What's the Value of a Degree? Evidence from Egypt, Jordan and Tunisia[1]

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Abstract

The Middle East and North Africa region has historically had the world's lowest returns to education. This paper examines what the value of a degree is in Egypt, Jordan and Tunisia. Specifically, we estimate Mincer models for levels and years of schooling. We find that returns were highest in Tunisia and lowest in Egypt, although all three countries fall short of the global average. Higher education is where returns were greatest. We also analyze the returns by sub-groups: gender, age group, and work sector. The returns were higher for women in the work force than men. As for age group, the older generation has higher returns than the young. The public sector has greater returns than the private sector. One reason for the low returns is that many individuals are overeducated relative to position requirements. Investment strategies for education need to be shifted away from expansion and towards quality improvement.

Keywords: Returns to education; Middle East and North Africa; Labor markets; Wages; Education Policy

JEL Codes: I26, I25, J2, J24, J31

1   Introduction

The region of the Middle East and North Africa (MENA) has made great strides in expanding access to education (Campante & Chor, 2012; World Bank, 2008). Expanding schooling and thus increasing human capital is expected to generate a return in terms of individual wages—as well as contributing to economic growth (Becker, 1962; Krueger & Lindahl, 2001; Sala-i-Martin, Doppelhofer, & Miller, 2004). However, in MENA there has not been the expected payoff following the rapid expansion in education. GDP growth rates, wages, and female labor force participation have not increased as expected with the accumulation of greater human capital (Assaad, Hendy, Lassasi, & Yassine, 2016; Said, 2015; World Bank, 2013). Despite finding low returns to education in the MENA region compared to global averages (Montenegro & Patrinos, 2014; Rizk, 2016; Salehi-Isfahani, Tunali, & Assaad, 2009), investment has continued in expanding the education system.

To better understand the returns to human capital in the MENA region and how those returns have evolved, this paper provides new estimates for three MENA countries: Egypt, Jordan and Tunisia. The timeliness of our surveys is informative of the labor market after the Arab Spring in the countries of Egypt and Tunisia. In all three countries we show important divisions across sector (public versus private), generation, and gender in the labor market. We present wage returns both in terms of years and levels, as there are substantial non-linearities in returns. For levels, we present both cumulative and marginal returns to understand the impact of different education choices on an individual's earning potential.

We find that in Egypt, Jordan and Tunisia, returns to education rise substantially starting at the post-secondary level. Overall, Tunisia had the greatest rate of return at 8.1% for an additional year of schooling. However, even though Tunisia had the greatest returns in comparison to Jordan and Egypt, all three countries fall short of the global average of 9.7% (Montenegro & Patrinos, 2014). Women have greater rates of return than men, but this is likely due to women's selective participation in the labor force and wage work. In addition, private sector returns were typically lower than those in the public sector. Generally, the older generation had greater returns than the younger generation, especially in Egypt and Tunisia where the expansion of education has been more recent.

The paper is organized as follows. Section 2 reviews literature on the returns to education globally and in the MENA region as well as providing background on country education systems. Section 3 describes the methods and data used in estimating the rate of return to education. Section 4 presents the results. Section 5 offers policy suggestions and conclusions.

2   Literature Review

Human capital—the skills, abilities, and knowledge which increase productivity—should pay off in the labor market in the form of higher wages (Becker, 1962). As with physical capital, individuals can invest in human capital, whether through on-the-job-learning, skills training, or schooling. Around the globe, there is substantial public (as well as private) investment in conferring human capital through education systems. This investment is expected to improve individuals' well-being along a number of dimensions, but particularly to raise their wages as a result of increased productivity. The increase in wages from additional education is typically termed the "return to schooling" or "return to education." There are inherent tradeoffs in making this, as in all investments. Choosing school entails substantial opportunity costs; during that time

young people are not working and thus are forgoing income. They (or their families) may also have to make substantial private complementary investments, for instance in uniforms, textbooks, and transportation.

The rate of return to education embodied in one's wages is an important incentive in the decision to forgo work experience and wages now, while undertaking schooling, to earn more in the future. The average return to an additional year of schooling internationally is 9.7%. This means that for each additional year an individual attends school, he or she will, on average, experience a 9.7% increase in wages (Montenegro & Patrinos, 2014). The global return has been falling over time (Psacharopoulos, 1985, 1987, 1994), but has been estimated at around 10% since the early 2000s (Montenegro & Patrinos, 2014; Psacharopoulos & Patrinos, 2004).

The MENA region, however, suffers from the lowest returns to schooling, most recently estimated at 7.3% (Montenegro & Patrinos, 2014). In the past, the region has suffered from low productivity of education due to a combination of low quality of education (Rugh, 2002), high population growth rates and volatile economies, and other factors (World Bank, 2008). Additionally, education growth has been very rapid in MENA. Among the twenty countries with the fastest growth in years of schooling from 1980-2010, nine were in the MENA region (Campante & Chor, 2012). The rapid expansion of education may be one of the reasons returns are low when compared to the rest of the globe.

Returns to education in Egypt, Jordan and Tunisia have all have been estimated before. However, the estimates given for our three MENA countries are outdated. The most recent estimates for returns to education in Egypt were 5.4% as reported from 2006 data (Salehi-Isfahani, Belhaj Hassine, & Assaad, 2014) and 3.4% in an estimate using 2011 data (Rizk, 2016). The estimate for Jordan in 2002 was 8.9% and the estimate for Tunisia in 2001 was 8.5% (Montenegro & Patrinos, 2014). The estimates presented for Jordan and Tunisia put them slightly above the regional average. An additional estimate for Tunisia using 2011 data was a 7.0% return (Rizk, 2016). This work provides additional insight into the heterogeneity in these returns as well as potential drivers of low returns, with important lessons for other developing countries working to expand education.

2.1 Background

Economic development is closely linked to human capital, education, and the returns to education. Gross domestic product (GDP) per capita in Egypt, Jordan and Tunisia has been increasing relatively slowly over time (Figure 1), despite substantial investments in human capital. Throughout the 1991-2014 period, Tunisia has consistently had the highest GDP per capita whereas Egypt has had the lowest. Though each country's GDP is consistently growing, the standard of living for these countries falls into lower-middle-income and upper-middle-income economies as categorized by the World Bank. Egypt and Tunisia both fall into the lower-middle-income economies with Gross National Income (GNI) per capita in 2015 between $1,026 and $4,035; Jordan falls into upper-middle-income which has a GNI per capita between $4,036 and $12,475 (World Bank, 2016a). Standards of living are not easily measured, but GNI and GDP per capita are often used as a way to represent the average income or production per person.

Figure 1. GDP per Capita by Country Over Time
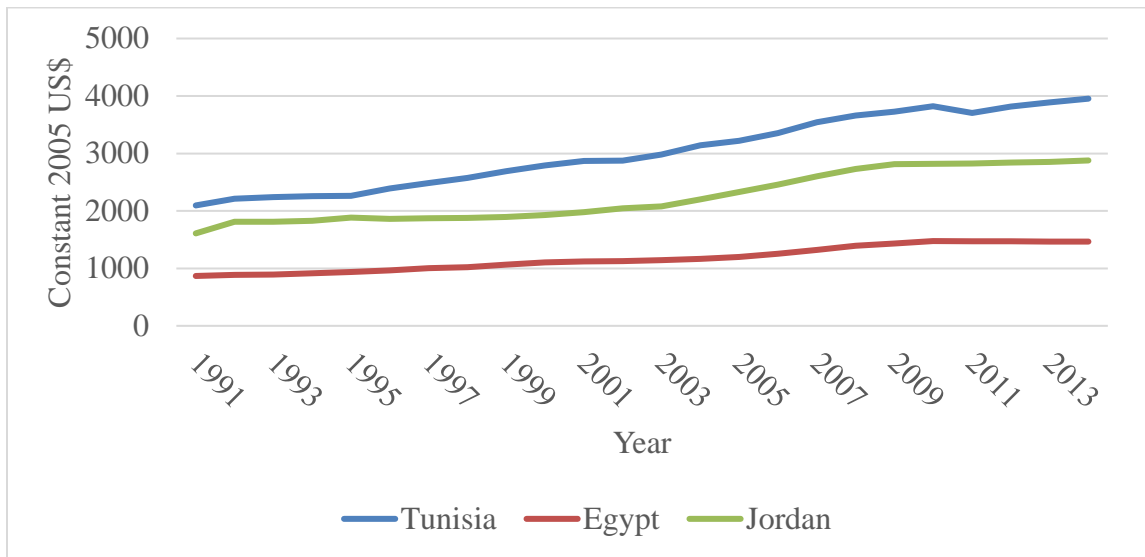
Source: World Bank Databank (2016)

Egypt has been struggling with a number of political, economic, and social challenges over the past several decades that may limit the returns to education. Growth has been limited, in part due to the global financial crisis and more recently due to the economic struggles that followed the January 25th, 2011 revolution. As is common in the MENA region, Egypt struggles with high rates of unemployment, particularly among youth, women, and the educated (Assaad & Krafft, 2015a). Education has expanded rapidly; Egypt had the 14th fastest growth in years of schooling from 1980-2010 (Campante & Chor, 2012). Primary enrollment is nearly universal as of 2012, but substantial problems with quality and inequality surrounding school success remain (Elbadawy, 2015).

One of the smallest in the Middle East and lacking the reserves of oil, and other natural resources, Jordan's economy depends on foreign aid and remittances. Additionally, Jordan has other economic challenges such as high government debt, high rates of unemployment, underemployment and poverty. According to a 2010 estimate, about 14.4% of people live below the poverty line (World Bank, 2016b). The construction of schools, promoted by the Jordanian monarchy starting in the 1950s, led to a rapid expansion in education throughout the country (Assaad & Saleh, 2016). On measures of labor market efficiency, education, and health, Jordan does relatively better than other MENA countries (Schwab, 2014). Though Jordan has "one of the highest levels of educational attainment and school enrollment in the Middle East and North Africa (MENA) region," (Amer, 2014, p. 65) in terms of the school-to-work transition, Jordan has a difficult transition for individuals aged 15-34 entering the labor market from the education system. Jordan has a very young population with approximately seventy-five percent being under the age of 35. The difficult transition into the labor force contributes to high levels of unemployment within the country, 15.4% for youth 15-34 as of 2010 (Amer, 2014).

Following their 2011 revolution, Tunisia became the only democracy in the Arab world after overthrowing President Ben Ali. Tunisia, as of 2015, also has a relatively high human development index that ranks it 96 out of 188 countries, while Jordan ranks 80th and Egypt 108th (United Nations Development Programme, 2015). The state claims full responsibility for public education with compulsory basic education for ages 6 to 16. Students with poor testing

performance do not progress beyond basic education. This could contribute to Tunisia's relatively higher standardized test scores as it eliminates the students who perform poorly (Akkari, 2005; Mullis, Martin, Foy, & Arora, 2012). Therefore, the group of people who achieve higher education are a select number of the entire Tunisian population. However, higher education access rapidly expanded during the 2000s (Assaad, Ghazouani, & Krafft, 2017). Both higher education and preceding levels suffer from quality and efficiency problems (Ben-Ayed, Lahmar, & Kammoun, 2016; Ramzi, Afonso, & Ayadi, 2016).

