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AFFECT LABOR MARKET OUTCOMES?
A COMPARISON OF EGYPT AND JORDAN**

**Ragui Assaad, Caroline Krafft,
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Working Paper No. 826



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Abstract

In Egypt and Jordan there is a substantial mismatch between the output of the higher education system and the needs of labor market. Both demand and supply-side factors could be driving this mismatch. This paper tests a key supply-side issue, whether differences in institutional structures and incentives in higher education affect students' employability. Specifically, does the stronger alignment of incentives in private, as compared to public, higher education generate more employable human capital and better labor market outcomes? The analysis examines the impact of higher education type on numerous outcomes, while controlling for pre-enrollment characteristics. The results demonstrate that supply-side issues and incentives have little impact on labor market outcomes. Family background plays by far the largest role in labor market success. Proposed reforms to higher education often suggest increasing the role of the private sector. Our findings indicate that this approach is unlikely to improve labor market outcomes.

JEL Classifications: I23, H4, J2, J31, J64, J62

Keywords: Higher education, Private education, Incentives, Labor markets, Egypt, Jordan, Middle East and North Africa

ملخص

يوجد في كل من مصر والأردن عدم تطابق كبير بين مخرجات نظام التعليم العالي واحتياجات سوق العمل. وقد تكون عوامل الطلب و جانب العرض هي العوامل التي تقود هذا التفاوت. تختبر هذه الورقة مسألة أساسية من جانب العرض، وهي ما إذا كانت الاختلافات في الهياكل المؤسسية والحوافز في التعليم العالي تؤثر على توظيف الطلاب. وعلى وجه التحديد، هل تستطيع المحاذاة الأقوى من الحوافز في القطاع الخاص، بالمقارنة مع العام، والتعليم العالي أن تولد رأس مال بشري أكثر قابلية للتوظيف و نتائج أفضل في سوق العمل؟ يتناول التحليل أثر نوع التعليم العالي على نتائج عديدة، وذلك بتثبيت خصائص مرحلة ما قبل الالتحاق. تثبت النتائج أن القضايا المتعلقة بجانب العرض والحوافز لها تأثير يذكر على نتائج سوق العمل. الخلفية العائلية تلعب حتى الآن دوراً أكبر في نجاح سوق العمل. الإصلاحات المقترحة على التعليم العالي في كثير من الأحيان تشير إلى زيادة دور القطاع الخاص. النتائج التي توصلنا إليها تشير إلى أن هذا النهج هو المرجح لتحسين نتائج سوق العمل.

1. Introduction

High unemployment among higher education graduates in Egypt and Jordan is a sign of the potential mismatch between the output of higher education system and the needs of labor market (Assaad & Krafft 2013a; Mryyan 2012). This kind of mismatch is either due to a labor market that fails to send the appropriate signals to those making educational investments or to an education system that is failing to respond adequately to labor market signals and thus produces the wrong kinds of human capital. Errors in the production or allocation of human capital are extremely costly, since human capital is one of the longest-lived assets in the economy, with an average lifetime of over forty years.

In this paper we examine whether differences in institutional structures and incentives in higher education affect labor market outcomes after controlling for pre-enrollment characteristics, such as family background, basic and secondary school experiences, secondary school performance, region of residence and other background characteristics. We focus on the production of human capital in two specific fields of higher education, namely business and information technology in both Egypt and Jordan. The effectiveness of labor market signals is more observable in these fields than in, say, humanities and the social sciences because they are more closely oriented toward the needs of the labor market. This is also reflected in the relatively high share of private higher education in these fields. The labor market outcomes we examine are wages in the first job, wage growth, wages five years after graduation, time to first job and time to first formal job.

A starting point for understanding the state of education in the Middle East and North Africa (MENA) is the World Bank flagship report on education in MENA, “The Road Not Travelled: Education Reform in the Middle East and North Africa.” As the report notes, a great deal of attention is paid in education reform to “engineering” type reforms, which focus on inputs, such as the quantity and quality of classrooms, teachers, and textbooks (World Bank 2008). Little attention has been paid to reforming the incentives or accountability of educators and educational institutions (World Bank 2008). A recent study of higher education finance in the Arab World identified the financing of higher education as a possible reason for the unsatisfactory performance of higher education institutions (Fahim & Sami 2010; Kanaan et al. 2010).

There is a pressing need to improve the quality of higher education in Egypt and Jordan, especially for higher education institutions to better prepare graduates for the labor market. The expansion of private higher education is often advocated as an important part of improving quality and labor market outcomes (Fahim & Sami 2010; Kanaan et al. 2010; OECD & World Bank 2010). This paper explores whether private higher education does, in fact, improve labor market outcomes. By controlling for pre-enrollment characteristics, we correct for selection into private versus public programs and also consider the selectivity of the higher education institutions in the two chosen fields of study. Ultimately, we find that the characteristics of higher education institutions do not matter much for labor market outcomes; enrollment in private institutions does not cause better (or worse) labor market outcomes. We find instead that labor market outcomes, even among the select group of higher education graduates in these two fields, are primarily driven by ascriptive characteristics such as gender, family background and place of residence, and, in some cases, by the type of secondary school the individual graduates from and his/her performance at the secondary level. This negative result suggests that labor markets function poorly and are unable to distinguish differences in quality among higher education graduates and must rely instead on more easily observed attributes that may or may

not be correlated with worker quality. With poor signals emanating from the labor market, neither public nor private institutions are able to adequately respond to labor market needs.

2. Conceptual Framework

While education is about the development of the individual for multiple roles in society, education is also about skill formation and future employment. If the labor market and education system are functioning optimally, the labor market would send correct signals to higher education institutions, prospective students and their families about what skills are rewarded and these signals would influence their choices about the kinds of education to invest in. If higher education institutions and the various agents within them have the right reward systems, they would have an incentive to respond to these signals. They would do this by designing curricula and delivering instruction in such a way as to maximize the employment potential of their students.

How do incentives work in higher education systems? A basic assumption of this work is that students and their parents get labor market signals and act in their own self-interest. To attract good students and maintain their reputation, higher education institutions have an incentive to respond to these signals by designing their curriculum and delivering instruction in such a way as to maximize the employment potential of their students. The alignment of incentives for private higher education institutions should be stronger, because they rely on tuition to fund their operations and must therefore satisfy their clients. Even non-profit private higher education institutions must do that to the extent that tuition is an important part of their revenue structure and to the extent that their donors impose the right set of objectives on them. Public higher education institutions could also have such incentives if a significant part of their revenues either comes from tuition or is contingent on the labor market performance of their students.

The situation in MENA is quite different from this ideal. MENA public universities developed at a time when the primary demand for their graduates was in the civil service. Free public education was extended to all levels of education, including higher education, as part of the social contract. One implication of this is that because the students do not pay tuition, the signals that they and their families might send to higher education institutions about their preferences are significantly attenuated. Since enrollment in public higher education is strongly rationed, higher education institutions may not have an incentive to tailor their programs to student preferences and needs. A history of government as the primary employer of their graduates, and the emphasis in government hiring on credentials rather than skills, has lead public higher education institutions to focus on the production of credentials rather than the mix of skills demanded in a competitive private-sector-led economy.

The common and justified view that education in the region relies more on rote memorization than analytical and problem-solving skills (OECD & World Bank 2010) derives from this emphasis on the production of credentials at the expense of productive skills. During the period of state-led development, this system served its purposes by supplying formally qualified cadres of civil servants to lead the development process.¹

As the economies of the region moved beyond the phase of state-led development to a more market-oriented model, the demand for educated labor became more diverse, with skills playing

¹ This dynamic was common throughout the MENA region and is sometimes referred to as the credentialist equilibrium (Salehi-Isfahani 2012).

an increasingly important role. In contrast to public employers, private employers place much greater emphasis on productive skills, both cognitive and non-cognitive, than on credentials. However, public higher education institutions were ill-equipped to respond to the changing signals emanating from the labor market. With the bulk of private sector employers being small and informal, they were in a weak position to compete with the government in signaling to higher education institutions, students, and their parents their demand for skills. The problem that this research is concerned with is to understand the inertia in the response of the higher education system to the changing employment landscape and to identify whether private higher education could increase the responsiveness of higher education institutions to this new landscape.

Some obvious reasons for the inertia come to mind. First, the financing of public higher education relies almost entirely on central budget allocations that are not responsive to market forces.² Second, the strong preferences of students and their families for public sector jobs, as surveys indicate, continue to drive the demand for credentials (Assaad 2013). To some extent this is a function of the anemic growth of the formal private sector and the inability of existing private sector employers to send clear signals about the type of skills they reward. Third, the compensation and promotion practices of higher education institutions do not reward good learning outcomes or responsiveness to students or employers' needs.

In this paper, we examine the hypothesis that observed labor market mismatches for graduates are due, at least in part, to a misalignment between the incentives of public higher education institutions (and agents within them) as producers of human capital and the signals emanating from the labor market. The misalignment is a legacy of the historical role of public universities as producers of credentials for public sector employment in both Egypt and Jordan, the result of institutional path dependency. One alternative hypothesis is that the labor market is sending the wrong signals due to the dominance of the public sector and the weakness of the private sector, especially for educated graduates. Students and their parents still have strong preference for public sector employment, which continues to drive the demand for credentials rather than skills. Higher education institutions are simply supplying what students and their parents want—credentials—rather than skills that will generate returns in the private sector. It may also be the case that dysfunctions in the labor market are such that the returns even in the private sector to productivity and skills are low or non-existent, making the content of higher education irrelevant in comparison to the credential.

Both demand and supply side explanations are possible for poor higher education institution performance. On the demand side, the problem is that the wrong signals are received from the labor market due to its structure. Students therefore demand credentials rather than skills. On the supply side, the financing of public higher education relies almost entirely on centralized budget allocations, which are not at all responsive to market forces. Additionally, compensation and promotion practices within higher education institutions have little relationship with the higher education institutions' overall performance.

Whether demand or supply side factors are driving mismatches can be tested, and testing that question is the focus of this paper. If the problem is on the demand side, that is, agents are acting on the wrong signals, there would be no difference in the performance of public and private higher education institutions. Both would be delivering the credentials that students and their

² For more information on the structure, governance, and financing of higher education institutions in Egypt and Jordan, see Barsoum and Mryyan (2014) and Barsoum (2014).

parents desire. If the problem is on the supply side—that is, if public higher education institutions have the wrong incentive structures, but private higher education institutions have good incentive structures—then we expect to see significant differences in the labor market performance of graduates from public and private higher education institutions. This is the core focus of our paper—identifying the causal effect of private versus public ownership of higher education institutions on the labor market performance of graduates. Identifying this causal effect will require addressing the problem of selection—that students select into private versus public higher education based on different characteristics, which would also affect labor market outcomes. In this study we benefit from information on a host of individual characteristics, including family background and test scores from before higher education.

3. Data

3.1 Sample

In order to assess how incentives in higher education affect labor market outcomes, we undertake two case studies, of Egypt and Jordan. To reduce the potential differences (heterogeneity) between students, we limit the focus of the study to two fields in which private higher education institutions are strongly represented: commerce (business) and information technology (IT). Our target population is individuals between the ages of 25 and 40 in 2012 who (1) graduated from the two specified fields of study from a four-year higher education institution, (2) have ever worked, (3) live in urban areas. The sources of our sample are the Labor Force Sample Survey in Egypt, and in Jordan the Employment and Unemployment Survey and Household Income and Expenditure Survey. In the field, return visits were made to individuals who met the criteria from the sample sources. A detailed questionnaire asked about education and labor market trajectories, along with individuals' family background. The sample sizes collected were 1,710 in Egypt and 1,539 in Jordan. We exclude those individuals in Egypt who went on to post-graduate education (as this might affect their labor market outcomes) and those in Jordan who attended higher education institutions outside of Jordan or who are not Jordanians. Our final sample sizes are 1,616 for Egypt and 1,418 for Jordan.

3.2 Outcome Variables

We examine five different labor market outcomes: the time to first job, time to first formal job, wage in first job, annual percent change in wage, and the wage five years after graduation. The time to first job is in months from graduation, and is net of time out of the labor force or military service. If individuals immediately obtained their first job upon graduation, this is treated as one month, as is a transition from out of the labor force into employment. We expect that characteristics of higher education institutions will affect the time to first job, and that, generally, 'better' institutions will create shorter times to first job. However, it is also possible that individuals from 'better' institutions will also queue for 'better' jobs, therefore lengthening their time to first job.

The time to first formal job is specified similarly to time to first job; it is the time in months from graduation to a formal job, net of time out of the labor force or military service. If individuals immediately obtained their first formal job after graduation, this is treated as one month, as is a transition from out of the labor force into a formal job. If individuals have yet to obtain a formal job, then they are 'right censored,' and this is accounted for by using survival analysis methods. Formal jobs are defined as those with contracts and/or social insurance coverage. If an individual obtained a contract or social insurance coverage during, but not at the start of the job, we still treat the start time of the job as the time of a formal job, since it is a job that became formal, and

because most individuals did not know when they obtained their contract or social security if it was not at the start of the job. As with the time to first job, we expect that ‘better’ institutions will reduce the time to first formal job.

Wages in the first job (after higher education) are calculated in real, local currency terms based on each country’s CPI. Wages are expressed on a per month basis. The units for Egypt are the Egyptian Pound (LE) and, for Jordan, the Jordanian Dinar (JD). For multivariate models, we transform wages in the first job into natural log form, which reduces the influence of outliers and allows us to interpret the effect of covariates as a percent change in wages. We expect higher education institutions with stronger incentives and better characteristics to result in higher initial wages for their graduates, everything else held constant.

We also calculate the annual rate of change in wages (in percentage terms). This is done based on the (real) wages at the start of the first job and the (real) wages at the end of the final or current job. The annual rate of change is calculated as the natural logarithm of the ratio of the ending and starting wage divided by the total time in wage work. We calculate this only for individuals who spent at least one year in wage work. We expect higher education institutions with stronger incentives and better characteristics to cause higher annual wage growth in their graduates.

