Economic Impacts of Education: Evidence from the Compulsory Education Reform in Türkiye

Araştırma Makalesi /Research Article

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ABSTRACT: *This study investigates the economic impact of Türkiye's 1997 compulsory education reform (CER), which extended mandatory schooling from five to eight years. Utilizing data from the seventh wave of the World Values Survey and employing an instrumental variable approach with Two-Stage Least Squares (2SLS) estimation, I provide new insights into the reform's outcomes. The findings reveal that the reform significantly increased educational attainment and reduced gender disparities. However, the anticipated economic benefits were limited, with higher unemployment rates and a lower likelihood of high-skilled employment among affected cohorts. Additionally, those affected by the reform reported lower perceived improvements in their standard of living compared to their parents. These results suggest that the expansion of education increased the supply of educated individuals, potentially lowering the overall value of education in the labour market.*

Keywords: CER, Economic Impact, Educational Attainment, Labour Market Outcomes, Gender Disparities

Eğitimin Ekonomik Etkileri: Türkiye'deki Zorunlu Eğitim Reformundan Kanıtlar

ÖZ: *Bu çalışma, Türkiye'nin 1997 yılında zorunlu eğitim süresini beş yıldan sekiz yıla çıkaran zorunlu eğitim reformunun ekonomik etkilerini araştırmaktadır. Yedinci dalga Dünya Değerler Anketi verilerini kullanarak ve İki Aşamalı En Küçük Kareler (2SLS) tahmin yöntemiyle yapılan araç değişken (IV) yaklaşımını kullanarak, reformun sonuçlarına dair yeni iç görüler sunmaktadır. Bulgular, reformun eğitim düzeyini önemli ölçüde artırdığını ve cinsiyet farkını azalttığını göstermektedir. Ancak, beklenen ekonomik faydalar sınırlı kalmıştır; etkilenen gruplar arasında işsizlik oranları daha yüksek ve yüksek vasıflı işlerde çalışma olasılığı daha düşüktür. Ayrıca, reformdan etkilenenler, ebeveynlerine kıyasla yaşam standartlarında daha düşük algılanan iyileşmeler bildirmiştir. Bu sonuçlar, eğitimin genişlemesinin eğitimli birey arzını artırarak işgücü piyasasında eğitimin genel değerini düşürebileceğini göstermektedir.*

Anahtar Kelimeler: Zorunlu Eğitim Reformu, Ekonomik Etki, Eğitim Düzeyi, İşgücü Piyasası Sonuçları, Cinsiyet Farklılıkları

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1. Introduction

Education is a critical factor influencing both individual and societal outcomes. Higher educational attainment has consistently been shown to lead to better labour market outcomes, including higher employment rates and increased earnings (Gunderson and Oreopolous, 2020; Scheld, 2019; Strawiński and Broniatowska, 2024; Torun, 2018). Education is also linked to improved health, decreased religiosity, and higher life satisfaction (Davies et al., 2018; Özer et al., 2024; Tan et al., 2020). Moreover, by equipping individuals with essential skills and knowledge, education can enhance productivity, foster innovation, and promote social cohesion (Akcigit et al., 2024; Andersson et al., 2009; Kong et al., 2022).

In Türkiye, the 1997 compulsory education reform(CER), which extended mandatory schooling from five to eight years, represents a significant policy alteration, which improved educational attainment and reduced dropout rates (Dulger, 2004). Globally, education reforms like this one have been used as unique natural experiments to analyze the causal effects of increased education on various outcomes (Adamecz, 2023; Clark, 2023; Fischer et al., 2016; Goldin, 2024; Gunderson and Oreopolous, 2020; Heckman et al, 2018; Strawiński, P., and Broniatowska, 2024). A substantial body of literature investigates the causal impact of education in Türkiye using the 1997 education reform as an instrument to address endogenity of education. This includes studies examining the reform's effects on labour market outcomes (Aydemir and Kirdar, 2017; Mocan, 2014; Patrinos et al., 2021; Torun, 2018), and non-monetary outcomes such as health, healh behaviours, life satisfaction, religiousity (Dursun and Cesur, 2016; Dursun et al., 2018; Özer et al., 2018; Özer et al., 2023; Özer et al., 2024). Aydemir and Kirdar (2017) find that the 1997 compulsory schooling reform in Turkey had a larger effect on women's wages compared to men's. They estimate that an extra year of schooling increases wages by about 7–8% for women, while the effect for men is a much lower and imprecisely estimated 2–2.5%. Similarly, Tansel (2018) finds that compulsory schooling has quite small effects on men's earnings but significantly positive effects on the earnings of women who work, although it does not increase their overall low labour force participation rate. Patrinos, Psacharopoulos, and Tansel (2021) also highlight these gender disparities in the returns to schooling. As these studies use older and often similar datasets, there is a need for additional research utilizing new and more recent datasets to further explore the long-term effects of education reforms on different demographic groups.