The three countries make varying investments in their education systems, which will likely affect the quantity and quality of education, and thus returns. While Tunisia spends 7.4% of GDP on education (Abdessalem, 2010), Jordan spends around 4% (Kanaan, Al-Salamat, & Hanania, 2010) and Egypt spends around 3.4% (El-Baradei, 2013). All three countries guarantee titular free access to primary/basic and secondary education, but not pre-primary education. While Egypt and Tunisia have free higher education as well, Jordan does not (Constitute Project, 2014; Egypt State Information Service, 2014; "The Constitution of the Hashemite Kingdom of Jordan," 1952). Even though access is supposed to be free, families often spend extensively on additional costs, such as private tutoring (Assaad & Krafft, 2015b; Rizk & Abou-Ali, 2016).

2.2 Education Systems

As shown in Figure 2, most children in Egypt's education system begin at age six starting with six years of primary schooling followed by three years of preparatory.[5] Together these comprise basic education. At the end of preparatory, either vocational or general secondary is selected largely based on the test scores of the student. Both the vocational and general secondary options are usually three years in length. Secondary has only recently (as of 2016) become mandatory (Egypt State Information Service, 2014). Typically, general secondary will provide students with the opportunity to pursue higher education after completion (Assaad, 2013). The next step for a vocational secondary graduate is to enter the workforce. Post-secondary institutes (two years), higher institutes (four years, but less prestigious) and university are all higher education options. Not shown in the figure (or subsequent figures) are post-graduate programs (master's and higher), which vary in length.

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[5] In all three countries while pre-primary (Kindergarten) education exists, it is not mandatory and attended by only a relatively elite minority of children (El-Kogali & Krafft, 2015). Thus children typically start school in grade one of primary at age six.
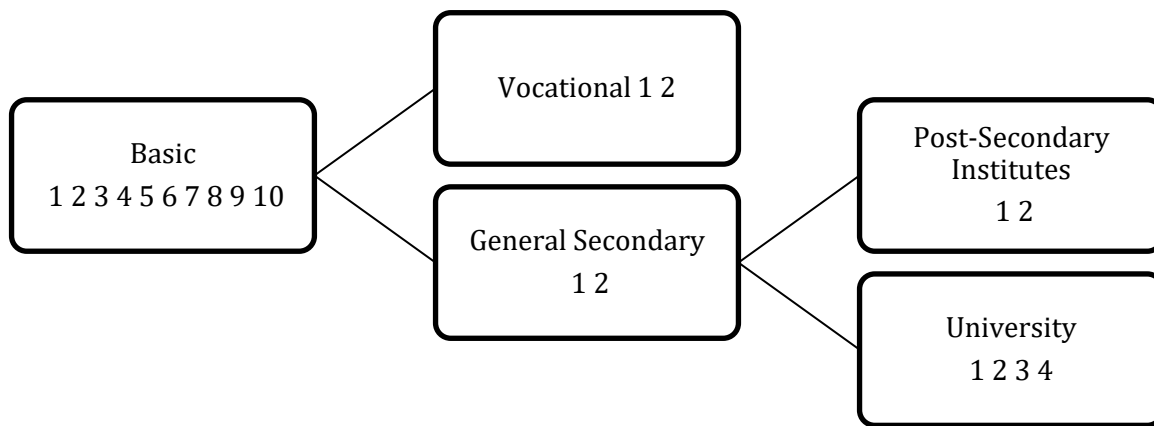
Figure 2. Egypt's Education System
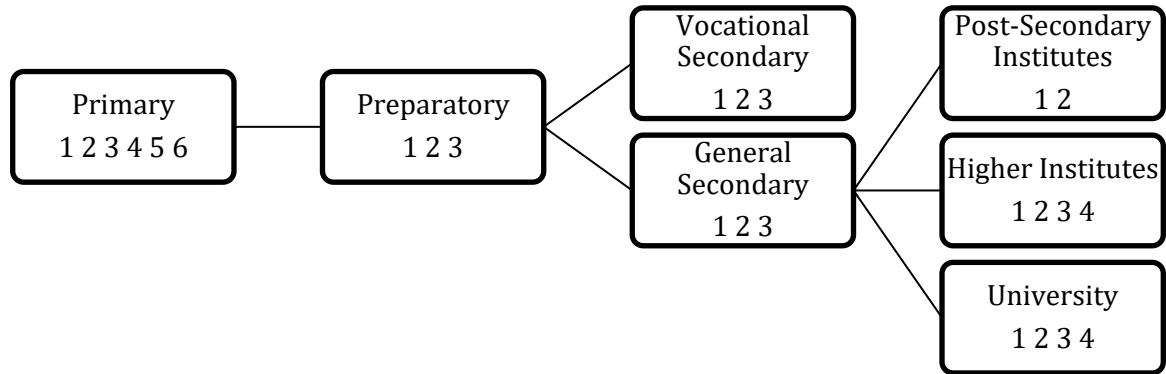
Source: Authors' creation

As shown in Figure 3, Jordan's education system begins with ten years of basic education and continues with two years of secondary in either academic (the most common) or vocational studies. Because Jordan does not distinguish between the primary and preparatory levels, in our models below, we consider either of these levels in Egypt and Tunisia to be basic education. In Jordan, basic education is mandatory ("The Constitution of the Hashemite Kingdom of Jordan," 1952). After secondary, a student can attend either a post-secondary institute for two years or a university for four.

Figure 3. Jordan's Education System

Source: Authors' creation

Tunisia has compulsory basic education for children aged 6 to 16. Similar to Egypt's education system, Tunisian basic education students typically enroll in both the primary level, lasting six years, and preparatory level, lasting three years. As illustrated in Figure 4, students also have the opportunity to enroll in either a vocational or, more commonly, general secondary education where both have the option to pursue higher education after the completion of the program. Higher education is more common for those who attend general secondary, and may be short-cycle university (two-three years) or long cycle (four years).[6]

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[6] In 2007, Tunisia switched to a new system of higher education, with three years (licensure) becoming short-cycle and an additional two years (masters) after that. Most of the individuals we are examining in our work would have attended under the old system.

Figure 4. Tunisia's Education System
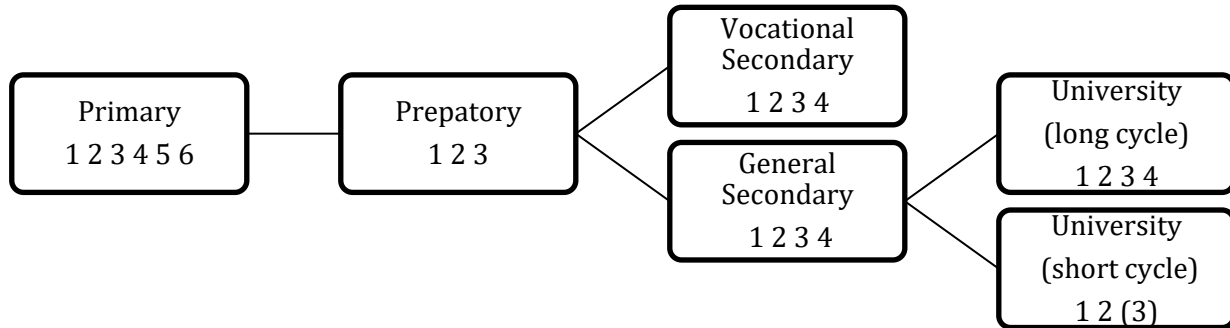
Source: Authors' creation

Access to education has expanded substantially over time in all three countries. Figure **5** shows the proportion of individuals that received each education level by age. We restrict the figure to ages 25-54 so that individuals will have achieved their final educational attainment. There is, as expected, a greater proportion of low education levels for the older age groups. However, in comparison to Egypt and Tunisia, Jordan has a greater proportion of those in the basic and secondary categories. Jordan expanded its basic education system very early (Assaad & Saleh, 2016). In addition, Jordan also has a more noticeable increase in the university level. While attainment of the post-graduate level is very rare in Egypt, it is an appreciable but small percentage for both Jordan and Tunisia.

Although the lower education levels are prevalent in each country, secondary (especially in Egypt) and university education are a greater proportion for the younger age groups. For individuals age 25 in Egypt, just over 40% have attained secondary education. In Jordan and Tunisia, basic education is the level with the greatest proportion (around 40%) for 25 year olds. In Jordan, 50 year olds have varying levels of education without one being much more prevalent than the others in Jordan. In Egypt and Tunisia illiteracy is dominant among 50 year olds, with approximately 45% in Egypt and 35% in Tunisia. Overall, these graphs demonstrate rapidly increasing levels of education for younger generations, as a result of expanding education systems.

Figure 5. Education Levels by Age and Country, Ages 25-54
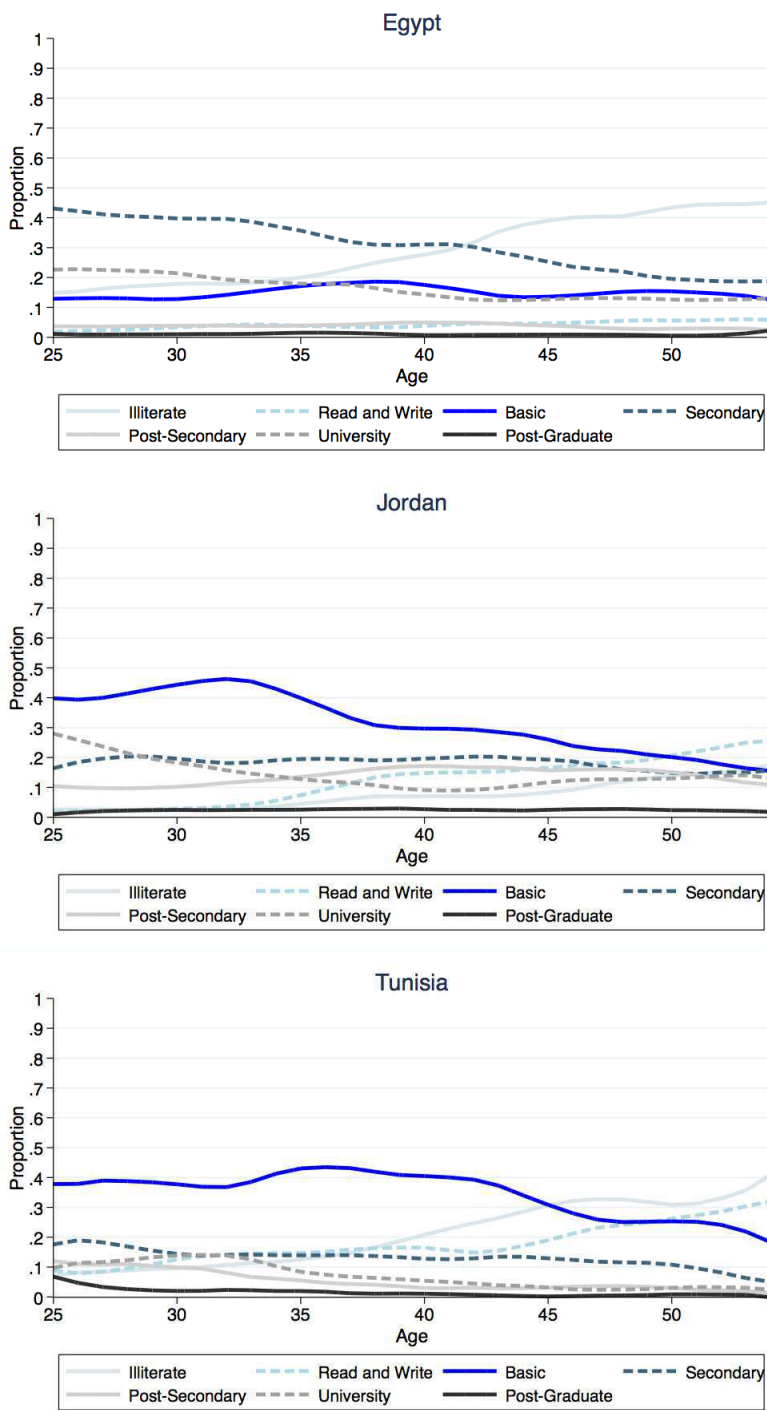
Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014
Notes: Lowess smoothed with bandwidth 0.3