Wages five years after graduation are an important measure of the long-term impact of education on labor market outcomes. These wages are the monthly salary, in real terms, based on each country’s CPI. These are calculated five years from graduation regardless of whether or not an individual spent five years in the labor market. They are only available for individuals who have been out of higher education for at least five years, and who are in wage work five years from graduation. We use linear interpolation between starting and ending salaries if five years after graduation is in the middle of a position. We expect higher education institutions with stronger incentives and better characteristics to result in higher wages five years after graduation for their graduates.

These outcomes represent a wide variety of labor market outcomes, which we expect will all be shaped by the higher education institutions that individuals attended. The incentives (private vs. public), selectivity of the institution, specialization (IT vs. commerce), and the pedagogical and accountability processes of each institution should affect the labor market prospects of their graduates.

3.3 Covariates

We use a detailed set of covariates on the demographics of individuals, their family background (including father’s and mother’s education and father’s employment status and occupation), schooling characteristics prior to the higher education level, and secondary school performance (including test scores during secondary, which serve as admission scores for higher education) to control for variables that might confound identification of the impact of higher education institutions on labor market outcomes. We also examine a variety of different characteristics of higher education institutions that we expect to impact graduates’ labor market outcomes, including whether they are public or private, their specialization, their selectivity, and a number of factors describing the educational process within them. Whether higher education institutions were public or private was identified based on the name of the institution, as individual responses were sometimes contradictory. We expect that private higher education institutions, which will have stronger incentives, will induce better labor market outcomes in their graduates.

The specialization was specified as either commerce or information technology (IT). The selectivity of the institution was determined within each type (public or private and commerce or IT) based on how the minimum admission scores obtained from the placement office of each country for that institution compared to those of other institutions of the same type. Institutions with scores that were at the 75th percentile or greater for their type were coded as selective. For some private institutions, the 75th percentile was the same as the lowest admission score, so the next highest score was used instead as a cutoff. We also expect that graduating from a more selective institution will result in better labor market outcomes.

A number of processes that occur within higher education institutions may affect labor market outcomes, including those related to pedagogy and accountability, as well as other processes captured by students' perceptions of quality. The survey data included a number of questions on pedagogy, accountability, and student perceptions. We reduced these sets of questions into three continuous, standardized variables using factor analysis, a data reduction technique. See Assaad et al. (2014) for information on these factors, which we refer to as the pedagogy, accountability, and perception factors. We expect that higher values of these factors (i.e. greater accountability, better pedagogy, higher perceived quality) will result in better labor market outcomes.

4. Methods

4.1 Regressions

In attempting to identify the effect of different higher education institution characteristics on labor market outcomes, we cannot simply compare those who attended public institutions with those who attended private institutions. Different individuals will select into these different types of institutions. For instance, those with lower secondary test scores—which may indicate lower innate ability—may not have the scores for public institutions, and select into private institutions. They may obtain lower wages in the labor market afterwards—but we could not say if this was because of the type of institution they attended, or lower innate ability. Likewise, those with wealthier families may select into private institutions because they can afford to pay the tuition. Their labor market outcomes may be a function of their socio-economic status rather than the institution they attended. To address these problems of selection, when estimating the impact of higher education institutional features on labor market outcomes, we control for a wide variety of individual characteristics determined prior to enrolling in higher education. These are the 'pre-treatment' characteristics since we are considering the type of higher education institution as the 'treatment.' The controls we include are the individual's gender, his/her basic education experience, his/her secondary education experience and specialization, his/her secondary performance, his/her father's and mother's educations, his/her father's employment status and occupation, the home environment when he/she was fifteen years of age, his/her parents' age at birth, and where he/she currently lives.

4.2 Survival Analysis Methods

One of the outcomes, time to first formal job, is 'right censored' for individuals who have never obtained a formal job. We therefore have to use special methods, survival analysis (also called duration analysis or time-to-event modeling) to calculate the impact of covariates on this outcome. In order to describe the time to first formal job before accounting for covariates, we use the Kaplan-Meier estimator, which accounts for right censoring, and allows us to state the time at which various proportions (25%, 50%, 75%) of our sample obtains their first formal job. For the multivariate models, we use the Cox proportional hazard model, which can account for right censoring while estimating the impact of covariates on the time to first formal job. We present

‘hazard ratios’ from this model, which are deviations from 1. Hazard ratios greater than 1 indicate a greater hazard, i.e. a greater probability of obtaining a first formal job at any given month. Hazard ratios less than 1 indicate lower hazards, i.e. a lower probability of obtaining a first formal job at any given month. Standard errors are also presented, and can be used to estimate statistical significance in terms of deviations from 1. See Moeschberger and Klein (2003) for additional information on these survival analysis techniques.

4.3 Propensity Score Matching

As well as using regression methods to control for covariates that might also affect labor market outcomes, and confound the effects of higher education institutions, we use propensity score matching to correct for selection into the various ‘treatments’ of higher education institutions. Propensity score matching matches on observable pre-treatment characteristics to compare those who, for instance, attended a private higher education institution (the ‘treatment’) to those who attended a public institution (the ‘control’), but have otherwise similar characteristics. Propensity score matching is recognized as an effective technique for addressing selection, but to assume that it fully corrects for selection, one has to assume that all selection is on observable characteristics (Becker & Ichino 2002; Rosenbaum & Rubin 1983).³ Given our rich set of pre-treatment covariates, we believe that we can account for much of selection.

Propensity score matching proceeds in two steps. First, ‘propensity scores’ are estimated for each of the different treatments, that is a private institution (versus public) or a selective institution (versus a non-selective institution). Propensity scores are estimated using a probit model for the probability of treatment based on pre-treatment characteristics, and the predicted probabilities are the propensity scores. These are estimated for the universe of each outcome variable, due to the somewhat different universes that are associated with different outcome variables, and separately for each country. Individuals are then ‘matched’ based on similar propensity scores, and treatment effects calculated for those matches. There are a variety of different matching methods that can be used after estimating the propensity score; we use the Epanechnikov kernel with a caliper, and require common support.

5. Results

5.1 Sample Descriptives

A rich set of covariates are used to control for variables that might confound the impact of higher education incentives, and in estimating the propensity score. Table 9 (in the Appendix) presents the characteristics of the sample for Egypt as proportions, including broken down by specialization and public versus private higher education, our main treatment of interest. Around a quarter of the sample in Egypt is female, with more women in commerce than IT. Individuals who attended private higher education were more likely to attend private school in the earlier years. While science students are over-represented in public institutions, arts and technical IT students are over-represented in private institutions. IT students tended to have better early home and parental environments. Public higher education students had higher secondary grades than private students. In higher education, most students were instructed in Arabic, but some were instructed in English or a mix of Arabic and English.

Table 10 (in the Appendix) presents similar data for Jordan. Around a third of the sample in Jordan is female, with more women in IT than commerce. Individuals who attended private

³ We estimate propensity scores using the `pscore` command in STATA, and use `psmatch2` for matching.

higher education were more likely to attend private school in the earlier years. While science students are over-represented in IT, within specializations there are few differences by type of secondary school. IT students tended to have better early home and parental environments. Public higher education students had higher secondary grades than students in private higher education. In higher education, most students were instructed in a mix of Arabic and English, but some were taught exclusively in Arabic or English.

Table 1 breaks down the sample into the different possible combinations of ‘treatments’ (public/private, commerce/IT and non-selective/selective) in Egypt and Jordan. In Egypt, overall, a third of students attended private higher education. Only a fifth of students were in IT. Since the selectivity was calculated on a higher education institution level at the 75th percentile, varying shares of students attended selective programs. Almost a third of the sample in Egypt (32.6%) is from public, non-selective commerce programs. Nearly a third (30.2%) of the sample is from a public, selective commerce program. Private commerce totals 15.9% of students, with one-third of these students (5.2% of all students) in non-selective and two-thirds in selective programs (10.7% of all students). IT programs were predominantly private programs. While 14.9% of the sample attended private, non-selective IT programs and 3.2% of the sample attended private selective IT programs, only 2.2% of the sample attended public, non-selective IT programs and 1.1% public selective IT programs.

In Jordan, 44.1% of students attended private higher education. Only a third of students were in IT. Since the selectivity was calculated on a higher education institution level at the 75th percentile, varying shares of students attended selective programs. Around a quarter of the sample attended public, non-selective commerce (23.2%) and a quarter (28.8%) attended private, non-selective commerce programs. Non-selective public IT programs (12.1%) and private, non-selective IT programs (11.6%) were also common. A sizeable share (14.3%) of the sample was from selective public commerce programs, but only 2.2% from selective private commerce programs. While public selective IT programs were a small share (6.6%) of the sample, private selective IT programs were an even smaller share, just 1.1%.

We examine a wide variety of labor market outcomes. Table 2 presents summary statistics for these outcomes, broken down by the different possible treatment combinations. In Egypt, the average time to a first job was around 7 months; students from selective IT programs, especially public programs, took longer on average, as did individuals from public, non-selective commerce. Students from public but non-selective IT had the shortest average time to a first job, around 3 months. In Jordan, the average time to a first job was around 9 months. Students from selective commerce institutions, especially private ones, took the longest. Public non-selective IT programs also had above average durations, more than 10 months. Durations were particularly short for private IT programs, which may indicate that these programs are particularly effective in preparing students for the labor market.

In terms of the time to first formal job, we present the 25th percentile and median from the Kaplan-Meier estimator, which accounts for the fact that many respondents never obtained a first formal job. In Egypt, 25% of the sample obtained a first formal job after 7 months in the labor market, and 50% after 72 months (six years). A quarter of students in selective commerce programs obtained formal jobs immediately following graduation, and had median times to first formal jobs that were below the overall median. Less than half of private, non-selective students in both commerce and IT ever obtained formal jobs, and had a longer span at the 25th percentile as well. Although public selective IT students had a long duration at the 25th percentile, 50% of

students obtained first formal jobs in less than six years. Private selective IT students took longer at both the 25th percentile and median, but more than half did obtain jobs after 8.5 years. Overall, if we take formal jobs as ‘good’ jobs, private, non-selective programs performed the worst in terms of graduates obtaining good jobs in Egypt. In Jordan, for all the program types, more than 25% of graduates immediately obtained formal jobs. The overall median was six months for the time to first formal job. Private, non-selective commerce, along with both public and private selective IT also immediately placed more than half of their graduates in formal jobs. Selective commerce programs had the longest median time to first formal job.

Although we use log wages in our regressions, we present real mean wages for the first job below. On average, monthly wages are 1,057 LE in Egypt for the sample.⁴ While private selective IT, public and private non-selective commerce, and public non-selective IT earn below average wages, private non-selective IT, private selective commerce, and public selective IT students receive substantially higher wages in their first job in Egypt. In Jordan, average wages are 342 JD per month in the first job. There are only minor differences in first wages by type of institution; those for public, non-selective IT are particularly low.

Wage growth is also of interest, since it may reflect information employers obtain during employment about skills and productivity. In Egypt, average annual real wage growth was 8.1%. Private, non-selective commerce students had particularly low wage growth while private, selective commerce students and public, non-selective IT students had relatively high wage growth. In Jordan, average real wage growth was 6.7% in the sample. Public, non-selective IT students and private selective commerce students had the highest wage growth. Overall, there do not appear to be clear patterns in terms of wage growth and type of higher education attended.

Although wages in the first job and annual wage growth are of interest, we are particularly interested in wages five years after graduation, which are more likely to represent long term labor market prospects. In Egypt, five years after graduation average wages were 1,774 LE per month. Private, non-selective IT students had particularly high wages (2,341 LE per month), while public selective IT students had particularly low wages (1,347 LE per month), although there is a small sample for this group. In Jordan, average monthly wages after five years were 561 JD. Private non-selective commerce students earned the most, 649 JD, while private selective commerce students earned the least, 347 JD per month. As with wage growth, there is not a clear relationship between type of institution and wages after five years. Looking across outcomes, in both Egypt and Jordan, there are not clear, consistent, or substantial benefits to certain types of higher education. However, students are selecting into these different specializations in non-random ways, and this needs to be accounted for before drawing conclusions on the effects of different types of higher education on labor market outcomes.

Although there are not substantial differences observed in outcomes by different higher education types, this may be due to selection into different higher education types canceling out the effects of the types. Employers, and wages, may also be responding to different, heterogeneous features of employees, such as their innate ability and productivity. We examine this possibility in Figure 1, which examines wages by secondary test scores for our sample of graduates, showing the scatter of scores and wages, and a linear fit line.⁵ We would expect that if employers were responding to ability or productivity, as measured by secondary test scores, there

⁴ In 2012, 6.06 LE= 1 U.S. Dollar and 0.71 JD= 1 U.S. Dollar (World Bank 2013)

⁵ A median spline was tested, but did not show substantively different results.

would be a clear increase in wages at higher test scores. We do not observe any such pattern. In Egypt, in first jobs, those with higher test scores actually have very slightly lower wages. In Jordan, in first jobs, those with higher test scores have slightly higher wages, but this pattern essentially disappears for wages after five years, which are unrelated to test scores in Jordan. In Egypt, wages very weakly increase with higher test scores after five years. This pattern indicates that either secondary scores are a very poor measure of underlying ability and productivity, or that wages are unrelated to any of the (measured) productivity or ability in secondary test scores, at least before accounting for other characteristics.

5.2 Selection in Higher Education

In order to assess the selection decision into different types of higher education, we estimate propensity scores based on probit models for the probability of attending private or selective institutions, as well as for these treatments broken down by specialization for each country. Propensity scores are estimated for each country and outcome since slightly different universes have data available. We present here only the models for selection into private higher education using the universe of the time to first job variable, which is available for almost the full sample. Table 3 presents the variables and categories of variables used in these regressions. Table 11 and Table 12 (in the appendix) present the marginal effects for Egypt and Jordan.

