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Could Reducing Compulsory Years of Schooling in a Developing Country be Beneficial?

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by

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I. Introduction

Towards the end of the 1980s Egypt introduced an educational policy aimed at reducing the years of compulsory primary schooling from six years to five years. This reduced the overall compulsory years of schooling from nine years to eight years. This paper will examine the educational and labor outcomes of this policy change differentiated by urban and rural areas using the Egypt Labor Market Panel Survey (ELMPS) 2006 and 2012 rounds. The data was restricted through the *treat* variable, which was one for those born between 1980 and 1985 and 0 for those born between 1975 and 1979. This restricted the sample to four cohorts before the law change and five cohorts after. After restricting the sample, the regressions differentiated between the urban and rural populations. The results suggested that the effect on the rural community was much larger than the effect on the urban population in terms of outcomes regarding wage, likelihood of finishing compulsory schooling, and age at first job.

II. Literature Review

This paper builds on substantial economics literature that examines the effect of years of compulsory schooling on labor market outcomes using changes in compulsory schooling age (e.g. Card 1999; Devereux and Harts 2010; Harmon and Walker 1995; Oreopoulous 2007). The literature primarily finds that an increase in years of schooling generally results in increased labor force participation, reduced wage inequality, and reduced overall unemployment. However, the case of this paper is novel in that it investigates the effects of reducing years of compulsory schooling in a developing country. The policy has been examined in the working paper, "How Does Reducing Years of Compulsory Schooling Affect Education and Labor Market Outcomes in a Developing Country?" by Elsayed and Marie (2015). The paper examined the effects of the same law reducing compulsory years of schooling with a particular focus on the effects amongst

males and females. Although this paper will examine the same outcomes, it will differentiate them by urban and rural populations. This particular differentiation was chosen as a result of research, which will be reported below, that confirmed that the urban and rural populations, especially in Egypt, have extremely different characteristics in terms of completing school and obtaining a job.

Compared to developed countries, developing countries tend to have lower-quality education systems and ineffective labor market structures. Therefore, we would expect to observe adverse effects on the population as a result of the lowering of years of schooling. The effect would be more pronounced amongst the rural population versus the urban population. As in many other developing countries, Egypt has a large rural, impoverished population accounting for approximately half of the entire population (approximately 45 million, meaning a total population of around 90 million). Most of the urban population lives in Cairo or Alexandria, whereas most of the country's rural population resides in Upper Egypt. Upper Egypt, as well as other rural areas, tends to have higher rates of infant mortality, poor access to safe water and sanitation, as well as a large number of underweight children. Additionally, Upper Egypt's economy is heavily dependent on agriculture, making the prospective for alternative employment limited. As a result, many children either only finish compulsory schooling or do not attend at all in order to help maintain family farms. (IFAD 2014) Therefore, the effects of the policy shortening the years of primary schooling could have positive effects for this rural population in terms of reaching higher levels of education at a faster rate, due to not being required to attend the 6^{th} grade and instead immediately starting middle school.

The Central Agency for Public Mobilization and Statistics (CAPMAS) conducted a study that reported that the percentage of Egyptians living below the World Bank's poverty line of

US$2 per day increased from 19.6 to 21.8 percent between 2004 and 2009. Analysts have blamed the worsening situation in rural governorates on the government's bias towards urban development for the past two decades[1]. As previously mentioned, most of the population in rural areas work in the agricultural sector, but in recent years the cost of fertilizers and other farming essentials have gone up as wages stayed stagnant or declined in some cases[2]. In addition, in the five-year span of their study, CAPMAS researchers found that there has been no improvement in the field of education and literacy in Egypt, regardless of income level. Approximately 41% of poor Egyptian families remain completely illiterate as compared to 24% for the rest of the population and only 1% of Egypt's poor have received any form of higher education. As wages continue to decline, there aren't many avenues through which Egypt's poor can rise into the middle class. (CAPMAS)

The purpose of the policy was to reduce the financial demands on an overwhelmed public educational system, but the Ministry of Education managed to keep the curriculum unchanged. Some positive effects of the policy would be that the cohort affected would finish compulsory schooling in a shorter time, and would be able to enter the labor market early, giving them an extra year's worth of income. Some negative effects of the policy would include short run consequences such as worse educational outcomes for individuals only receiving five years of primary schooling due to lack of preparation for higher stages of schooling. This paper aims to empirically examine the effects of this policy for both the rural and the urban areas in Egypt. The remainder of this paper will cover Egypt's educational structure as well as the policy change, the data and methods, followed by the empirical results and the conclusion.

[1] Blaydes, Lisa. Elections and Distributive Politics in Mubarak's Egypt. New York: Cambridge UP, 2014. Print.
[2] Farouk, Menna A. "Egypt Launches Initiative to Keep Farmers from Bailing on Their Land." Al-Monitor. Al-Monitor, 02 June 2017. Web. 26 July 2017. <http://www.al-monitor.com/pulse/originals/2017/06/egypt-farmers-government-prevent-abandoning-agriculture.html>.

a. Egyptian Education System

Currently, pre-university education in Egypt is divided into three levels: primary, preparatory, and secondary. The primary level consists of six grades, whereas preparatory and secondary are each three grades. Children enter primary school at the age of six and upon completion transition to preparatory school, which then completes their compulsory schooling as per current Egyptian law. After finishing preparatory school, a student can choose one of two tracks for secondary school. These tracks are the vocational (technical) track or the general secondary track (Elbadawy 2014).