This study utilizes a recent dataset from the seventh wave of the World Values Survey, not previously used in the context of the 1997 education reform in Türkiye. By employing an instrumental variable (IV) approach with Two-Stage Least Squares (2SLS) estimation, it provides robust causal estimates of the reform's impact on employment status, unemployment, and perceived standard of living compared to parents. A unique contribution is the analysis of a broader age range of 22 to 43 years, capturing experiences at different stages of adulthood. Previous

studies often used older datasets and considered younger cohorts, potentially overlooking significant variations in the reform's impact as individual's transition from education to the workforce. Thus, the findings can contribute to a deeper understanding of how education policies affect economic outcomes, providing valuable insights for policymakers and researchers.

Using an instrumental variable (IV) approach with Two-Stage Least Squares (2SLS) estimation to obtain the causal effects of the reform on various outcomes, with the 1997 education reform serving as an exogenous instrument, this study's findings show that the reform significantly increased educational attainment for both males and females, notably reducing gender disparities. However, the results also reveal higher unemployment rates, a negative impact on working in high-skilled jobs among affected cohorts, and lower perceived life improvements among the affected cohorts compared to their parents. This suggests that the economic benefits of increased education may not have been fully realized. These insights are crucial for policymakers aiming to design effective education policies that enhance educational attainment and translate into better economic and social outcomes.

The remainder of this paper is structured as follows. The next section provides detailed information about the 1997 compulsory education reform in Türkiye. This is followed by a discussion of the data and descriptive statistics used in the analysis. The subsequent section outlines the estimation model and methods, explaining the instrumental variable (IV) approach with Two-Stage Least Squares (2SLS) estimation. The paper then presents the estimation results and discussion, highlighting the key findings and their implications. Finally, the conclusion summarizes the main insights of the study and offers recommendations for policymakers.

2.1997 Compulsory Education Reform

The 1997 CER in Türkiye, which extended mandatory schooling from five to eight years, was a pivotal development aimed at improving educational attainment and reducing dropout rates. This reform was motivated by the need to align Türkiye's education standards with those of the European Union and to promote secular education, countering the influence of religious schools (Özer, Fidrmuc and Eryurt, 2018; Özer et al., 2024; Özer et al., 2023). Prior to the 1997 reform, Türkiye's educational structure consisted of five years of compulsory primary education, followed by optional three-year junior high school and three-year senior high school. The reform merged primary and lower secondary education into a continuous eight-year compulsory education system, requiring students to complete junior high school (Dulger, 2004). The reform specifically affected cohorts who were aged 6 in the 1997-98 academic year, meaning it impacted those born in and after 1986. This demographic shift ensured that these children were required to complete the extended eight years of compulsory schooling, thereby experiencing the full effect of the reform. The youngest cohort affected by the education reform

is born in 1996 and aged 22 at the time of the survey, while the oldest cohort is born in 1986 and aged 32 at the time of the survey.