Table 4, below, presents the tests for joint significance for different predictors of private higher education, using the categories in Table 3. These joint tests are particularly important for demonstrating what affects selection; given the large number of variables, multicollinearity is likely in the regression models. In both Egypt and Jordan, family background is a significant predictor of attending private higher education, as are gender and geography. Basic schooling matters only marginally in Egypt and somewhat in Jordan, and secondary schooling is significant in Egypt but not Jordan. Secondary performance is a significant predictor of private, as compared to public higher education.

A number of individual marginal effects (Table 11, appendix) are also statistically significant and noteworthy. In Egypt, graduates who had fathers working as employers in the service industry were significantly more likely to attend private higher education, which is likely to be a family socio-economic status effect. Females were 5.3 percentage points less likely to attend private higher education. Individuals who attended a private secondary school were 14.5 percentage points more likely to attend private higher education, and those who daily used a computer in secondary school (compared to never) were 13.2 percentage points more likely to attend private higher education. This, again, may represent a socio-economic effect as families with substantial resources can place their children into private, technology rich secondary schools.

Figure 2 presents the relationship between secondary performance as reflected in test scores and the probability of attending private higher education over the plausible test score range in Egypt. At low test scores, between 60 and 65, almost half of arts and technical secondary students are predicted to attend private higher education, but less than a quarter of science students. The probability of attending private higher education declines with increasing scores for arts and science, falling below a 5% chance by a score of 80, but remains high for technical students, who lack good routes to higher education in general, until scores of 90 or higher.

A number of individual marginal effects are also noteworthy in Jordan (Table 12, appendix). Relative to illiterate fathers, those with more educated fathers who do attend higher education are

less likely to attend private higher education, but the opposite pattern is observed for mothers, where increasing mother's education is associated with higher probabilities of private higher education; since mother's and father's education are highly correlated, the net effect is unclear. Employer professional fathers and employer service fathers increase the probability of private higher education, likely a socio-economic effect as in Egypt. Females are 18.1 percentage points less likely to attend private higher education at the reference case in Jordan. Those who attend private basic schools are significantly more likely to attend private higher education in Jordan.

Figure 3 shows how secondary test scores and the probability of attending private higher education are related in Jordan over the plausible test score range for different secondary specializations. At low scores, around 65, the predicted probability of attending private education is around 80%, with relatively equal probabilities for arts, science, and technical secondary students. The probability of private higher education declines with higher test scores. Over the middle of the test score range, technical secondary students are slightly more likely to attend private programs, and at high scores, the probabilities of private higher education are around 30% for the arts, 25% for the sciences, and 20% for technical secondary students. In comparison to Egypt, at least for the reference case, private higher education is more likely in Jordan. Overall, there is a clear relationship between secondary performance, which is likely to be, at least to some extent, a measure of ability, and the type of institution attended. Poorer scoring students are more likely to attend private institutions in both Egypt and Jordan. While we expect that private institutions' incentives and processes will lead to better labor market outcomes, since poorer performing students are attending, it is clear that selection is an issue. The impact of better institutional features may be counter-acted by the lower ability of students selecting into private higher education, generating the lack of a clear pattern in labor market outcomes observed in Table 2.

5.4 Higher Education and Labor Market Outcomes

We control for selection in two ways, first by including a variety of pre-treatment covariates in regressions for labor market outcomes, and then by using propensity score matching. Table 5 presents the joint significance tests from the regressions for characteristics determining labor market outcomes. Of particular interest are how the higher education institution characteristics and factors affect labor market outcomes. Do graduates of private programs, different specializations, or more selective institutions perform better in the labor market? Does the pedagogy, accountability, or perceived quality of their higher education institution affect their labor market outcomes? Looking at the joint tests for institution characteristics, including private versus public, selectivity, specialization, and language of instruction, the answer is 'no.' Institution characteristics do not affect labor market outcomes. Out of five outcomes and both countries, institution characteristics are only ever significant in Egypt for the wage after five years, and only due to language of instruction. Main effects and interactions for private versus public, selectivity, and specialization are jointly insignificant for all outcomes. After controlling for a complex set of covariates, the institution an individual attends does not matter. The process factors also do not matter; only once, in Egypt for time to first formal job, are these factors significant, and only at the 10% level.

If the type of higher education institution does not affect labor market outcomes, then what does? Family background plays a major role in labor market outcomes, even after accounting for other characteristics. It is significant at the 10% level for time to first job in both Egypt and Jordan, significant for time to first formal job in Egypt (but not Jordan), significant for wages in the first

job and wages after five years in both Egypt and Jordan, and significant at the 10% level for wage growth in Jordan (but not Egypt). Gender matters a great deal for time to first job, but not for first formal job; and for wages, both in the first job and after five years, but not wage growth, and this is true in both Egypt and Jordan. Geography matters for many of the outcomes. Basic schooling characteristics matter little, and secondary schooling only marginally. Notably, secondary performance, which is likely to measure ability, at least to some extent, does not affect time to first job or first formal job, nor does it affect wages in the first job in Egypt. It is significantly related to wages in the first job in Jordan, and wage growth in both Egypt and Jordan (10% level) as well as wages after five years in Egypt (10% level) and Jordan. The weak relationships between secondary performance and labor market outcomes could indicate either that test scores are a poor measure of ability or future productivity, or that the labor market does not reward whatever productivity or ability is measured by these scores.

A number of individual marginal effects are significant and noteworthy for labor market outcomes. More educated fathers predict significantly higher wages in Egypt, as much as 29.8% higher for a university educated father compared to an illiterate father in terms of wages five years after graduation. Access to a computer at home at age fifteen significantly increases five year out wages. Those with fathers who were employers in the service sector have higher wages in their first job, and much higher wages after five years, when their wages are 64.4% greater than if their fathers were blue collar informal workers. Those with fathers who were employers in craft occupations also have significantly higher wages five years out. Women have much longer times to first jobs, lower wages, and especially lower wages after five years, where they earn 68.2% less than men. Private preparatory school increases wages in the first job and after five years. The only higher education institutional feature that is significant for any of the outcomes is the interaction between private and IT; relative to public, non-selective commerce students, private IT students earn higher wages in their first job, but this is not significant five years out. English language students earn more in their first job, and in their job five years after graduation. None of the education process factors are statistically significant. Quite a lot of the variation, especially in wages, is explained by the models; 23.1% of the variation in log wages in the first job is explained by the model, and 37.6% of log wages five years after graduation. The increase in explanatory power suggests that observed characteristics are even more deterministic as time goes on and employer learning seems unimportant.

Turning to the Cox proportional hazard models for time to first formal job in Egypt, having a father with a formal job (professional, service, or craft) compared to a blue collar informal job, significantly increases the hazard a young person will obtain a formal job. Those who used computers daily in secondary school have a higher hazard of a formal job. A higher perception of a higher education institution's quality increases the hazard of a first formal job, although causality could run in either direction—those who get formal jobs may, retrospectively, assess their higher education institution more positively.

In Jordan, more educated fathers, and especially a mother with above university education, increases wage growth. A more educated father also increases the wage five years after graduation. Access to a computer at age fifteen decreases the time to first job. Refugees in Jordan have lower wages in their first jobs. As in Egypt, those with employer service fathers earn higher wages in the first job, and after five years (31.8% higher after five years) compared to those with blue collar informal fathers. Women have longer times to first jobs, and lower wages in the first job and even lower wages in the job five years out. The difference in wages after five years is

that women receive wages that are 24.6% lower than men, which is a smaller gap than in Egypt. Those who attended private secondary schools earned higher wages in their first jobs. Those who used computers daily in secondary school had lower wages in their first jobs but faster wage growth. Secondary grades were significantly related to wage growth and wages after five years. The only higher education institution characteristic that mattered was, compared to Arabic language students, students who attended Arabic and English language programs took longer to find their first jobs. Notably, in Jordan absolutely nothing was individually significant, and the model as a whole was not statistically significant for time to first formal job. Obtaining a formal job in Jordan (primarily a government job) is essentially a lottery, which, while not terribly meritocratic, is less nepotistic than in Egypt.

The relative roles of institutions, ability, and family background in determining labor market outcomes are of great interest. While the regressions make clear that the characteristics of higher education institutions have little impact on labor market outcomes, they do not readily show how large the differences are by family background. To answer this question, we simulate (predict) wages in the first job and after five years for different profiles in Egypt and Jordan. First, we vary the characteristics of the higher education institution and then vary individuals' family background and grades. Figure 4 presents the results of these simulations for Egypt, starting with the same reference case as the regressions and a public, commerce, non-selective institution. This individual has predicted wages near 1000 LE per month. The differences by institutional characteristics are small, and wages range from approximately 800-1000 LE per month. However, when a 'good family' (father university educated and a service employer, mother university educated, computers, internet, and magazines/books in the house at age 15) profile is simulated for what is otherwise the reference case, wages are predicted to be more than 1900 LE per month, nearly double, based on family background. In contrast, good grades (test scores of 90) added to the reference case (or a good family) increase wages only slightly. For attendees of higher education, family background determines wages far more than their ability or the institution they attended.

The pattern of simulations for first wages in Jordan is similar but less dramatic (Figure 5). The reference, public, non-selective, commerce graduate earns around 340 JD per month. There are moderate variations, down to 310 JD and up to 360 JD per month for different institutions. Adding a good family to the reference case increases wages to 410 JD. Adding good grades to the reference case (or good family case) increases wages only slightly.

The pattern of family being the greatest determinant of wages in the first job is in fact strengthened five years out in Egypt (Figure 6). For the public, non-selective commerce reference case, monthly wages are around 1300 LE, and by institutional characteristics they vary from a high of approximately 1500 LE to a low of approximately 800 LE. However, a reference individual with a good family would earn more than 4600 LE per month five years after graduation, almost three times as much as the reference case. A reference individual with good grades would earn around 1800 LE per month. While ability (as measured by test scores) might increase wages slightly, family background matters much more. The combination of good grades and good family creates the highest wages, more than 6300 LE per month in Egypt.

After five years in Jordan, wages are dramatically different for the different profiles. After five years, the reference profile is expected to earn just 75 JD per month in salary. Other institutional characteristics in fact decrease wages slightly. In contrast, having a good family raises wages to a predicted approximately 325 JD per month. A reference profile with good grades would earn

approximately 225 JD per month. Someone with both good grades and a good family would earn much more, about 900 JD per month. In both Egypt and Jordan, two patterns are evident comparing first and five year wages. Family matters the most, and matters more over time, but good grades matter slightly more five years out than in first jobs. Good grades also matter slightly more in Jordan than Egypt, which suggests that Jordan has some combination of better testing, better education (learning in school), or a labor market better at rewarding grades or ability underlying grades.

Although we use a rich set of characteristics to control for potential confounding factors in the relationship between higher education institution characteristics and labor market outcomes in the regressions, we also used propensity score matching to account for selection and estimate the impact of different features on higher education. Table 6 presents propensity score matching estimates for treatment effects of private or selective higher education institutions on labor market outcomes, also broken down by specialization. The same overall result as in the regressions holds; overall, higher education institutions with better features do not improve labor market outcomes. Because propensity score matching does not account for censoring, we do not examine time to first formal job. No institution characteristic is significant for time to first job in Egypt. In Jordan, attending a private institution as compared to public increases the time to a first job with the bootstrapped standard errors, a result that holds for private commerce programs but not private IT programs. Selective commerce programs increase the time to first jobs, but selective IT programs decrease it in Jordan. The only difference in wages in first job is in Egypt, where private higher education in commerce decreases wages by 28.4%. In terms of annual change in wages, private in IT has a marginally significant decrease in wage growth in Egypt using the bootstrapped standard errors. In Jordan, no effect is significant for wages after five years. In Egypt, the private higher education effect is significant, increasing wages by 30% compared to public higher education, but this result does not hold up for private in commerce or private in IT. Selective programs actually decrease wages, a result which holds for selective commerce programs as well. Overall, institutions with better characteristics do not produce better labor market outcomes even when we use propensity score matching to better account for selection. As the regressions demonstrated, family, not higher education institutions, is what matters for labor market outcomes.

It is clear that labor market outcomes are not shaped by the characteristics of higher education institutions we examine and are driven primarily by family characteristics—even for the privileged sample we examine, those who attend higher education. Why is there this disconnect between higher education, ability, and the labor market? One alternative hypothesis is that private employers are not sending the right signals to higher education institutions; another is that the higher education institutions' incentives remain perverse, and so they do not respond to such signals. Alternatively, the labor market might not respond to the qualities of the labor supply. This alternative hypothesis is considered in Table 7 and Table 8. Table 7 presents how individuals obtained their first job. Possibilities include government search (applying to various ministries and labor bureaus within the government, entering government hiring contests), private search (applying for job postings, sending out applications, going to job sites, working with labor contractors, or starting a project or business), and using one's family, friends, or network.

In Egypt, the predominant method for obtaining a first job is through family, friends, or network (61.1%), followed by private search (35.4%) and government search (3.5%). In Jordan, private

searches predominate (58.0%), followed by family/friends/and networks (26.3%) and government search (15.8%). Foreign labor markets, particularly in the Gulf, absorb many educated Jordanians (Wahba, 2012), and this may be shaping the search process, as well as the education system and rewards on the labor market within Jordan. Overall, social networks clearly play a large role in first jobs, especially in Egypt. The lack of meritocratic hiring in the labor market may be why family, but not higher education institution characteristics or ability (as measured by grades) drive labor market outcomes.

Table 8 presents individual's relationships with their employers in their first job. Although social networks are important in finding first jobs, the majority of first jobs in Egypt and Jordan are for individuals with no pre-existing personal relationship to the graduates, or are jobs (e.g., in the government) for which such a question is not applicable. In Egypt, 14.3% of graduates work for family, 10.5% for a friend or neighbor, and 2.4% for someone else they know. In Jordan, the percentages are lower; 5.6% of graduates are hired by family, 2.3% by friends or neighbors, and 3.2% by individuals with some other personal relationship. Overall, more than a quarter of Egyptian graduates are hired directly by individuals within their network, compared to more than a tenth of Jordanian graduates. This pattern of obtaining jobs is likely to drive labor market outcomes, rather than individuals' ability or higher education characteristics.

