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**HOW DOES REDUCING YEARS OF COMPULSORY
SCHOOLING AFFECT EDUCATION AND LABOR
MARKET OUTCOMES IN A DEVELOPING COUNTRY?**

Ahmed Elsayed and Olivier Marie

Working Paper No. 944

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Abstract

At the end of the 1980's, Egypt introduced a policy change to its pre-university education system where the years of primary education decreased from six to five, reducing the overall years of compulsory education from nine to eight. Using data from the Egypt Labor Market Panel Survey (ELMPS) in 2006 and 2012, we study the effect of this educational reform on several education and labor market outcomes. We find that the policy had positive effects on educational outcomes as it significantly increased the probability of finishing compulsory education and raised the overall years of education. However, the policy significantly postponed the age of entering the labor market, increased the time between completing education and getting the first job, and reduced the probability of the first job being paid. The effects of the policy on both education and labor market outcomes were more pronounced for males than for females.

JEL Classification: I26, J24

Keywords: Years of education, Labor market outcomes, Egypt

ملخص

في نهاية عام 1980، أدخلت مصر تغيير لسياسات نظام التعليم قبل الجامعي حيث انخفضت سنوات التعليم الابتدائي من ست إلى خمس سنوات، والحد من سنوات الشاملة للتعليم الإلزامي من تسع إلى ثمان سنوات. وباستخدام بيانات من مسح سوق العمل التتبعي في مصر (ELMPS) في عام 2006 وعام 2012، ودراسة تأثير هذا الإصلاح التربوي في عدة مخرجات التعليم وسوق العمل، نجد أن هذه السياسة كان لها آثار إيجابية على النتائج التعليمية كما أنها زادت بشكل كبير من احتمال الانتهاء من التعليم الإلزامي ورفعت سنوات التعليم بشكل عام. ومع ذلك، فإن هذه السياسة أدت إلى تأجيل دخول سوق العمل إلى أعمار أعلى، وزيادة الوقت بين استكمال التعليم والحصول على أول وظيفة، وقللت من احتمال الالتحاق بعمل بأجر. وكانت آثار هذه السياسة على حد سواء لمخرجات التعليم أو سوق العمل أكثر وضوحاً بالنسبة للذكور عنها من الإناث.

1. Introduction

This paper investigates the effect of a change in years of compulsory schooling on further educational attainment and labor market outcomes in Egypt. The identification of the causal relationship comes from a policy change to the pre-university education system at the end of the 1980's, whereby years of compulsory schooling decreased from nine years (six years in the primary stage and three years in the preparatory stage) to eight years (five years in the primary stage and three years in the preparatory stage) while academic content was kept almost unaltered (Eldahshan 1992). This policy reform provides a natural experiment setting for the evaluation of the effects of early education on students' subsequent academic achievement and their short-term labor market outcomes at the time of entry into the labor market. This has the advantage of eliminating the common bias associated with using ordinary least-squares (OLS) when estimating the impact of years of education on labor market outcomes because these individual outcomes are driven by the same unobservable characteristics (e.g., ability, patience etc.).

The paper builds on substantial economic literature that attempts to measure the effect of years of compulsory education on labor market outcomes using changes in compulsory schooling age (e.g., Brunello et al. 2009; Card 1999; Devereux and Harts 2010; Harmon and Walker 1995; Oreopoulos 2007; Spohr, 2003). This literature usually finds that more years of education increases labor force participation and wages (Spohr, 2003) and reduces wage inequality (Brunello et al. 2009) and unemployment (Oreopoulos, 2007). However, the paper is perhaps the first to consider the causal link between years of education and labor market outcomes in Egypt. This is interesting given that in developing countries labor markets are not as structured as they are in advanced countries, and the quality of education is usually judged to be low, especially in view of the costs, in terms of forgone earnings, that keeping children at school entails (Kirdar et al. 2014). This paper is also innovative as it is one of the first to investigate the effects of a *reduction* in years of schooling on educational attainment and labor market outcomes.¹ The aim of the policy was to reduce the financial demands on an over-stretched public educational system while attempting to keep the curriculum unchanged. If this was successful, we should find that more students finished compulsory education after the reform (which made reaching this level less costly) and also that the labor market outcome of these cohorts has improved. However, it is also possible that policies reducing years of basic schooling have negative effects on quality (in the short-run at least) and this would be reflected in a relatively worse labor market outcome for individuals undergoing five rather than six years of basic primary education. This is the important question that this study is attempting to empirically shed light on.