2.3   Labor markets

The returns to education are determined both by the supply of educated labor (and thus the education system) and the demand for that labor. Demand for educated labor, in the human capital framework, should be related closely to any increased productivity conferred by education. However, in the context of the Middle East and North Africa, there are several labor market imperfections that may disrupt this relationship. First and foremost is the historical development of the region's education systems as, primarily, providers of credentials for government bureaucrats. In such a context, credentials, rather than skills, were the key outcome of education. Education was required to access (lucrative) government employment, leading to a dual labor market structure. Particularly under regimes which guaranteed public sector employment to the educated, queuing in the unemployed state to obtain a government job was the norm (Assaad, 1997, 2014a; Salehi-Isfahani, 2012). Although public sector employment guarantees are no longer in place, the higher pay and substantial benefits of the public sector mean that it continues to be the preferred employer of the educated (Barsoum, 2015; Said, 2015). An emphasis on credentials, rather than skills, persists in the education system as a result of this legacy (Assaad, Krafft, & Salehi-Isfahani, 2014; Barsoum, 2017).

In the private sector, social connections (*wasta*) play a key role in obtaining employment. In Egypt 55% of youth report that jobs are obtained by wasta "to a large extent" and only 2% of youth said wasta had no role in obtaining jobs (Roushdy & Sieverding, 2015). Throughout the MENA region, the vast majority of youth agreed that wasta is critical to getting a job (Krishnan, Ibarra, Narayan, Tiwari, & Vishwanath, 2016). Family and other social networks play a key role in job access even for higher education graduates (Assaad, Krafft, & Salehi-Isfahani, 2014). This labor market dysfunction means that not only is sub-optimal matching of workers and positions occurring, which reduces productivity overall, especially for skilled jobs, but also that jobs and thus wages depend less on education.

3   Methods & Data

3.1   Methods

Initially, we use descriptive statistics to examine the relationship between education, wages, and experience. We then use the standard Mincer model (Equation 1) to explain wages as a function of years of schooling and experience. Log hourly wages ($\ln(W)$) for individual i are a function of a constant (α), years of schooling (S), and years of experience (E). Years of experience squared are included to represent the potentially non-linear relationship between experience and wages, where the returns to experience tend to diminish over time. α is the log wage for someone with no experience or schooling, and ε_i is the error term—what we cannot observe or explain. We are particularly interested in β, the coefficient on years of schooling, which can be interpreted as the return to schooling: the percentage change in wages for an additional year.

$$ln(W_i) = \alpha + \beta S_i + \gamma E_i + \delta E_i{}^2 + \varepsilon_i \qquad \text{(Equation 1)}$$

The standard Mincer equation (Equation 2) assumes a constant return to each year of school. Estimating this linear model allows us to compare average returns on a global and regional scale, even if the relationship is not linear as is assumed in the standard Mincer equation.

For a variety of reasons, the impact that schooling has on wages may not be linear (Jaeger & Page, 1996). The level of education provides a more meaningful picture of the rate of return, especially in the MENA context. In the Mincer equation with levels, L_{ij} represents the dummy variable for each level of j levels, for instance, secondary. In our data, the dummy variables represent seven levels of education: illiterate (the omitted category), able to read and write, basic education, secondary education, post-secondary, university and post-graduate. The β_j coefficient is estimated as the cumulative return to education for a level.[7] We also present marginal returns, the return to a level compared to the preceding level. For instance the marginal returns to secondary versus basic are calculated as $\beta_3 - \beta_2$. The number of years still varies within each level, so we annualized marginal returns by dividing the marginal returns by the mean number of years of education in a level in our data.

$$ln(W_i) = \alpha + \sum_j \beta_j L_{ij} + \gamma_1 E_i + \gamma_2 E_i^2 + \epsilon_i \qquad \text{(Equation 2)}$$

Further, we analyze differences within sub-groups, namely the differences between sexes, age groups and sectors to examine variation in returns.

While the Mincer equation can be used to estimate the returns to education, the findings can be misleading, especially when applied to developing countries (Glewwe, 1996). Estimates do not identify the causal impact of education on individuals or society. One particularly important factor that could lead to overestimated returns would be unobserved ability, generating ability bias due to more able individuals progressing further in school and also earning more due to their ability—not necessarily their schooling. Additionally, it is common for there to be measurement error in the years of schooling, especially in developing countries, which leads to an underestimated rate of return for education. Ability bias and measurement error may in fact cancel each other out (Krueger & Lindahl, 2001).

As in our study, data collected on earnings are typically limited to wage-earners and leave out those who are self-employed. Because those who are self-employed generally have a lower return, excluding this population may lead to over-estimated returns (Glewwe, 1996). In addition, the inclusion of government workers may result in distorted estimates. Wages received by government employees better reflect government salary policies than productivity of individual workers. Thus returns to education incorporating the public sector may provide helpful guidance for individuals, but not policy makers. Therefore, we split our results by sector. In addition to these estimation issues, the Mincer method does not accurately account for the (positive) externalities generated by education, nor does it incorporate the cost of schooling. It is important to keep these multiple potential caveats in mind when examining estimated returns.

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[7] The interpretation of a coefficient in the semi-logarithmic Mincer equation as a percentage change is an approximation. This approximation works best for small changes in continuous variables. For categorical variables and larger coefficients (which necessarily occur when examining an entire level), the coefficient and percentage change increasingly diverge (Halvorsen & Palmquist, 1980). While we continue to interpret the results in percentage terms, that this interpretation is approximate must be kept in mind.

3.2 Data

Three similar surveys are used as data sources for this research: the Egypt Labor Market Panel Survey (ELMPS) of 2012 (OAMDI, 2013), the Jordan Labor Market Panel Survey (JLMPS) of 2010 (OAMDI, 2014), and the Tunisia Labor Market Panel Survey (TLMPS) of 2014 (OAMDI, 2016).[8] All are nationally representative household surveys, with detailed demographic, education, and labor market data for all the individuals in each household. The surveys were carried out by the Economic Research Forum (ERF) in partnership with local implementing statistics agencies.[9] The sample sizes for the surveys were somewhat varied. Egypt, when survey data was collected in 2012, had a total population of 85,660,902.[10] The ELMPS sampled 49,186 individuals in 12,060 households. In 2010, the time at which the survey was conducted, Jordan's total population was 6,046,000. The JLMPS sampled 25,969 individuals in 5,102 households. During Tunisia's survey in 2014, the population was 10,996,600. The TLMPS sampled 16,430 individuals in 4,521 households.

For our analysis sample, we chose the age group of 20-54 to focus on the majority of the labor force in each country; we chose this range because these are prime working ages. We excluded ages above and below because they are less likely to be working; the young are likely to still be in school and older ages may enter retirement. We included both men and women to compare the differences between sexes. We only included wage workers, as the return to education is measured based on wage data.

Wages are measured in hourly terms as 2012 real PPP international dollars, and include overtime, bonuses, profit sharing, and any other pay. For reference, the 2012 U.S. minimum wage in 2012 real PPP international dollars was $7.25. Potential experience is defined as age minus total years of schooling with six additional years deducted. Six is the typical age at which a child begins school. Years of schooling is the total number of years an individual completed in school. Time spent repeating grades is not counted in this measure. Level of schooling is the greatest level completed by an individual, falling into one of seven possible categories: illiterate, read and write, basic education, secondary education, post-secondary, university, and post-graduate. We mapped out the educational pathways of the three countries and combined several levels to create appropriate sample sizes and to make more comparable to one another. Specifically, we combined primary and preparatory in Egypt and Tunisia to be comparable to Jordan's basic education level. Additionally, we combined general and vocational secondary into one level to create the secondary level. Individuals categorized as illiterate are the omitted category in our regressions and used as the comparison group for the data. Those that are characterized as read and write did not complete any level of formal education, but report these abilities. They may have, however, completed a literacy program in which they receive a literacy certificate upon completion. In our subgroup analyses we examine differences by age group, sex, and sector. Age groups in our sample are divided between the young and old. Young are defined as ages 20-34 and old are ages 35-54. There are two different sectors that work can fall into:

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[8] See Assaad and Krafft (2013) for more information on the ELMPS 2012. See Assaad (2014c) for further details on the JLMPS 2010. See Assaad, Ghazouani, Krafft, and Rolando (2016) for information about the TLMPS 2014.

[9] All are publicly available from ERF at http://www.erfdataportal.com/index.php/catalog

[10] All population statistics from World Bank Databank (2016).

public (including state owned enterprises) or private. These two sectors are compared in order to determine the sector differences in returns to education.

4   Results

We present our results in our first sub-section in terms of descriptive statistics. Specifically, we examine selection into wage work by age and subsequently education. Then we descriptively analyze the relationship between wages and years of schooling, as well as experience. This is followed by an examination of levels of schooling, required levels of education for employment, and wages by levels of education. The standard (years of schooling) Mincer results are presented in the following sub-section. We then turn to the Mincer results by level and present models increasingly disaggregated by gender, age, and sector sub-groups.

