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# Does the Type of Higher Education Affect Labor Market Outcomes? Evidence from Egypt and Jordan

By Ragui Assaad,<sup>1</sup> Caroline Krafft,<sup>2</sup> and Djavad Salehi-Isfahani<sup>3</sup>

## Abstract

In Egypt and Jordan there is a substantial mismatch between the output of the higher education system and the needs of the labor market. Both demand and supply-side factors could be driving this mismatch. This paper tests a key supply-side issue, whether differences in the institutional structures and incentives in higher education affect the labor market outcomes of graduates. Specifically, we ask if the stronger alignment of incentives in private relative to public higher education institutions produces more employable human capital and better labor market outcomes. We examine the impact of the type of higher education institution a person attends on several labor market outcomes while controlling for his or her pre-enrollment characteristics. The results demonstrate that supply-side issues and institutional incentives have little impact on labor market outcomes while family background plays by far the largest role. Proposed reforms for higher education often suggest increasing the role of the private sector in provision of higher education. Our findings indicate that this approach is unlikely to improve labor market outcomes.

**Keywords:** Higher education; Private education; Incentives; Labor markets; Egypt; Jordan

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## 1. Introduction

High unemployment among higher education graduates in Egypt and Jordan is a sign of potential mismatch between the output of the higher education system and the needs of the labor market (Mryyan, 2014; Assaad & Krafft, 2015a). Skills mismatch has been blamed for the unemployment of educated youth and social unrest in the wider Middle East and North Africa (MENA) region (Salehi-Isfahani, 2012, 2013; Assaad, 2014a). Labor market mismatch and graduate employability are concerns for families and policy makers making decisions about higher education throughout the globe (Albert, 2000; Cranmer, 2007; Livanos, 2010; Pillai, Khan, Ibrahim, & Raphael, 2011). 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. Problems with mismatch are 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.

In this paper we investigate the reasons for labor market mismatch in Egypt and Jordan. Specifically, we examine the impact of institutional structures and incentives in higher education on labor market outcomes. We use two unique surveys, one from each country, which report on labor market outcomes of university graduates in commerce and information technology (IT). Our choice of these two specific fields is because we believe that productivity signals are more clearly observable in these fields than in, say, humanities or the social sciences, as well as the fact that there is more 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.

Our paper contributes to the debate in MENA countries regarding the role of higher education in skill formation and employment in important ways. MENA higher education has expanded rapidly, often at the expense of quality. For example, with less than half the per capita income of Turkey, Egypt has twice as many college graduates and lower returns to higher education (Salehi-Isfahani, Tunali, & Assaad, 2009). The widespread protests in the Arab world since 2011 have brought the unemployment of educated youth to the fore and as a central part of what ails MENA societies (World Bank, 2013). There are two broad approaches in attempts to respond to the unemployment of educated youth. One approach has been to focus on the demand side for educated labor and emphasize the role of improving the business environment. Another approach, from the labor supply side, emphasizes improving skill formation in MENA education systems and reducing the mismatch between the skills the systems produce and what private employers need. This paper investigates the labor supply side of this debate, examining the evidence on the importance of the incentives that higher education institutions (HEIs) face in providing the right kind of human capital.

Discussions of how to improve the supply side of the skilled labor market generally follow two strands. One strand focuses on what the World Bank (2008) calls 'engineering' reforms, increasing the quantity and quality of classrooms, teachers, and textbooks and improving curricula and instruction methods. Another strand identifies the poor incentives that public financing of education provides as a source of the problem and advocates for private education as a way to improve labor market outcomes of graduates (Fahim & Sami, 2010; Kanaan, Al-Salamat, & Hanania, 2010; OECD/The World Bank, 2010). However, there is no evidence from the region on whether private higher education actually leads to better labor

market outcomes, a substantial gap in the literature. The evidence we provide compares the labor market outcomes of graduates from institutions of higher education that differ in ownership – public versus private – as well as in other characteristics that are expected to affect the quality of human capital of their graduates, such as accountability. The comparative element of our work, including both Egypt and Jordan, which have some common labor market and education structures, but also important differences, can help shed light on whether, when, and why the relationship between higher education characteristics and labor market outcomes may vary.

The main concern in comparing public and private higher education is the selection of students into different types of institutions. Public institutions in MENA are generally more selective and some more than others (Barsoum, 2017; Krafft, Elbadawy, & Sieverding, 2017), which affects the labor market success of their graduates irrespective of the institution's effectiveness. We deal with selection into private versus public programs by, variously, controlling for and matching on pre-enrollment characteristics of students. These measures include test scores in secondary exams, which determine the type of institution and specialization to which a student can be admitted.

