
Panel B: Reduced Form					
Demand Index	0.077***	0.071**	Demand Index	0.075***	0.074**
	(0.029)	(0.029)		(0.029)	(0.029)
Lagged UE		-0.002**	Birth order		-0.008***
		(0.001)			(0.000)
Panel C: IV					
Unskilled UE	0.003***	0.003**	Unskilled UE	0.003***	0.003***
	(0.001)	(0.001)		(0.001)	(0.001)
Skilled UE	-0.013**	-0.011**	Skilled UE	-0.013**	-0.012**
	(0.005)	(0.005)		(0.005)	(0.005)
Lagged UE		-0.001	Birth order		-0.007***
		(0.001)			(0.000)
Number of observations	701,596	701,596		701,348	701,348

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender, number of siblings, year and sub-region fixed effects, age fixed effects, sub-region specific time trend, and time-varying sub-region demographics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Long-term effects of unemployment rate (UE) during childhood on education and labor market outcomes

	Attend School				HS Completion	Currently Employed	In Labor Force
	Age 18 in 2013 [1]	Ages 18-19 in 2013 [2]	Ages 18-20 in 2013 [3]	Ages 19-20 in 2013 [4]	Ages 19-20 in 2013 [5]	Ages 19-20 in 2013 [6]	Ages 19-20 in 2013 [7]
Panel A: All							
UE between 9-14	-0.0088***						
	(0.0002)						
UE between 10-14		-0.0123***					
		(0.0003)					
UE between 11-14			-0.0112***	-0.0112***	-0.0019***	-0.0047***	-0.0026***
			(0.0003)	(0.0005)	(0.0004)	(0.0002)	(0.0002)
Number of observations	8,422	15,532	21,314	12,892	12,892	12,892	12,892
Panel B: Males							
UE between 9-14	-0.0135***						
	(0.0004)						
UE between 10-14		-0.0157***					
		(0.0002)					
UE between 11-14			-0.0175***	-0.0150***	-0.0057***	-0.0067***	-0.0069***
			(0.0004)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of observations	4,382	7,897	10,389	6,007	6,007	6,007	6,007
Panel C: Females							
UE between 9-14	-0.0083***						
	(0.0002)						
UE between 10-14		-0.0085***					
		(0.0004)					
UE between 11-14			-0.0045***	-0.0023**	-0.0024***	-0.0036***	-0.0013***
			(0.0001)	(0.0004)	(0.0004)	(0.0002)	(0.0000)
Number of observations	4,040	7,635	10,925	6,885	6,885	6,885	6,885

Notes: Regressions weighted by survey weights and standard errors in parentheses clustered at the sub-region level. Regressions control for child gender, household size, sub-region fixed effects, age fixed effects, and time-varying sub-region demographics. The independent variables are average sub-region UE rates during childhood. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.