To do so, we use data from the 2006 and 2012 waves of the Egypt Labor Market Panel Survey (ELMPS) to test the policy effect. We first find that reducing years of preparatory education by one year increases the probability of finishing compulsory schooling and also raises total years of education. We, however, indicate that this also leads to relatively worse labor market outcomes at the first job. These effects of the policy on both education and labor market outcomes are more pronounced for males than for females. Our analysis suggests that the policy change increases the probability of finishing compulsory education by 5.5 percentage points. In addition, it raises years of education by 0.64 years on average. As a consequence, the policy

¹ Germany has recently gone through a reduction in years of schooling where most of the German states have abolished the last year of secondary schooling (Büttner and Thomsen 2013). The effects of this policy reform on several aspects of students' performance has been investigated in the literature, and it has been shown that such reduction has a negative impact on math grades of the students in the final year of secondary education (Büttner and Thomsen 2013), and increases grade repetition (Huebener and Marcus 2014). However, since the implementation of this policy change in Germany is quite recent¹, the impact of this policy change on labor market outcomes is still difficult to estimate. Another advantage of our paper over the literature on the German case is that the policy change in Egypt takes place early in the stage of compulsory education, compared to later towards the end of secondary education in the German scenario.

also implied that a significant increase of age at entry into the labor market and the first job of those affected by the policy came 0.75 years later. Interestingly, young males took on average almost 30 percent longer between finishing/exiting education and the first job. Despite this delay, more treated individuals entered into non-paying jobs, which is a strong indicator of poor labor market outcomes, which can be arguably linked to the lower value of the diploma. The negative effects of the policy reform on labor market outcomes still hold even after controlling for years of education, which suggests that reducing years of education has direct negative implications on short-run labor market outcomes, not necessarily through changes in schooling outcomes.

The rest of the paper is organized as follows. Section 2 explains the institutional background about pre-university education in Egypt and the change in education policy. Section 3 describes the data and shows some descriptive statistics. Section 4 presents the empirical strategy and discusses the empirical findings. Section 5 concludes.

2. Institutional Background

2.1 The Egyptian school system

Pre-university education in Egypt is divided into three levels: primary, preparatory, and secondary. The primary level consists of six grades, while the preparatory and secondary levels amount to three grades each. Children usually start their primary education when they turn six and then transition to a preparatory school, which are the two compulsory education levels. Upon finishing the preparatory education successfully, a student can join one of two secondary tracks: the vocational (technical) track or the general secondary track (Elbadawy 2014). Figure 1 summarizes the structure of the pre-university education system in Egypt.

The country has a centralized top-down approach to education in which the Ministry of Education is in charge of putting general educational policies, choosing state-wide curricula, and allocating funds and teachers to individual schools according to official enrolment counts (Hanushek et al. 2006). With the exception of religious (Azhari) schools and some international schools, which jointly represent less than 7 percent of the population of pupils at any given year, all public and private schools in Egypt work under the supervision of the Ministry of Education.²

2.2 The policy change

For a long time, compulsory education in Egypt consisted of the six years that are part of primary education but in 1981 this was extended to also include the three years of the preparatory level (Elbaradie and Elbaradie 2004). This consequently increased the age of basic education from 11 to 14 years. However, by the end of the 1980's, the Ministry of Education introduced a policy change to pre-university education at schools that are supervised by the Ministry by which years of compulsory schooling decreased from nine years (six years in the primary level + three years of preparatory level) to eight years (five years in the primary level + three years in the preparatory level). The purpose of this policy change was primarily to allow for the absorption of a larger number of children in an over-stretched school system (Assad et al. 2005), and aimed to reduce pressures coming from the large class sizes in primary schools, and to eventually eliminate running schools on a daily two-shift basis (Eldahshan 1992). It was estimated that abolishing this final year of primary education would at the very least yearly save about 13 million Egyptian pounds in the form of authoring and printing costs of the curriculum books of the sixth primary grade (Eldahshan 1992). Despite the intense national public debate brought about by this policy reform and the worries that such a cut in years of education could have negative implications on the overall quality of education, the Ministry of

² For more detailed information on the structure of pre-university education in Egypt, see Elbadawy (2014) and Hanushek et al. (2006).

Education defended the policy change by arguing that reducing the years of basic education would not necessarily reduce the total schooling hours, as the suggested system would keep the academic content almost unaltered through increasing the academic year from 32 weeks to 38 weeks, as well as increasing hours of a school day after cutting down school shifts.

This change was implemented for all pupils who were in the fifth and the sixth grades of the primary stage in the academic year 1989/1990. The former ‘skipped’ the last year of primary education and joined the latter to integrate together in the first year of preparatory education. These pupils then completed their education jointly through compulsory education at the same time, despite the difference in years of schooling and age. Moreover, a ‘double cohort’ arrived simultaneously to the labor market (Eldahshan 1992).³ The implementation of the policy provides a natural experiment setting, by comparing the cohorts born before 1979 and after 1980 (i.e., in the fifth and sixth grades of primary education in 1989/90), for the evaluation of the effects of reducing years of education on several educational outcomes as well as labor market outcomes.

3. Data and Descriptive Statistics

We use data from the 2006 and 2012 waves of the Egyptian labor market panel surveys (ELMPS).⁴ The ELMPS is a nationally-representative panel survey that covers the Egyptian labor market and collects detailed data over educational performance and labor market outcomes of individuals. The survey contains several questions on the education history for those who left school, in addition to current school experiences for students. The education section in 2006 covered all individuals who are six years and older. In 2012, only those above six years of age and less than 45 years of age who had updates in their education since 2006 were asked the full education module. The respondents for whom there was already detailed education information in 2006 were not asked for this information again in 2012 (Elbadawy 2014).⁵ As a consequence, we have sufficiently sampled educational attainment information for those born between 1975 and 1985, which represents four cohorts born before and five cohorts born after the policy reform.