6. Discussion and Conclusions

Education and labor market mismatches are a substantial problem in Egypt and Jordan, with particularly high unemployment rates observed among higher education graduates (Assaad & Krafft 2013a; Mryyan 2012). We set out to examine whether higher education/labor market mismatches were due to demand side problems or supply side problems – that is, poor incentive structures in public higher education institutions. If supply-side problems, driven by poor incentives, were the primary problem, then we would expect to see significant differences in the labor market performance of graduates from private programs, compared to public programs, once we accounted for selection into these programs. Overall, we did not find significant effects on labor market outcomes due to the characteristics of higher education institutions. Poor incentives in higher education are not the primary driver of poor labor market outcomes for graduates.

Our alternative hypothesis, that demand for credentials rather than skills is what higher education responds to, is supported by our results. Family background, gender, and geography, and to some extent secondary school performance, appear to play a much larger role in labor market outcomes, even in this select group of graduates, than the type or quality of their higher education institutions. This suggests that the labor markets do not in fact reward skills, or do so to a very limited extent, so that neither higher education institutions nor students have any reason to seek out the type of higher education that builds productive skills. Especially in Egypt, social networks played an enormous role in employment for graduates. This may be related to the predominance of small firms in the private sector, even among those hiring educated graduates. These employers most likely lack the ability to evaluate potential employees' skills or perform a complex and thorough employee search, making skills substantially less relevant, and recommendations from within a social network, or other socio-economic signals, of paramount importance. The pattern of employment through networks was somewhat diminished in Jordan, where private search methods were the norm. It is also noteworthy that access to formal jobs in Egypt is nepotistic. In Jordan access to formal employment is essentially a lottery, completely

unrelated to characteristics. This avoids problems of nepotism, but reinforces the need for only a credential—not any particular skill set—among graduates.

Structural features of the labor market may be causing the disconnect between skills and rewards. For instance, in Egypt more than 60% of all employment is in firms with fewer than ten employees and 76% in firms with fewer than fifty employees (Assaad & Krafft 2013b). In Jordan, 37% of employment is in firms with fewer than ten employees and 54% in businesses with fewer than fifty employees⁶ (Assaad 2012). The small size of most employers makes it difficult for them to evaluate employees skills or credentials, and more likely to rely on social networks rather than formal hiring processes. This is particularly true in Egypt.

Proposed reforms to improve education quality and better connect higher education and the labor market often include proposals to increase the role of the private and non-profit sectors in higher education (Fahim & Sami 2010; Kanaan et al. 2010; OECD & World Bank 2010). Our findings indicate that increasing the role of private higher education is unlikely to improve labor market outcomes. The demand among students for credentials, and the disproportionate role of family background in determining labor market outcomes indicate that simply encouraging private higher education will not address labor market and education mismatches for graduates. Labor market outcomes are disconnected from individuals' abilities and skills, in part due to the structure of the labor market for graduates as primarily government employment or employment in small enterprises. These structural features mean that even if private institutions were conferring better skills, these skills would not be rewarded in the labor market. Given this context, changes in the composition of higher education institutions and their incentives will not be sufficient to improve education quality or solve the higher education and labor market mismatch.

⁶ After excluding 'don't know' responses in Jordan, 47% of employment is in businesses with fewer than ten employees and 69% in businesses with fewer than fifty employees.

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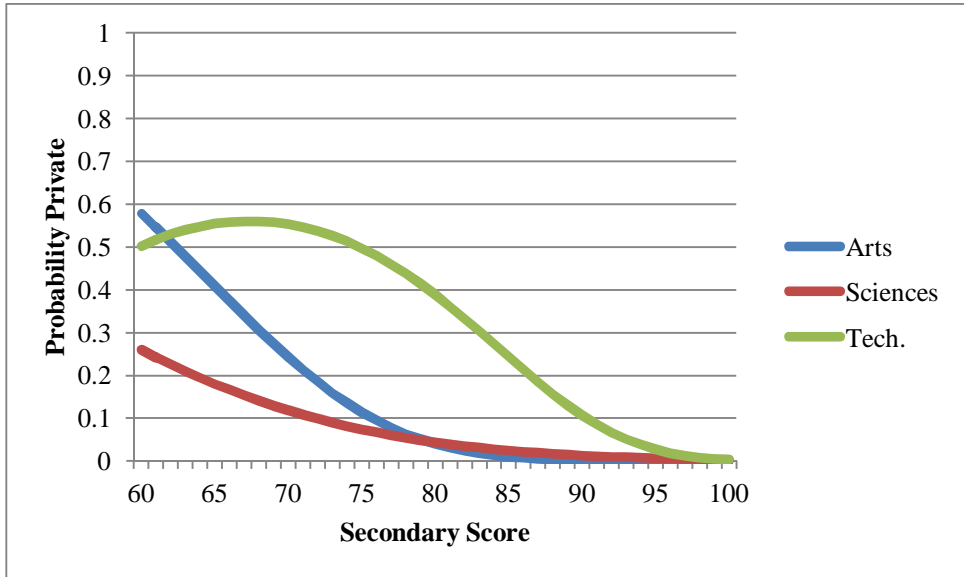
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Figure 1: First Job and Five Year Out Wages and Secondary Test Scores, Egypt and Jordan



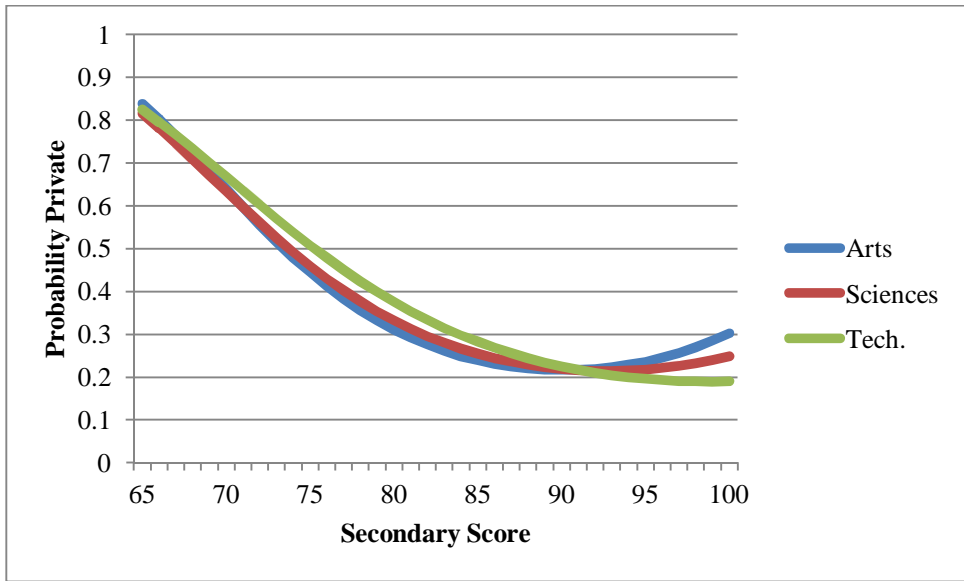
Source: Authors' calculations.

Figure 2: Secondary Test Scores and Predicted Probability of Attending Private Higher Education by Secondary Specialization, Egypt



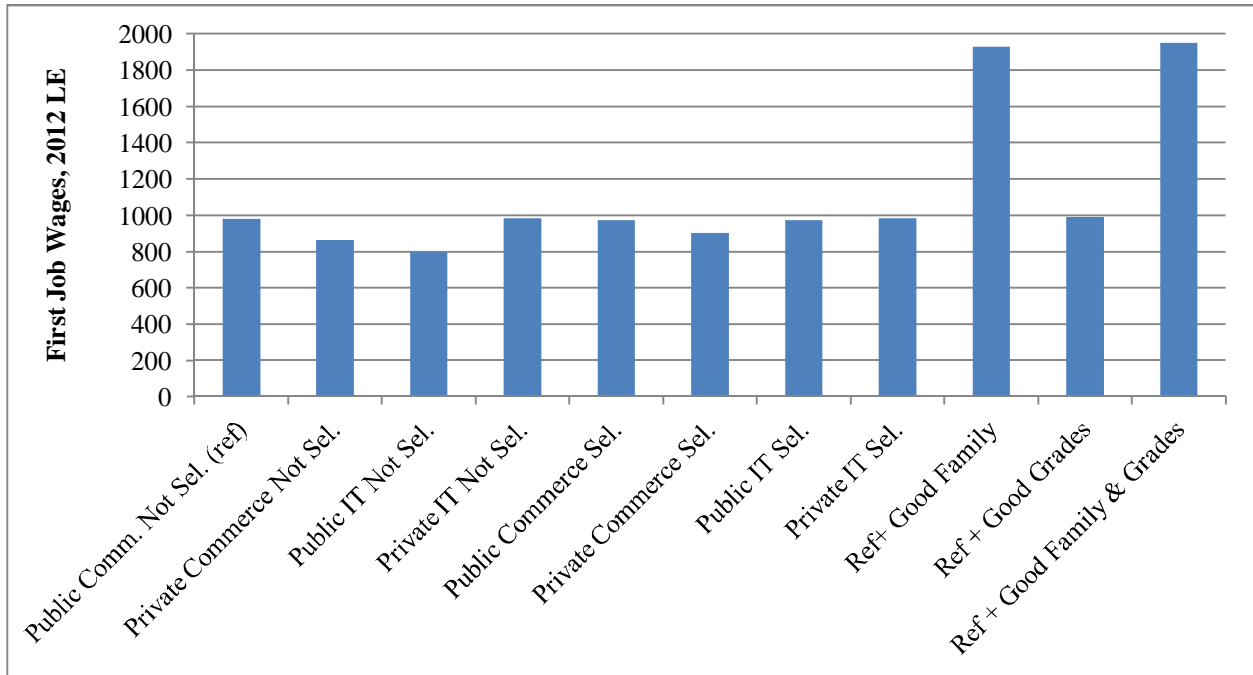
Notes: Based on regressions presented in Table 11. At reference case for Egypt.
Source: Authors' calculations.

Figure 3: Secondary Test Scores and Predicted Probability of Attending Private Higher Education by Secondary Specialization, Jordan



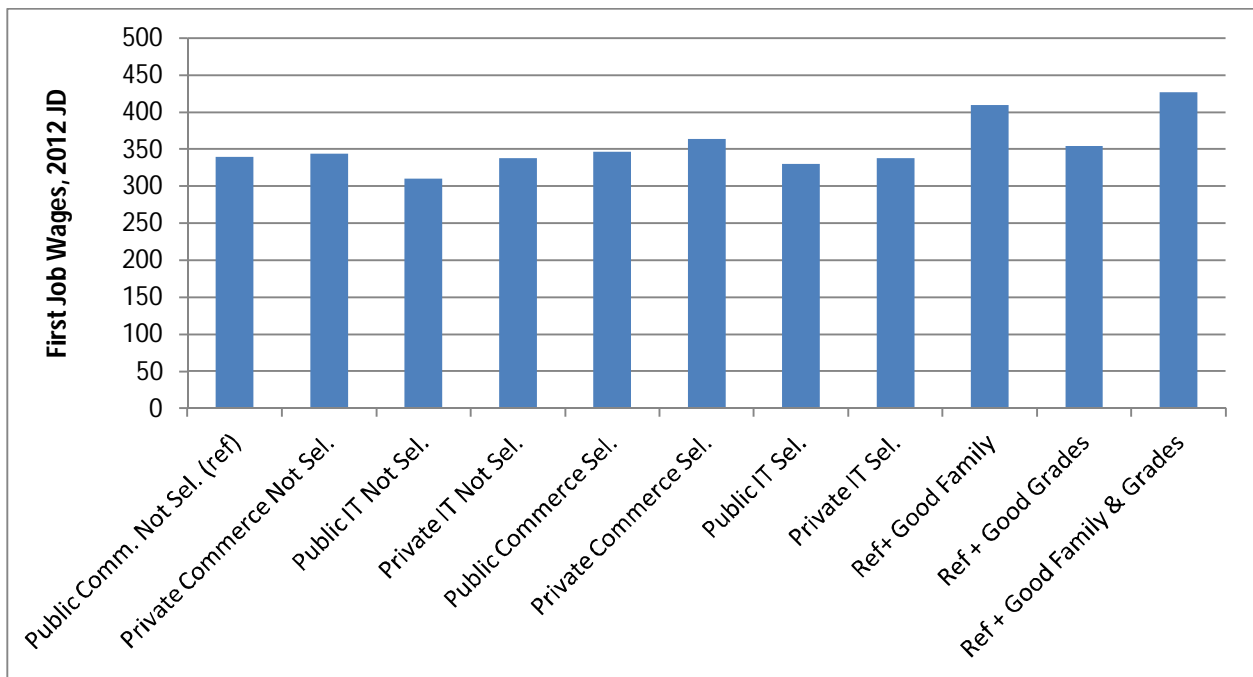
Notes: Based on regressions presented in Table 12. At reference case for Jordan.
Source: Authors' calculations.