We do not find any evidence that the characteristics of HEIs that individuals attended influenced their labor market outcomes appreciably. Enrollment in private institutions, which are supposed to be more responsive to labor market needs, 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 family background. The robustness of our findings is clearly predicated on how successfully we correct for selection into public and private institutions. If lower ability students are selected into private schools, any positive labor market outcomes for these schools may be underestimated. However, selection into private institutions is primarily based on test scores and ability to pay, both of which are controlled for in our models.

## **2. Conceptual Framework**

While education is about the development of the individual for multiple roles in society, it is also about skill formation and future employment. If the markets for labor and education function optimally, employers would send signals to individuals and HEIs regarding the type of skills they reward. Prospective students and their families would use the signals to decide in which skills to invest (Tymon, 2013), and HEIs would in turn respond by designing curricula and delivering instruction in such a way as to maximize the employment potential of their students (Rae, 2007).

The theory that describes the behavior of individuals in this scenario is the well-known human capital model developed by Becker (1962, 1993). It can be easily augmented to account for the behavior of HEIs as well. In order to attract good students and maintain their reputation these institutions would respond to labor market signals, as reflected in the type of skills students and their families demand, by teaching those skills. The alignment of incentives for private HEIs should be stronger than public institutions because they rely on tuition to fund their operations and must therefore satisfy their clients (Shleifer, 1998; Bishop & Wößmann, 2004; van Zanten & Legavre, 2014). Even non-profit private HEIs would be responsive if tuition were an important part of their revenues or if their donors imposed the right set of objectives on them. Public HEIs, too, could respond similarly if a substantial part of their revenues came from tuition or was

contingent on their performance (Ferris, 1992). On the whole, there is a strong *theoretical* argument in favor of private provision of education, which has led to a policy push for expanding the role of the private sector not only in higher education but also in pre-university education. However, the *empirical* evidence on the efficiency, quality, and equity of private versus public education is mixed.

In terms of learning outcomes, there are studies showing improvements in academic achievement from private education (Anand, Mizala, & Repetto, 2009). However, after accounting for selection into private schools other studies find no effect (Chudgar & Quin, 2012). In some contexts, public education may have higher quality and lead to higher achievement than private education (Newhouse & Beegle, 2006). Competition between the private and public sectors may also improve educational outcomes (Hoxby, 2000; Thapa, 2013). Competition and choice are often invoked in favor of private education, but the reality of how private and public educational institutions operate is more complex (Henig, 1995; Dill, 1997; Plank & Sykes, 2003; Tooley, 2013).

Although private and public higher education institutions may have substantial differences, there may also be substantial overlap between their characteristics and performance. For example, in Brazil, while there are business-style private higher education institutions, there are also private institutions much more akin to public institutions (Martins, 2013). In Argentina, although the private sector of higher education only offers fields for which there is high demand, the fields of private and public higher education are increasingly similar (Raboosi, 2011). Decentralized systems and decreased public funding have pushed public institutions globally to act more like private institutions (Torres & Schugurensky, 2002; Knott & Payne, 2004). Additionally, the public sector may intervene to varying degrees in the private sector, further increasing the similarity across sectors (Roger, 1988; Kim & Lee, 2006).

In a number of countries, including Egypt, private higher education is a fallback position if access to public higher education is denied (Wilkinson & Ishak, 2005; Welch, 2007; Barsoum, 2017). Low-quality private higher education is particularly a concern in contexts where private education is a fallback or demand-absorbing sector (Amaral & Teixeira, 2000; Teferra & Altbach, 2004). Equity is also a concern with private higher education, as income and wealth are more of a constraint in accessing private education (Patrinos, 1990; Buckner, 2013).