Egypt has a centralized top-down approach to education in which the Ministry of Education is in charge of instituting educational policies, choosing state-wide curricula, and allocating funds and teachers to individual schools. With the exception of religious and international schools, all public and private schools in Egypt work under the supervision of the Ministry of Education. Figure 1 shows the structure and organization of the education system in Egypt as it currently stands.

Prior to the law change in the 1989/1990 school year, the compulsory years of schooling totalled nine years, six years in primary school and three years in preparatory school. The Ministry of Education in Egypt introduced Law No. 1981, which provided for eight years of compulsory education covering primary education, lasting five years, and the three year preparatory cycle. The purpose of the policy change was primarily to allow for the absorption of a larger number of children in an overwhlemed school system. It also aimed at reducing the large class sizes in Egyptian schools and eliminated having to run schools on a daily two-shift (i.e. morning and night shifts) to accommodate the large number of students. (Elsayed & Marie 2015)

The policy received much concern from the Egyptian population as it was preceived to lower the quality of education in the nation. However, the Ministry of Education addressed this concern by keeping the curricula almost unaltered and increased the academic year from 32 weeks to 38 weeks as well as the the hours in the school day. The pre-reform hours consisted of two sessions, one in the morning from 8 a.m. to 2 p.m. and then a second session from 3 p.m. to 9 p.m. After the reform, the hours were set at 8 a.m. to 4 p.m. for everyone, creating for a 40 hour school week. The change was implemented for all students who were in the fifth and sixth grades of primary school of academic year 1989/1990. The fifth graders were considered to be done with primary school by the end of the year, and the sixth grade was eliminated in the next year. The cohort of fifth and sixth graders of that school year then went on to enter and complete preparatory school despite differences in age and overall years of schooling. The law was revoked in 1999 and compulsory basic eduation was restored to nine years. This was due to a large investment in the education budget, which allowed the country to hire the teachers it desparately needed (NCERD 1999)[3]. However the implementation of the policy for the short period of time from 1989 to 1999 allows us to consider it a natural experiment.

III. Data & Descriptive Statistics

The datasets used for this paper are the 2006 and 2012 waves of the Egyptian Labor Market Panel Surveys (ELMPS). The ELMPS is a nation-wide panel survey that collects information on labor and educational outcomes in population. It includes a large amount of data regarding many sectors in the labor market as well as micro-level household data. In terms of educational variables, the ELMPS covers experiences of current students as well as of adults. The 2006 wave included education data on all participants over the age of six; however, the 2012 wave only

[3] Bahaa El-Din, Dr. Hussein Kamel. "Development of Education in the Arab Republic of Egypt." National Centre for Educational Research and Development (1996): Unesco.org. United Nations, 01 Jan. 2001. Web. 26 July 2017.

included educational information on participants between the ages of 6 and 45 who had updates to report since the initial 2006 wave. A large number of observations on educational outcomes are only available in the 2006 wave for many of the respondents that participated in both waves and successfully completed the set of education questions in the 2006 round. The dataset was restricted to the non-missing observations of the using a dummy variable *treat*, which was 1 for those born between 1980 and 1985 and 0 for those born between 1975-1979. This provided a sample of four cohorts before the law change and five cohorts after. This cutoff was chosen as a result of observing the data and determining the likelihood that an individual was affected by the policy change. Figure 2 shows a graph that represents the likelihood of attending primary schooling during the reform period. The graph showed a discontinuity at approximately 1979 with differing confidence intervals, which led to the birth year 1979 being the cutoff point for the treatment variable.

I attempted to combine the two waves using a 1:1 merge in Stata, however it was during this process that I discovered that approximately 20,000 observations were dropped between the 2006 and the 2012 rounds. Therefore, it was determined that treating both waves as separate cross-sections was the best way to combine the data. As a result, it was necessary to cluster by person to avoid distorting standard errors as a result of repeated observations for some respondents.

The main outcome variables used were probability of completing compulsory schooling, probability of finishing secondary schooling, education level, wage, and age at first job. Unfortunately, unlike Elsayed and Marie (2015), it was concluded that years of schooling could not be used as an outcome variable due to the lack of the variable in the 2006 wave. There did exist a categorical variable that provided information on the highest educational certificate

received by the participant but it could not be transformed into the continuous variable *years of schooling*. Therefore, the main education outcomes remained the probability of completing compulsory schooling, primary and preparatory schools, and probability of finishing secondary schooling. The main outcomes for short-term and long-term labor market success were wage and age at the first job.

Treatment and control groups were defined using birth year, due to its exogenous nature, since parents did not choose birth year based on the future (or current in some instances) policy. The main assumption used is that those born between 1975 and 1979 are less likely to have been affected by the law change as compared to those born between 1980 and 1985, as the law did not revert back until 1999. However, it is important to note that this is not a perfect rule as other exogenous factors, such as grade repetition and age when first starting school, are not accounted for. Furthermore, prior to full implementation of the law, the Ministry of Education had selected a few experimental schools to test it out on prior to the 1989/1990 academic school year. Nonetheless, it does give us a restricted and representative sample of both the treated and the untreated individuals.