Graph 1 demonstrates the impact of the 1997 education reform on the completion rates of 8 years of education for both males and females born from 1986 onwards. Prior to 1986, the rates were relatively low and stable. However, with the implementation of the 8-year education reform in 1997, there was a substantial increase in completion rates, indicating the reform's effectiveness. Before the reform, males had higher completion rates compared to females. After the reform, this gap significantly narrowed. The completion rate for males increased from approximately 56% to 94%, while for females, it rose from about 37% to 85%. Descriptive statistics further support these findings: for cohorts born before 1986, the completion rate was 50.6% for males and 36.6% for females. For cohorts born in 1986 and later, the completion rates increased to 70.3% for males and 68.5% for females, highlighting the reform's success in promoting educational access and attainment for both genders.

Graph 1: Impact of the 1997 Education Reform on 8-Year Compulsory Schooling Completion Rates by Gender
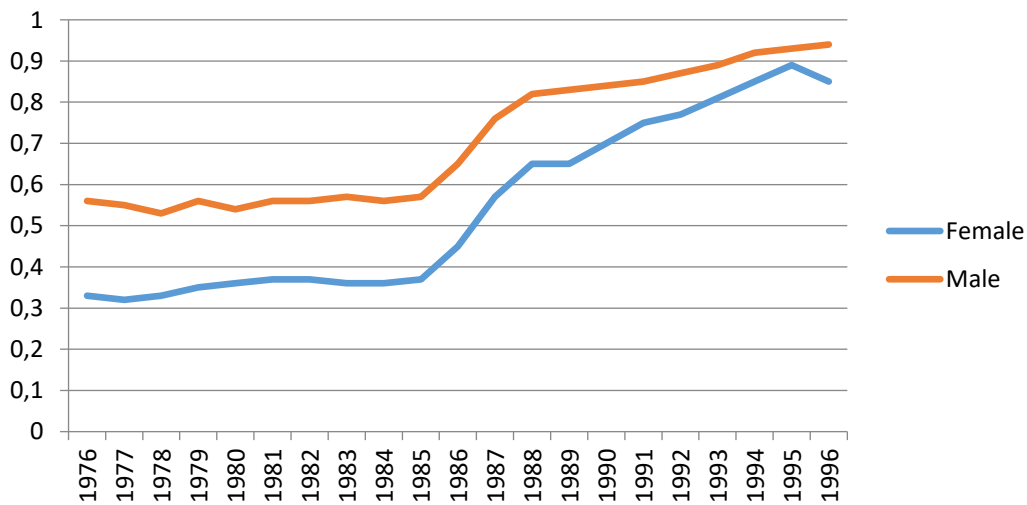
Source: Authors' own calculation from Turkish Statistical Institute.

3. Data and Descriptive Statistics

The data for this study is drawn from the 2018 Türkiye sample of the seventh wave of the World Values Survey (WVS). This wave was chosen because it includes detailed regional information, which is a key independent variable in this study. Earlier waves lacked comparable regional data. The survey provides comprehensive information on individual characteristics, beliefs, and socio-economic conditions, making it suitable for analysing the economic effects of the 1997 education reform in Türkiye. The outcome variables are adjusted and recoded as follows:

Table 1 provides the descriptive statistics for key variables, disaggregated by treatment status (untreated vs. treated) and gender (male vs. female). The treated cohorts encompass individuals born between 1986 and 1996, whereas the untreated cohorts include those born between 1975 and 1985. For the variable "8 Years of Compulsory Education Completed," the completion rate is 51% among untreated males, which increases to 70% in the treated cohort. Similarly, 37% of females in the untreated cohort completed the 8 years of education, compared to 69% in the treated cohort, indicating a substantial rise attributable to the reform. Regarding the "Rural" variable, 25% of untreated males reside in rural areas, compared to 29% of treated males. Among females, 26% of the untreated cohort and 27% of the treated cohort live in rural areas. In terms of "High Skilled Job," 36% of untreated males hold high-skilled positions, declining to 27% in the treated cohort. For females, 33% of the untreated cohort holds high-skilled jobs, with a slight increase to 34% in the treated cohort. For the variable "Having Better Life than Parents," 49% of untreated males perceive their life as better than their parents', compared to 41% in the treated cohort. Among females, 47% of the untreated cohorts perceive a better life, in contrast to 43% of the treated cohort.