The situation in MENA is quite different from the ideal incentive structure. MENA public universities developed at a time when the primary demand for their graduates was in the civil service and the public enterprise sector (World Bank, 2008). Free public education was extended to all levels of education, including higher education, as part of the social contract (Rugh, 2002). Because the students do not pay much in tuition, and higher quality institutions face excess supply of candidates, the signals that they might send to HEIs about their preferences are substantially attenuated (World Bank, 2008). A history of government as the primary employer of graduates and the emphasis in government hiring on credentials has led public HEIs to focus on the production of credentials rather than the mix of skills demanded in a competitive private-sector-led economy (Psacharopoulos & Sanyal, 1982; Rugh, 2002; World Bank, 2013;

Assaad, 2014a). 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.<sup>4</sup>

As the economies of the region moved from a state-led to a more market-oriented development model, skills played an increasingly important role. However, public HEIs were ill-equipped to respond to the changing labor market. First, the financing of public higher education relies almost entirely on central budget allocations that are not responsive to market forces.<sup>5</sup> Second, the strong preferences of students and their families for public sector jobs, as surveys indicate, continue to drive the demand for credentials (Assaad, 2014a; Barsoum, 2015). To some extent this is a function of the anemic growth of the formal private sector and the inability of existing private sector employers, which are primarily small and informal (Assaad, 2014b; Assaad & Krafft, 2015b), to send clear signals about the type of skills they reward. Third, staff compensation and promotion practices of HEIs do not reward good learning outcomes or responsiveness to students or employers' needs (World Bank, 2008; OECD/The World Bank, 2010).

Under these circumstances, it is easy to imagine that mismatch arises between the skills produced by HEIs and those demanded by employers, but identifying the precise source of the mismatch is more complicated. This complexity is because the source of the mismatch can lie in either of two markets, the market for education or the market for skilled labor, which together determine the production of skills. Furthermore, both markets are subject to information problems that may prevent an efficient equilibrium from arising.

On the demand side of the market for skilled labor are employers and on the supply side students and HEIs. Students comprise the demand side of the market for education, while HEIs are the suppliers of education. Malfunction in either the education or labor market may lead to skills mismatch. Private employers may fail to send the right signals of rewards to the education market, and the education market may not respond efficiently to these signals. In addition, the quality of certain skills may not be readily observable by students or employers. Employers only observe certain skills after a period of employment. Where labor laws prevent layoffs, employers tend to rely on credentials, which are ex-ante signals of productivity, again encouraging students to favor credentials.

We capture the interactions between the students, HEIs, and employers in two flow charts that illustrate the difference between the two types of market equilibria we discussed above, one oriented toward production of skills (Figure 1) and the other oriented toward credentials (Figure 2). We represent the strength of the signals between the three players by the thickness of the arrows that connect them. We distinguish between public and private employers as differing by the strength of the signals they send for credentials versus skills. We also divide the HEIs into public and private; these differ by their incentives or ability to respond to demands coming from students.

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<sup>4</sup> This dynamic was common throughout the MENA region and is sometimes referred to as the credentialist equilibrium (Salehi-Isfahani, 2012).

<sup>5</sup> For more information on the structure, governance, and financing of HEIs in Egypt and Jordan, see Barsoum and Mryyan (2014) and Barsoum (2014).

In the skills-oriented case, private employers send strong signals of the skills they need to students who, in turn, demand those skills from HEIs. Private HEIs respond strongly to students' signals and demands, but public HEIs may not. Public HEIs tend to be more rigid and have little incentive to adapt to the new environment defined by rising private sector employment. Thus, public HEIs' supply of skills is weak. Public HEIs do not fear the loss of demand for their services because regardless of what they teach students line up to enroll and the government continues to pay for them. Private HEIs have better incentive structures, leading to stronger skills, so we expect to see significant differences in the labor market performance of graduates from public and private HEIs after controlling for individual characteristics that affect labor market outcomes.

In the credentials-oriented case, the strongest employer signals are for credentials, which in turn lead students to demand credentials. As a result, both private and public HEIs produce credentials. The credentials-oriented case can arise for two different reasons, both of which are relevant to MENA. First is the strong legacy of public-sector dominated market for higher education graduates. MENA governments offer much greater job security and sometimes even higher pay, inducing graduates to seek government jobs and thus the credentials required by such jobs. A second reason for the credentialist case is information asymmetry in the markets for education and labor. Not all skills can be measured and signaled accurately. A student's skills may be tested and certified to varying degrees. Hard skills, such as subject matter knowledge, may be relatively easier to observe, whereas soft skills, such as ability to work in teams, timeliness, and general attitude toward work, are difficult to measure and signal accurately. For many skills, employers need to observe new workers on the job before they can determine their productivity. Labor regulations that limit the discretion of employers to fire workers after they have observed worker productivity reduce the willingness of employers to rely on imprecise signals of skills when they hire graduates. Likewise, students may be unable to fully determine the type and value of the skills that education institutions provide and therefore prefer to invest in credentials. The inability to determine the value of skills may be due, in part, to the small size of private sector employers, who cannot send strong signals of their demand for skills. As a result, in rigid labor markets employers, public or private, as well as students, would be more interested in ex ante signals of productivity – i.e., credentials – and public and private HEIs would specialize in producing them.