Table 1 shows an initial look at the data with respect to rural and urban populations. It shows that the groups are similar but have some differences. There are some disparities in education for both the respondents and their parents. The education variables are categorical, showing that the mean level of education for the mother in the urban population is the knowledge of reading and writing. The father's education in the urban population is somewhat higher suggesting that some have attended primary school. In the rural areas, most mothers are illiterate, whereas fathers were more likely to have finished primary schooling. Similarly, the education variable shows a mean of having attended college in the urban population and finishing high school in the rural

population. The variable wage is a monthly wage represented in Egyptian Pounds. Mean wages show that monthly wages are much higher in urban areas. We can also see that the 80% of people in urban areas finish compulsory schooling whereas only 66% do in rural areas. It is important to note that the variable age at first job refers to first paying job. Upon exploring the main datasets from which the sample was created it was discovered that many respondents did nonpaying work for their families.

IV. Empirical Strategy & Analysis

Using both the 2006 and 2012 rounds of the ELMPS, I estimated the effects of the reform on the educational and labor market outcomes for group *a* at time *t*:

$$E_{at} = \beta_0 + \beta_1 Treat_{at} + \Sigma_{j=0}^{j} X_{jat} + v_{at} \quad (1)$$

$$L_{at} = \delta_0 + \delta_1 Treat_{at} + \Sigma_{j=0}^{j} X_{jat} + u_{at} \quad (2)$$

Where E_{at} is a set of educational outcomes, such as the probability of finishing compulsory schooling and likelihood of completing certain levels of education. As mentioned, years of schooling could not be used in the same way as in Elsayed and Marie's paper due to its discrete character. Equation 2 represents a set of short-term and long-term labor market outcomes such as age at first job and wage. *Treat* is a dummy variable that is equal to 1 for those born between 1980 and 1985 and zero for those born between 1975 and 1979. X_{jat} represents a set of *J* control variables that account for demographic characteristics such as age, gender, father's education, mother's education, living in a rural area, and time trend controls, such as the survey year. The main coefficients that are of importance in this paper are β_1 and δ_1, which will indicate the effects of the reform on education and labor market outcomes.

For the regressions with outcome variables *Finish Compulsory* and *Finish Secondary* a standard OLS regression was used. The regression specified was then run for urban and rural

populations separately, which allowed me to test whether the coefficients were different from zero. I also included a specification that combined the two populations using an interaction term between *treat* and *rural* across all models. This allowed me to test the significance of the difference between the treated in the urban population and the treated in the rural population. The regressions with outcome variables *Age at First Job* and *Wage* were also estimated using the OLS method. The set of regressions with outcome variable *Education*, which is a categorical variable, were appropriately specified using an ordered logit.

V. Empirical Results

a. Finishing Compulsory Schooling

Table 2 displays the results from the first set of regressions using likelihood of finishing compulsory schooling as the dependent variable. Four models were utilized, the first being the most basic in order to see what the bare treatment effect was for the entire treatment group. An interaction term was used in models (1) and (2) between the variables *treat* and *rural*. The second specification included more control variables, such as the parent's education. This specification shows that the treatment group is 2.8 percentage points more likely to finish compulsory schooling and that result is statistically significant at the 1% significance level. This is plausible as the treatment group went through fewer years of schooling overall due to the reform. The interaction term shows a larger economic effect on the rural population, though the difference between the two coefficients is not statistically significant.

The last two models, (3) and (4), were run with rural=0 and rural=1, respectively. This tests whether the coefficients are different from zero. We can see that in urban areas the likelihood of finishing compulsory schooling rose by 1.76 percentage points, whereas in rural areas the likelihood of finishing compulsory schooling rose by 5.23 percentage points, both statistically

significant at the 10% and 1% significance levels respectively. Compared to model (3), we can see that women in rural areas, model (4), are 9.28 percentage points less likely to finish compulsory schooling.

In models (2), (3), and (4), we can see that both parents' education has a highly significant effect on the likelihood of finishing compulsory schooling, with the father's education having a larger effect. In model (2), if the mother finished intermediate schooling (i.e. middle school) the likelihood of the child finishing compulsory schooling rises by 9.95 percentage points, and this is statistically significant at the 1% significance level. Referring to the same model, we see that the largest effect of the father's education is in the postgraduate category. If a father completed a post graduate degree, the likelihood of the child finishing compulsory schooling increases by 27.5 percentage points, and this is also statistically significant at the 1% significance level. Similarly, in models (3) and (4), the most significant and largest effect the mother's education has on the likelihood of finishing compulsory schooling was if the mother completed intermediate schooling. In urban areas if the mother finished intermediate school the likelihood of the child finishing compulsory schooling rises by 8.83 percentage points and this effect is statistically significant at the 1% significance level.