4.1   Descriptive Analyses

As shown in Figure 6, the percentage of men engaged in wage work across Egypt, Jordan and Tunisia is higher than women in those same countries. At most around 20% of women at any age are engaged in wage work. The wage work rate does not accurately reflect their level of participation in the country's economy because most of their work is domestic labor (house work) (Assaad, Krafft, & Selwaness, 2017). Wage work becomes increasingly common from age 20 to 25 as individuals enter the labor market. The share of men engaged in wage work peaks at nearly 80% in Jordan and 75% in Egypt for men around age 30. In Tunisia the share rises up to only 60% for men around age 45. Beginning at age 40, both Jordanian men and women have a decreasing pattern of wage work. Early retirement may be driving this pattern in Jordan (Al Hawarin, 2014).
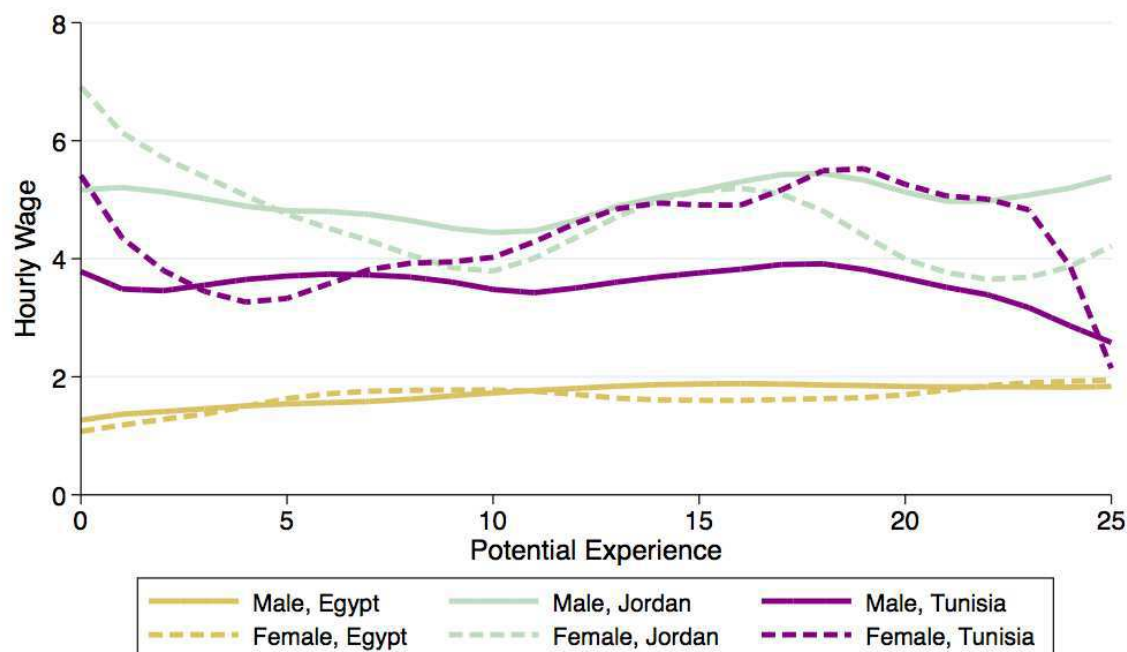
Figure 6. Wage Work by Age, Sex, and Country, Ages 20-54
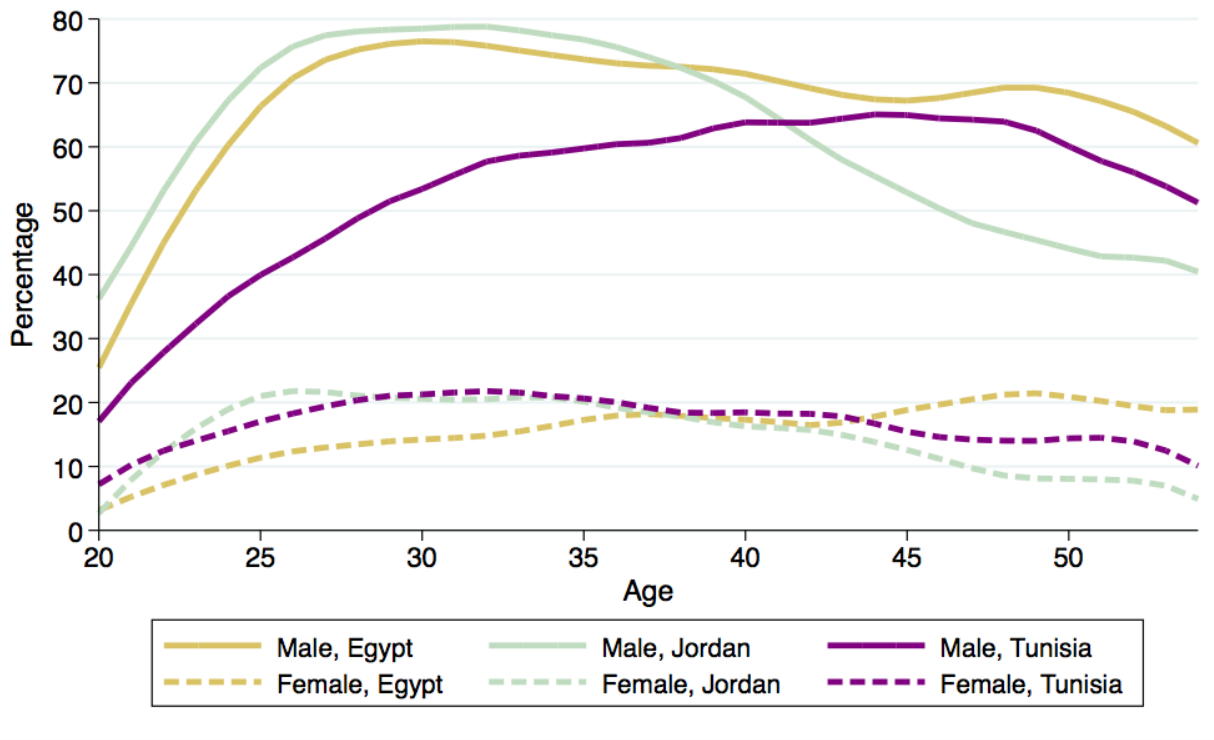
Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014
Notes: Lowess smoother with bandwidth 0.3

In Table 1, we examine wage work participation in our sample by country, sex and education level. Men's participation rises with education in Egypt, and also with some fluctuation in Jordan, but is more mixed in Tunisia. For women, participation rises with education in all three countries, with university graduates the most likely to participate, although not at the same rates as men. Interestingly, there seems to be a decrease of wage work participation for men in Jordan when going from basic education to secondary education, possibly because it is at this education level people get access to jobs with pensions and thus the early retirement we see in Figure 6. Jordanian women have the greatest increase in participation when moving from secondary education to post-secondary education, an increase of 20.4 percentage points. The increases in wage work participation by education and sex show that the patterns of selection into wage work depend on both gender and education level, selection that precludes causal interpretation of returns.

Table 1. Wage Work Participation by Country, Sex, and Education Level, Ages 20-54 (Percentages)

	Egypt		Jordan		Tunisia	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Illiterate	58.2	3.0	48.5	7.0	52.4	6.6
Read & Write	65.7	8.1	58.3	5.9	58.7	12.4
Basic Education	64.8	5.2	68.9	6.4	52.5	17.7
Secondary Education	64.9	14.2	53.9	6.5	50.9	21.9
Post-Secondary	72.7	26.4	73.9	26.9	55.5	21.4
University	74.3	41.1	71.7	44.3	44.2	34.6
Post-Graduate	86.3	64.8	81.6	73.8	49.1	48.6
Total	66.1	14.7	65.1	16.1	52.6	17.3
N	11,328	11,593	5,490	5,564	3,391	4,128

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

In Figure 7, we analyze the relationship between hourly wage and years of schooling, and the differences by sex in each country. There is an increase in wages for Jordan and Tunisia past 10 years of schooling, which signifies the completion of basic or secondary education. In Egypt, however, additional years of schooling do not have a substantial impact on wages until completion of tertiary education. There is a noticeable decrease in wages for some groups around eight years of schooling, which likely reflects individuals who drop out before completion of basic education. These are likely some of the people who flunk out of school based on their examination scores. Tunisia has the steepest slope past basic education, which indicates that the reward for additional years of education past this stage was large in comparison to Egypt, for example, in which the trend stays quite stagnant until they reach about 15 years of schooling (completion of higher education).

Figure 7. Hourly Wage by Years of Schooling, by Sex and Country, Ages 20-54
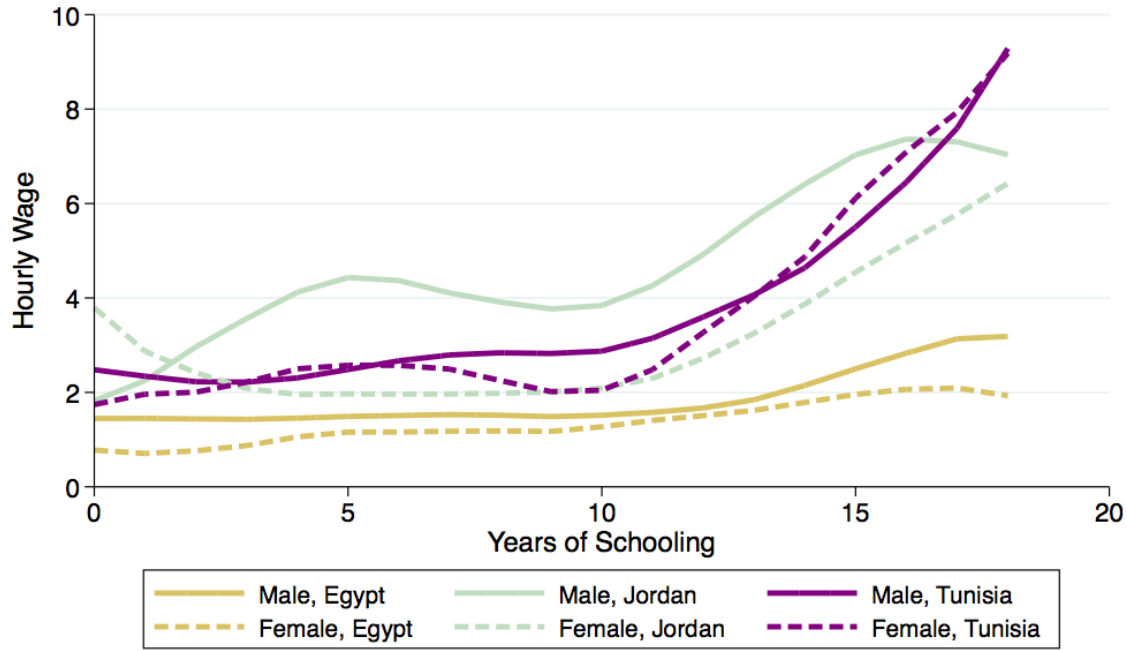
Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014
Notes: Lowess smoothed with bandwidth 0.5

In Figure 8, we analyze the relationship between hourly wage and potential experience. Potential experience does not necessarily have a positive relationship with hourly wage as seen by the flat wage-experience profile in Egypt. It must be kept in mind that those with more experience likely have less education, a relationship we untangle in the Mincer models below. Women's hourly wage in Jordan and Tunisia does not follow a clear pattern, but this fluctuation may be due to a small sample of women wage workers. Generally, potential experience does not have a clear bivariate relationship with hourly wage for individuals within these countries.