We use the likelihood to have finished compulsory (preparatory) schooling and years of education as our main measures of education outcomes. The dataset also includes detailed information about labor market experiences, including a section focusing on the characteristics of and experience at the first job respondents occupied. We use age at labor market entry, time spent between finishing/exiting education and starting the first job, and type of the first job (paid vs. unpaid), as our main measures of short-term labor market success.

Our main analytical approach is to use year of birth as a proxy for treatment since parents did not make fertility decisions in view of the (future) policy and is therefore completely exogenous to the change in years of education. The simple assumption is that those born before 1980 are much more likely to be affected by the policy. This, however, is not a perfect rule and due to grade repetition, or variation in school entry age, some individuals could have been treated despite having been born before 1980 (or vice versa). Moreover, some experimental schools that are supervised by the Ministry of Education have already implemented the five-year primary schooling policy change before the academic year 1989/1990 (Eldahshan 1992).

To estimate the actual probability of treatment, the 2012 wave of the dataset includes a subjective question over exact number of years of education (five or six) in the primary stage but, due to the structure of the data, this question was not answered by those who had already

³ The sixth year was phased back starting with the children who entered the first grade in 2000 (Assad et al. 2005).

⁴ An earlier wave of the ELMPS exists for 1998, however, since the individuals affected by the policy were not surveyed on their educational outcomes (mostly because they were too young at the time) we chose not to use it for our analysis

⁵ For more details on the structure of the dataset see Assad and Krafft (2013) and Barsoum (2009).

been surveyed on education in the previous 2006 wave. We cannot, therefore, use this information for our general analysis but we can use this subjective question to descriptively test the effect of policy implementation on the treated cohorts. Figure 2 shows the share of people who spent five rather than six years in primary school by year of birth. The figure shows that the likelihood to spend five instead of six years in primary education increased significantly in the very last years of the 1970's.

Table 1 shows the descriptive statistics for the variables used in our analysis. The table shows that 0.75 of the sample finished their compulsory education, with the share of women finishing compulsory education slightly higher than that of men. The table also shows that labor market participation of women in Egypt is quite low as only 31% of women in the sample have ever worked. The probability that the first job is paid is 0.82 for the pooled sample, and 0.74 for women.

4. Empirical Strategy and Analysis

To estimate the causal effects of the education reform on educational and labor market outcomes, we estimate the following two equations for a particular age cohort a in year t :

$$E_{at} = \beta_0 + \beta_1 Reform_{at} + \sum_{j=0}^J \varphi X_{jat} + v_{at} \quad (1)$$

$$L_{at} = \delta_0 + \delta_1 Reform_{at} + \sum_{j=1}^J \varphi X_{jat} + u_{at} \quad (2)$$

Where E_{at} is an educational outcome (i.e., probability to finish compulsory education, years of education), L_{at} is a short-term labor market outcome (i.e., age at first job, time between exiting/finishing education and the first job, and whether the job was paid or not), $Reform$ is a dummy variable that is equal to one for individuals born between 1980 and 1985, and zero for individuals born between 1975 and 1979. X_{jat} is a set of J control variables which account for demographic characteristics (i.e., gender, father's education, and lives in urban area, and natural changes in education over time by inclusion of a quadratic term of cohort of birth). β_0 and δ_0 are constant terms, and v_{at} and u_{at} are error terms. We are mainly interested in estimating β_1 and δ_1 which measure the impact of reducing the number of years of primary school on respectively education and labor market outcomes.

Before estimating the models econometrically, we can first graphically illustrate discontinuities in outcomes potentially induced by the reform. Figure 3 shows the average in our measures of educational attainment for individuals born between 1975 and 1985. Graph 3.1 shows the proportion of individuals who successfully finished compulsory education (i.e., preparatory schooling), and graph 3.2 shows the average number of years of schooling completed. The vertical lines in Figure 3 show the timing at which the policy change affected (after) or not (before) the various cohorts we study. The figure shows a very clear and marked increase in the proportion of people who finished compulsory education. Graph 3.2 reveals that before the policy implementation, average years of schooling had been declining which seems to confirm the negative effect of an over-stretched education system; however, this trend was stopped after the policy and even reversed with increases in subsequent years.

Figure 4 shows the labor market outcomes at the entry in the labor market for individuals born between 1975 and 1985. Graph 4.1 shows the age at the first job, graph 4.2 shows the time spent between exiting/finishing education and the first job, and graph 4.3 shows the proportion that enter the job market in a paid job. Firstly, the graphs clearly show that the entry of the treated cohorts to the labor market is postponed with average age at first job around 18.2 years old for those who were born in 1979, whereas it is around 19 years for those who were born in 1980. This difference is large and also conceptually important since it mostly avoided that two cohorts entered the labor market simultaneously, which was one of the predicted effects of the policy. Figure 3 further shows that there seemed to be an upward break in the delay between

exiting/finishing school that is longer for the treated cohorts, which is a first signal that perhaps they had some difficulties in finding the first job they desired. Finally, the final graph shows some reduction in the probability to enter the labor market in a paid job (i.e., increases in taking up non-paid employment) for the cohorts affected by the policy reform, which seems to confirm that these individuals had relatively poor labor market outcomes at the entry into the labor market. To check more rigorously for the statistical significance of these effects, we now estimate equations (1) and (2) for the whole sample and separately for men and women.