Lastly, across all four models we can see that females overall are less likely to finish compulsory schooling. In model (2), we observe that females are 3.89 percentage points less likely to finish compulsory schooling; however, this model is representative of the entire population. Recall that models (3) and (4) differentiate between urban and rural areas, respectively. The coefficient on *female* in model (3) suggests that females in urban areas are 1.44 percentage points more likely to finish compulsory schooling, however this result is not statistically significant. Model (4) reveals a more interesting trend, suggesting that females in

rural areas are 9.28 percentage points less likely to finish compulsory schooling, and this result is significant at the 1% significance level. This is believable, as women in rural areas tend to drop out of school early or never attend at all due to many cultural factors.

b. Finishing Secondary Schooling Regressions

Table 3 shows the regressions with *Finish Secondary* as the outcome variable. This dummy variable was equal to one if the individual completed any form of secondary schooling, which could be either technical (vocational) or general. This was included in order to see if the one less year of education would have had negative effects on secondary school completion, with the main argument being that they would ill-prepared due to the reform. However, the results suggest the complete opposite. The regressions were specified in the same way and with the same controls as the *Finish Compulsory* regressions. Once again, I tested to see if there was a statistically significant difference between the coefficients on rural and urban. Models (3) and (4) were included to illustrate the effect on the urban and rural population separately, that is testing against zero not the difference.

Model (1) provides insight into the treatment effect on the likelihood of finishing secondary schooling. It is evident that there is a positive, statistically significant relationship between being treated and finishing secondary schooling. Model (2) includes controls for mother and fathers' education. The coefficient on treatment suggests that those in the treatment group are 5.32 percentage points more likely to finish secondary schooling. The coefficient on the treatment and rural interaction is statistically insignificant, suggesting that they are not statistically different from each other. It also observed that once controls for parents' education are added the coefficient on female increases from -0.0318 to -0.0275, which now implies that women are only 2.75 percentage points less likely to finish secondary schooling.

An interesting trend is observed with respect to parents' education in models (2), (3), and (4). For mother's education we observe a negative, statistically significant effect on the likelihood of finishing secondary schooling. As the mother's education level rises, the likelihood of the individual finishing secondary schooling decreases. It is only in model (4), that we observe a positive, statistically significant effect if the mother is able to read and write, increasing the likelihood of finishing secondary school by 4.82 percentage points. We observe an opposite effect in the father's education. As the level of education rises in fathers, the likelihood of finishing secondary schooling increases. The level of education with the highest effect across models (2), (3), and (4) is "Reads & Writes," with coefficients of 0.0851, 0.0444, and 0.107 respectively, all of which are statistically significant at the 1% significance level.

Models (3) and (4) are regressions run with rural=0 and rural=1, respectively. This allowed me to see if the treatment among those groups was statistically different from zero. In model (3), we can see that the coefficient is 0.0456, suggesting that living in an urban community and being in the treatment group increases the likelihood of attending secondary school by 4.56 percentage points. Similarly, in model (4) the coefficient on treatment its 0.0492, suggesting that living in a rural community increases the likelihood of attending secondary schooling by 4.92 percentage points. Both coefficients are statistically significant at the 1% significance level. Since these coefficients are very similar numerically, it further explains why the interaction term between treatment and rural in models (1) and (2) were small and statistically insignificant.

Lastly, the coefficient on female was found to be negative across all four models. The largest effect was observed in model (4), where if you are a female living in a rural area the likelihood that you finished secondary schooling decreases by 4.88 percentage points. Interestingly, the coefficient on female in model (3), although negative, is very small and insignificant. This

suggests that females in urban areas are more likely to finish secondary schooling compared to their rural counterparts.

c. Education Attainment Ordered Logit

Table 4 represents a set of ordered logit regressions with educational attainment as the outcome variable. Educational attainment is broken down into seven categories: no education, primary education, preparatory education, general secondary education, technical schooling, above intermediate school, university, and post-graduate. Three models were specified, each with control variables that account for parents' education and whether the individual lives in an urban or rural area.

Right away it is clear across all three models the treatment effect is not statistically significant. The only time where significance is present is in the interaction term between treatment and rural in model (2). The difference between model (2) and model (3) is that in model (3) father's education was controlled for. However, in model (2) we can see that those treated in the rural population have a statistically significant difference in effect as compared to their urban counterparts. That is, people who live in rural communities and were affected by the reform would have an increase in ordered log-odds of being in a higher education category of 0.147, and this is statistically significant at the 10% significance level.

One trend that also emerged was among the coefficients on rural, which were negative across all three models and statistically significant at the 1% significance level. In model (3) it is suggested that if you live in a rural area, your ordered log-odds of being in a higher education category decrease by 0.403. We observe the same negative trend for the coefficient on female, which has shown up in the other education regressions. Referring to model (3), if you are a female, your ordered log-odds of being in a higher education category decrease by .212.

Parents' education is a popularly used control in analyzing the likelihood of an individual attaining a certain level of education. In model (3), the better specified out of the three, we can see that both mother and father's education have positive, statistically significant effects on an individual's own educational attainment. We observe that if the mother and father both only read and write, the ordered log-odds of being in a higher education category increase by 0.632 and 0.615, respectively. Naturally, we observe that the higher the parents' education, the larger the effect. If the mother and father attend post-graduate school, the ordered log-odds of being in a higher education category increase by 3.027 and 2.971, respectively, with the mother's education having a larger effect than the fathers'. These results are statistically significant at the 1% significance level.

What can be taken away from this set of regressions are two things: (1) compared with the father's educational level, mother's education has a larger effect on the likelihood of their child attaining a higher level of education, and (2) among those in rural communities who were treated there was a positive, statistically significant effect that suggested a higher likelihood to have attained higher levels of education.

d. Age at First Job Regressions

Table 5 presents the OLS regressions run with age at first job as the outcome variable. The primary reason these models were considered in this paper is to determine whether those in the treatment group were able to gain an extra year of employment as compared to those not affected by the reform. Three models were utilized, with model (3) representing the main results.