Figure 8. Hourly Wage by Potential Experience, Sex and Country, Ages 20-54

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014
Notes: Lowess smoothed with bandwidth 0.3

We turn now from years of schooling to education levels in Table 2. Egypt has the largest share of illiterate people (22 percent) between the ages of 20 and 54 when compared with Jordan (5 percent) and Tunisia (17 percent). However, Egypt also has the largest percentage of workers with a university education at nearly 17 percent. Jordan has the smallest percentage of illiterate people (5 percent) and the greatest percentage of post-graduate (2 percent) compared to Egypt and Tunisia. As for Tunisia, just over one-third (35 percent) of their workers have a basic education. When combining university and post-graduate education levels, less than 10 percent of Tunisia's workers have a higher education.

Table 2. Distribution of Education Levels by Country, Ages 20-54

	Egypt	Jordan	Tunisia
Illiterate	22.6	5.1	17.2
Read & Write	3.5	8.2	15.1
Basic Education	15.1	35.0	35.7
Secondary Education	37.4	22.9	15.0
Post-Secondary	3.6	11.9	7.3
University	16.8	15.1	8.3
Post-Graduate	0.9	1.9	1.5
Total	100.0	100.0	100.0
Number of Observations	22,921	11,054	7,625

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

In Table 3 we explore the relationship between education and the self-reported education requirements of jobs. This data is only available for Egypt and Tunisia. When individuals are overeducated, that is working at a job that requires less education than they have attained, this may reduce the returns they receive to their education (Hartog, 2000; Li, John Morgan, & Ding, 2008). Generally, men are more overeducated than women. Slightly less than half the time males are overeducated in Egypt and Tunisia, while 18% of females in Egypt and 33% of females in Tunisia are overeducated. This may be because men typically have more access to education compared to women or because women select out of work. For example, if a job does not pay enough, women will stay home because it does not make economic sense to work for a small wage given their domestic responsibilities (Hoodfar, 1997). Because men are expected to be the primary breadwinners, they are far less likely to choose not to work. Those with moderate levels of education are particularly likely to be overeducated. More than half of individuals who completed a basic education are overeducated across countries and genders (50%-80%). Those with a university degree have the smallest rate of overeducation (7%-23% across countries and genders). The majority of individuals with a post-graduate education are not using their full education in their current job.

Table 3. Percentage of People Overeducated Relative to their Job Requirements, by Level of Education, Sex and Country, Ages 20-54, Wage Workers

	Egypt		Tunisia	
	Male	**Female**	**Male**	**Female**
Education Level				
Illiterate	0.0	0.0	0.0	0.0
Read & Write	68.1	70.3	65.5	61.0
Basic Education	80.6	70.8	56.5	50.0
Secondary Education	57.4	12.7	34.7	19.4
Post-Secondary	53.3	41.7	28.5	23.8
University	23.3	9.9	11.9	6.7
Post-Graduate	83.8	77.2	48.4	74.6
Total	47.3	18.3	43.8	32.7
N	7466	1658	1654	520

Source: Authors' calculations based on ELMPS 2012, TLMPS 2014

As shown in Table 4, hourly wages increase by varying amounts for different levels of education completed. Although both Egypt and Jordan's hourly wages increase steadily with level of education, differences are fairly small. In Egypt, the greatest increase in hourly wages is from post-secondary to university going from $1.8 to $2.5. Jordan's education system has a consistent increase in wages until reaching $7.7, the hourly wage for individuals obtaining post-graduate education. Tunisia seems to have the greatest increase with additional education. Wages rise sharply past the post-secondary level; individuals who pursue a university education will almost double their hourly wage ($8.8) compared to those that stop at a post-secondary degree ($4.7).

Table 4. Mean Real Hourly Wage in 2012 PPP International Dollars by Education Level and Country

	Egypt	Jordan	Tunisia
Illiterate	1.3	2.7	2.2
Read & Write	1.5	3.4	2.6
Basic Education	1.5	3.8	2.9
Secondary Education	1.6	4.5	3.8
Post-Secondary	1.8	5.9	4.7
University	2.5	6.3	8.8
Post-Graduate	2.8	7.7	9.6
Total	1.8	4.8	3.6
N	22,921	11,054	7,625

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

4.2   Standard Mincer model

For international benchmarking purposes and to see the average return to a year of schooling, we estimate the standard Mincer model with years of schooling in Table 5. Tunisia has the greatest return to education with an 8.1% increase in wages for each additional year of school, like Jordan which has a 7.7% return, whereas Egypt has almost half as much at 4.6%. It is important to note that the global average return to education is around 10% and all three countries fall short of that mark. Part of the reason that Egypt in particular seems to have such a low return to education likely results from the fact that success in the labor force relies heavily on social networking rather than human capital (Assaad, Krafft, & Salehi-Isfahani, 2014). Assessing the power of the model, Egypt and Jordan have an R-squared of around 10% which indicates that schooling and experience explain only about 10% of wages. Tunisia's R-squared is higher than both Jordan and Egypt which shows experience and schooling explain more of wages, but that much remains unexplained.

Table 5. Standard Mincer Model ages 20-54

	Egypt	Jordan	Tunisia
Years of School	0.046***	0.077***	0.081***
	(0.002)	(0.003)	(0.004)
Experience	0.030***	0.014***	0.035***
	(0.003)	(0.004)	(0.007)
Experience^2/100	-0.032***	0.001	-0.042**
	(0.006)	(0.010)	(0.013)
Constant	-0.616***	-0.040	-0.292**
	(0.032)	(0.055)	(0.095)
N	9107	4491	1329
r2	0.093	0.111	0.210

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014
Notes: *p<0.05; **p<0.01; ***p<0.001
Standard errors in parentheses

4.3   *Mincer model with levels*

In presenting our Mincer models with levels, we present the coefficients of the model, which are the cumulative returns. We also present the marginal returns comparing a level to the preceding level. Further, we present annualized marginal returns that facilitate comparisons across levels. Table 6 presents the regression results of the Mincer model including education levels and compares countries as well as the sexes. The lowest marginal return tends to be found for read and write versus illiterate, which also is statistically insignificant.

There is a pattern of increasing returns for additional levels of education completed. University versus secondary education has the greatest marginal return with the highest being 92.8% (22.0% annually) for females in Tunisia. Jordan and Tunisia both have a majority of returns over 10% for an additional year within a level beginning at the post-secondary level. Egypt, however, does not reach returns of 10% for an additional year until essentially post-graduate education. Overall, returns are larger beginning at the post-secondary level of education and largest across countries with completion of university education. Women have greater returns than males in the higher education levels. Educated women who work are a more select group among the young (Assaad, Ghazouani, & Krafft, 2017; Assaad & Krafft, 2015a)..

Table 6. Mincer models with levels, by country and sex, ages 20-54

	Egypt Total	Egypt Female	Egypt Male	Jordan Total	Jordan Female	Jordan Male	Tunisia Total	Tunisia Female	Tunisia Male
Level of education (Illit. Omit)									
Read & Write	0.041	0.091	0.024	0.133	-0.010	0.156	0.057	-0.084	0.071
	(0.043)	(0.176)	(0.043)	(0.079)	(0.188)	(0.087)	(0.064)	(0.152)	(0.071)
Basic Education	0.130***	0.641***	0.081**	0.281***	0.139	0.276***	0.212***	0.126	0.202**
	(0.028)	(0.116)	(0.029)	(0.075)	(0.184)	(0.083)	(0.064)	(0.149)	(0.072)
Secondary Education	0.300***	0.880***	0.250***	0.404***	0.510**	0.393***	0.604***	0.676***	0.550***
	(0.025)	(0.082)	(0.026)	(0.077)	(0.186)	(0.085)	(0.079)	(0.168)	(0.090)
Post-Secondary	0.421***	1.020***	0.395***	0.558***	0.758***	0.568***	1.072***	1.275***	0.937***
	(0.039)	(0.105)	(0.043)	(0.078)	(0.175)	(0.088)	(0.100)	(0.192)	(0.121)
University	0.651***	1.319***	0.634***	0.873***	1.163***	0.849***	1.422***	1.603***	1.323***
	(0.027)	(0.086)	(0.030)	(0.077)	(0.178)	(0.087)	(0.095)	(0.175)	(0.126)
Post-Graduate	0.870***	1.654***	0.816***	1.152***	1.434***	1.129***	1.799***	1.873***	1.753***
	(0.061)	(0.125)	(0.075)	(0.093)	(0.197)	(0.107)	(0.169)	(0.300)	(0.208)
Experience	0.038***	0.036***	0.035***	0.017***	0.003	0.022***	0.051***	0.070***	0.038***
	(0.003)	(0.006)	(0.003)	(0.004)	(0.008)	(0.005)	(0.007)	(0.013)	(0.008)
Experience^2	-0.001***	-0.000	-0.000***	-0.000	0.000	-0.000**	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.527***	-1.356***	-0.419***	0.422***	0.161	0.440***	-0.109	-0.429*	0.136
	(0.034)	(0.093)	(0.037)	(0.078)	(0.176)	(0.087)	(0.096)	(0.186)	(0.116)
N	9106	1651	7455	4491	891	3600	1319	328	968
r2	0.103	0.198	0.099	0.122	0.250	0.107	0.255	0.417	0.195
Marginal Returns									
Read & Write vs. Illit.	0.041	0.091	0.024	0.133	-0.010	0.156	0.057	-0.084	0.071
Basic vs. Read & Write	0.089	0.550	0.057	0.148	0.149	0.120	0.155	0.210	0.131
Secondary vs. Basic	0.170	0.239	0.168	0.123	0.371	0.117	0.392	0.549	0.348

	Egypt Total	Egypt Female	Egypt Male	Jordan Total	Jordan Female	Jordan Male	Tunisia Total	Tunisia Female	Tunisia Male
Post-Secondary vs. Secondary	0.121	0.140	0.146	0.153	0.248	0.175	0.468	0.599	0.387
University vs. Secondary	0.351	0.439	0.385	0.469	0.653	0.456	0.818	0.928	0.774
Post-Grad vs. University	0.219	0.335	0.182	0.279	0.271	0.280	0.377	0.269	0.429
Annualized marginal returns									
Read & Write vs. Illit.	0.017	0.038	0.012	0.033	-0.002	0.042	0.014	-0.020	0.019
Basic vs. Read & Write	0.023	0.132	0.016	0.035	0.035	0.044	0.057	0.077	0.048
Secondary vs. Basic	0.041	0.059	0.040	0.051	0.152	0.025	0.080	0.109	0.073
Post-Secondary vs. Secondary	0.066	0.080	0.077	0.103	0.167	0.061	0.167	0.220	0.135
University vs. Secondary	0.091	0.115	0.098	0.131	0.184	0.098	0.182	0.212	0.166
Post-Grad vs. University	0.132	0.231	0.099	0.114	0.134	0.089	0.125	0.091	0.137