Table 1: Descriptive Statistics

Variable	Male (Untreated)	Male (Treated)	Female (Untreated)	Female (Treated)
	Obs.	Mean	Obs.	Mean
8 Years of Compulsory Education Completed	776	0.506	427	0.703
Rural	779	0.250	427	0.288
Have a High Skilled Job	739	0.359	334	0.272
Having Better Life than Parents	765	0.490	410	0.414
Unemployed	676	0.074	361	0.163

The unemployment rate among untreated males stands at 7%, which rises to 16% in the treated cohort. Among females, the unemployment rate is 5% in the untreated cohort, increasing to 20% in the treated cohort. The findings suggest that while the reform led to higher education completion rates, it also coincided with increased unemployment rates and lower perceived life improvements, indicating mixed impacts of the policy intervention.

4. Estimation Model and Method

Employing the 2018 Türkiye sample from the seventh wave of the World Values Survey (WVS), this paper tests the effect of education on highly skilled jobs by using the 1997 education reform in Turkiye. First, I assess how education impacts highly skilled job attainment using the following main regression model:

$$\text{HighSkilledJob}_i = \propto + \text{Education}_i + \gamma * X_i + \varepsilon_i \qquad (1)$$

where HighSkilledJob_i is a binary variable indicating whether individual i holds a high-skilled job, Education_i is the main independent variable indicating the

completion of eight years of compulsory schooling, and X_i represents a vector of control variables. ε_i is the error term. Standard errors are clustered at the NUTS 2 region level.

HighSkilledJob$_i$ variable is derived from the respondent's occupational group. High-status jobs (professional, technical, higher administrative, and clerical positions) are coded as one, and low-status jobs (service, skilled, semi-skilled, and unskilled workers, as well as farm workers and owners) are coded as zero. Responses of "no answer" and "don't know" are coded as missing. The analysis includes several additional explanatory variables: gender, rural residence, and NUTS 2 region of residence. The variable for gender is coded as one if the respondent is female and zero if male. The rural variable is coded as one if the respondent lives in a rural area and zero otherwise. The NUTS 2 region of residence represents 26 region fixed-effect dummies to control for regional variations across Türkiye. These controls ensure that the estimates of the effects of education on the outcome variables are not biased by differences in gender, urban or rural residence, or regional factors.

It is important to note that I exclude control variables such as marital status from our model because they are likely influenced by the education reform, potentially violating the assumption of conditional independence and leading to biased estimates. Deuchert and Huber (2017) emphasize that the validity of IV regressions depends on control variables being determined before the instrument. Therefore, this study focuses on pre-reform control variables to ensure robust and credible estimates.

This study also examines the effect of education on other outcomes such as perceived life improvement and employment status to emphasize that education impacts multiple dimensions. Having a better life than parents is coded as one if the respondent perceives their standard of living as better compared to their parents, and zero otherwise. Unemployed is coded as one if the respondent is not working and zero otherwise. Respondents who are students, retired, or housewives are coded as missing, as they are not counted in the unemployment category in the survey.

Similar to previous studies in the literature (Aydemir and Kirdar, 2017; Mocan, 2014; Özer et al., 2018; Özer et al., 2023; Özer et al., 2024; Strawiński and Broniatowska, 2024; Tansel and Bodur, 2012), this study utilizes changes in compulsory schooling as instruments for education, employing 2SLS estimation to estimate the impact of education on various outcomes. The outcome measures are having a high-skilled job, perceiving a better life than parents, and unemployment status. Education is considered endogenous in this context because it is potentially influenced by factors that also affect the outcome variables, leading to biased estimates in a simple regression model. Several reasons contribute to this endogeneity. Firstly, individual decisions about education can be influenced by unobserved factors such as innate ability, motivation, family background, and socio-economic status, which also affect outcomes like employment and life

satisfaction. Secondly, there may be reverse causality where individuals with better employment prospects or higher anticipated life satisfaction might pursue more education. Thirdly, measurement error in the education variable can introduce bias. To address these endogeneity concerns, in this paper, I utilize the exogenous increase in educational attainment resulting from the 1997 education reform, which extended compulsory schooling by three years, as an instrument for education. For an instrument to be valid, it must affect the outcome variable only through its impact on schooling. I contend that the education reform meets this requirement. First, the compulsory schooling reform was driven by political events in 1997, which are unrelated to the outcome variables. Second, factors typically causing endogeneity in education, such as natural ability and personal characteristics, are unlikely to be correlated with the year of birth.