Across all three models we can see that there is a negative, statistically significant effect of being treated on age at first job. In model (3), we observe that if you're in the treatment group the age at which you get your first job decreases by 1.55 years, or approximately 18 months. This

result was expected as the reform led to the treatment group graduating one year earlier than they would have prior to the reform. The interesting result observed in this model, however, is the coefficient on the treatment and rural interaction term. When accounting for the coefficient on treatment, we observe that those treated in rural areas began working later as compared to those in urban areas. Although, the coefficient on rural does suggest that those in rural areas begin their first job 0.898 years sooner than those in urban areas. These results are statistically significant at the 1% significance level. Ultimately, this could suggest that those in the treatment group started work later because they had attended school longer than they generally would have outside of the reform.

Once again, we observe a positive, statistically significant effect of parents' education on age at first job. This is plausible because children whose parents have attained high levels of education are more likely to do the same, which therefore leads to a delayed entry into the labor market. Notably, in model (3), we observe that if both the mother and the father are able to read and write the child has a delayed labor market entry by 1.043 and 0.665 years, respectively. On the other hand, if both the mother and the father completed post-graduate education the child has a delayed labor market entry 2.233 and 2.894 years, respectively. These results are statistically significant at the 1% significance level.

In conclusion, the main finding in this set of regressions is the effect of being treated in a rural area, which suggested that that population had delayed labor market entry as opposed to their urban counterparts. One explanation for this finding could be that that group among the treated chose to continue attending school for a longer period of time. However, a more plausible explanation is that once those in rural areas attain high levels of education the ineffective labor

market in those regions will not be well suited for them. Rural areas in Egypt do not offer high-skilled jobs, which in turn would make it more difficult for a skilled laborer to find work.

e. Wage Regressions

Lastly, Table 6 represents the wage regressions, represented in Egyptian Pounds[4]. Right away we can see that the treatment variable has a positive, statistically significant coefficient only in model (3). For that reason, I will focus the analysis mainly on that model. These models were considered due to the assumption that the treated group received an extra year to work; therefore I expected to see a positive coefficient on treatment.

Initially, after running the regressions in models (1) and (2) and observing a statistically insignificant coefficient on *Treatment*, I better specified the model by adding the variable *Job Sector*, which is a categorical variable split into 6 categories; government, public, private, investment, international, and other. The omitted category for this variable, or the category that is referenced, is government. Control variables for age, parents' education, gender, whether or not the individual lived in a rural area were added as well as a time variant variable, survey year. The omitted control variable was education, which was done because it was correlated with the treatment variable and rendered all insignificant results. Therefore, treatment served as a proxy variable for education.

We can observe that the coefficient on *Treatment,* 160.6, is positive and statistically significant at the 5% significance level. Therefore, we can say that those in the treatment group made 160.6 Egyptian Pounds (EGP) more monthly compared to those who were not. This model also suggests that if you are a female you would make 381.6 EGP less than your male counterparts, and this result is statistically significant at the 1% significance level. Workers in

[4] 2012 Dollar to EGP Exchange Rate was 1 USD = 6.1396 EGP. (exchangerates.org.uk)

rural areas earn 77.69 EGP less than those who live in urban areas, and this result is statistically significant at the 5% significance level. This result was anticipated due to the previously mentioned information regarding market inefficiencies in rural areas. In addition, rural areas mostly specialize in farming, which does not yield as much earnings as the other sectors do. Lastly, it is worth noting that the interaction between being treated and living in a rural area did not yield statistically significant results, indicating that there is no added effect.

With regard to the controls for parents' education, the results suggest that the level of parents' education that has the most significant effect on wage is having attended university. However, in mother's education we can also note that completing intermediate schooling (i.e., middle school) has a significant effect on wage. If both the mother and the father completed university the individual would earn 630.8 and 277.5 EGP more monthly, respectively. In addition, if the mother completed intermediate schooling, the individual would earn 309.3 EGP more monthly and if the father can read or write then the individual would make 84.88 EGP more monthly. Lastly, when controlling for age, we can observe that with each additional year the individual would make 38 EGP more monthly. These results are statistically significant at the 1% and 5% significance levels. These findings suggest that the mother's education has a larger effect on wage than that of the father's. This could be due to the fact that females are generally less educated, as we have seen above, and therefore when they are educated have larger positive effects on their children, whether it is in regards to wage or education.

After adding *Job Sector*, we can observe that compared to an individual who works in the government sector those who work in the public sector or the investment sector have a higher wage. If the individual works in the public sector, their wage increases by 257.2 EGP and,

similarly, if the individual works in the investment sector their wage increases by 597.2 EGP. These results are statistically significant at the 1% significance level.

The main takeaway from this set of regressions is that the treatment group did receive an advantage by bypassing the 6th grade and entering the labor force early. We also observe the same trend observed in the ordered logit education regressions, which is the mother's education has a larger effect as compared to father's education in explaining increases in wage for an individual. This could be as a result of the common trend that as one's education rises, their wage will also rise.