[Figure 1 and Figure 2 near here]

The distinction we draw between the reasons for weak signals of skills coming from private employers in the credentialist case has implications for policy. If asymmetry of information combined with labor market rigidity explains why private employers are unable to send strong signals of reward for skills to students, labor market liberalization would weaken the credentialist equilibrium, with private HEIs leading the response. Liberalization would enable private employers to reduce their reliance on ex-ante signals of productivity and be willing to take greater risks with signals of skills. The two countries that we study in this paper, Egypt and Jordan, have differentially flexible labor markets, with Jordan more dynamic than Egypt (Assaad & Krafft, 2016). The comparison of the two countries and the differences between the labor market outcomes of public and private HEIs is thus informative of the role of dynamism. Our results suggest that the credentialist case pertains in both countries, in part due to the long shadow of the public sector on youth perceptions of the ideal job.

### 3. Brief Background on the Higher Education System and the Labor Market for Graduates in Jordan and Egypt

The use of Egypt and Jordan as case studies for this comparative analysis offers a number of advantages. On the one hand, there are many similarities across the two countries in terms of the structure of their higher education systems and the labor markets for graduates. For instance, both countries use a higher education admission system based on grades obtained in a general secondary school exam and administered by a centralized placement office. Both countries track students in the higher education-bound general secondary stage into science and arts tracks; Jordan has an additional track in information technology and Egypt has one in mathematics, but these are generally quite small. Their higher education systems consist of a relatively small number of large diversified public institutions (23 in Egypt and 10 in Jordan), which enroll 76 percent of all students in 4-year degree programs in Egypt and 73 percent of such students in Jordan. The two countries have a similar number of private universities (19 in both Egypt and Jordan), which enroll 4 percent of students in Egypt and 27 percent of students in Jordan (Assaad, Badawy, & Krafft, 2016). In addition, Egypt has a large number (131) of more specialized private higher institutes that grant four-year bachelor degrees and that enroll 14 percent of all students in 4-year degree programs. The only equivalent in Jordan are two-year community colleges, which fall outside the scope of this analysis.

To reduce the potential heterogeneity among graduates, we limit the focus of this analysis to two fields of study in which private HEIs are strongly represented, namely commerce (business) and information technology (IT). Commerce students make up 20 percent of students in 4-year degrees in Egypt and 25 percent in Jordan. IT students make up 4 percent of students in Egypt and 9 percent in Jordan. While enrollment in commerce is disproportionately tilted toward public universities in Egypt (with only 12 percent of private enrollment made up of commerce students), the opposite is true in Jordan, where commerce students make up 38 percent of private university enrollment. IT students are disproportionately represented in private institutions in both countries. They make up 19 percent of enrollment in private institutions in Egypt and 11 percent in Jordan.<sup>6</sup>

Although the number of students allocated to each specialization in every university is centrally determined in both countries, Jordanian public universities enjoy greater autonomy in governance than those in Egypt. In Egypt, the Ministry of Higher Education controls most aspects of public university operation, including curriculum design, the approval of new degrees, staffing levels, the appointment of university leadership, and budgetary allocations. In Jordan, public universities have their own board of trustees that, at least in theory, makes decisions about university policy, strategic direction, budgetary allocations, tuition and fees, and most staffing decisions (Barsoum, 2014; Barsoum & Mryyan, 2014).<sup>7</sup>

In both Egypt and Jordan, private HEIs enjoy greater autonomy than public institutions, but are also closely regulated by the state (Assaad, Badawy, & Krafft, 2016). Private higher education is relatively new in both countries. Although private higher institutes existed in Egypt prior to 1996, private universities only became legal in the 1990s with the first private

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<sup>6</sup> See Assaad, Badawy, and Krafft (2016) for more details about the distribution of commerce and IT students across public and private institutions in both countries.

<sup>7</sup> See also Said (2013), Barsoum (2014) and Barsoum and Mryyan (2014) for further discussion of university governance and autonomy in Egypt and Jordan.



universities opening in 1996 (Said, 2013; Barsoum, 2014).<sup>8</sup> As in Egypt, private higher education only arrived in Jordan in the 1990s (Kanaan, Al-Salamat, & Hanania, 2010).<sup>9</sup> While theoretically private higher education faces different incentives, research from the region indicates that these institutions are a fallback option for students, absorbing demand in excess of the public system's capacity (Barsoum, 2014). In other global contexts, private HEIs have been shown to be more risk-averse in order to maximize short term profits, which may limit their innovativeness (Rossi, 2010).