The first-stage regression model is specified as follows:

$$Education_i = \propto + \beta * Reform_i + \gamma * X_i + \varepsilon_i \tag{2}$$

where $Education_i$ is a binary variable showing whether individual iii completed 8 years of compulsory schooling or not, $Reform_i$ is an indicator variable for the 1997 education reform (1 if the individual was born in 1986 or later, 0 otherwise), X_i is the vector of control variables (gender, urban/rural residence, and NUTS 2 region fixed effects), and ε_i is the error term. Standard errors are clustered at the NUTS 2 region level, resulting in 26 clusters.

The first stage regression identifies the exogenous variation in education induced by the 1997 reform, which is then used in the second stage of the 2SLS estimation. It is crucial to highlight that I opted for the traditional 2SLS estimation method rather than IV-Probit or Logit, as recommended by Angrist (1991) and Angrist (2001). This decision is due to the dichotomous nature of the dependent and endogenous variables, as well as the instrument. In this context, the 2SLS estimates provide the marginal treatment effect regardless of whether the dependent variable is binary or continuous, and offer greater robustness compared to estimates from nonlinear models (Angrist & Pischke, 2009). The second stage regression model using the instrumented values of education from the first stage is specified as follows:

$$Y_i = \propto + \widehat{Education}_i + \gamma * X_i + \varepsilon_i \tag{3}$$

In this model, $\widehat{Education}_i$ represents the instrumented values of education from the first stage regression. Y_i represents the outcome variables, X_i includes the control variables, and ε_i is the error term. Standard errors are clustered at the NUTS 2 region level to account for potential intra-region correlation. It is important to note that in 2SLS, both stages are estimated simultaneously, rather than sequentially. Estimating the stages separately and then using these values in the second stage can lead to bias (Angrist & Pischke, 2009).

5. Estimation Results and Discussion

Impact on High-Skilled Job

Table 2 shows the impact of completing 8 years of compulsory schooling on having a high-skilled job. Column (1) presents the results for the whole data, column (2) for males, and column (3) for females. The IV estimates indicate a significant negative effect for males and no significant effect for females. The OLS estimates, on the other hand, show a significant positive effect across all groups. The first stage results confirm the strong relevance of the instrument with high F statistics, all greater than 10, indicating that the instrument is strong (Staiger and Stock, 1997).

Table 2: The Impact of Completing 8 Years of Compulsory Schooling on High-Skilled Job by Gender - OLS and IV 2SLS

VARIABLES	Whole Data	Male	Female
	(1)	(2)	(3)
Completing 8 years of compulsory education (IV)	-0.223	-0.412*	0.070
	(0.157)	(0.225)	(0.175)
Completing 8 years of compulsory education (OLS)	0.288***	0.244***	0.377***
	(0.027)	(0.032)	(0.040)
First Stage	0.194***	0.165***	0.242***
	(0.025)	(0.027)	(0.043)
F stats	59.92	38.10	31.23
Observations	1,644	1,070	574

Note: Coefficients are reported. LATE is reported. Clustered standard errors at NUTS 2 level are reported in parentheses. Control variables include gender (in the whole data model), urban/rural residence, and NUTS 2 region fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Impact on Perceiving a Better Life than Parents

Table 3 illustrates the effect of completing 8 years of compulsory schooling on perceiving a better life than parents. The IV estimates in column (1) indicate a significant negative effect on the whole data, while columns (2) and (3) show significant negative effects for males and no significant effect for females. The OLS results are not significant for any group. The first stage results remain robust with high F statistics, indicating that the instrument is still strong.

