I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15541

Returns to Education in Greece: Evidence from the 1977 Labor Market Survey Using the Greek Civil War as an Instrument

Harry Anthony Patrinos

AUGUST 2022

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15541

Returns to Education in Greece: Evidence from the 1977 Labor Market Survey Using the Greek Civil War as an Instrument

Harry Anthony Patrinos
World Bank and IZA

AUGUST 2022

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Returns to Education in Greece: Evidence from the 1977 Labor Market Survey Using the Greek Civil War as an Instrument

Greece experienced a devastating civil war in 1946-1949. This led to many deaths, economic losses, and severe reductions in schooling expenditures and attendance. Using an instrumental variables approach, we estimate the 1977 returns to schooling, showing that for those affected by the civil war, the returns to schooling are higher than the corresponding least squares estimate.

JEL Classification: I21, J31

Keywords: returns to education, instrumental variables, civil war, Greece

Corresponding author:
Harry Anthony Patrinos
The World Bank
Avenue Marnix 17
1000 Bruxelles
Belgium

E-mail: hpatrinos@worldbank.org

1. Introduction

Studies have attempted to estimate the returns to education in Greece using a variety of methods and controls (Kanellopoulos 1997; Livanos and Pouliakas 2011; Magoula and Psacharopoulos 1999; Prodromidis and Prodromidis 2008; Chletsos and Roupakias 2020). Psacharopoulos (1982) analyzed the 1977 labor market survey and estimates the rate of return to schooling. He finds a relatively low rate of return, at 5.8 percent, which is lower than estimates for Greece from the 1960s.

One event that occurred and which could be useful for understanding the returns to education is the Greek civil war. This led to a devastating economic situation and during the war expenditures on education declined considerably. School attendance declined and outcomes were lowered for a generation. We contribute to the empirical literature on returns to education. We show that the true returns are higher than previously thought, using the civil war as an instrument.

A variety of empirical studies have used changes in supply as instruments in instrumental variables (IV) estimations of the returns to schooling. The main finding is that such estimates of returns to schooling are typically larger than ordinary least squares (OLS) estimates. Card (2001) interprets this finding as suggesting that the marginal returns among the low-education subgroups (which are typically affected by supply changes) tend to be relatively high, reflecting their high marginal costs of schooling rather than low ability.

2. The Greek Civil War

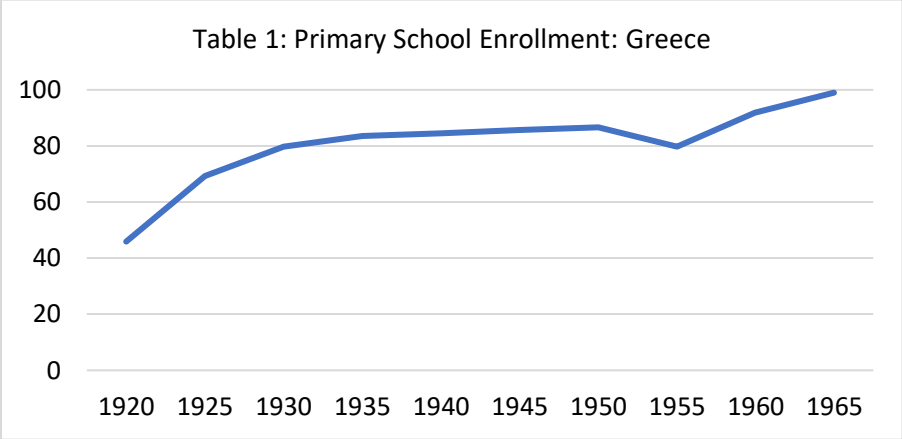
War has been known to cause much damage to humankind, both directly in terms of human lives and indirectly through its harmful economic and social effects. However, there are relatively few studies on the impacts of war on labor market outcomes. Moreover, most of the few existing studies focus on developed countries, such as Ichino and Winter-Ebmer (2004) for Austria and Germany, and Arrazola and de Hevia (2006) for Spain. Here we focus on using the civil war as an instrument to estimate the returns to schooling.

The instruments used by Ichino and Winter-Ebmer (2004) to estimate the loss of earnings suffered by people who received less schooling because of World War II seem to serve well the purpose of estimating the upper limit of the range of returns to schooling in Germany. This is the local average treatment effect (LATE) framework of Angrist et al. (1996). Note that given the instrument, in this case the treatment is defined as a reduction of schooling. We further conjecture that none of the other groups is likely to be affected by this instrument.