Figure 4: Profiles and Wages in First Job, Egypt



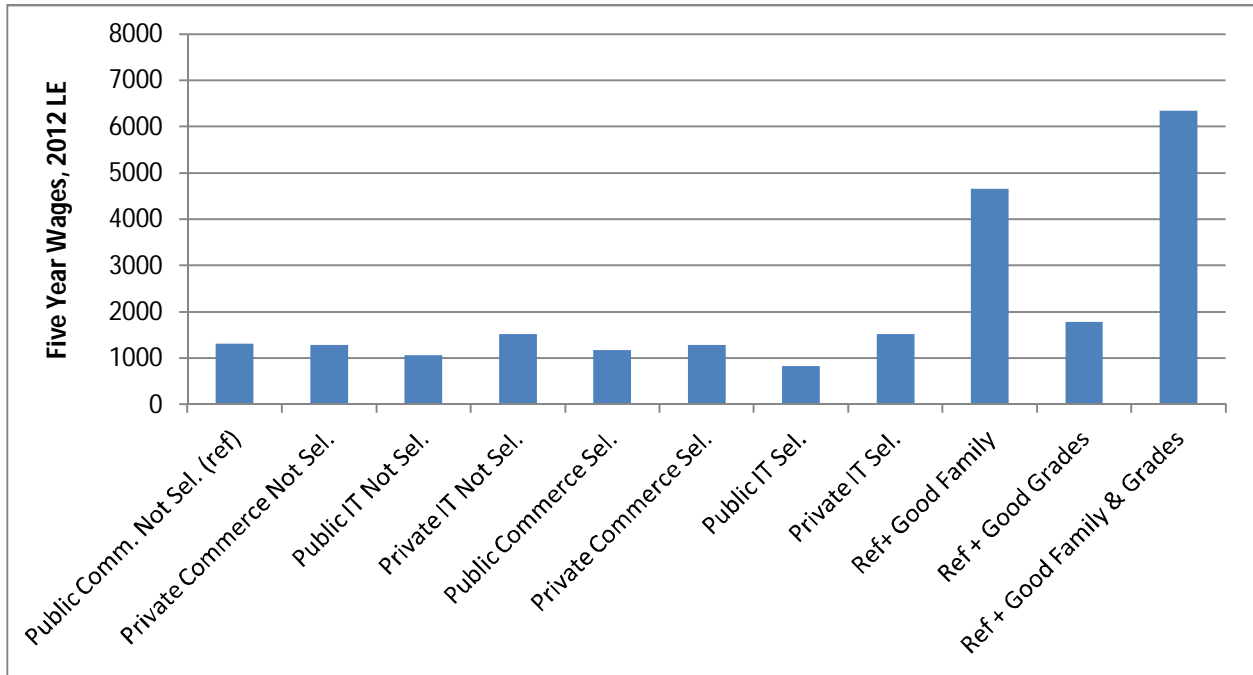
Notes: Based on regressions presented in Table 13.
Source: Authors' calculations.

Figure 5: Profiles and Wages in First Job, Jordan



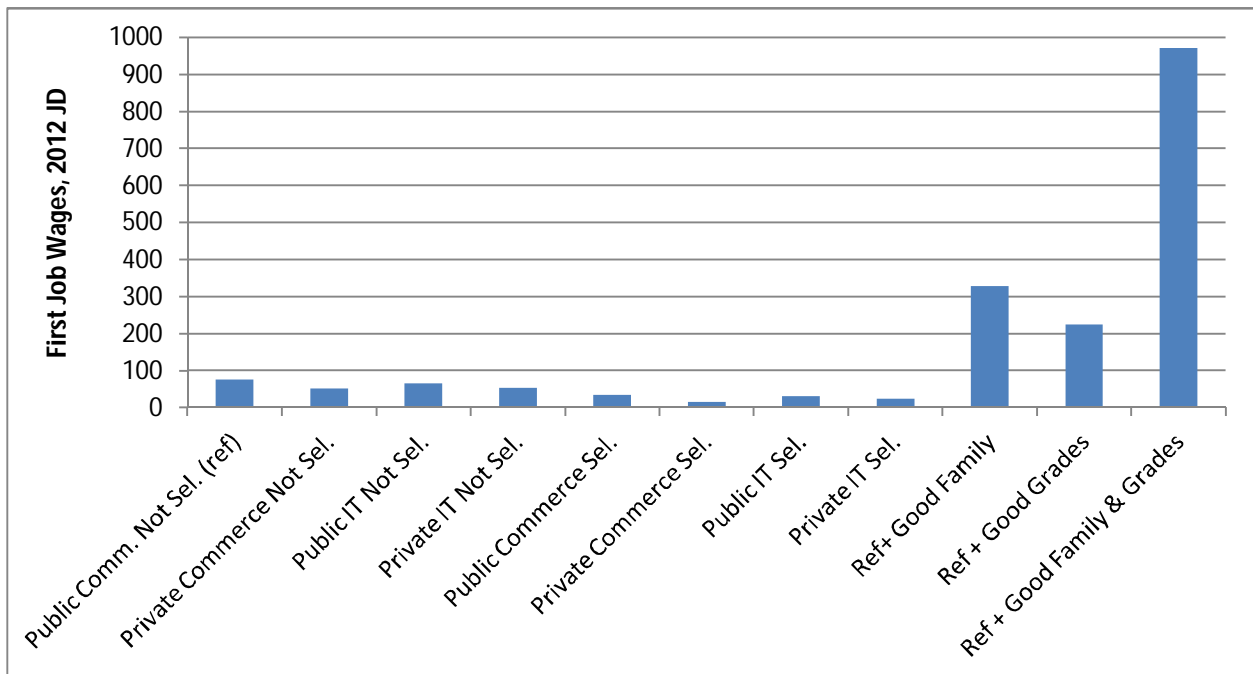
Notes: Based on regressions presented in Table 14.
Source: Authors' calculations.

Figure 6: Profiles and Wages Five Years after Graduation, Egypt



Notes: Based on regressions presented in Table 13.
Source: Authors' calculations.

Figure 7: Profiles and Wages Five Years after Graduation, Jordan



Notes: Based on regressions presented in Table 14.
Source: Authors' calculations.

Table 1: Percent of Sample by Public/Private, Specialization, Selectivity, Egypt and Jordan

Type	Egypt	Jordan
Public Not Sel. Commerce	32.6	23.2
Private Not Sel. Commerce	5.2	28.8
Public Not Sel. IT	2.2	12.1
Private Not Sel. IT	14.9	11.6
Public Sel. Commerce	30.2	14.3
Private Sel. Commerce	10.7	2.2
Public Sel. IT	1.1	6.6
Private Sel. IT	3.2	1.1
Total	100.0	100.0
N(Observations)	1,615	1,418

Source: Authors' calculations.

Table 2: Labor Market Outcome Descriptives by Type of Higher Education, Egypt and Jordan

	Time to First Job (Months)		Time to First Formal Job (Months)			Wage in First Job		Annual Percent Chg. in Wage		Wage in 5 Year out Job	
	Mean	N	25%	50%	N	Mean	N	Mean	N	Mean	N
Egypt											
Public Not Sel. Commerce	8.34	520	8	72	519	999	478	7.75	429	1609	251
Private Not Sel. Commerce	5.48	84	13	.	83	914	74	5.93	63	1630	29
Public Not Sel. IT	3.31	35	14	63	35	961	30	9.35	26	1674	13
Private Not Sel. IT	5.85	238	14	.	236	1176	212	7.34	185	2341	91
Public Sel. Commerce	7.82	486	1	65	477	1068	447	8.6	407	1723	270
Private Sel. Commerce	5.58	172	1	41	164	1189	135	9.78	130	1905	65
Public Sel. IT	10.78	18	22	54	18	1259	18	9.08	15	1347	10
Private Sel. IT	8.00	51	15	102	51	881	48	8.44	43	1990	22
Private	5.90	546	7	102	544	1110	470	7.96	422	2067	207
IT	6.17	342	14	108	343	1114	308	7.81	269	2147	136
Selective	7.38	727	1	54	717	1084	648	8.86	595	1761	367
Total	7.28	1,604	7	72	1,583	1058	1,442	8.14	1,298	1774	751
Jordan											
Public Not Sel. Commerce	9.68	328	1	6	329	344	325	6.82	319	496	202
Private Not Sel. Commerce	8.09	408	1	1	405	353	401	6.47	386	649	277
Public Not Sel. IT	10.58	169	1	7	172	301	168	7.67	167	514	87
Private Not Sel. IT	6.50	165	1	8	165	353	160	6.82	155	601	109
Public Sel. Commerce	11.09	202	1	10	202	349	198	5.99	194	520	145
Private Sel. Commerce	16.42	31	1	14	31	319	31	7.59	31	347	21
Public Sel. IT	8.18	92	1	1	92	331	90	6.98	88	539	60
Private Sel. IT	6.31	16	1	1	16	384	16	6.54	16	569	12
Private	8.03	620	1	4	617	352	608	6.63	588	619	419
IT	8.40	442	1	5	445	329	434	7.17	426	558	268
Selective	10.57	341	1	7	341	343	335	6.43	329	512	238
Total	9.17	1,411	1	6	1,412	342	1,389	6.73	1,356	561	913

Source: Authors' calculations.

Table 3: Variable Categories used in Joint Tests

Category	Variables
Family Background	Father's Education, Mother's Education, Computer, Internet, or Magazines and Books in Home at Age 15, Father's Age at Birth (and square) or DK, Mother's Age at Birth (and square) or DK, Father's Employment Status
Gender	Female
Geography	Governorates (Country-specific)
Basic Schooling	Kindergarten Attendance, Primary Private and Preparatory Private (Egypt), Basic Private (Jordan)
Secondary Schooling	Secondary Specialization, Frequency of Computer Use in Secondary
Secondary Performance	Age Graduated Secondary, Secondary Grade and Square, Secondary Grade DK (Egypt), and interactions between grade and specialization
Higher Education (HE) Institution Characteristics	Private, Selective, and IT—along with interactions between all three. Also Language of Instruction
HE Process Factors	Factors for Pedagogy, Accountability, and Perception of Quality

Table 4: Tests for Joint Significance for Predictors of Private Higher Education

	Egypt P-value	Sig.	Jordan P-value	Sig.
Family Background	0.010	**	0.026	*
Gender	0.009	**	0.000	***
Geography	0.000	***	0.000	***
Basic Schooling	0.067	+	0.031	*
Secondary Schooling	0.000	***	0.461	
Secondary Performance	0.000	***	0.000	***

Note: *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.1. For propensity score for time to first job equation (others similar).
Source: Authors' calculations.

Table 5: Joint Significance Tests for Characteristics Determining Labor Market Outcomes

	Time to First Job		Time to First Formal Job		Wages in First Job		Annual Change in Wage		Wages After 5 years	
	Eg.	Jo.	Eg.	Jo.	Eg.	Jo.	Eg.	Jo.	Eg.	Jo.
Family Background	+	+	***		***	*		+	**	**
Gender	***	***			***	***			***	***
Geography		***	***	+	***	***		***	***	+
Basic Schooling					*					
Secondary Schooling						***		*		+
Secondary Performance						***	*	+	+	*
HE Institution Char.									*	
HE Institution Factors				+						

Notes: *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.1. Joint tests of significance based on the regressions in Table 13, Table 14, Table 15, and Table 16.

Source: Authors' calculations.

Table 6: Propensity Score Matching Estimates for Treatment Effects of Private or Selective Higher Education Institutions

	Time to First Job		Wages in First Job		Annual Change in Wage		Wages After 5 years	
	Egypt	Jordan	Egypt	Jordan	Egypt	Jordan	Egypt	Jordan
<u>Private</u>	-1.361	1.941	-0.054	0.017	1.184	-0.485	0.300	0.023
SE	(1.69)	(1.304)	(0.091)	(0.034)	(3.43)	(0.901)	(0.152) *	(0.063)
Bootstrapped SE	(1.495)	(0.857) *	(0.072)	(0.035)	(2.165)	(0.817)	(0.116) *	(0.069)
N(observations)	1605	1409	1430	1387	1256	1354	725	890
<u>Selective</u>	0.615	-0.204	-0.033	0.011	1.151	0.180	-0.168	-0.076
SE	(0.974)	(1.269)	(0.052)	(0.033)	(1.913)	(0.865)	(0.092) +	(0.06)
Bootstrapped SE	(0.984)	(1.242)	(0.058)	(0.031)	(1.817)	(0.822)	(0.085) *	(0.057)
N(observations)	1518	1409	1358	1387	1224	1354	700	905
<u>Private in Comm.</u>	-1.858	2.235	-0.284	-0.011	4.577	-1.220	0.091	-0.062
SE	(2.183)	(1.747)	(0.156) +	(0.045) *	(5.361)	(1.137)	(0.21)	(0.084)
Bootstrapped SE	(2.051)	(1.138) *	(0.094) *	(0.053) *	(4.152)	(1.199)	(0.178)	(0.078)
N(observations)	1203	967	1045	953	952	928	464	627
<u>Private in IT</u>	-0.896	1.056	0.019	0.034	-9.721	0.623	NA	0.061
SE	(2.753)	(2.438)	(0.249)	(0.072)	(8.343)	(2.048)	NA	(0.135)
Bootstrapped SE	(3.702)	(1.317)	(0.275)	(0.064)	(5.882) +	(1.634)	NA	(0.115)
N(observations)	313	427	225	419	194	395	NA	261
<u>Select. in Comm.</u>	0.179	2.604	-0.064	-0.031	0.385	1.035	-0.187	-0.074
SE	(1.433)	(1.727)	(0.072)	(0.043)	(2.895)	(1.087)	(0.119)	(0.077)
Bootstrapped SE	(1.011)	(1.48) +	(0.077)	(0.042)	(2.955)	(0.963)	(0.081) *	(0.073)
N(observations)	1180	967	1055	953	965	928	558	617
<u>Selective in IT</u>	1.031	-4.624	-0.137	0.070	3.213	-0.160	NA	-0.051
SE	(2.051)	(2.079) *	(0.132)	(0.064)	(3.66)	(1.934)	NA	(0.115)
Bootstrapped SE	(1.416)	(2.263) *	(0.151)	(0.062)	(4.238)	(1.313)	NA	(0.086)
N(observations)	292	405	260	386	226	380	NA	240

Note: *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.1. NA if sample size inadequate for estimation.

Source: Authors' calculations.

Table 7: How Individuals Obtained their First Job, Egypt and Jordan

	Egypt	Jordan
Government Search	3.5	15.8
Private Search	35.4	58.0
Family/Friends/Network	61.1	26.3
Total	100.0	100.0
N (Observations)	1,614	1,413

Source: Authors' calculations.

Table 8: Relationship with Employer in First Job, Egypt and Jordan

	Egypt	Jordan
Family	14.3	5.6
Friends/Neighbors	10.5	2.3
Personal Relationship	2.4	3.2
No Relationship	60.3	52.7
N/A	12.5	36.2
Total	100.0	100.0
N(Observations)	1,613	1,413

Source: Authors' calculations.