Table 3: The Impact of Completing 8 Years of Compulsory Schooling on Having a Better Life than Parents by Gender - OLS and IV 2SLS

VARIABLES	Whole Data	Male	Female
	(1)	(2)	(3)
Completing 8 years of compulsory education (IV)	-0.216**	-0.333**	-0.137
	(0.100)	(0.133)	(0.126)
Completing 8 years of compulsory education (OLS)	0.026	0.042	0.004
	(0.024)	(0.028)	(0.030)
First Stage	0.254***	0.197***	0.313***
	(0.018)	(0.023)	(0.026)
F stats	195.94	73.92	145.39
Observations	2,354	1,172	1,182

Note: Coefficients are reported. LATE is reported. Clustered standard errors at NUTS 2 level are reported in parentheses. Control variables include gender (in the whole data model), urban/rural residence, and NUTS 2 region fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Impact on Unemployment

Table 4 examines the impact of completing 8 years of compulsory schooling on unemployment status. The IV results indicate a significant positive effect for all groups in columns (1), (2), and (3). The OLS estimates are mostly insignificant except for a small negative effect for males. The first stage F statistics confirm the instrument's strength, with values greater than 10, indicating that the instrument is strong.

Table 4: The Impact of Completing 8 Years of Compulsory Schooling on Unemployment by Gender - OLS and IV 2SLS

VARIABLES	Whole Data	Male	Female
	(1)	(2)	(3)
Completing 8 years of compulsory education (IV)	0.681***	0.661***	0.710***
	(0.145)	(0.199)	(0.234)
Completing 8 years of compulsory education (OLS)	-0.021	-0.038*	0.021
	(0.017)	(0.020)	(0.038)
First Stage	0.158***	0.134***	0.205***
	(0.024)	(0.024)	(0.043)
F stats	42.65	30.01	22.87
Observations	1,506	1,035	471

Note: Coefficients are reported. LATE is reported. Clustered standard errors at NUTS 2 level are reported in parentheses. Control variables include gender (in the whole data model), urban/rural residence, and NUTS 2 region fixed effects. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Placebo Test

Table 5 provides the results of the placebo tests. I conducted the placebo regressions using cohorts born between 1974 and 1985, choosing 1974 to 1979 as the control group and 1980 to 1985 as the treated group. None of these cohorts were affected by the 1997 education reform. The purpose of running these placebo regressions is to verify that the observed effects in the educational attainment are truly due to the reform and not due to other unrelated factors, such as changes in the economy, labour market conditions, or other concurrent policy changes that might have occurred during the same period. By showing that the placebo regressions yield insignificant results, I can be more confident that the main findings are not driven by spurious correlations or external influences unrelated to the reform itself.

Table 5: Placebo Test Results

VARIABLES	Whole Data	Male	Female
	(1)	(2)	(3)
Fake Instrument	0.018	-0.035	0.059
	(0.045)	(0.076)	(0.039)
Constant	0.653***	0.514***	0.485***
	(0.084)	(0.087)	(0.072)
Observations	1601	728	823

These findings suggest that while the 1997 education reform has successfully increased educational attainment, its impact has been greater for females, consistent with previous studies using the same education reform to estimate market and nonmarket returns of education (Aydemir and Kirdar, 2017; Mocan, 2014; Özer et al., 2018; Özer et al., 2023; Özer et al., 2024). However, Education has led to higher unemployment rates, with a slightly larger negative effect for females, and a decreased perception of having a better life than parents, particularly among males. Additionally, the negative impact on having a high-skilled job is weakly significant for males but not for females, indicating gender differences in the impact of education.

These results are consistent with previous research that has identified similar negative or negligible effects of increased education on employment, standard of living, and job status. The main argument could be that expanding compulsory education to eight years has increased the supply of educated individuals while decreasing the supply of uneducated individuals available for unskilled jobs. This shift has potentially lowered the overall value of education in the labour market, a trend observed in other countries and now in Türkiye (Lauder and Mayhew, 2020; Lacuesta, Puente, and Villanueva, 2020; Özer and Perc, 2020; Aydemir and Kirdar, 2017; Clark, 2023; Fischer et al., 2016; Adamecz, 2023). Additionally, the gender differences observed in this study align with the gender disparities reported in these previous studies (Barth et al., 2021; Cortés and Pan, 2023; Sloane et al., 2021).