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

Notes: *p<0.05; **p<0.01; ***p<0.001

Standard errors in parentheses

Light shading in annualized marginal returns indicates return>0.05 and return<0.10

Dark shading in annualized marginal returns indicates return>0.10

Table **7** presents the Mincer regression model with levels by country and sex, splitting results by age group. Age groups are defined as "young" for those aged 20-34 and "old" for those aged 35-54. Typically, there is a greater return for the old compared to the young. Jordanian males are the exception to this pattern. Although coefficients are similar, the younger males sometimes have higher returns, including higher marginal returns to basic and secondary. This may be related to Jordan having more success in expanding labor demand in the formal sector (Assaad, 2014b). In Egypt and Tunisia, males have greater differences between age groups and this may be due to less selection into the labor force than for women. The annualized marginal returns show that overall the returns in the secondary versus university level are greater than 10% except for Egyptian males and Egyptian females in the younger age range. That returns have been falling rapidly across generations is evident in comparing across time as well as age groups in other research (Krafft, 2013; Salehi-Isfahani, Tunali, & Assaad, 2009). In addition to greater wage returns, the old group also generates a greater R-squared across all sexes and countries, indicating that education and experience have greater explanatory power in the older generation.

Table 7. Mincer models with levels, by country, age group, and sex, ages 20-54

	Egypt				Jordan				Tunisia			
	Females		**Males**		**Females**		**Males**		**Females**		**Males**	
	20-34	**35-54**	**20-34**	**35-54**	**20-34**	**35-54**	**20-34**	**35-54**	**20-34**	**35-54**	**20-34**	**35-54**
Education Level (Illit. Omit.)												
Read & Write	-0.223	0.236	-0.018	0.071	0.067	-0.022	0.127	0.155	0.235	-0.169	0.114	0.069
	(0.313)	(0.203)	(0.060)	(0.063)	(0.432)	(0.216)	(0.187)	(0.099)	(0.287)	(0.190)	(0.139)	(0.086)
Basic Education	0.450*	0.497***	-0.034	0.150**	-0.012	0.239	0.354*	0.236*	0.273	0.154	0.206	0.208*
	(0.222)	(0.147)	(0.041)	(0.047)	(0.407)	(0.237)	(0.168)	(0.099)	(0.280)	(0.205)	(0.138)	(0.092)
Secondary Education	0.399	0.996***	0.032	0.437***	0.422	0.484*	0.495**	0.311**	0.679*	0.942***	0.436**	0.686***
	(0.215)	(0.098)	(0.042)	(0.046)	(0.426)	(0.234)	(0.172)	(0.103)	(0.318)	(0.238)	(0.157)	(0.125)
Post-Secondary	0.566*	1.110***	0.170**	0.574***	0.630	0.787***	0.602***	0.559***	1.316***	1.602***	0.738***	1.279***
	(0.238)	(0.130)	(0.064)	(0.068)	(0.426)	(0.216)	(0.178)	(0.107)	(0.336)	(0.300)	(0.178)	(0.195)
University	0.794***	1.480***	0.357***	0.889***	0.986*	1.266***	0.869***	0.883***	1.637***	1.945***	1.055***	1.598***
	(0.223)	(0.107)	(0.048)	(0.052)	(0.424)	(0.223)	(0.174)	(0.108)	(0.325)	(0.295)	(0.201)	(0.185)
Post-Graduate	1.174***	1.773***	0.451***	1.084***	1.205**	1.563***	1.244***	1.048***	2.199***	0.914	1.473***	2.213***
	(0.249)	(0.188)	(0.122)	(0.104)	(0.445)	(0.251)	(0.208)	(0.133)	(0.418)	(0.724)	(0.283)	(0.340)
Potential Experience	0.035	0.049*	0.043***	0.033***	-0.001	0.007	0.008	0.019	0.070*	0.087	0.066**	0.050*
	(0.018)	(0.019)	(0.007)	(0.010)	(0.019)	(0.031)	(0.011)	(0.019)	(0.035)	(0.044)	(0.023)	(0.025)
Potential Experience^2	-0.079	-0.033	-0.124***	-0.031	0.040	0.042	0.022	-0.036	-0.099	-0.123	-0.172*	-0.066
	(0.094)	(0.037)	(0.028)	(0.018)	(0.111)	(0.062)	(0.054)	(0.035)	(0.140)	(0.072)	(0.081)	(0.040)
Constant	-0.810***	-1.674***	-0.207***	-0.639***	0.345	0.046	0.430*	0.537*	-0.544	-0.946	0.054	-0.217
	(0.218)	(0.241)	(0.058)	(0.140)	(0.410)	(0.396)	(0.172)	(0.255)	(0.344)	(0.704)	(0.196)	(0.406)
N (Observations)	815	836	4379	3076	544	347	2177	1423	168	160	348	620
R-squared	0.082	0.242	0.041	0.127	0.226	0.281	0.074	0.137	0.357	0.496	0.164	0.220
Marginal Returns												
Read & Write vs. Illit.	-0.223	0.236	-0.018	0.071	0.067	-0.022	0.127	0.155	0.235	-0.169	0.114	0.069
Basic vs. Read & Write	0.674	0.260	-0.016	0.079	-0.079	0.261	0.228	0.081	0.038	0.322	0.092	0.139
Secondary vs. Basic	-0.051	0.499	0.065	0.287	0.434	0.245	0.141	0.075	0.406	0.789	0.229	0.478
Post-Secondary vs. Secondary	0.167	0.114	0.139	0.137	0.208	0.303	0.107	0.248	0.637	0.659	0.302	0.593

	Egypt				Jordan				Tunisia			
	Females		Males		Females		Males		Females		Males	
	20-34	35-54	20-34	35-54	20-34	35-54	20-34	35-54	20-34	35-54	20-34	35-54
University vs. Secondary	0.395	0.485	0.325	0.452	0.565	0.782	0.374	0.573	0.959	1.002	0.619	0.912
Post-Grad vs. University	0.380	0.293	0.094	0.195	0.219	0.297	0.376	0.165	0.561	-1.031	0.418	0.615
Annualized marginal returns												
Read & Write vs. Illit.	-0.111	0.080	-0.010	0.035	0.021	-0.005	0.034	0.046	0.064	-0.039	0.045	0.017
Basic vs. Read & Write	0.152	0.066	-0.005	0.020	-0.012	0.067	0.038	0.021	0.013	0.125	0.032	0.051
Secondary vs. Basic	-0.013	0.116	0.015	0.065	0.157	0.137	0.053	0.040	0.080	0.159	0.046	0.106
Post-Secondary vs. Secondary	0.101	0.062	0.084	0.075	0.188	0.137	0.094	0.114	0.233	0.267	0.106	0.205
University vs. Secondary	0.106	0.123	0.086	0.115	0.178	0.183	0.115	0.133	0.226	0.212	0.140	0.183
Post-Grad vs. University	0.321	0.131	0.061	0.116	0.113	0.139	0.145	0.061	0.174	-1.336	0.254	0.122

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

Notes: *p<0.05; **p<0.01; ***p<0.001

Standard errors in parentheses

Light shading in annualized marginal returns indicates return>0.05 and return<0.10

Dark shading in annualized marginal returns indicates return>0.10

In Table 8, we analyze the Mincer model with levels by country, sex and work sector. Generally, returns to education in the public sector were greater than returns to the private sector. Results for the private sector were of mixed statistical significance and were only greater than pubic returns for some levels in Jordan. The greatest annualized marginal return for both public and private sectors was in the completion of a university education compared to only a secondary education. Egyptian males in the private sector had the lowest annualized marginal returns across the board. Notably, the returns are insignificant for less than secondary, and are at most 7.6% annually (for university vs. secondary) for males in the private sector. Tunisian females in the public sector had over 10% annualized marginal returns at nearly all levels. Females in the public sector across all countries receive the greatest return to additional levels of education completed. These consistently increasing returns may be due to the selection bias present in the participation decision for females, as well as lower levels of discrimination in the public sector (lower female-male wage gaps) (Said, 2015).

Table 8. Mincer models with levels, by country, sex, and ages 20-54

	Egypt				Jordan				Tunisia			
	Females		**Males**		**Females**		**Males**		**Females**		**Males**	
	Public	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**
Education Level (Illit. Omit)												
Read & Write	0.324	-0.025	0.266**	0.008	0.201	-0.106	0.066	0.163	-0.372	-0.028	0.094	0.075
	(0.277)	(0.257)	(0.102)	(0.047)	(0.250)	(0.291)	(0.131)	(0.119)	(0.334)	(0.157)	(0.155)	(0.074)
Basic Education	1.173***	0.344*	0.422***	0.033	0.435	-0.017	0.247	0.208	0.336	0.072	0.363*	0.159*
	(0.221)	(0.157)	(0.081)	(0.031)	(0.251)	(0.280)	(0.128)	(0.113)	(0.393)	(0.147)	(0.159)	(0.075)
Secondary Education	1.269***	0.322*	0.752***	0.145***	0.531*	0.486	0.305*	0.353**	0.849*	0.304	0.890***	0.268*
	(0.167)	(0.146)	(0.075)	(0.030)	(0.249)	(0.289)	(0.130)	(0.118)	(0.363)	(0.194)	(0.176)	(0.105)
Post-Secondary	1.398***	0.453*	0.956***	0.236***	0.798***	0.654*	0.421**	0.595***	1.398***	0.752**	1.261***	0.718***
	(0.182)	(0.223)	(0.089)	(0.058)	(0.238)	(0.277)	(0.132)	(0.126)	(0.388)	(0.253)	(0.222)	(0.147)
University	1.621***	1.021***	1.215***	0.452***	1.042***	1.201***	0.647***	0.964***	1.794***	0.818***	1.614***	0.982***
	(0.171)	(0.154)	(0.078)	(0.038)	(0.242)	(0.276)	(0.130)	(0.125)	(0.384)	(0.231)	(0.216)	(0.167)
Post-Graduate	1.958***	1.199***	1.382***	0.549***	1.228***	1.718***	0.889***	1.295***	2.180***	0.673	2.214***	0.858*
	(0.195)	(0.343)	(0.112)	(0.152)	(0.254)	(0.340)	(0.147)	(0.166)	(0.492)	(0.450)	(0.303)	(0.344)
Potential Experience	0.024**	0.039**	0.030***	0.028***	-0.005	0.006	0.019***	0.027***	0.050*	0.045**	0.055**	0.019*
	(0.008)	(0.013)	(0.006)	(0.003)	(0.009)	(0.014)	(0.005)	(0.007)	(0.024)	(0.015)	(0.017)	(0.009)
Potential Experience^2	0.000	-0.000	-0.000	-0.000***	0.000	0.000	-0.000*	-0.000*	-0.000	-0.001*	-0.001*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Constant	-1.555***	-1.075***	-0.959***	-0.244***	0.402	0.026	0.664***	0.293*	-0.270	-0.109	-0.203	0.398**
	(0.171)	(0.185)	(0.087)	(0.045)	(0.238)	(0.275)	(0.129)	(0.123)	(0.403)	(0.207)	(0.251)	(0.126)
N (Observations)	1254	397	2382	5073	507	384	1876	1724	115	213	281	675
R-squared	0.157	0.152	0.170	0.041	0.183	0.264	0.100	0.112	0.467	0.104	0.354	0.074
Marginal Returns												
Read & Write vs.	0.324	-0.025	0.266	0.008	0.201	-0.106	0.066	0.163	-0.372	-0.028	0.094	0.075