The labor markets for graduates in the two countries have many similarities as well as some differences. In both countries, the public sector had been the dominant employer of graduates but has significantly reduced its role in that respect in recent years. The proportion of new entrants with at least secondary degrees who worked in the public sector for their first job went from over 70 percent in 1965 to under 20 percent in 2005 in Egypt (Assaad, 2014b). That proportion remained above 60 percent in Jordan until 1985 and then declined precipitously to just over 30 percent by 2000 (Assaad, 2014b). Like elsewhere in the MENA region, the historical dominance of the public sector as an employer of graduates drove the demand for credentials in both settings, creating little incentive for skill acquisition and a phenomenon that has since become known as the 'credentialist equilibrium' (Salehi-Isfahani, 2012). With the decline in the role of the public sector, the labor market for graduates in the two countries has diverged somewhat. In Egypt, formal private wage employment has essentially stagnated at around 20 percent of new entrants, leaving informal employment to pick up the slack created by falling public sector employment. In particular, informal wage employment, that is wage employment without the benefit of legal contracts or social insurance coverage, grew from under 5 percent of first jobs for graduates in 1970 to over 40 percent of first jobs in 2005 (Assaad, 2014b). In contrast, it was formal private wage employment that grew substantially in Jordan to take up the slack created by the retreat of the public sector. It should be noted, however, that much of the growth of formal private employment in Jordan took the form of employment with the more flexible temporary contracts rather than the indefinite duration contracts that had been the norm up to that point (Assaad, 2014b).

To further explore the labor market status of commerce and IT graduates in comparison to other university graduates, we draw on recent data from the official labor surveys in the two countries. We use the same selection criteria that were used to draw the sample for the Higher Education Graduates Surveys (HEGS) that we rely on for the remainder of this paper, namely that an individual must have a four-year university degree, must be in the 25-40 age range, reside in an urban area and must either be currently employed or had been previously employed. To ensure a sufficient sample size, we pool data from the 2011 to 2013 survey years in both countries, a time period which brackets the HEGS, which were conducted in 2012 in both Egypt and Jordan.

As shown in Table 1, somewhere between a third and two-thirds of university graduates are employed by the public sector around 2012 in both Egypt and Jordan. Male graduates in Egypt occupy the lower end of this range and female graduates, also in Egypt, the upper end,

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<sup>8</sup> The exception to this is the American University in Cairo, which was established in 1919.

<sup>9</sup> Although private higher education is relatively new, the average ages across public and private higher education within our sample are similar (Assaad, Badawy, & Krafft, 2016).

with males and females in Jordan falling somewhere in between. In both countries and for both sexes, commerce and IT graduates are less likely to be employed in the public sector than other graduates, nonetheless about half of female commerce and IT graduates in Egypt and female IT graduates in Jordan end up in public sector employment. Although it is not possible to distinguish between formal and informal private sector employment in the Jordanian data, it is clear that about one third of private sector jobs for graduates in Egypt are informal in nature. That proportion rises substantially when non-wage employment, which is almost entirely informal, is included.<sup>10</sup>

## **4. Data**

### *4.1. Sample*

As explained above, the target population for the HEGS consists of individuals between the ages of 25 and 40 in 2012 who (1) graduated from the two specified fields of study from a four-year HEI, (2) are either currently working or have previously worked, and (3) live in urban areas. We selected all individuals who met these criteria from one of the 2012 rounds of the official Labor Force Survey in Egypt and the Employment and Unemployment Survey and Household Income and Expenditure Survey in Jordan. These source surveys are administered to nationally-representative stratified cluster samples, which ensures that individuals in our sample are randomly selected from the universe they represent. Once the sample was identified, return visits were made to the selected individuals to administer the HEGS. Unfortunately, it was not possible to subsequently link the data from HEGS to the source data at the individual level. The HEGS questionnaire inquired in detail about the education and labor market trajectories of the selected individuals, along with their family background and their views about their higher education experiences. 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 HEIs outside of Jordan or who are not Jordanians. Our final sample sizes are 1,616 for Egypt and 1,418 for Jordan.<sup>11</sup>

### *4.2. Outcome Variables*

We examine five different labor market outcomes: the time to first job, time to first formal job, wage in first job, annual percentage change in wage, and the wage five years after graduation. All of these outcomes are based on detailed retrospective questions. The time to first job is in months from graduation, and is net of time out of the labor force or in mandatory 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. The time to first formal job is specified similarly. If individuals have yet to obtain a formal job, then they are ‘right censored,’ which our survival analysis takes into account. We define formal jobs 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.