Table 2 presents our estimates of the effects of the reform on educational outcomes after controlling for background characteristics and natural changes in educational attainment over time. Panel A shows the linear probability estimates of the effect of the treatment (i.e., reducing the years of compulsory education) on the probability of finishing the preparatory level (i.e., compulsory schooling). Panel B reports the estimates of the effect of the reform on years of education. The results show that the policy had, in general, a significant and positive effect on our measures of education attainment. For the pooled sample, the probability to finish preparatory school increases by 5.5 percentage points from an average of 71 percent who complete this stage before the reform. Years of education increased, in general, by about 0.64 years from the average of 10.84 before the reform. The table also reveals that the effects of the policy reform are more pronounced for males than for females.

Table 3 reports the OLS estimates of the effect of the policy reform on first job outcomes after controlling for background characteristics and natural changes in the labor market over time. Panel A shows the effect of the policy on the age at the first job, Panel B shows the time delay in years between exiting/finishing education and getting the first job, and panel C shows the probability that the first job is a paid one. We will focus on the male results from this table because of the low probability of women working in Egypt.⁶ The table shows that the policy increased the age of the first job by about 0.75 years from an average of 18.80 years before the policy reform. This finding was to be expected considering that this outcome is mechanically related to the increase in the number of years of education we have observed before. More interestingly, the table shows that the effect of the policy change on the time between finishing/exiting education and the first job is insignificant for the pooled sample. However, treated men (those who had fewer years of primary education) took on average 1/3rd of a year longer than untreated men (who on average took about one year between finishing/exiting education and getting the first job). This provides evidence that this cohort, despite having on average more years of education, experienced more difficult times in finding a first job at labor market entry, indicating that there may have been some issues with the quality of education they received. This is confirmed by our finding in panel C of a significant drop in the probability that the first job was paid one. This decreased by 3.3 percentage points for men from an average of 82 percent before the policy.

The effects shown in Table 3 (especially age at the first job, and the time between exiting/finishing education) could be entirely driven by the longer years of education students get on average after the policy reform, and do not necessarily imply worsening of the labor market outcomes. To deal with this possibility, we re-estimate the regressions in Table 3 after accounting for years of education, to check whether the effect of the policy still holds. Table 4 reports these estimates. Although the effect of the policy on the age at the first job is less pronounced than it was in Table 3, it is still economically and statistically significant (particularly for men). Treated men start their job 0.38 years later than the average of 17.94 for untreated men. The probability to start in a paid job almost disappeared after controlling for years of education. However, the effect of the treatment on the time in years between

⁶ We tested if the probability of 'Ever Working' had changed as a result of the policy but found this is not the case with very small coefficients which were insignificant for either the pooled sample or for the two genders separately.

exiting/finishing education and first job becomes stronger after accounting for the years of education.

5. Concluding Remarks

Using data from the Egypt labor market panel surveys of 2006 and 2012, this paper investigated the effects of a change in years of compulsory schooling on further educational attainment and labor market outcomes in Egypt. The identification of the causal relationship comes from a policy change to the pre-university education system at the end of the 1980's, whereby years of compulsory schooling decreased from nine years (six years in the primary stage and three years in the preparatory stage) to eight years (five years in the primary stage and three years in the preparatory stage) while academic content was kept almost unaltered. This policy reform provides a natural experiment setting for the evaluation of the effects of early education on students' subsequent academic achievement and their short-term labor market outcomes at the time of entry into the labor market.

We found that the policy change increased the probability of finishing compulsory education by 5.5 percentage points. In addition, it increased years of education by 0.64 years on average. As a consequence, the policy implied a significant increase of age at entry into the labor market, and the first job of those affected by the policy came 0.75 years later. Young males took, on average, almost 30 percent longer between finishing/exiting education and the first job. Despite this delay, more treated individuals entered into non-paying jobs, which is a strong indicator of poor labor market outcomes, which can arguably be linked to a lowering of education quality. The negative effects of the policy reform on labor market outcomes still hold even after controlling for years of education, which suggests that reducing years of education has direct negative implications on short-run labor market outcomes, but not necessarily through changes in schooling outcomes.

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Figure 1: The Structure of Pre-University Education in Egypt