	Egypt				Jordan				Tunisia			
	Females		Males		Females		Males		Females		Males	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Education Level (Illit. Omit)												
Illit.												
Basic vs. Read & Write	0.849	0.369	0.156	0.025	0.234	0.089	0.180	0.045	0.708	0.100	0.269	0.084
Secondary vs. Basic	0.096	-0.023	0.330	0.112	0.096	0.503	0.058	0.145	0.512	0.232	0.527	0.109
Post-Secondary vs. Secondary	0.129	0.131	0.204	0.091	0.267	0.169	0.117	0.242	0.549	0.448	0.371	0.450
University vs. Secondary	0.352	0.699	0.463	0.307	0.511	0.715	0.342	0.611	0.946	0.514	0.723	0.714
Post-Grad vs. University	0.337	0.179	0.167	0.097	0.186	0.517	0.242	0.332	0.385	-0.145	0.600	-0.124
Annualized marginal returns												
Read & Write vs. Illit.	0.288	-0.009	0.225	0.004	0.073	-0.030	0.021	0.050	-0.093	-0.007	0.022	0.021
Basic vs. Read & Write	0.139	0.101	0.037	0.007	0.040	0.021	0.039	0.011	0.153	0.035	0.087	0.032
Secondary vs. Basic	0.041	-0.006	0.084	0.027	0.073	0.282	0.038	0.066	0.145	0.048	0.125	0.023
Post-Secondary vs. Secondary	0.083	0.074	0.118	0.044	0.137	0.084	0.059	0.127	0.199	0.165	0.148	0.142
University vs. Secondary	0.100	0.176	0.119	0.076	0.129	0.172	0.084	0.150	0.208	0.118	0.162	0.139
Post-Grad vs. University	0.258	0.124	0.088	0.070	0.097	0.211	0.100	0.117	0.092	-0.077	0.108	-0.071

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

Notes: *p<0.05; **p<0.01; ***p<0.001

Standard errors in parentheses

Light shading in annualized marginal returns indicates return>0.05 and return<0.10

Dark shading in annualized marginal returns indicates return>0.10

Table 9 presents the regression results for the Mincer model by level, sector, and age group. There have been decreases in returns for the younger compared to older generation in both the public and private sector in Egypt. At this point, the only level with a significant return among the young generation in Egypt is higher education (true for both the public and private sectors).[11] The lower return for Egyptians in the public sector may reflect shifting public sector pay scales and hiring practices as there has been massification of secondary education, leaving higher education as the elite degree. In the private sector, over-education is more likely to be the cause. The fall in returns to university versus secondary in Tunisia for those in the private sector is likely a result of the rapid expansion of higher education leading to its devaluation (Assaad, Ghazouani, & Krafft, 2017). Although returns have decreased slightly across generations in both the public and private sectors in Jordan, notably returns to university and secondary remain substantial and are in fact higher in the private sector within both age groups. In Egypt and Tunisia returns strongly favor the public sector, and to an increasing extent across generations For instance, while the return to university has dropped from 16.3% to 11.6% in the private sector it has risen from 17.6% to 20.3% in the public sector across generations in Tunisia.

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[11] The extremely low returns to education for the younger generation in Egypt and even insignificant returns to education have been confirmed with more rigorous methods accounting for selection (Krafft, 2013).

Table 9. Mincer models with levels, by country, sector, and age group, ages 20-54

	Egypt				Jordan				Tunisia			
	Public		**Private**		**Public**		**Private**		**Public**		**Private**	
	20-34	**34-54**	**20-34**	**34-54**	**20-34**	**34-54**	**20-34**	**34-54**	**20-34**	**34-54**	**20-34**	**34-54**
Education Level (Illit. Omit)												
Read & Write	0.196	0.296**	-0.032	0.096	-0.041	0.070	0.227	0.095	-0.054	0.056	0.228	0.053
	(0.242)	(0.102)	(0.062)	(0.076)	(0.258)	(0.132)	(0.232)	(0.128)	(0.409)	(0.150)	(0.128)	(0.084)
Basic Education	0.092	0.586***	-0.006	0.097	0.312	0.192	0.283	0.190	0.261	0.405*	0.271*	0.198*
	(0.188)	(0.085)	(0.042)	(0.056)	(0.226)	(0.136)	(0.214)	(0.128)	(0.383)	(0.164)	(0.126)	(0.089)
Secondary Education	0.138	0.951***	0.061	0.254***	0.358	0.259	0.504*	0.245	0.679	1.042***	0.459**	0.326*
	(0.187)	(0.078)	(0.043)	(0.062)	(0.229)	(0.138)	(0.223)	(0.137)	(0.428)	(0.184)	(0.147)	(0.150)
Post-Secondary	0.415*	1.044***	0.055	0.446***	0.450	0.420**	0.572*	0.548***	1.118*	1.548***	0.824***	1.107***
	(0.201)	(0.093)	(0.074)	(0.105)	(0.232)	(0.137)	(0.229)	(0.143)	(0.445)	(0.235)	(0.173)	(0.254)
University	0.491*	1.357***	0.318***	0.748***	0.669**	0.685***	0.971***	1.091***	1.559***	1.860***	0.993***	1.164***
	(0.194)	(0.082)	(0.051)	(0.082)	(0.230)	(0.137)	(0.224)	(0.154)	(0.454)	(0.222)	(0.178)	(0.267)
Post-Graduate	0.794***	1.537***	0.318*	1.441***	0.837***	0.918***	1.453***	1.270***	2.100***	2.355***	1.171***	0.599
	(0.217)	(0.112)	(0.147)	(0.354)	(0.250)	(0.150)	(0.265)	(0.207)	(0.513)	(0.371)	(0.301)	(0.658)
Potential Experience	0.055**	0.018	0.047***	0.019	0.000	0.045**	0.006	0.011	0.071	0.046	0.058**	0.050
	(0.017)	(0.012)	(0.007)	(0.015)	(0.011)	(0.017)	(0.016)	(0.029)	(0.049)	(0.029)	(0.020)	(0.031)
Potential Experience^2	-0.002*	0.000	-0.001***	-0.000	0.000	-0.001*	0.000	-0.000	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.000)
Constant	-0.438*	-1.036***	-0.269***	-0.335	0.711**	0.333	0.264	0.458	-0.185	-0.336	-0.128	-0.247
	(0.190)	(0.153)	(0.061)	(0.226)	(0.227)	(0.231)	(0.220)	(0.397)	(0.469)	(0.463)	(0.178)	(0.504)
N (Observations)	1378	2258	3816	1654	1439	944	1282	826	119	286	401	501
R-squared	0.063	0.168	0.027	0.070	0.072	0.161	0.104	0.139	0.329	0.438	0.117	0.066
Marginal Returns												
Read & Write vs. Illit.	0.196	0.296	-0.032	0.096	-0.041	0.070	0.227	0.095	-0.054	0.056	0.228	0.053
Basic vs. Read &	-0.104	0.290	0.026	0.001	0.353	0.122	0.056	0.095	0.315	0.349	0.043	0.145

	Egypt				Jordan				Tunisia			
	Public		**Private**		**Public**		**Private**		**Public**		**Private**	
	20-34	34-54	20-34	34-54	20-34	34-54	20-34	34-54	20-34	34-54	20-34	34-54
Write												
Secondary vs. Basic	0.046	0.365	0.067	0.157	0.047	0.067	0.220	0.055	0.418	0.637	0.188	0.129
Post-Secondary vs. Secondary	0.277	0.093	-0.006	0.192	0.092	0.160	0.068	0.303	0.439	0.506	0.365	0.781
University vs. Secondary	0.354	0.406	0.257	0.494	0.311	0.426	0.467	0.845	0.880	0.818	0.534	0.838
Post-Grad vs. University	0.303	0.179	0.000	0.692	0.168	0.233	0.482	0.179	0.541	0.495	0.178	-0.565
Annualized marginal returns												
Read & Write vs. Illit.	0.206	0.248	-0.015	0.036	-0.019	0.022	0.062	0.030	-0.013	0.013	0.082	0.012
Basic vs. Read & Write	-0.032	0.063	0.007	0.000	0.056	0.029	0.010	0.026	0.139	0.097	0.014	0.057
Secondary vs. Basic	0.012	0.091	0.016	0.035	0.031	0.041	0.091	0.029	0.090	0.163	0.039	0.028
Post-Secondary vs. Secondary	0.152	0.054	-0.003	0.101	0.050	0.073	0.041	0.140	0.161	0.198	0.120	0.266
University vs. Secondary	0.089	0.106	0.064	0.123	0.080	0.100	0.122	0.195	0.203	0.176	0.116	0.163
Post-Grad vs. University	0.243	0.097	0.000	0.401	0.085	0.099	0.190	0.061	0.131	0.086	0.089	-0.464

Source: Authors' calculations based on ELMPS 2012, JLMPS 2010, TLMPS 2014

Notes: *p<0.05; **p<0.01; ***p<0.001

Standard errors in parentheses

Light shading in annualized marginal returns indicates return>0.05 and return<0.10

Dark shading in annualized marginal returns indicates return>0.10

5   Discussion and Conclusions

This paper examined the returns to education in Egypt, Jordan, and Tunisia. Overall, returns were lower than global averages in all three countries and especially so in Egypt, where returns in terms of years of schooling are less than half the global average. Returns are clearly non-linear; we found that returns increased substantially starting at the post-secondary level. Generally the older generation had greater returns to education compared to the younger generation. Women have greater rates of return than men at all levels. Specifically, females in the public sector had the greatest return to additional levels of education completed. Selection into work and wage work is likely to be driving these results, as educated women who face low wages select out of the labor market. The private sector has lower returns than the public sector in Egypt and Tunisia, and to an increasing extent across generations. Egyptian males in the private sector have the lowest returns, with returns to university notably low. The increase in wages for approximately 16 years of schooling, versus remaining illiterate, was only a total of 45%. Additionally, males had greater differences between age groups, perhaps due to consistent participation in the labor force, while women who would receive low returns leave. Thus, despite increases in education, female labor force participation remains low (Assaad, Hendy, Lassasi, & Yassine, 2016).