VI. Conclusion & Policy Implications

This paper attempts to add to the existing academic literature in examining the effects of changing years of compulsory schooling on educational and labor outcomes. The difference in this paper is that it analyzes the effect of a reduction in years of compulsory schooling in a developing country, Egypt. The results were differentiated by urban and rural to determine if there was a statistical difference in the coefficients between the two groups.

The set of regressions regarding the probability of finishing secondary schooling were the main outcome in this paper. The treatment group was found to have had a higher probability of finishing secondary schooling in both urban and rural populations, with a slight higher effect in rural areas. The results in the education regressions also suggest that there is an added effect for those living in rural communities. However, overall the results showed that the treatment group across the country went on to finish secondary schooling at a higher probability.

There results suggest a number of policy changes. Perhaps in order to encourage the struggling rural community in Egypt, or any other developing country, the Ministry of Education could provide this population with a better opportunity at finishing schooling beyond the

compulsory years by reducing the overall compulsory years of schooling. This could potentially allow a larger portion of the disadvantaged population to obtain higher levels of education and therefore potentially have higher wages. This approach could be one method to alleviate the level of poverty in these areas. An interesting extension of this paper could study development and investment in rural areas to determine if this reduces labor market inefficiencies. Although this paper attempts to determine the effect of a reduction in compulsory years of schooling there is still much more research that could be done, as it is not a common educational law change. As data from these regions continues to become more available we can begin to gain a deeper understanding of the effects of changes in their education laws.

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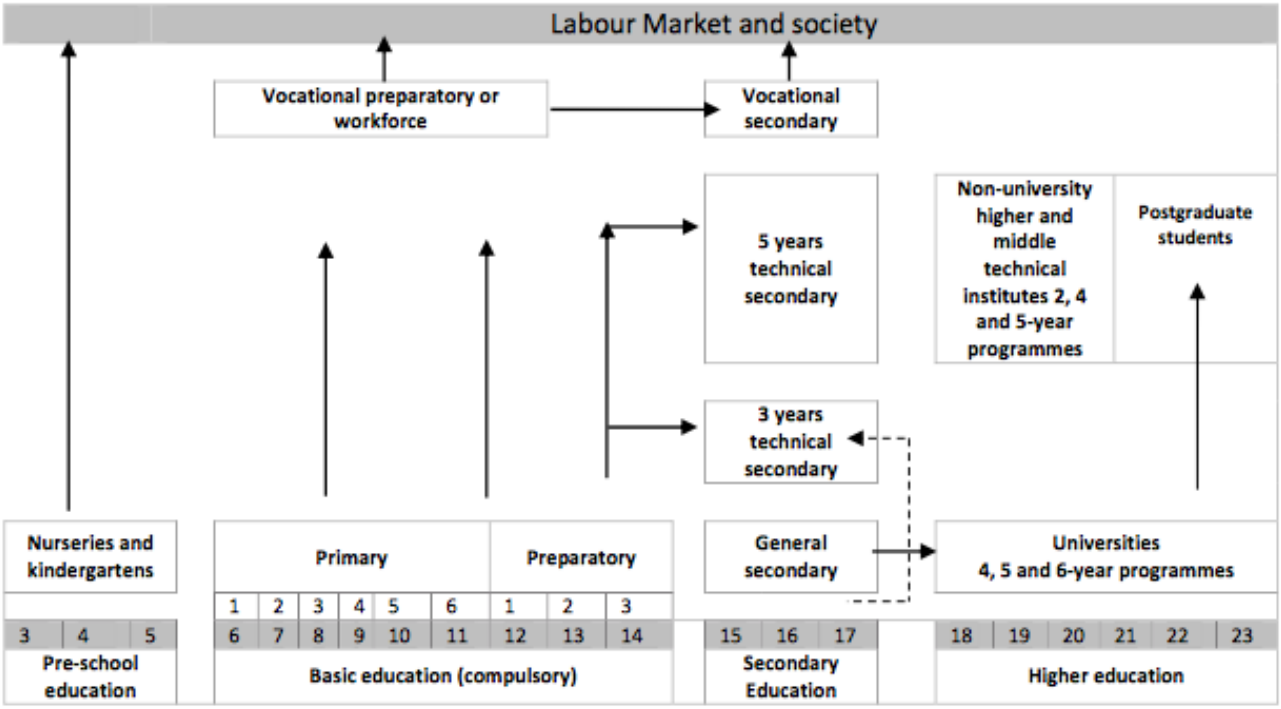
Appendix

Figure 1. Education System in Egypt Currently



Source. Ministry of Education (2011), Pre-University Education System in Egypt: Background Report, Ministry of Education, Cairo.