Ichino and Winter-Ebmer (2004) estimate the average return to education for those individuals who had to reduce their educational investments in human capital due to World War II. As instruments they use a 1930-1939 birth cohort indicator. These returns are also interpreted as measures for the long-run educational costs of the war (Pfeiffer and Pohlmeier 2011). In Spain, civil war produces higher returns in IV than OLS (Arrazola et al. 2003; Arrazola and De Hevia 2006, 2008).

Greece is the only European country which actually fought a full-blown civil war after the German occupation, a civil war with two opposing armies – the left-wing Democratic Army of Greece and the Greek National Army. This was a war that lasted officially for three years: 1946–1949 (Van Boeschoten 2005: 39.). Using neoclassical growth-accounting, the economic cost of the conflict is estimated to surpass an annual GDP, in line with similar findings in contemporary civil wars (Christodoulakis 2016). The Greek Civil

War led to a significant reduction in schooling between 1950 and 1955 (Table 1).



Source: Lee and Lee 2016

3. Data and Sample

We use the Greek 1977 Special Wages and Salaries Survey, a specially designed survey administered by National Statistical Service of Greece to a random stratified sample of 8,756 wage and salary earners in 12 cities. This is the same survey used by Psacharopoulos (1982).

4. Identification strategy: Instrumental variables

Given an instrument Z_i, the coefficient b_i in the general returns model is intended to capture the unique gain of each individual and has a population mean of b_0 (Patrinos and Sakellariou 2006). Even in the homogeneous returns model, using IV estimation requires the instrument to meet the orthogonality constraints, meaning it must be uncorrelated with both the error term and ability. However, under the heterogeneous model, merely meeting the orthogonality requirements is insufficient. For the treated, it is necessary to make the additional and quite strong assumption that instrument Z is not associated with the person-specific return component. That is, it is necessary that people's decisions about going to school be unrelated to their individual-specific gains while still allowing for heterogeneous returns. B_i changes in the population when the return to schooling is a random variable and there is a distribution of causal effects, and different causal effects answer different questions. Under certain assumptions, the conventional IV estimates of returns to schooling relate to various treatment parameters and what policy questions IV estimation answers. Here we are estimating a local average treatment effect (LATE).

Given that the Greek civil war took place from 1946-1949, and the levels of schooling dropped precipitously in the 1950s, then we operationalize the instrument by setting it so that those 22 to 27 years of age, that is, who were 10 years of age during the civil war years, are deemed to be affected.

5. Empirical analysis

We estimate a LATE: the returns to schooling for a marginal student affected by the civil war. Our estimate of the returns to schooling in Greece in 1977, using the civil was as an instrument, is higher than the existing non-experimental returns to education estimates at the time. We use as dependent variable the log of annual earnings and include all workers, male and female. The ordinary least squares estimates use the standard Mincerian specification. The instrument in the instrumental variables (IV) regressions is the

workers aged 22-27 years in 1977 dummy.

The returns to schooling in 1977 were estimated as 5.8 percent (Psacharopoulos 1982) to 5.9 percent (Table 2). The IV estimate is 8.0 percent and 26 percent higher than the corresponding OLS estimator. These results can easily be reconciled with the idea of heterogeneous returns to education (Card 2001). Moreover, the LATE concept gives a meaning to these heterogeneous returns: the LATE measures exactly the returns for the group that changes treatment status because of the war. In our case, these are predominantly poor individuals, with returns that are probably higher at the margin.

Table 2: Returns to education: Greece, 1977

Variable	OLS	IV-LATE
Constant	10.591	10.323
Years of schooling	0.059	0.080
	(48.8)	(10.3)
Experience	0.066	0.063
	(41.9)	(32.6)
Experience-squared	-0.0011	-0.0010
	(31.1)	(15.8)
F-test	231.3	
[*p*-value]	0.000	
Overidentification statistic		Exactly identified
R-square	0.352	0.330
Number of observations	8,756	8,756

Source: Labor market survey 1977

Note: In each column the dependent variable is the log of annual earnings. The instrument in the IV regressions is the workers aged 22-27 years in 1977 dummy. OLS = ordinary least squares; IV-LATE = local average treatment effect (LATE) interpretation of instrumental variables (IV) techniques. Numbers in parentheses are t-scores in the case of OLS and z-scores for the IV.