Table 2, 3 and 4 show that the IV coefficients are significantly larger than the OLS estimates and the statistical significance of these coefficients also differs. This disparity can be explained by several factors. Firstly, the IV method corrects for the endogeneity of education, a limitation not addressed by OLS. Secondly, as discussed by Imbens and Angrist (1994), IV coefficients measure the Local Average Treatment Effect (LATE), which represents the marginal impact of education on the dependent variable for those individuals whose schooling decisions were influenced by the reform. These individuals would likely have chosen fewer years of education without the reform due to higher marginal costs. Moreover, if these individuals experience higher returns to education, the IV estimates will naturally be larger. Consequently, the substantial differences between OLS and IV results underscore the importance of addressing endogeneity to derive accurate estimates of the causal relationship between education and labour market outcomes.

5. Conclusion

This study examined the impact of the 1997 compulsory education reform in Türkiye, which extended mandatory schooling from five to eight years. Using data from the seventh wave of the World Values Survey and an instrumental variable (IV) approach with Two-Stage Least Squares (2SLS) estimation, I assessed the reform's economic outcomes. Our findings reveal that while the reform successfully increased educational attainment, particularly for females, it also resulted in higher unemployment rates and a decreased likelihood of obtaining high-skilled jobs among the affected cohorts. Additionally, individuals reported lower perceptions of having a better life compared to their parents. These results indicate that expanding education alone is insufficient to improve economic outcomes. It highlights the need for complementary policies that align educational attainment with labour market demands. Implementing vocational training and job placement programs could help enhance employability and ensure that increased education leads to tangible economic benefits. Moreover, targeted support for females, who despite higher educational attainment still face higher unemployment rates, could address gender-specific challenges in the labour market. Policymakers should also consider partnerships with industries to create curricula that meet current job market requirements and invest in continuous education and skill development programs to keep the workforce adaptable to changing economic conditions. Addressing these issues is essential for maximizing the benefits of education reforms and promoting equitable economic growth.

References

Adamecz, A. (2023). Longer schooling with grade retention: The effects of increasing the school leaving age on dropping out and labour market success. *Economics of Education Review*, *97*, 102487.

Angrist, J. (1991). Instrumental variables estimation of average treatment effects in econometrics and epidemiology (No. w0115). National Bureau of Economic Research.

Angrist, J. D. (2001). Estimation of limited dependent variable models with dummy endogenous regressors: Simple strategies for empirical practice. *Journal of Business & Economic Statistics*, **19**(1), 2–28.

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Akcigit, U., Pearce, J., and Prato, M. (2024). Tapping into talent: Coupling education and innovation policies for economic growth. *Review of Economic Studies*, rdae047.

Andersson, R., Quigley, J. M., and Wilhelmsson, M. (2009). Urbanization, productivity, and innovation: Evidence from investment in higher education. *Journal of Urban Economics*, *66*(1), 2-15.

Aydemir, A., and Kirdar, M. G. (2017). Low wage returns to schooling in a developing country: Evidence from a major policy reform in Türkiye. *Oxford Bulletin of Economics and Statistics*, *79*(6), 1046-1086.

Barth, E., Kerr, S. P., and Olivetti, C. (2021). The dynamics of gender earnings differentials: Evidence from establishment data. *European Economic Review*, *134*, 103713.

Clark, D. (2023). School quality and the return to schooling in Britain: New evidence from a large-scale compulsory schooling reform. *Journal of Public Economics*, *223*, 104902.

Choi, B. Y. (2024). Instrumental variable estimation of weighted local average treatment effects. *Statistical Papers*, *65*(2), 737-770.

Cortés, P., and Pan, J. (2023). Children and the remaining gender gaps in the labor market. *Journal of Economic Literature*, *61*(4), 1359-1409.

Davies, N. M., Dickson, M., Davey Smith, G., Van Den Berg, G. J., and Windmeijer, F. (2018). The causal effects of education on health outcomes in the UK Biobank. *Nature human behaviour*, *2*(2), 117-125.