Though our findings shed light on the relationship between wages and education, there are a number of limitations to our results. The returns, in one sense, are likely to be underestimated because they do not account for externalities. Additionally, our research examines only wage workers, which can lead to overestimation of returns. The sample includes government workers whose pay does not adequately reflect the productivity of the worker but instead how the government's salary policies take effect. All of these are common challenges with the Mincer approach (Glewwe, 1996) that preclude causal interpretations of our results. Research that works to achieve causal identification using family fixed effects from Egypt suggests that, if anything, even these low returns are a substantial over-estimate of the true causal impact of education on wages (Krafft, 2013).

Although our estimates cannot be interpreted causally, they are notably low compared to global estimates. Why are the returns to education in the region so persistently low? One possible explanation is the unique evolution of the supply and demand for skilled workers in the MENA region. Essentially, the supply of educated workers has expanded rapidly while the demand for educated workers has remained relatively stagnant in the region. Consider a simple model of the labor market, portrayed in Figure 9, with two types of work, "educated" (a) and "uneducated" (b) labor. From time 1 to time 2 the supply of educated labor increases much more rapidly than uneducated labor, but because the structure of the economy is essentially unchanged, demand for both educated and uneducated workers shifts to a similar extent. As a result, while wages for uneducated workers remain relatively constant, wages for educated workers fall substantially, reducing the return to education.

The MENA region experienced extremely rapid increases in access to education, with Egypt, Jordan, and Tunisia among the top 20 countries for growth in years of schooling from 1980-2010 (Campante & Chor, 2012). In other contexts, shifts in the supply of skilled labor have been shown to depress the returns to education (Manacorda, Sanchez-Paramo, & Schady, 2010; Pritchett, 2001). However, increases in education and thus the supply of skilled workers do not necessarily mean that wages must fall. In fact, the returns to education can continue to rise even

as education expands. The change in returns to education depends on labor demand, and especially whether increases in demand for educated (skilled) labor fall behind, keep pace with, or outpace shifts in supply (Birdsall, Ross, & Sabot, 1995). Skill-biased technological change, where production shifts towards increasingly skilled labor, could potentially lead to the increasing returns even during education expansions (Acemoglu & Autor, 2011).

However, in the countries we examine it appears that supply of educated labor has outpaced demand. Egypt in particular appears to be struggling with declining returns to education due to increases in educated labor without commensurate increases in the demand for educated labor (Assaad & Krafft, 2015a, 2015c). Essentially, as access to education increases, in the absence of increases in the demand for educated labor, education becomes increasingly devalued. This problem of over-education has occurred in other countries in the region, such as the West Bank and Gaza (Angrist, 1995), as well as in other regions, such as China (Li, John Morgan, & Ding, 2008).

Figure 9. Labor Supply and Demand with Rapid Education Expansion
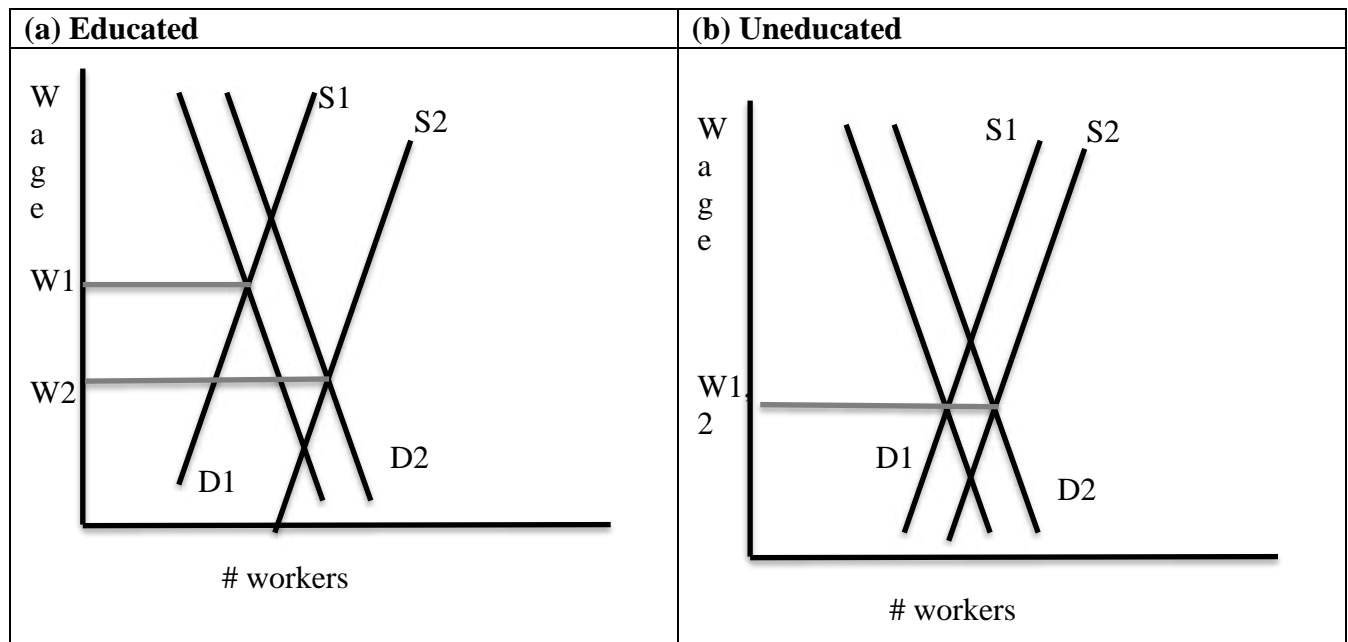
Given the low (and declining) returns observed in the region, what actions should policy makers take? First and foremost, there should be an adjustment in the education investment strategy. Further expansion of education, in the absence of changes to education's relevance and labor demand, will only generate lower returns. Instead of working to expand education systems there should be a shift in focus to improving the quality of education, and particularly its relevance to the labor market. At the same time as they are over-educated, youth in MENA lack both the hard and soft skills sought by employers (World Bank, 2013). It is important to note that shifting the skills conferred by the education system will only improve returns to the extent that there is unmet labor demand for those skills. While employers' complaints suggest some unmet demand, the extensiveness of this demand—and payoffs to these skills—are important empirical questions for future research.

Inasmuch as learning is a constraint, improvements in education quality may pay off in the labor market. Changing pedagogy, including such practices as targeted remedial education, student tracking, reading-intensive teaching, and teacher training (which is particularly beneficial when combined with other pedagogy changes) have been demonstrated as effective strategies globally for improving learning in developing countries (Evans & Popova, 2015; Glewwe & Muralidharan, 2015; Kerwin & Thornton, 2015; Popova, Evans, & Arancibia, 2016). While appropriate implementation and evaluation in the MENA context is critical, these alternative investment strategies within the school system should be investigated.

Additionally, the school system as the primary source of human capital should be reconsidered. The human capital accumulation route that individuals take could be reframed to include alternative paths and incorporate more prominently the paths that will provide the greatest returns. For example, apprenticeships may be a better investment than secondary education (as has been demonstrated in Egypt (Krafft, 2013)) to help match individuals with the proper training for a position with labor demand in the work force. Internships are an equivalent model for professional occupations. Both internships and apprenticeships may not only increase human capital but also deal with serious information problems in the school-to-work transition. The lack of information provided by academic credentials and the key role of social networks in employment (Assaad, Krafft, & Salehi-Isfahani, 2014) might be overcome by internships and apprenticeships. Likewise, the clear labor demand inherent in internships and apprenticeships overcomes education-employer disconnects, where education systems are not providing the "right" human capital.

Traditional active labor market policies, typically targeting the unemployed, are less likely to be effective (Krafft & Assaad, 2015). For instance, soft-skills training and wage subsidies have been ineffective at generating youth employment in Jordan (Groh, Krishnan, McKenzie, & Vishwanath, 2012). Similar results have been found for vocational training programs for the unemployed in Turkey (Hirshleifer, McKenzie, Almeida, & Ridao-Cano, 2014).

In addition to reforms within education, countries need to undertake labor market reforms so that there is an increased demand for skilled workers. The role of the public sector as a primary employer historically (and in some cases, still today) of the educated continues to distort labor markets and encourage students to invest in credentials rather than skills (Assaad, Krafft, & Salehi-Isfahani, 2014; Assaad, 1997; Barsoum, 2014, 2017; Salehi-Isfahani, 2012). Public and private sector wages and benefits should be more closely matched so as to allow a more efficient distribution of workers to both sectors. It is notable that Jordan, which has made relatively more progress in increasing the dynamism of the private sector (Assaad, 2014b), is also where private sector returns are relatively higher and have remained so across generations. Policies that support the growth of private sector enterprises and in particular policies that increase competition in contexts with corruption and "crony capitalism" depressing job creation may also increase the demand for educated labor (Diwan & Haidar, 2016; Diwan, Keefer, & Schiffbauer, 2014; Rijkers, Arouri, Freund, & Nucifora, 2014).

Lastly, policies could improve overall equity in education so as to ensure that there is fair access to the higher levels with high returns. While school entry is very close to universal among children in all three countries, in terms of finishing basic education, accessing secondary education, and especially attaining higher education there are substantial inequalities (Assaad, Salehi-Isfahani, & Hendy, 2014; Krafft & Alawode, 2016). Because returns increase with increasing levels of education (and are especially high in the public sector and higher education), inequality in education contributes to individual and inter-generational economic inequalities

(Assaad, Krafft, Roemer, & Salehi-Isfahani, 2016a, 2016b; Assaad & Krafft, 2014). Research on inequality suggests that the education system and its policies can play an important role in exacerbating or reducing inequality, with pre-primary education being the most effective policy for inequality reduction (Checchi & van de Werfhorst, 2014); pre-primary is thus one (neglected) area (El-Kogali & Krafft, 2015) where additional expansion, particularly targeted expansion, might be warranted on both efficiency (Krafft, 2015) and equity grounds.

The ongoing challenge of low and declining returns to education in MENA is tied into a number of other education system and labor market challenges. It is unlikely that any single policy or intervention will reverse these trends. An important area for future research is identifying which interventions are working to improve learning, better match labor supply to labor demand, and reduce inequality. However, an even more important area for research may be understanding the complementarities between different interventions. For instance, improving pedagogy when the curriculum remains irrelevant to the labor market is unlikely to lead to higher returns to education. Research that identifies not simply *if* an intervention works, but *when* an intervention works is therefore critically important.

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