Appendix

Table 9: Sample Descriptives by Public/Private and Specialization, Egypt

Cells are proportions or means

	Public IT	Private IT	Public Commerce	Private Commerce	Total
Female	0.132	0.168	0.272	0.272	0.249
Kindergarten Attendance	0.547	0.616	0.379	0.486	0.444
Private School					
Private Primary School	0.283	0.38	0.191	0.288	0.244
Private Preparatory School	0.264	0.291	0.117	0.206	0.168
Private Secondary School	0.094	0.205	0.044	0.163	0.094
Secondary specialization					
Secondary specialization science	0.377	0.144	0.316	0.272	0.280
Secondary specialization arts	0.472	0.599	0.567	0.615	0.577
Secondary specialization tech.	0.151	0.257	0.117	0.113	0.143
Father's Education					
Father illiterate	0.132	0.195	0.232	0.152	0.209
Father basic	0.094	0.113	0.134	0.113	0.126
Father secondary or post-sec.	0.472	0.360	0.378	0.362	0.375
Father university	0.302	0.318	0.241	0.362	0.276
Father above university	0.000	0.010	0.011	0.012	0.011
Unknown father's edu.	0.000	0.003	0.005	0.000	0.004
Mother's Education					
Mother illiterate	0.189	0.360	0.404	0.245	0.364
Mother basic	0.151	0.123	0.131	0.163	0.136
Mother secondary or post-sec.	0.491	0.295	0.321	0.432	0.339
Mother university	0.170	0.216	0.137	0.148	0.154
Mother above university	0.000	0.007	0.001	0.004	0.002
Unknown mother's edu.	0.000	0.000	0.006	0.008	0.005
Age 15 Home Environment					
Access to computer at age 15	0.453	0.449	0.294	0.307	0.329
Access to internet at age 15	0.302	0.229	0.137	0.148	0.161
Access to magazines & books at age 15	0.755	0.798	0.731	0.821	0.758
Computer at Secondary School					
Never using Comp. at Sec School	0.528	0.411	0.534	0.599	0.522
Rarely using Comp. at Sec School	0.170	0.158	0.185	0.097	0.166
Sometimes using Comp. at Sec School	0.189	0.305	0.219	0.187	0.228
Daily using Comp at Sec School	0.113	0.127	0.062	0.117	0.084
Age when graduated secondary	17.811	17.709	17.649	17.809	17.691
Secondary Grade					
Secondary Final Grade	71.057	65.414	76.343	69.969	73.181
Sec Grade Sq/100	54.370	45.042	60.616	52.051	56.235
Don't Know Sec Grade	0.057	0.031	0.028	0.047	0.032
Father's age at birth					
Father's age at birth	23.245	24.202	21.402	25.128	22.561
Father's age at birth sq/100	7.786	8.338	7.279	8.358	7.659
Don't know father's age at birth	0.283	0.274	0.347	0.218	0.311
Mother's age at birth					
Mother's age at birth	18.981	19.507	16.628	22.315	18.130
Mother's age at birth sq/100	5.081	5.546	4.597	6.426	5.075
Don't know mother's age at birth	0.264	0.281	0.371	0.191	0.322

Table 9: Continued

	Public IT	Private IT	Public Commerce	Private Commerce	Total
Governorates					
Cairo	0.528	0.469	0.352	0.195	0.354
Alexandria	0.019	0.130	0.008	0.471	0.104
Port-said	0.057	0.003	0.009	0.000	0.008
Suez	0.000	0.034	0.018	0.016	0.020
Damietta	0.038	0.007	0.008	0.004	0.008
Dakhalia	0.038	0.010	0.062	0.008	0.043
Sharkia	0.038	0.003	0.066	0.008	0.045
Kalyoubia	0.057	0.041	0.092	0.019	0.070
Kafr El Sheikh	0.000	0.014	0.011	0.000	0.009
Gharbia	0.019	0.017	0.051	0.008	0.037
Menoufia	0.000	0.000	0.012	0.004	0.008
Behera	0.019	0.007	0.013	0.105	0.027
Ismailia	0.019	0.007	0.011	0.000	0.009
Giza	0.038	0.233	0.142	0.117	0.151
Menia	0.000	0.000	0.013	0.008	0.009
Asyout	0.057	0.003	0.037	0.004	0.027
Suhag	0.000	0.017	0.025	0.000	0.019
Aswan	0.019	0.003	0.012	0.008	0.010
Beni-Suef & Fayoum	0.019	0.000	0.040	0.008	0.027
Luxor & Qena	0.038	0.000	0.019	0.019	0.016
Father's Employment					
Formal Professional Father	0.340	0.240	0.320	0.272	0.298
Employer Professional Father	0.113	0.144	0.076	0.160	0.103
Informal Professional Father	0.019	0.086	0.059	0.051	0.061
Formal Technician Father	0.170	0.182	0.192	0.140	0.181
Employer Technician Father	0.000	0.007	0.008	0.054	0.015
Informal Technician Father	0.038	0.017	0.037	0.012	0.030
Formal Craft Father	0.113	0.147	0.136	0.144	0.139
Employer Craft Father	0.094	0.045	0.023	0.039	0.032
Informal Craft Father	0.038	0.079	0.102	0.074	0.091
Unknown Father's Employment	0.075	0.055	0.047	0.054	0.051
University Private	0.000	1.000	0.000	1.000	0.340
University IT	1.000	1.000	0.000	0.000	0.213
Selective University	0.340	0.178	0.481	0.672	0.452
Teaching Language					
Arabic Language	0.792	0.668	0.893	0.864	0.844
English Language	0.019	0.027	0.018	0.051	0.025
Arabic and English Language	0.189	0.305	0.090	0.086	0.131
N(Observations)	53	292	1,014	257	1,616

Source: Authors' calculations.

Table 10: Sample Descriptives by Public/Private and Specialization, Jordan

Cells are proportions or means

	Public IT	Private IT	Public Commerce	Private Commerce	Total
Female	0.494	0.238	0.408	0.207	0.340
Kindergarten Attendance	0.562	0.602	0.457	0.559	0.527
Private School					
Private Basic School	0.155	0.265	0.164	0.273	0.209
Private Secondary School	0.106	0.193	0.109	0.150	0.132
Secondary specialization					
Secondary specialization science	0.698	0.691	0.316	0.289	0.427
Secondary specialization arts	0.234	0.249	0.615	0.632	0.502
Secondary specialization tech	0.068	0.061	0.070	0.080	0.071
Father's Education					
Father illiterate	0.064	0.083	0.118	0.121	0.104
Father basic	0.362	0.326	0.406	0.369	0.376
Father secondary	0.170	0.182	0.212	0.175	0.189
Father post-secondary	0.158	0.122	0.085	0.100	0.108
Father university	0.215	0.254	0.133	0.187	0.181
Father above university	0.030	0.033	0.045	0.048	0.042
Mother's Education					
Mother illiterate	0.200	0.138	0.274	0.195	0.219
Mother basic	0.400	0.436	0.404	0.425	0.414
Mother secondary	0.211	0.238	0.188	0.236	0.214
Mother post-secondary	0.132	0.105	0.077	0.084	0.093
Mother university	0.053	0.083	0.049	0.055	0.056
Mother above university	0.004	0.000	0.008	0.005	0.005
Age 15 Home Environment					
Access to computer at age 15	0.498	0.431	0.385	0.336	0.397
Access to internet at age 15	0.170	0.149	0.126	0.093	0.127
Access to magazines & books at age 15	0.815	0.718	0.754	0.761	0.763
Refugees in Jordan	0.042	0.044	0.045	0.064	0.050
Computer at Secondary School					
Never using Comp. at Sec School	0.087	0.110	0.203	0.234	0.179
Rarely using Comp. at Sec School	0.249	0.282	0.282	0.275	0.274
Sometimes using Comp. at Sec School	0.589	0.558	0.479	0.461	0.504
Daily using Comp. at Sec School	0.075	0.050	0.036	0.030	0.043
Age when graduated secondary	18.004	18.044	17.883	18.077	17.987
Secondary Grade					
Secondary Final Grade	79.915	71.180	77.070	69.777	74.587
Sec Grade Sq/100	64.491	51.363	60.065	49.302	56.442
Don't Know Sec Grade	0.000	0.000	0.002	0.000	0.001
Father's age at birth					
Father's age at birth	33.192	32.845	33.387	33.348	33.269
Father's age at birth sq/100	11.919	11.675	12.031	11.890	11.921
Don't know father's age at birth	0.034	0.033	0.026	0.020	0.027
Mother's age at birth					
Mother's age at birth	27.347	27.729	27.438	27.480	27.471
Mother's age at birth sq/100	8.200	8.220	8.076	8.043	8.107
Don't know mother's age at birth	0.034	0.011	0.015	0.007	0.016
Governorates					
Amman	0.460	0.669	0.523	0.627	0.562
Balqa	0.057	0.044	0.062	0.050	0.055
Zarqa	0.042	0.110	0.085	0.130	0.094
Madaba	0.011	0.017	0.015	0.020	0.016
Irbid	0.155	0.050	0.100	0.082	0.098
Mafraq	0.060	0.006	0.041	0.016	0.032
Jarash	0.030	0.028	0.030	0.032	0.030
Ajlun	0.042	0.011	0.015	0.016	0.020
Karak	0.072	0.055	0.075	0.020	0.055
Tafiela	0.042	0.000	0.036	0.005	0.023
Aqaba	0.030	0.011	0.019	0.002	0.015

Table 10: Continued

	Public IT	Private IT	Public Commerce	Private Commerce	Total
Father's Employment					
Formal Professional Father	0.279	0.276	0.194	0.250	0.238
Employer Professional Father	0.008	0.028	0.011	0.018	0.015
Informal Professional Father	0.011	0.000	0.008	0.011	0.008
Formal Technician Father	0.321	0.260	0.314	0.218	0.279
Employer Technician Father	0.019	0.022	0.021	0.052	0.030
Informal Technician Father	0.030	0.044	0.043	0.043	0.041
Formal Craft Father	0.060	0.133	0.103	0.109	0.101
Employer Craft Father	0.026	0.066	0.045	0.045	0.044
Informal Craft Father	0.091	0.055	0.103	0.089	0.090
Unknown father's Employment	0.155	0.116	0.158	0.164	0.154
University Private	0.000	1.000	0.000	1.000	0.438
University IT	1.000	1.000	0.000	0.000	0.315
University Selective	0.351	0.088	0.382	0.070	0.242
Teaching Language					
Arabic Language	0.042	0.116	0.171	0.286	0.176
English Language	0.136	0.127	0.060	0.055	0.081
Arabic and English Language	0.823	0.757	0.769	0.659	0.743
N(Observations)	265	181	532	440	1,418

Source: Authors' calculations.

Table 11: Marginal Effects from Probit Model for Private University, Egypt

	Egypt
Baseline Probability	0.141
Father's Education (Illit. Omit.)	
Father basic	0.021 (0.039)
Father secondary or post-sec.	0.072 (0.043)
Father university	0.128 (0.066)
Father above university	0.089 (0.152)
Unknown father's edu.	-0.047 (0.119)
Mother's Education (Illit. Omit.)	
Mother basic	-0.016 (0.031)
Mother secondary or post-sec.	0.039 (0.036)
Mother university	0.017 (0.045)
Mother above university	0.457 (0.382)
Unknown mother's edu.	0.062 (0.160)
Age 15 Home Environment	
Access to computer at age 15	0.081 (0.042)
Access to internet at age 15	-0.013 (0.032)
Access to magazines & books at age 15	-0.006 (0.024)
Parents' Age at birth	
Father's age at birth	-0.001 (0.015)
Father's age at birth sq/100	0.005 (0.021)
Don't know father's age at birth	0.054 (0.324)
Mother's age at birth	-0.020 (0.018)
Mother's age at birth sq/100	0.029 (0.030)
Don't know mother's age at birth	-0.136* (0.059)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	-0.028 (0.041)
Employer Professional Father	0.001 (0.048)
Informal Professional Father	0.031 (0.055)
Formal Service Father	0.001 (0.042)
Employer Service Father	0.307* (0.155)
Informal Service Father	-0.097 (0.050)
Formal Craft Father	0.035 (0.046)
Employer Craft Father	0.044 (0.069)
Unknown Father's Employment	-0.051 (0.048)
Sex (Male Omit.)	
Female	-0.053* (0.025)

Table 11: Continued

	Egypt
Baseline Probability	0.141
Basic Education	
Kindergarten Attendance	0.043 (0.027)
Private Primary School	0.060 (0.045)
Private Preparatory School	-0.025 (0.036)
Secondary Education	
Private Secondary School	0.145* (0.066)
Secondary specialization (Arts Omit.)	
Secondary specialization science	0.364 (2.165)
Secondary specialization tech	-0.141* (0.058)
Computer at Sec. School (Never Omit)	
Rarely using Comp. at Sec School	0.002 (0.030)
Sometimes using Comp. at Sec School	0.063 (0.035)
Daily using Comp. at Sec School	0.132* (0.062)
Secondary Performance	
Age when graduated secondary	-0.007 (0.010)
Secondary Final Grade	0.007 (0.021)
Sec Grade Sq/100	-0.021 (0.016)
Don't Know Sec Grade	-0.140* (0.058)
Interactions	
Interaction: Sec Grade & Sci Spec	-0.020 (0.035)
Interaction: Sec Grade & Tech Spec	0.076 (0.051)
Interaction: Sec Grade Sq/100 & Sci Spec	0.021 (0.025)
Interaction: Sec Grade Sq/100 & Tech Spec	-0.041 (0.034)
Interaction: Sci Spec & Sec Grade DK	-0.121 (0.269)
Interaction Tech Spec & Sec Grade DK	0.859*** (0.058)
Governorates Included	Yes
P-value model	0.000
N (observations)	1605
Pseudo R-Squared	0.474

Notes: For those with valid time to first job.