Deuchert, E., & Huber, M. (2017). A cautionary tale about control variables in IV estimation. *Oxford Bulletin of Economics and Statistics*, *79*(3), 411-425.

Dulger, I. (2004, May). Türkiye: Rapid coverage for compulsory education–the 1997 basic education program. In *Scaling up poverty reduction: A global learning process and conference, Shanghai* (pp. 25-27).

Dursun, B., & Cesur, R. (2016). Transforming lives: the impact of compulsory schooling on hope and happiness. *Journal of Population Economics*, *29*, 911-956.

Dursun, B., Cesur, R., & Mocan, N. (2018). The impact of education on health outcomes and behaviors in a middle-income, low-education country. *Economics & Human Biology*, *31*, 94-114.

Fischer, M., Karlsson, M., Nilsson, T., and Schwarz, N. (2016). The sooner the better? compulsory schooling reforms in Sweden.

Goldin, C. (2024). Human capital. In *Handbook of cliometrics* (pp. 353-383). Cham: Springer International Publishing.

Gunderson, M., and Oreopolous, P. (2020). Returns to education in developed countries. In *The economics of education* (pp. 39-51). Academic Press.

Heckman, J. J., Humphries, J. E., & Veramendi, G. (2018). Returns to education: The causal effects of education on earnings, health, and smoking. *Journal of Political Economy*, *126*(S1), S197-S246.

Imbens, G., & Angrist, J. (1994). Estimation and identification of local average treatment effects. *Econometrica*, *62*, 467-475.

Kong, D., Zhang, B., and Zhang, J. (2022). Higher education and corporate innovation. *Journal of Corporate Finance*, *72*, 102165.

Lacuesta, A., Puente, S., and Villanueva, E. (2020). The schooling response to a sustained increase in low-skill wages: evidence from Spain 1989–2009. *SERIEs*, *11*, 457-499.

Lauder, H., and Mayhew, K. (2020). Higher education and the labour market: an introduction. *Oxford Review of Education*, *46*(1), 1-9.

Mocan, L. (2014). The impact of education on wages: analysis of an education reform in Türkiye. *Available at SSRN 2537472*.

Mogstad, M., Torgovitsky, A., and Walters, C. R. (2021). The causal interpretation of two-stage least squares with multiple instrumental variables. *American Economic Review*, *111*(11), 3663-3698.

Özer, M., Fidrmuc, J., and Eryurt, M. A. (2018). Maternal education and childhood immunization in Türkiye. *Health economics*, *27*(8), 1218-1229.

Özer, M., Fidrmuc, J., and Eryurt, M. A. (2023). Education and domestic violence: Evidence from a natural experiment in Türkiye. *Kyklos*, *76*(3), 436-460.

Özer, M., Fidrmuc, J., Mentzakis, E., and Özkan, Ö. (2024). Does education affect religiosity? Causal evidence from a conservative emerging economy. *CESifo Economic Studies*, *70*(1), 34-50.

Patrinos, H. A., Psacharopoulos, G., & Tansel, A. (2021). Private and social returns to investment in education: the case of Turkey with alternative methods. *Applied Economics*, *53*(14), 1638-1658.

Scheld, J. (2019). Education decisions and labour market outcomes. *Applied Economics*, *51*(9), 911-940.

Sloane, C. M., Hurst, E. G., and Black, D. A. (2021). College majors, occupations, and the gender wage gap. *Journal of Economic Perspectives*, *35*(4), 223-248.

Strawiński, P., and Broniatowska, P. (2024). The impact of prolonging compulsory general education on the labour market. *Educational Studies*, *50*(4), 413-433.

Tan, H., Luo, J., and Zhang, M. (2020). Higher education, happiness, and residents' health. *Frontiers in Psychology*, *11*, 1669.

Tansel, A., and Bodur, F. B. (2012). Wage inequality and returns to education in Türkiye: A quantile regression analysis. *Review of Development Economics*, *16*(1), 107-121.

Torun, H. (2018). Compulsory schooling and early labor market outcomes in a middle-income country. *Journal of Labor Research*, *39*, 277-305.