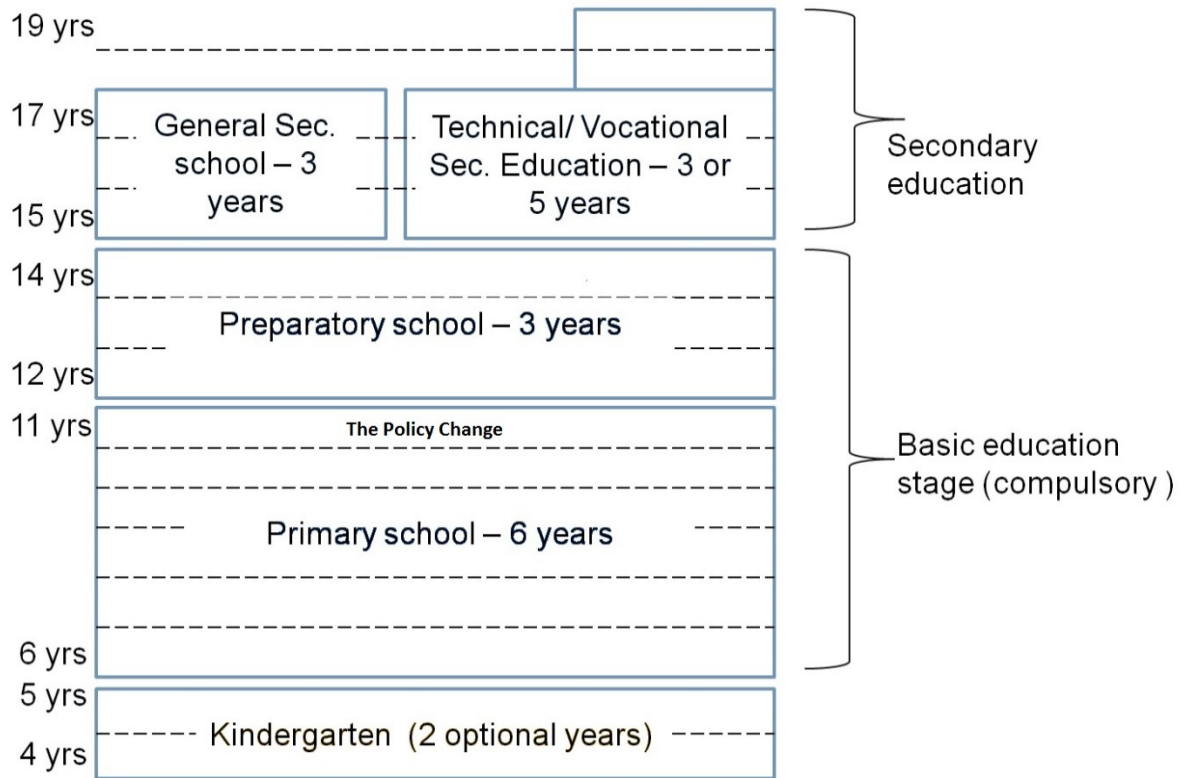


Figure 2: The Proportion of Students Who Received 5 (rather than 6) Years of Primary Education, (i.e. Probability of Treatment - ELMPS 2012 Wave Only)