Marginal effects calculated at reference (omitted) case for all binary/categorical variables and mean values (and, where relevant, their squares) for continuous variables.

Source: Authors' calculations.

Table 12: Marginal Effects from Probit Model for Private University, Jordan

	Jordan
Baseline Probability	.464
Father's Education (Illit. Omit.)	
Father basic	-0.160** (0.060)
Father secondary	-0.177** (0.067)
Father post-secondary	-0.152* (0.077)
Father university	-0.084 (0.085)
Father above university	-0.096 (0.109)
Mother's Education (Illit. Omit.)	
Mother basic	0.143** (0.048)
Mother secondary	0.150* (0.059)
Mother post-secondary	0.129 (0.071)
Mother university	0.125 (0.087)
Mother above university	-0.252 (0.185)
Age 15 Home Environment	
Access to computer at age 15	-0.026 (0.039)
Access to internet at age 15	-0.123* (0.051)
Access to magazines & books at age 15	-0.043 (0.038)
Refugees in Jordan	0.033 (0.072)
Parents' Age at birth	
Father's age at birth	-0.005 (0.015)
Father's age at birth sq/100	0.005 (0.020)
Don't know father's age at birth	0.033 (0.292)
Mother's age at birth	-0.033 (0.018)
Mother's age at birth sq/100	0.063* (0.031)
Don't know mother's age at birth	-0.390*** (0.117)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	0.073 (0.079)
Employer Professional Father	0.276* (0.121)
Informal Professional Father	-0.108 (0.172)
Formal Service Father	0.049 (0.064)
Employer Service Father	0.242* (0.098)
Informal Service Father	0.095 (0.092)
Formal Craft Father	0.129 (0.073)
Employer Craft Father	0.107 (0.092)
Unknown Father's Employment	0.055 (0.067)
Sex (Male Omit.)	
Female	-0.181*** (0.033)

Table 12: Continued

	Jordan
Basic Education	
Kindergarten Attendance	0.052 (0.035)
Private Basic School	0.103* (0.050)
Secondary Education	
Private Secondary School	0.029 (0.062)
Secondary Specialization (Arts Omit.)	
Secondary specialization science	-0.464*** (0.088)
Secondary specialization tech	-0.464*** (0.088)
Computer at Sec. School (Never Omit.)	
Rarely using Comp. at Sec School	-0.017 (0.049)
Sometimes using Comp. at Sec School	-0.071 (0.046)
Daily using Comp. at Sec School	-0.148 (0.084)
Secondary Performance	
Age when graduated secondary	0.018 (0.017)
Secondary Final Grade	-0.209*** (0.042)
Sec Grade Sq/100	0.117*** (0.028)
Interactions	
Interaction: Sec Grade & Sci Spec	0.045 (0.062)
Interaction: Sec Grade & Tech Spec	0.084 (0.126)
Interaction: Sec Grade Sq/100 & Sci Spec	-0.028 (0.041)
Interaction: Sec Grade Sq/100 & Tech Spec	-0.053 (0.084)
Governorates Included	
	Yes
P-value model	0.000
N (observations)	1409
Pseudo R- Squared	.288

Notes: For those with valid time to first job.

Marginal effects calculated at reference (omitted) case for all binary/categorical variables and mean values (and, where relevant, their squares) for continuous variables.

Source: Authors' calculations.

Table 13: Regressions for Labor Market Outcomes, Egypt

	Time to First Job (months)	Log Wages in First Job	Annual Percent Change in Wages	Log Wages Five Years after Graduation
Father's Education (Illit. Omit.)				
Father basic	3.641** (1.301)	-0.062 (0.063)	-0.551 (2.510)	-0.064 (0.099)
Father secondary or post-sec.	-0.263 (1.180)	0.133* (0.057)	-1.873 (2.257)	0.239* (0.093)
Father university	0.310 (1.515)	0.238** (0.075)	-5.193 (2.944)	0.298* (0.123)
Father above university	0.091 (3.830)	0.265 (0.183)	-12.584 (7.248)	-0.097 (0.364)
Unknown father's edu.	-5.702 (6.112)	0.227 (0.284)	6.414 (12.559)	0.305 (0.414)
Mother's Education (Illit. Omit.)				
Mother basic	0.113 (1.181)	-0.041 (0.057)	-0.588 (2.253)	0.124 (0.093)
Mother secondary or post-sec.	0.235 (1.083)	-0.094 (0.053)	-1.758 (2.081)	-0.082 (0.086)
Mother university	0.534 (1.488)	-0.133 (0.073)	1.199 (2.859)	-0.017 (0.123)
Mother above university	3.413 (7.329)	-0.321 (0.340)	-16.250 (17.568)	0.781 (0.641)
Unknown mother's edu.	1.896 (5.260)	0.071 (0.261)	-5.826 (10.332)	-0.693 (0.400)
Age 15 Home Environment				
Access to computer at age 15	-0.314 (1.029)	0.069 (0.050)	1.140 (1.960)	0.168* (0.083)
Access to internet at age 15	0.131 (1.251)	-0.095 (0.061)	3.154 (2.422)	0.106 (0.114)
Access to magazines & books at age 15	0.760 (0.870)	0.109** (0.042)	-4.744** (1.674)	0.068 (0.071)
Parents' Age at birth				
Father's age at birth	0.742 (0.528)	-0.026 (0.026)	2.108 (1.109)	0.006 (0.044)
Father's age at birth Sq/100	-0.994 (0.741)	0.032 (0.037)	-3.455* (1.581)	-0.024 (0.063)
Don't Know Father's age at birth	13.844 (9.370)	-0.548 (0.464)	32.332 (19.322)	-0.116 (0.758)
Mother's age at birth	-1.846*** (0.559)	0.013 (0.027)	-1.363 (1.069)	0.016 (0.041)
Mother's age at birth Sq/100	2.986** (0.984)	-0.023 (0.047)	2.904 (1.882)	-0.006 (0.073)
Don't know mother's age at birth	-26.985*** (7.857)	0.233 (0.380)	-16.845 (15.057)	0.374 (0.582)
Father's Emp. Stat. (Blue Coll. Informal Omit.)				
Formal Professional Father	-1.497 (1.528)	-0.035 (0.074)	2.208 (2.923)	-0.140 (0.118)
Employer Professional Father	-2.345 (1.675)	0.048 (0.083)	3.513 (3.257)	0.038 (0.131)
Informal Professional Father	1.913 (1.870)	0.062 (0.094)	-0.610 (3.700)	0.102 (0.161)
Formal Service Father	-0.513 (1.480)	-0.067 (0.071)	0.699 (2.839)	-0.129 (0.112)
Employer Service Father	1.160 (3.167)	0.489** (0.165)	-3.469 (6.222)	0.644* (0.263)
Informal Service Father	0.296 (2.396)	-0.249* (0.117)	5.385 (4.583)	-0.133 (0.211)
Formal Craft Father	0.009 (1.518)	-0.036 (0.073)	1.689 (2.894)	-0.118 (0.120)
Employer Craft Father	-4.171 (2.301)	0.214 (0.115)	-3.965 (4.451)	0.374* (0.177)
Unknown Father's Employment	-2.195 (2.002)	-0.076 (0.098)	3.161 (3.924)	0.132 (0.163)
Sex (Male Omit.)				
Female	7.707*** (0.839)	-0.482*** (0.040)	-1.308 (1.603)	-0.682*** (0.069)

Table 13: Continued

	Time to First Job (months)	Log Wages in First Job	Annual Percent Change in Wages	Log Wages Five Years after Graduation
Basic Education				
Kindergarten Attendance	-1.017 (0.822)	-0.076 (0.040)	3.388* (1.574)	0.049 (0.066)
Private Primary School	1.949 (1.275)	-0.060 (0.062)	-0.637 (2.454)	-0.136 (0.099)
Private Preparatory School	-1.980 (1.524)	0.195** (0.073)	1.562 (2.920)	0.288* (0.125)
Secondary Education				
Private Secondary School	0.200 (1.469)	0.081 (0.071)	2.483 (2.802)	-0.199 (0.127)
Secondary Spec. (Arts Omit.)				
Secondary specialization science	62.218 (42.367)	-2.386 (2.004)	107.941 (79.853)	-5.592 (3.130)
Secondary specialization tech	-42.815 (66.442)	2.651 (3.193)	-121.997 (126.127)	2.906 (5.948)
Computers in Secondary (Never Omit.)				
Rarely using Comp. at Sec School	-2.120* (1.060)	-0.054 (0.052)	0.786 (2.057)	0.009 (0.088)
Sometimes using Comp. at Sec School	-1.733 (0.976)	-0.093* (0.047)	-0.271 (1.886)	0.060 (0.083)
Daily using Comp at Sec School	-3.181* (1.454)	-0.074 (0.069)	-4.769 (2.733)	-0.180 (0.126)
Secondary Performance				
Age when graduated secondary	-0.404 (0.330)	-0.030 (0.016)	0.021 (0.641)	0.004 (0.026)
Secondary Final Grade	0.763 (0.633)	-0.016 (0.031)	-0.065 (1.244)	-0.032 (0.057)
Sec Grade Sq/100	-0.583 (0.437)	0.010 (0.021)	0.088 (0.856)	0.031 (0.039)
Don't Know Sec Grade	22.079 (22.971)	-0.656 (1.108)	-5.524 (45.133)	-0.709 (2.073)
Interaction Sec Grade & Sci Spec	-1.749 (1.148)	0.067 (0.054)	-3.273 (2.164)	0.150 (0.086)
Interaction Sec Grade & Tech Spec	1.091 (1.764)	-0.071 (0.085)	3.351 (3.354)	-0.066 (0.156)
Interaction Sec Grade Sq/100 & Sci Spec	1.199 (0.770)	-0.046 (0.037)	2.368 (1.452)	-0.100 (0.058)
Interaction Sec Grade Sq/100 & Tech Spec	-0.724 (1.164)	0.045 (0.056)	-2.281 (2.215)	0.032 (0.102)
Interaction Sci Spec & Sec Grade DK	-62.216 (42.607)	2.866 (2.017)	-120.084 (80.320)	5.784 (3.157)
Interaction Tech Spec & Sec Grade DK	45.539 (66.665)	-2.630 (3.203)	139.194 (126.516)	-3.013 (5.962)
HE Char. (Public Not Sel. Comm. Arabic Omit.)				
Private	-2.631 (1.838)	-0.126 (0.089)	-0.494 (3.612)	-0.016 (0.160)
Selective	-0.409 (1.031)	-0.006 (0.049)	0.866 (1.942)	-0.108 (0.077)
Selective and Private	2.943 (2.575)	0.051 (0.128)	5.030 (5.046)	0.110 (0.224)
IT	-3.116 (2.662)	-0.205 (0.133)	-0.885 (5.448)	-0.206 (0.244)
Private and IT	4.942 (3.184)	0.336* (0.158)	-0.620 (6.388)	0.372 (0.289)
Selective and IT	6.348 (4.271)	0.203 (0.204)	-2.623 (8.311)	-0.149 (0.340)
Selective Private and IT	-6.933 (5.414)	-0.461 (0.262)	-0.818 (10.498)	0.117 (0.446)
English Language	0.379 (2.395)	0.260* (0.115)	-3.820 (4.541)	0.418* (0.176)
Arabic and English Language	-0.594 (1.124)	0.013 (0.054)	1.677 (2.153)	0.122 (0.094)

Table 13: Continued

	Time to First Job (months)	Log Wages in First Job	Annual Percent Change in Wages	Log Wages Five Years after Graduation
Process Factors				
Pedagogy Factor	0.379 (1.177)	-0.027 (0.058)	3.404 (2.381)	0.012 (0.101)
Accountability Factor	-0.571 (1.107)	0.019 (0.054)	-4.598 (2.424)	0.058 (0.107)
Perception Factor	0.163 (1.109)	0.013 (0.054)	1.012 (2.199)	-0.001 (0.094)
Constant	4.300 (25.059)	8.304*** (1.210)	-7.199 (49.181)	7.531*** (2.113)
Governorates Included	Yes	Yes	Yes	Yes
P-value model	0.000	0.000	0.172	0.000
N (observations)	1604	1439	1298	751
R- Squared	0.120	0.231	0.070	0.376
Adjusted R- Squared	0.074	0.186	0.009	0.303

Source: Authors' calculations.