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<sup>10</sup> Non-wage employment includes self-employment and unpaid family work.

<sup>11</sup> The data and metadata from the HEGS surveys are available for public use from the ERF Open Access Microdata Initiative ([www.erf.org.eg](http://www.erf.org.eg))

Wages in the first job (after higher education) are monthly and calculated in local currency (Egyptian Pounds (£E) and Jordanian Dinars (JD)) and in real terms using each country's CPI. An important issue is whether there is selection into wage work; in Egypt 89% of those who graduated from public institutions and 86% of those who graduated from private institutions had a first job that was wage work. In Jordan 97% of those who graduated from public institutions and 96% of those who graduated from private institutions were wage workers in their first job. Thus, selection into wage work is extant, but not substantial nor differential by type of higher education in either context. We also calculate the annual percentage change in wages 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. We calculate this only for individuals who spent at least one year in wage work. The growth is calculated treating the time from first waged employment to current or final waged employment as uninterrupted. Wages five years after graduation are an important measure of the long-term impact of education on labor market outcomes. They are only available for individuals who are in wage work five years from graduation regardless of whether or not they spent five years in the labor market. Together, these variables capture a wide range of labor market outcomes that we expect HEIs to influence. The incentives (private vs. public) and other characteristics of each institution should affect the labor market prospects of their graduates. In general, we expect private higher education, with its theoretically stronger incentives, to improve labor market outcomes.

#### 4.3. *Covariates*

We use a detailed set of covariates on the demographics of individuals (sex,<sup>12</sup> five-year age cohorts), 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 at the end of the secondary stage, which serve as admission scores for higher education) to control for variables that might confound identification of the impact of HEIs on labor market outcomes. These variables are summarized in Table 10 (in the Appendix). We also examine a variety of different characteristics of HEIs that we expect to impact graduates' labor market outcomes, including whether they are public or private, their specialization, their degree of selectivity, and a number of factors describing the educational processes within them. Whether HEIs were public or private was identified based on the name of the institution, as individual responses were sometimes contradictory.

We expect private HEIs, which presumably have stronger incentives, to induce better labor market outcomes in their graduates. Private higher education should lead to higher wages in the first job, a shorter duration to a formal (higher quality) job, higher wage growth, and higher wages five years after graduation. The expected impact of private higher education on time to first job is more ambiguous; it may be that those with private higher education transition more rapidly, because private higher education confers more relevant skills. However, it may also be the case that private higher education graduates spend longer in initial unemployment because they have higher aspirations for their initial jobs, given their additional skills, and therefore spend additional time to search for the right match.

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<sup>12</sup> We tested excluding women from the sample and re-running the regressions with only men. The key results around higher education incentives were robust to excluding women. Although our sample size precludes estimation split by gender, the robustness of our main results to excluding women suggests that gender differences/interactions are not driving our results.

The specialization was categorized 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 at the 75<sup>th</sup> percentile or greater for their type were coded as selective. For some private institutions, the 75<sup>th</sup> percentile was the same as the lowest admission score, so the next highest score was used instead as a cutoff. If selectivity is a proxy for the (perceived) quality of HEIs, we would expect selective institutions to lead to better labor market outcomes.

A number of processes that occur within HEIs may affect labor market outcomes. The survey data included a number of questions on pedagogy, accountability, and student perceptions. We reduced these sets of questions to three continuous, standardized variables using factor analysis, a data reduction technique. See Assaad, Badawy, and Krafft (2016) for information on these factors, which we refer to as the pedagogy, accountability, and perception factors, as well as a discussion of potential measurement, recall, and bias issues.

## **5. Methods**

### *5.1. Regression*

In attempting to identify the effect of different HEI characteristics on labor market outcomes, we cannot simply compare the graduates of public and private institutions because different individuals select into different types of institutions. To address these problems of selection when estimating the impact of HEI features on labor market outcomes, we control for a wide variety of individual characteristics determined prior to enrolling in higher education. However, some characteristics remain unobserved, which may generate bias. For instance, students with low secondary test scores who do not gain admission to public institutions and select into private institutions may have lower innate ability. In this case the effect of unobserved ability will confound the impact of institution type on wages. To reduce this bias, we control for grades at the end of the secondary stage, which determine access to different types of higher education, in our models. These measures may also serve as a proxy for unobserved ability. However, bias will ultimately only be reduced to the extent we can measure the factors that drive higher education selection.