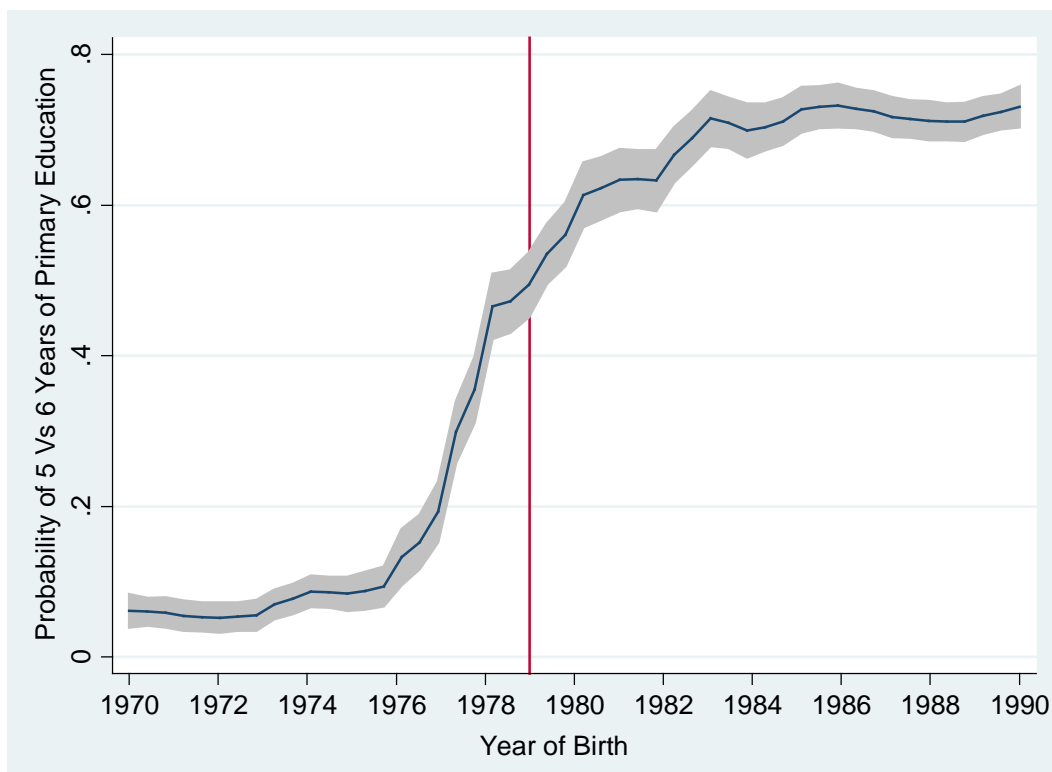


Figure 3: The Effects of Reducing Years of Education on Education Outcomes

Figure 3.1: Probability of Finishing Compulsory Schooling

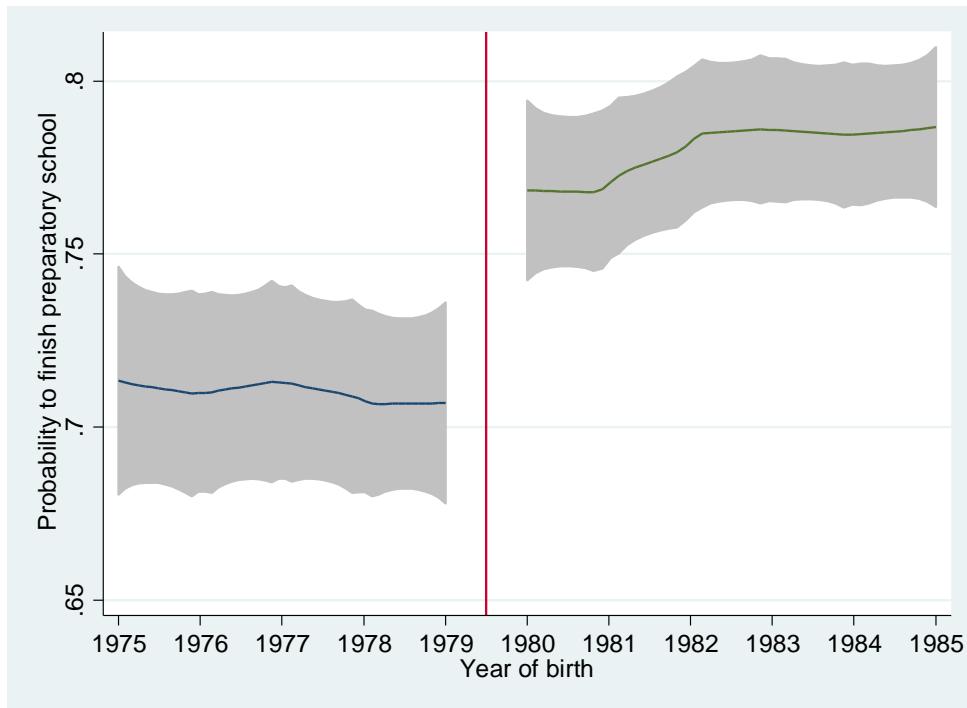


Figure 3.2: Years of Education

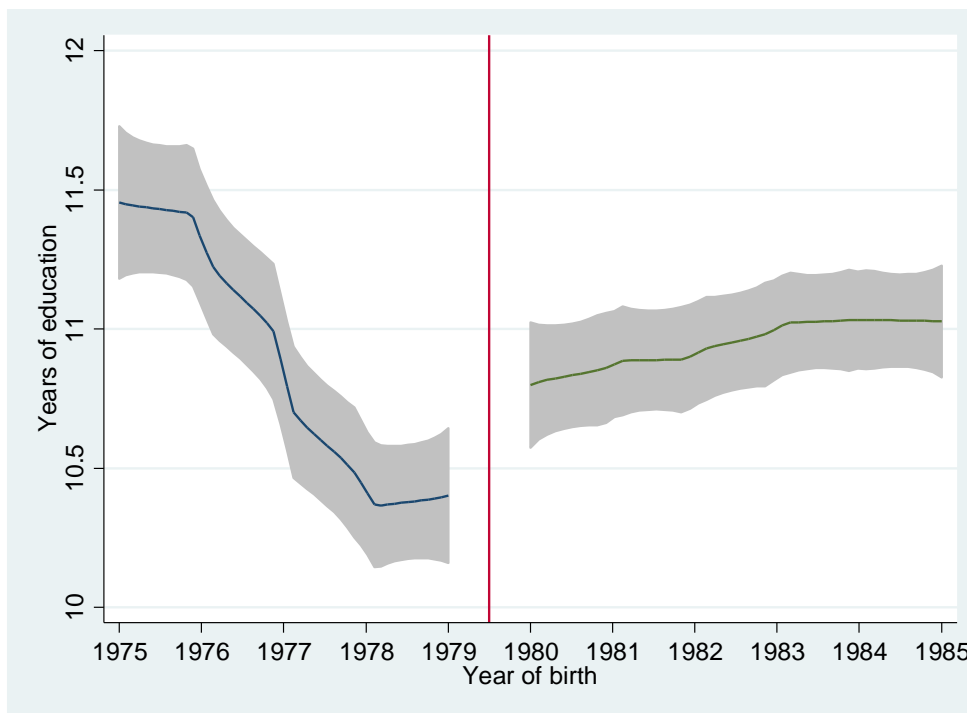


Figure 4: The Effects of Reducing Years of Education on Labor Market Outcomes at the Entry