Our results are consistent with others who have used civil war as IV (see, for example, Ichino and Winter-Ebmer 2004; Arrazola and De Hevia 2006; Arrazola et al. 2003), and the many studies that use instruments to estimate the returns to schooling (Aryal et al. 2022; Harmon et al. 2003; Chletsos and Roupakias 2020 for Greece). But since we are using an instrument that means less schooling, then this suggests a high cost of war, along the lines of Ichino and Winter-Ebmer (2004). Summing up, we find that the indicator of war constraints to schooling result in somewhat higher returns to education for the respective group.

6. Concluding remarks

Greece experienced a devastating civil war in 1946-1949. This led to many deaths, economic losses, and severe reductions in schooling expenditures and attendance. Using an instrumental variables approach, we estimate the 1977 returns to schooling, showing that for those affected by the civil war, the returns to schooling are higher than the corresponding least squares estimate. Our LATE estimate only applies to marginal students whose schooling was affected by the civil war. Our results are consistent with the

literature. We find that the indicator of war constraints to schooling result in somewhat higher returns to education for the respective group. The LATE estimator is 8.0 percent and 26 percent higher than the corresponding least squares estimator.

Acknowledgements

Thanks to George Psacharopoulos and Suzanne Roddis for useful comments.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

No funding was received

ORCID

Harry Patrinos https://orcid.org/0000-0002-4939-3568

References

Angrist, J.D., G.W. Imbens and D.B. Rubin.. 1996. Identification of causal effects using instrumental variables. Journal of the American Statistical Association 91: 444-455.

Arrazola, M. and J. de Hevia. 2008. Three measures of returns to education: An illustration for the case of Spain. Economics of Education Review 27(3): 266-275.

Arrazola, M. and J. de Hevia. 2006. Gender Differentials in Returns to Education in Spain. Education Economics 14(4): 469-486.

Arrazola, M., J.D. Hevia, M. Risueño and J.F. Sanz. 2003. Returns to education in Spain: Some evidence on the endogeneity of schooling. Education Economics 11(3): 293-304.

Aryal, G., M. Bhuller and F. Lange. 2022. Signaling and employer learning with instruments. American Economic Review 112(5): 1669-1702.

Card D. 2001. Estimating the Returns to Schooling: Progress in Some Persistent Econometric Problems. Econometrica 69(5): 1127–1160.

Chletsos, M. and S. Roupakias. 2020. Education and wage inequality before and during the fiscal crisis: A quantile regression analysis for Greece 2006–2016. Review of Development Economics 24(4): 1333-1364.

Christodoulakis, N. 2016. Conflict dynamics and costs in the Greek Civil War 1946–1949. Defence and Peace Economics 27:5: 688-717.

Harmon, C., H. Oosterbeek and I. Walker. 2003. The returns to education: Microeconomics. Journal of Economic Surveys 17(2): 115-156.

Ichino, A. and R. Winter-Ebmer. 2004. The Long-Run Educational Cost of World War II. Journal of Labor Economics 22(1): 57-86.

Ichino, A. and R. Winter-Ebmer. 1999. Lower and upper bounds of returns to schooling: An exercise in IV estimation with different instruments. European Economic Review 43(4-6): 889-901.

Kanellopoulos, C.N. 1997. Public-Private Wage Differentials in Greece. Applied Economics 29: 1023-1032.

Lee, J.-W. and H. Lee. 2016. Human Capital in the Long Run. Journal of Development Economics 122: 147-169.

Livanos, I. and K. Pouliakas. 2011. Wage Returns to University Disciplines in Greece: are Greek Higher Education Degrees Trojan Horses? Education Economics 19(4): 411-445.

Magoula, T. and G. Psacharopoulos. 1999. Schooling and Monetary Rewards in Greece: An Over-education False Alarm? Applied Economics 31: 1589-1597.

Patrinos, H.A. and C. Sakellariou. 2006. Economic volatility and returns to education in Venezuela: 1992–2002. Applied Economics 38(17): 1991-2005.

Prodromidis, K.P. and P.I. Prodromidis. 2008. Returns to education: the Greek experience, 1988–1999. Applied Economics 40(8): 1023-1030.

Pfeiffer, F. and W. Pohlmeier. 2011. Causal Returns to Schooling and Individual Heterogeneity. Review of Economic and Business Studies 8: 29-41.

Psacharopoulos, G. 1982. Earnings and education in Greece, 1960–1977. European Economic Review 17(3): 333-347.

Van Boeschoten, R., 2005. 'Little Moscow' and the Greek Civil War. Memory and World War II: An Ethnographic Approach.