### *5.2. Survival Analysis*

For individuals who are yet to obtain a formal job, the time to first formal job is right censored, so the appropriate estimation method is survival analysis. We use the Kaplan-Meier estimator to provide a summary description of the time to first formal job. The Kaplan-Meier estimator does not assume, but rather estimates, the distribution of time to first formal job, taking into account right censoring. We use the Cox proportional hazards model to estimate the impact of covariates. The Cox model does not assume any particular parametric form for the baseline hazard, but does assume that hazards estimated for different values of the covariates are proportional. The Cox model estimates ‘hazard ratios,’ which, when greater than 1, indicate higher hazards, 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 based on the delta method, and roughly describe statistical significance in terms of deviations from 1 (Moeschberger and Klein 2003).

### 5.3. Propensity Score Matching

In addition to controlling for the covariates that affect labor market outcomes and confound the effects of HEIs, we use propensity score matching as an alternative approach to correct for selection into the various types of HEIs. Selection is a serious concern in trying to identify the causal impact of different aspects of higher education on labor market outcomes. Propensity score matching addresses selection on observables by matching on observable pre-treatment characteristics to compare those who, for instance, attended a private HEI (the ‘treatment’) with those who attended a public institution (the ‘control’), but have otherwise similar characteristics. This method first estimates propensity scores for being treated, for example, being in a private versus public institution. These propensity scores are predicted probabilities from a probit model for the probability of treatment based on pre-treatment characteristics. 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. We match observations using the Epanechnikov kernel weights.

The main advantage of propensity score matching (PSM) is that it does not assume the typical linear functional form of regression models. It is instead a non-parametric method for estimating treatment effects, and limits estimation to the area where probabilities (propensities) are similar between the treated and control observations, the region of common support. This precludes comparing radically different observations. PSM does not control for selection on unobservable characteristics, so in that regard it is not considered an improvement over regression (Rosenbaum & Rubin, 1983; S. O. Becker & Ichino, 2002).<sup>13</sup> Thus, propensity score matching is a complementary method to regression, relaxing some of its assumptions, but not overcoming the inherent challenge of selection on unobservables.

## 6. Results

### 6.1. Sample Descriptives

A rich set of covariates is used to control, as much as possible, for variables that might confound the impact of higher education incentives and in estimating propensity scores. Table 10, in the Appendix presents the characteristics of the sample as proportions and means. Table 2 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, a third of the sample attended private higher education, and a fifth were in IT. Since the selectivity was calculated on a HEI level at the 75<sup>th</sup> percentile, varying shares of students attended selective programs. In Jordan, 44% of students attended private higher education and a third were in IT.

[Table 2 near here]

Table 3 presents the summary statistics for the outcomes that we examine, broken down by the different possible treatment combinations of HEI characteristics. In Egypt, the average time to a first job was around 7 months and in Jordan around 9 months. In terms of the time to first formal job, we report the 25<sup>th</sup> percentile and median values from the Kaplan-Meier estimator

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<sup>13</sup> We estimate propensity scores using the `psmatch2` command in STATA version 14.2. Testing, presented in Appendix 2, is undertaken using the accompanying `pstest` and `psgraph` commands.

because 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 six years. In Jordan, for all program types, more than 25% of graduates immediately obtained formal jobs. The overall median was six months for the time to first formal job.

The average monthly wage in the first job for the Egypt sample is £E 1,058 per month and varies by the type of institution attended.<sup>14</sup> Graduates of private selective IT, public and private non-selective commerce, and public non-selective IT earn below average wages, while those from private non-selective IT, private selective commerce, and public selective IT receive substantially higher wages in their first job in Egypt. In Jordan, the average wage is JD 341 per month in the first job, which is 2.8 times as high as the average for Egypt in US dollars (1.9 in PPP adjusted terms). 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 that employers obtain during employment about skills and productivity. In Egypt, average annual real wage growth was 7.6% and in Jordan 6.3%. Overall, there are not clear patterns in wage growth by type of higher education attended.