Figure 4.1: Age at the First Job

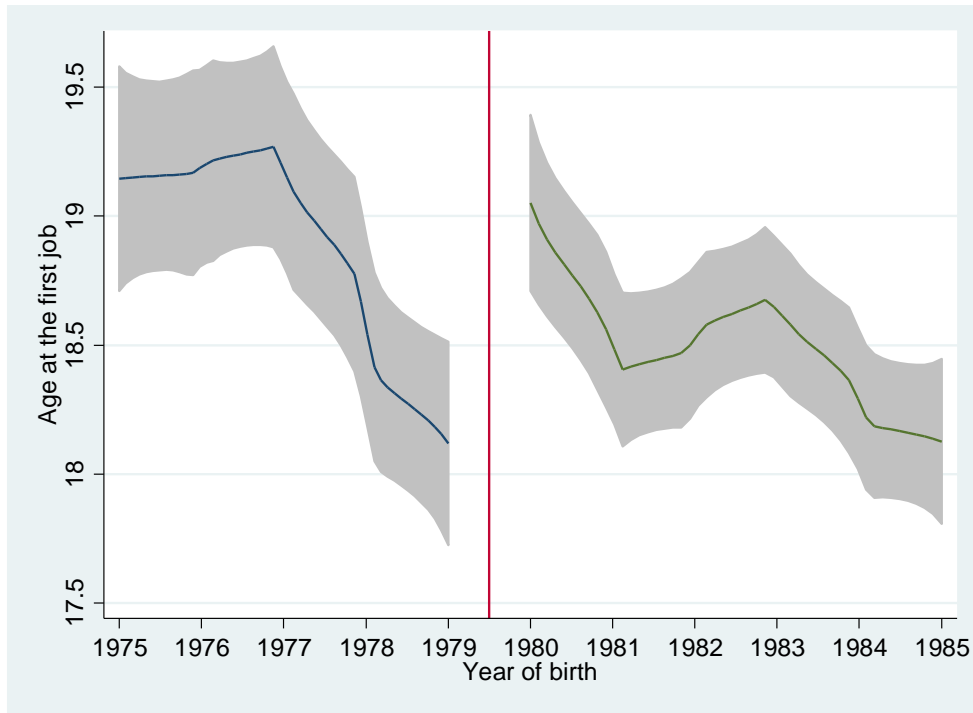


Figure 4.2: Time Spent between Exiting Education and the First Job

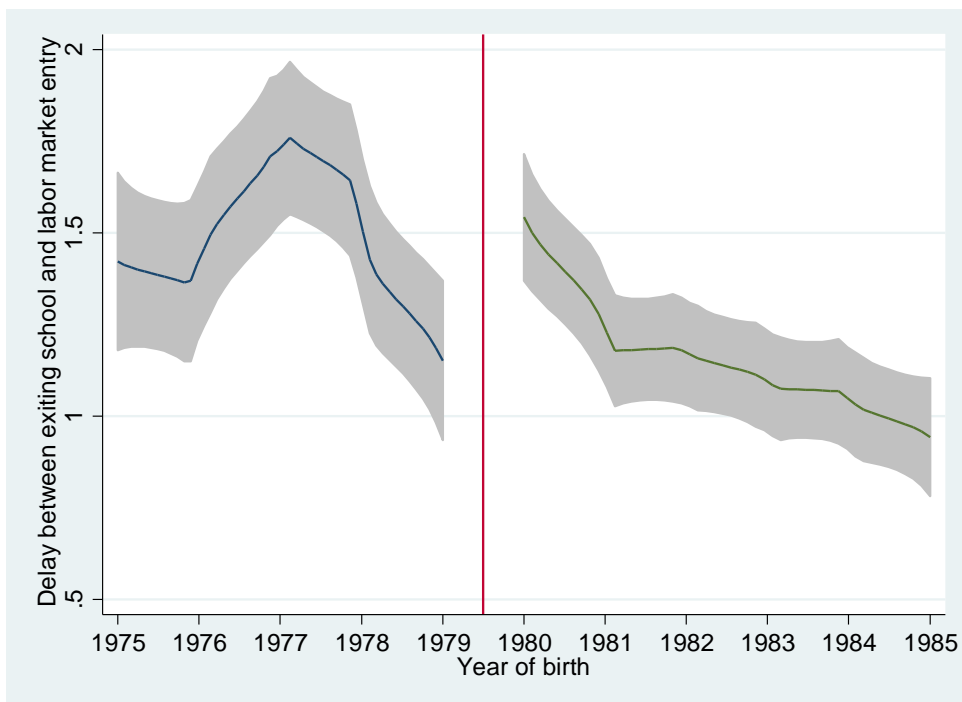


Figure 4.3: Probability that the First Job Was Paid

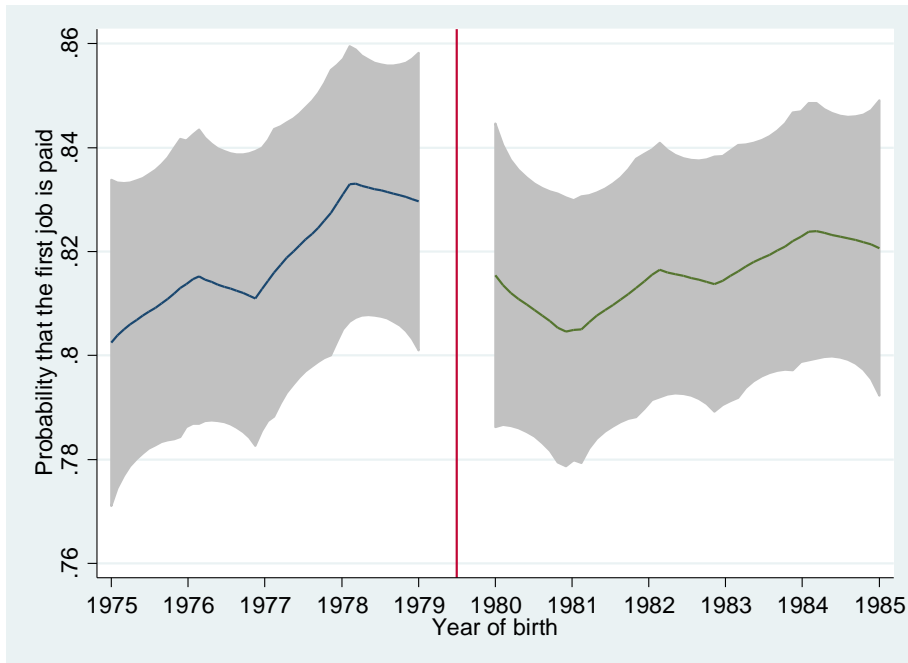


Table 1: Descriptive Statistics

Variables	Whole sample		Male		Female	
	Mean	Observations	Mean	Observations	Mean	Observations
Background characteristics						
Treated (born > 1979)	0.62	8,985	0.60	4,670	0.64	4,315
Father more than literate	0.30	8,985	0.29	4,670	0.32	4,315
Lives in urban area	0.46	8,985	0.45	4,670	0.46	4,315
Education outcomes						
Compulsory schooling	0.75	7,870	0.74	4,341	0.77	3,529
Years of education	10.91	7,870	10.78	4,341	11.07	3,529
Labor market outcomes						
Ever worked	0.65	8,985	0.97	4,670	0.31	4,315
Age at the first job	18.63	6,159	17.93	4,535	20.58	1,624
Delay in LM	1.27	5,634	0.96	4,244	2.22	1,390
First job is paid	0.82	5,397	0.84	4,073	0.74	1,324

Table 2: The Effects of Reducing Years of Education on Educational Outcomes

	(1) Pooled sample	(2) Male	(3) Female
Panel A			
Probability to finish preparatory education			
Treatment	0.055** (0.018)	0.071* (0.030)	0.033* (0.016)
Controls	Yes	Yes	Yes
Cohort square	Yes	Yes	Yes
Observations	7,870	4,341	3,529
Panel B			
Years of education			
Treatment	0.637*** (0.142)	0.699** (0.270)	0.559** (0.159)
Controls	Yes	Yes	Yes
Cohort square	Yes	Yes	Yes
Observations	7,870	4,341	3,529

Notes: Source is the ELMPS 2006 and 2012 waves. Controls include a dummy for father's education level (reads and write = 1), a dummy for urban vs. rural area, a dummy for owning a dwelling. Robust standard errors clustered at the regional in parentheses. The stars represent significance of the estimated coefficients at the *** p<0.01, ** p<0.05, and * p<0.1 levels.

Table 3: The Effects of Reducing Years of Education on Labor Market Outcomes

	(1) Pooled sample	(2) Male	(3) Female
Panel A			
Age at the first job			
Treatment	0.746** (0.268)	0.868** (0.295)	0.376 (0.385)
Controls	Yes	Yes	Yes
Cohort square	Yes	Yes	Yes
Observations	6,167	4,539	1,628