Table 14: Regressions for Labor Market Outcomes, Jordan

	Time to First Job (months)	Log Wage First Job	Annual Percent Change in Wages	Log Wage Five Years after Graduation
Father's Education (Illit. Omit.)				
Father basic	0.682 (1.589)	0.027 (0.042)	2.075 (1.159)	0.212** (0.075)
Father secondary	2.197 (1.849)	-0.042 (0.049)	2.820* (1.355)	0.226* (0.090)
Father post-secondary	-2.017 (2.135)	-0.041 (0.057)	2.219 (1.563)	0.265* (0.106)
Father university	0.713 (2.311)	-0.086 (0.062)	2.696 (1.685)	0.158 (0.115)
Father above university	-1.869 (3.005)	-0.048 (0.080)	2.200 (2.190)	0.207 (0.150)
Mother's Education (Illit. Omit.)				
Mother basic	-1.564 (1.244)	0.019 (0.033)	0.773 (0.905)	0.018 (0.060)
Mother secondary	-2.406 (1.574)	0.038 (0.042)	1.619 (1.147)	0.097 (0.078)
Mother post-secondary	-1.709 (1.893)	0.055 (0.050)	1.621 (1.381)	0.191 (0.098)
Mother university	-3.582 (2.298)	0.041 (0.062)	1.645 (1.673)	0.189 (0.119)
Mother above university	0.481 (5.919)	0.133 (0.157)	12.809** (4.237)	-0.547 (0.368)
Age 15 Home Environment				
Access to computer at age 15	-2.080* (1.010)	0.010 (0.027)	-0.409 (0.730)	0.032 (0.052)
Access to internet at age 15	-0.671 (1.431)	-0.020 (0.038)	0.816 (1.042)	0.045 (0.087)
Access to magazines & books at age 15	-0.778 (0.974)	-0.010 (0.026)	0.025 (0.709)	-0.056 (0.049)
Refugees in Jordan	-0.043 (1.895)	-0.125* (0.050)	0.453 (1.384)	-0.168 (0.098)
Parents' Age at birth				
Father's age at birth	0.742 (0.386)	0.004 (0.010)	0.301 (0.280)	0.032 (0.018)
Father's age at birth sq/100	-0.922 (0.520)	-0.004 (0.014)	-0.330 (0.378)	-0.023 (0.024)
Don't know father's age at birth	8.032 (7.489)	0.104 (0.199)	5.110 (5.463)	0.676 (0.362)
Mother's age at birth	-0.405 (0.486)	-0.027* (0.013)	0.443 (0.357)	-0.028 (0.024)
Mother's age at birth sq/100	0.362 (0.819)	0.041 (0.022)	-0.698 (0.602)	0.043 (0.039)
Don't know mother's age at birth	-7.129 (7.765)	-0.235 (0.206)	11.683* (5.738)	-0.234 (0.386)
Father's Emp. Stat. (Blue Coll. Informal Omit.)				
Formal Professional Father	1.873 (2.028)	0.060 (0.054)	-1.919 (1.473)	0.086 (0.104)
Employer Professional Father	1.076 (3.683)	0.163 (0.100)	-0.705 (2.824)	-0.018 (0.195)
Informal Professional Father	5.471 (5.019)	0.141 (0.133)	-1.335 (3.595)	-0.050 (0.258)
Formal Service Father	2.956 (1.598)	-0.002 (0.043)	-1.828 (1.160)	0.016 (0.084)
Employer Service Father	1.278 (2.741)	0.250*** (0.075)	-3.310 (2.064)	0.318* (0.139)
Informal Service Father	3.024 (2.429)	0.034 (0.064)	-0.591 (1.777)	0.168 (0.124)
Formal Craft Father	-1.441 (1.872)	-0.040 (0.050)	-0.788 (1.359)	0.019 (0.096)
Employer Craft Father	1.488 (2.373)	-0.017 (0.064)	-2.945 (1.786)	-0.035 (0.120)
Unknown Father's Employment	1.224 (1.704)	0.042 (0.045)	-3.362** (1.241)	0.021 (0.088)

Table 14: Continued

	Time to First Job (months)	Log Wage First Job	Annual Percent Change in Wages	Log Wage Five Years after Graduation
Sex (Male Omit.)				
Female	7.947*** (0.919)	-0.162*** (0.024)	-0.729 (0.665)	-0.246*** (0.048)
Basic Education				
Kindergarten Attendance	-1.615 (0.899)	-0.022 (0.024)	0.111 (0.657)	0.061 (0.046)
Private Basic School	0.034 (1.324)	0.015 (0.036)	1.472 (0.973)	0.060 (0.066)
Secondary Education				
Private Secondary School	0.846 (1.612)	0.181*** (0.043)	-2.260 (1.183)	0.013 (0.080)
Secondary Specialization (Arts Omit.)				
Secondary specialization science	20.420 (52.026)	0.764 (1.382)	-49.089 (37.902)	-5.542* (2.701)
Secondary specialization tech	-41.642 (112.058)	-6.165* (3.011)	-66.805 (82.003)	-10.441 (10.267)
Computers in Sec. School (Never Omit.)				
Rarely using Comp at Sec School	-0.817 (1.287)	-0.044 (0.034)	0.025 (0.942)	0.094 (0.059)
Sometimes using Comp at Sec School	1.733 (1.237)	-0.045 (0.033)	1.078 (0.905)	0.139* (0.058)
Daily using Comp at Sec School	-1.316 (2.347)	-0.154* (0.062)	4.819** (1.690)	0.209 (0.126)
Secondary Performance				
Age when graduated secondary	-0.373 (0.442)	-0.021 (0.012)	0.639 (0.328)	0.004 (0.033)
Secondary Final Grade	-0.079 (0.892)	0.017 (0.024)	-1.345* (0.653)	-0.147** (0.052)
Sec Grade Sq/100	0.029 (0.597)	-0.008 (0.016)	0.860* (0.437)	0.094** (0.034)
Don't Know Sec Grade	9.617 (36.611)	0.484 (0.970)	-36.190 (26.655)	-5.458** (2.037)
Interaction Sec Grade & Sci Spec	-0.541 (1.382)	-0.023 (0.037)	1.255 (1.007)	0.138 (0.072)
Interaction Sec Grade & Tech Spec	0.850 (3.006)	0.167* (0.081)	1.623 (2.201)	0.277 (0.277)
Interaction Sec Grade Sq/100 & Sci Spec	0.341 (0.911)	0.018 (0.024)	-0.804 (0.665)	-0.082 (0.047)
Interaction Sec Grade Sq/100 & Tech Spec	-0.378 (1.998)	-0.113* (0.054)	-0.949 (1.465)	-0.178 (0.186)
HE Char. (Public Not Sel. Comm. Arabic Omit.)				
Private	1.350 (1.334)	0.012 (0.035)	-0.389 (0.971)	-0.021 (0.073)
Selective	0.977 (1.625)	0.019 (0.043)	-0.766 (1.176)	-0.017 (0.084)
Selective and Private	0.662 (3.461)	0.037 (0.092)	-0.456 (2.483)	-0.283 (0.171)
IT	0.742 (1.764)	-0.091 (0.047)	-0.144 (1.276)	0.062 (0.099)
Private and IT	-1.454 (2.131)	0.072 (0.057)	0.189 (1.553)	-0.053 (0.114)
Selective and IT	-4.129 (2.492)	0.042 (0.066)	0.032 (1.810)	-0.060 (0.130)
Selective Private and IT	-0.321 (5.739)	-0.011 (0.152)	0.354 (4.124)	0.384 (0.285)
English Language	0.441 (1.836)	0.012 (0.049)	1.439 (1.351)	-0.008 (0.096)
Arabic and English Language	2.571* (1.140)	-0.004 (0.030)	0.487 (0.837)	0.002 (0.057)

Table 14: Continued

	Time to First Job (months)	Log Wage First Job	Annual Percent Change in Wages	Log Wage Five Years after Graduation
Process Factors				
Pedagogy Factor	0.625 (1.173)	-0.014 (0.031)	0.091 (0.849)	-0.052 (0.070)
Accountability Factor	-0.347 (1.128)	0.005 (0.030)	0.191 (0.816)	-0.001 (0.066)
Perception Factor	-1.621 (0.938)	0.016 (0.025)	0.538 (0.677)	0.013 (0.057)
Constant	7.327 (35.555)	5.772*** (0.943)	32.037 (25.968)	11.045*** (2.086)
Governorates Included	Yes	Yes	Yes	Yes
P-value model	0.000	0.000	0.000	0.000
N (observations)	1410	1388	1355	913
R-Squared	.152	.166	.089	.188
Adjusted R-Squared	.108	.123	.041	.123

Source: Authors' calculations.

Table 15: Cox Proportional Hazard Model for Time to First Formal Job, Egypt

Coefficients are hazard ratios

Father's Education (Illit. Omit.)	
Father basic	0.754 (0.115)
Father secondary or post-sec.	0.982 (0.128)
Father university	1.208 (0.197)
Father above university	1.579 (0.589)
Unknown father's edu.	1.889 (1.072)
Mother's Education (Illit. Omit.)	
Mother basic	1.002 (0.130)
Mother secondary or post-sec.	0.933 (0.111)
Mother university	0.996 (0.156)
Mother above university	1.148 (0.864)
Unknown mother's edu.	0.418 (0.312)
Age 15 Home Environment	
Access to computer at age 15	1.134 (0.123)
Access to internet at age 15	0.780 (0.107)
Access to magazines & books at age 15	0.974 (0.093)
Parents' Age at birth	
Father's age at birth	0.930 (0.049)
Father's age at birth sq/100	1.109 (0.080)
Don't know father's age at birth	0.323 (0.309)
Mother's age at birth	1.033 (0.062)
Mother's age at birth sq/100	0.958 (0.100)
Don't know mother's age at birth	1.694 (1.439)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	1.568* (0.282)
Employer Professional Father	0.951 (0.196)
Informal Professional Father	0.997 (0.232)
Formal Service Father	1.715** (0.300)
Employer Service Father	0.816 (0.338)
Informal Service Father	0.496 (0.182)
Formal Craft Father	1.788** (0.316)
Employer Craft Father	1.240 (0.336)
Unknown Father's Employment	1.402 (0.321)
Sex (Male Omit.)	
Female	0.959 (0.086)

Table 15: Continued

Basic Education	
Kindergarten Attendance	0.925 (0.083)
Private Primary School	1.114 (0.150)
Private Preparatory School	1.036 (0.166)
Secondary Education	
Private Secondary School	0.929 (0.147)
Secondary Specialization (Arts Omit.)	
Secondary specialization science	0.036 (0.168)
Secondary specialization tech	254.420 (1876.737)
Computers in Sec. School (Never Omit.)	
Rarely using Comp at Sec School	1.221 (0.138)
Sometimes using Comp at Sec School	1.132 (0.122)
Daily using Comp at Sec School	1.530** (0.231)
Secondary Performance	
Age when graduated secondary	1.071* (0.036)
Secondary Final Grade	0.957 (0.067)
Sec Grade Sq/100	1.030 (0.050)
Don't Know Sec Grade	0.317 (0.809)
Interaction: Sec Grade & Sci Spec	1.091 (0.136)
Interaction: Sec Grade & Tech Spec	0.872 (0.171)
Interaction: Sec Grade Sq/100 & Sci Spec	0.947 (0.079)
Interaction: Sec Grade Sq/100 & Tech Spec	1.089 (0.141)
Interaction: Sci Spec & Sec Grade DK	14.602 (68.132)
Interaction: Tech Spec & Sec Grade DK	0.003 (0.023)
HE Char. (Public Not Sel. Comm. Arabic Omit.)	
Private	0.805 (0.174)
Selective	1.165 (0.128)
Private and Selective	0.665 (0.193)
IT	0.717 (0.235)
Private and IT	1.318 (0.515)
Selective and IT	1.399 (0.635)
Private Selective IT	0.910 (0.538)
English Language	1.399 (0.311)
Arabic and English Language	1.014 (0.127)

Table 15: Continued

Process Factors	
Pedagogy Factor	1.060 (0.130)
Accountability Factor	0.919 (0.118)
Perception Factor	1.275* (0.154)
Governorates Included	Yes
P-value model	0.000
N (observations)	1583

Source: Authors' calculations.

Table 16: Cox Proportional Hazard Model for Time to First Formal Job, Jordan

Coefficients are hazard ratios

Father's Education (Illit. Omit.)	
Father basic	1.036 (0.115)
Father secondary	1.011 (0.133)
Father post-secondary	1.086 (0.167)
Father university	0.989 (0.163)
Father above university	1.132 (0.238)
Mother's Education (Illit. Omit.)	
Mother basic	0.950 (0.084)
Mother secondary	1.067 (0.120)
Mother post-secondary	1.176 (0.159)
Mother university	1.262 (0.206)
Mother above university	0.945 (0.377)
Age 15 Home Environment	
Access to computer at age 15	0.920 (0.067)
Access to internet at age 15	0.898 (0.096)
Access to magazines & books at age 15	0.920 (0.064)
Refugees in Jordan	0.967 (0.132)
Parents' Age at birth	
Father's age at birth	0.977 (0.026)
Father's age at birth sq/100	1.031 (0.036)
Don't know father's age at birth	0.644 (0.335)
Mother's age at birth	1.042 (0.036)
Mother's age at birth sq/100	0.945 (0.054)
Don't know mother's age at birth	2.279 (1.264)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	0.983 (0.142)
Employer Professional Father	1.198 (0.300)
Informal Professional Father	0.746 (0.264)
Formal Service Father	0.856 (0.098)
Employer Service Father	0.961 (0.191)
Informal Service Father	0.842 (0.144)
Formal Craft Father	0.882 (0.119)
Employer Craft Father	0.817 (0.141)
Unknown Father's Employment	0.938 (0.114)
Sex (Male Omit.)	
Female	0.919 (0.061)

Table 16: Continued

Basic Education	
Kindergarten Attendance	0.934 (0.059)
Private Basic School	1.056 (0.100)
Secondary Education	
Private Secondary School	0.921 (0.106)
Secondary Specialization (Arts Omit.)	
Secondary specialization science	0.217 (0.802)
Secondary specialization tech	0.001 (0.008)
Computers in Sec. School (Never Omit.)	
Rarely using Comp at Sec School	1.055 (0.097)
Sometimes using Comp at Sec School	1.042 (0.092)
Daily using Comp at Sec School	1.380 (0.232)
Secondary Performance	
Age when graduated secondary	0.995 (0.032)
Secondary Final Grade	0.989 (0.060)
Sec Grade Sq/100	1.012 (0.041)
Don't Know Sec Grade	0.682 (1.679)
Interaction: Sec Grade & Sci Spec	1.046 (0.103)
Interaction: Sec Grade & Tech Spec	1.171 (0.300)
Interaction: Sec Grade Sq/100 & Sci Spec	0.967 (0.062)
Interaction: Sec Grade Sq/100 & Tech Spec	0.913 (0.154)
HE Char. (Public Not Sel. Comm. Arabic Omit.)	
Private	0.942 (0.090)
Selective	0.876 (0.103)
Selective and Private	1.251 (0.303)
IT	1.043 (0.132)
Private and IT	0.895 (0.139)
Selective and IT	1.249 (0.224)
Selective Private and IT	1.012 (0.410)
English Language	1.023 (0.135)
Arabic and English Language	0.996 (0.084)
Process Factors	
Pedagogy Factor	0.950 (0.079)
Accountability Factor	1.041 (0.085)
Perception Factor	0.966 (0.066)
Governorates Included	Yes
P-value model	0.184
N(observations)	1410

Source: Authors' calculations.