Figure 2. Likelihood of Being

Table 1. Summary Statistics

Variables	Whole Sample		Urban		Rural	
	Mean	Observations	Mean	Observations	Mean	Observations
Age	29.76101	11306	29.76148	5337	29.7606	5969
Mother's Education	1.497258	11306	1.810942	5337	1.216787	5969
Father's Education	2.041748	11306	2.432265	5337	1.692578	5969
Wage (EGP)	735.13	6437	792.8795	3248	676.2779	3189
Married	0.8573324	11306	0.8178752	5337	0.8926118	5969
Finish Compulsory	0.7320892	11306	0.8086942	5337	0.6635952	5969
First Job Age	19.19901	2427	19.66269	1340	18.62741	1087
Age at Marriage	21.85523	2238	22.37414	1160	21.29685	1078
Education	4.348134	11306	4.805883	5337	3.938851	5969

Table 2. Probability of Finishing Compulsory Schooling Regressions

Variables	(1) Finish Compulsory	(2) Finish Compulsory	(3) Finish Compulsory, Rural=0	(4) Finish Compulsory, Rural=1
Treatment	0.0345*** (0.0118)	0.0283** (0.0112)	0.0176 (0.0113)	0.0523*** (0.0132)
Rural	-0.164*** (0.0143)	-0.0755*** (0.0142)		
Treatment * Rural	0.0239 (0.0180)	0.0183 (0.0172)		
Survey Year	-0.0626*** (0.00769)	-0.0429*** (0.00801)	-0.000700 (0.00985)	-0.0899*** (0.0130)
Female	-0.0295*** (0.00911)	-0.0389*** (0.00867)	0.0144 (0.0112)	-0.0928*** (0.0131)
Mother's Education				
Reads & Writes		0.0850*** (0.0121)	0.0688*** (0.0150)	0.122*** (0.0201)
Less than Intermediate		0.0879*** (0.0127)	0.0713*** (0.0151)	0.125*** (0.0233)
Intermediate		0.0995*** (0.00952)	0.0883*** (0.0108)	0.135*** (0.0198)
Above Intermediate		0.0811*** (0.00999)	0.0849*** (0.0110)	0.121*** (0.0184)
University		0.0834*** (0.0107)	0.0773*** (0.0105)	0.149*** (0.0318)
Post-Graduate		0.0772*** (0.0135)	0.0782*** (0.0103)	
Father's Education				
Reads & Writes		0.145*** (0.0112)	0.110*** (0.0163)	0.169*** (0.0155)
Less than Intermediate		0.197*** (0.0127)	0.178*** (0.0165)	0.206*** (0.0204)
Intermediate		0.274*** (0.0115)	0.240*** (0.0148)	0.303*** (0.0196)
Above Intermediate		0.274*** (0.0125)	0.249*** (0.0156)	0.290*** (0.0226)
University		0.277*** (0.0113)	0.247*** (0.0139)	0.313*** (0.0222)

Post-Graduate		0.275*** (0.0141)	0.251*** (0.0142)	0.388*** (0.0333)
Constant	0.864*** (0.0116)	0.686*** (0.0136)	0.657*** (0.0164)	0.660*** (0.0184)
Observations	11908	11908	5806	6102

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.
The omitted category for mother and father's education is *Illiterate*.

Table 3. Finish Secondary Schooling Regressions

Variables	(1) Finish Secondary	(2) Finish Secondary	(3) Finish Secondary, Rural = 0	(4) Finish Secondary, Rural = 1
Treatment	0.0408***	0.0532***	0.0456***	0.0492***
	(0.0151)	(0.0147)	(0.0148)	(0.0147)
Rural	0.0460***	0.0104		
	(0.0164)	(0.0167)		
Treatment*Rural	-0.00142	-0.00556		
	(0.0210)	(0.0207)		
Survey Year	-0.0584***	-0.0547***	-0.0197	-0.0927***
	(0.00876)	(0.00917)	(0.0124)	(0.0139)
Female	-0.0318***	-0.0275***	-0.00900	-0.0488***
	(0.0104)	(0.0103)	(0.0146)	(0.0144)
Mother's Education				
Reads & Writes		0.000270	-0.0244	0.0482*
		(0.0175)	(0.0224)	(0.0280)
Less than Intermediate		-0.0613***	-0.0722***	-0.0295
		(0.0205)	(0.0246)	(0.0381)
Intermediate		-0.196***	-0.197***	-0.160***
		(0.0226)	(0.0260)	(0.0493)
Above Intermediate		-0.187***	-0.156***	-0.205***
		(0.0309)	(0.0352)	(0.0738)
University		-0.228***	-0.211***	-0.182**
		(0.0281)	(0.0316)	(0.0754)
Post-Graduate		-0.311***	-0.283***	
		(0.0374)	(0.0380)	
Father's Education				
Reads & Writes		0.0851***	0.0444**	0.107***
		(0.0128)	(0.0190)	(0.0175)
Less than Intermediate		0.0647***	0.0222	0.0939***
		(0.0163)	(0.0224)	(0.0242)
Intermediate		0.0336*	-0.0309	0.104***
		(0.0198)	(0.0254)	(0.0328)
Above Intermediate		0.0255	-0.0398	0.108**
		(0.0260)	(0.0324)	(0.0445)
University		-0.144***	-0.210***	-0.0591
		(0.0233)	(0.0284)	(0.0442)
Post-Graduate		-0.148**	-0.215***	0.111
		(0.0574)	(0.0562)	(0.344)
Constant	0.452***	0.465***	0.470***	0.496***
	(0.0140)	(0.0159)	(0.0191)	(0.0196)
Observations	11908	11908	5806	6102

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.
The omitted category for mother and father's education is *Illiterate*.