Panel B			
Years between finishing education and first job			
Treatment	0.185 (0.109)	0.274** (0.104)	-0.119 (0.237)
Controls	Yes	Yes	Yes
Cohort square	Yes	Yes	Yes
Observations	5,634	4,244	1,390
Panel C			
Probability that the first job is paid			
Treatment	-0.026** (0.008)	-0.033* (0.013)	-0.008 (0.027)
Controls	Yes	Yes	Yes
Cohort square	Yes	Yes	Yes
Observations	5,403	4,077	1,326

Notes: Source is the ELMPS 2006 and 2012 waves. Controls include a dummy for father's education level (reads and write = 1), a dummy for urban vs. rural area, a dummy for owning a dwelling. Robust standard errors clustered at the regional in parentheses. The stars represent significance of the estimated coefficients at the *** p<0.01, ** p<0.05, and * p<0.1 levels.

Table 4: The Effects of Reducing Years of Education on Labor Market Outcomes - Controlling for Education

	(1) Pooled sample	(2) Male	(3) Female
Panel A			
Age at the first job			
Treatment	0.341* (0.153)	0.382** (0.119)	0.148 (0.316)
Years of education	0.801*** (0.032)	0.856*** (0.031)	0.629*** (0.060)
Trend	Yes	Yes	Yes
Trend square	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	6,167	4,539	1,628
Panel B			
Years between finishing education and first job			
Treatment	0.282** (0.109)	0.336** (0.088)	0.053 (0.214)
Years of education	-0.142*** (0.026)	-0.085** (0.021)	-0.322*** (0.050)
Trend	Yes	Yes	Yes
Trend square	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	5,634	4,244	1,390
Panel C			
Probability that the first job is paid			
Treatment	-0.024* (0.011)	-0.030 (0.017)	-0.006 (0.027)
Years of education	0.013*** (0.002)	0.005*** (0.001)	0.037*** (0.008)
Trend	Yes	Yes	Yes
Trend square	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	5,403	4,077	1,326

Notes: Source is the ELMPS 2006 and 2012 waves. Controls include a dummy for father's education level (reads and write = 1), a dummy for urban vs. rural area, a dummy for owning a dwelling. Robust standard errors clustered at the regional in parentheses. The stars represent significance of the estimated coefficients at the *** p<0.01, ** p<0.05, and * p<0.1 levels.