Table 4. Education Attainment Ordered Logit Regressions

Variables	(1) Education Category	(2) Education Category	(3) Education Category
Treatment	0.0829 (0.0565)	-0.0357 (0.0557)	0.0104 (0.0559)
Rural	-0.932*** (0.0605)	-0.570*** (0.0621)	-0.403*** (0.0629)
Treatment*Rural	0.0758 (0.0765)	0.147* (0.0774)	0.0649 (0.0782)
Survey Year	-0.164*** (0.0314)	-0.126*** (0.0329)	-0.0615* (0.0350)
Female	-0.122*** (0.0388)	-0.172*** (0.0392)	-0.212*** (0.0395)
Mother's Education			
Reads & Writes		1.022*** (0.0612)	0.632*** (0.0634)
Less than Intermediate		1.428*** (0.0777)	0.795*** (0.0821)
Intermediate		2.576*** (0.0899)	1.503*** (0.0974)
Above Intermediate		2.494*** (0.120)	1.293*** (0.132)
University		3.547*** (0.139)	1.891*** (0.158)
Post-Graduate		4.851*** (0.596)	3.027*** (0.626)
Father's Education			
Reads & Writes			0.615*** (0.0465)
Less than Intermediate			0.895*** (0.0611)
Intermediate			1.491*** (0.0735)
Above Intermediate			1.621*** (0.100)
University			2.378*** (0.109)
Post-Graduate			2.971*** (0.490)
Constants			
Cut 1	-2.321*** (0.0561)	-1.901*** (0.0571)	-1.490*** (0.0607)

	Cut 2	-1.706*** (0.0564)	-1.265*** (0.0574)	-0.829*** (0.0612)
	Cut 3	-1.454*** (0.0564)	-1.000*** (0.0575)	-0.553*** (0.0613)
	Cut 4	-1.351*** (0.0561)	-0.891*** (0.0572)	-0.440*** (0.0611)
	Cut 5	0.510*** (0.0546)	1.215*** (0.0585)	1.784*** (0.0641)
	Cut 6	0.755*** (0.0549)	1.517*** (0.0596)	2.107*** (0.0651)
	Cut 7	4.393*** (0.123)	5.708*** (0.139)	6.456*** (0.147)
Observations		11908	11908	11908

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.
The omitted category for mother and father's education is *Illiterate*.

Table 5. Age at First Job Regressions

Variables	(1)	(2)	(3)
	Age at First Job	**Age at First Job**	**Age at First Job**
Treatment	-1.234***	-1.311***	-1.550***
	(0.159)	(0.154)	(0.187)
Survey Year	1.450***	1.452***	1.489***
	(0.158)	(0.155)	(0.158)
Female	1.685***	1.506***	1.434***
	(0.152)	(0.146)	(0.144)
Mother Education			
Reads & Writes		1.632***	1.043***
		(0.232)	(0.236)
Less than Intermediate		1.822***	0.969***
		(0.256)	(0.273)
Intermediate		3.062***	1.814***
		(0.209)	(0.258)
Above Intermediate		3.798***	2.014***
		(0.260)	(0.307)
University		3.689***	1.794***
		(0.267)	(0.342)
Post-Graduate		4.225***	2.233**
		(1.001)	(0.927)
Rural			-0.898***
			(0.228)
Treatment*Rural			0.782***
			(0.291)
Father's Education			
Reads & Writes			0.665***
			(0.204)
Less than Intermediate			0.945***
			(0.237)
Intermediate			1.153***
			(0.271)
Above Intermediate			2.360***
			(0.277)
University			2.221***
			(0.291)
Post-Graduate			2.894***
			(0.789)
Constant	18.65***	17.91***	17.79***
	(0.139)	(0.143)	(0.189)
Observations	2719	2719	2719

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01.
The omitted category for mother and father's education is *Illiterate*.

Table 6. Wage Regressions

Variables	(1)	(2)	(3)
	Wage	**Wage**	**Wage**
Treatment	-28.60	-32.65	160.6**
	(22.24)	(21.42)	(64.51)
Survey Year	776.0***	738.2***	524.5***
	(22.40)	(23.35)	(60.05)
Female	-316.5***	-371.4***	-381.6***
	(21.93)	(23.54)	(33.43)
Mother's Education			
Reads & Writes		81.93**	60.08
		(32.14)	(48.57)
Less than Intermediate		85.73**	63.15
		(40.42)	(58.95)
Intermediate		375.1***	309.3***
		(82.39)	(104.8)
Above Intermediate		137.2***	56.11
		(30.25)	(81.76)
University		768.6***	630.8***
		(127.7)	(140.8)
Post-Graduate		1122.6***	771.7
		(351.5)	(504.1)
Rural		-81.54***	-77.69**
		(23.67)	(38.48)
Treatment*Rural			-0.304
			(53.27)
Father's Education			
Reads & Writes			84.88**
			(33.74)
Less than Intermediate			73.64
			(49.54)
Intermediate			50.07
			(49.96)
Above Intermediate			184.5
			(125.5)
University			277.5***
			(81.86)
Post-Graduate			665.9
			(858.6)
Age			38.00***
			(9.276)
Job Sector			
Public			257.2***
			(86.26)

	Private			-1.247 (43.12)
	Investment			597.2*** (175.6)
	International			-271.9 (252.0)
	Other			-22.44 (207.6)
Constant		370.7*** (21.47)	390.5*** (24.50)	-746.8*** (284.8)
Observations		7038	7038	5444
Standard errors in parentheses* p<0.1, ** p<0.05, *** p<0.01. The omitted category for mother and father's education is *Illiterate.* The omitted category for job sector is *Government*.				