Although wages in the first job and annual wage growth are important, 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 £E 1,774 (US\$293 or 937 PPP international dollars) per month and in Jordan JD 625 (US\$881 or 1,894 PPP international dollars). As with wage growth, there is not a clear relationship between the type of institution attended and wages after five years. Looking across outcomes, in both Egypt and Jordan, there are not clear, consistent, or substantial differences across types of higher education. However, students are selecting into specializations and school types 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.

[Table 3 near here]

The fact that we do not observe substantial differences in outcomes by type of higher education may be due to selection into different higher education types, which cancels 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, which we can only partially observe inasmuch as they are proxied by test scores. We examine this possibility in Figure 3, which shows the scatter of secondary test scores and wages, as well as the fitted line.<sup>15</sup> We would expect that if test scores signaled ability or productivity and employers were responding to that signal, there would be a clear increase in wages at higher test scores. We do not observe such a pattern, which indicates that, at least in the two fields we examine, either secondary scores are a poor signal of underlying ability and productivity or employers do not reward the ability and productivity that scores may measure.

[Figure 3 near here]

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<sup>14</sup> In 2012, the official exchange rate was £E 6.06 = 1 U.S. Dollar and JD 0.71 = 1 U.S. Dollar. The PPP adjusted rate was JD 0.33 = 1 international dollar and £E 1.89 = 1 international dollar (World Bank, 2016).

<sup>15</sup> A median spline was tested, but did not show substantively different results.

## 6.2. Selection into Different Types of Higher Education

Test scores play a critical role in selection into higher education. Figure 4 shows the distribution of test scores by type of higher education. In both Egypt and Jordan, those who attend private higher education have disproportionately lower test scores. This is a result of the aforementioned admissions structure where access to public higher education, and also preferred fields within public higher education, depends on test scores. Those with lower test scores, and especially those with very low test scores, tend to go to private institutions, while those with the highest test scores go to public institutions. Although those with higher test scores are more likely to attend public higher education, there is substantial overlap over the test score distribution. Additional factors such as socioeconomic status also affect selection in to private and public higher education, as we will see below.

In order to model the selection decision into different types of higher education, we estimate 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 outcome based on the probit models. We present here only the models for selection into private higher education used for the sample for the time to first job variable, which is almost the full sample. Table 4 presents the variables and categories of variables used in these regressions and Table 11 (in Appendix 1) presents the marginal effects.

[Table 4 near here]

Table 5 presents the results of tests of joint significance for different predictors of private higher education, using the categories in Table 4. These joint tests are particularly important for demonstrating what affects selection given the substantial multicollinearity between different individual characteristics, such as mother's and father's education. In both Egypt and Jordan, family background is a significant predictor of attending private higher education, as are demographics and geography. Basic schooling characteristics are not significant in Egypt but are in Jordan, whereas secondary schooling characteristics are significant in Egypt but not Jordan. Secondary performance of graduates is a significant predictor of attending private higher education.

Examining specific characteristics that predict private higher education (Table 11 in Appendix 1), we highlight a few key dimensions of selection. Having a father with a better employment status is a significant predictor of private higher education. Females are significantly less likely to attend private higher education. All else being equal, private higher education was significantly less available for older cohorts in Egypt, but more available in Jordan. Those with the lowest test scores are the most likely to attend private higher education. These findings are consistent with past research demonstrating that private higher education is attended by the wealthy, those whose low test scores preclude access to public programs in desirable specializations, and males (Buckner, 2013; Barsoum, 2017; Krafft, Elbadawy, & Sieverding, 2017). These characteristics are also likely to determine labor market outcomes, which further emphasizes the importance of correcting for selection as much as possible.

[Table 5 near here]

### 6.3. Higher Education and Labor Market Outcomes

We attempt to account 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. In our regressions, we sequentially build our models to see if adding further controls, potentially accounting for selection, affects our estimates. We show the significance of HEI characteristics in this stepwise process in Table 6. Of particular interest is how HEI characteristics affect labor market outcomes. Do graduates of private programs, different specializations, or more selective institutions perform better in the labor market?

While HEI characteristics are often significant initially, particularly for wages, when no other covariates are in the model, these effects disappear as additional controls are added. The progression of the coefficients in the regressions (not shown) suggests that, if anything, there is selection of those who would have otherwise better labor market outcomes into private higher education. The coefficient on private is positive and significant in the initial model (HEI characteristics only) in Egypt and Jordan for wages in the first job and in Egypt for wages after five years. The coefficient is negative for time to first job (less of a wait, a good thing) in Egypt. Not only do the coefficients for private HEIs lose their significance, they decrease in effect size with the addition of controls. Figure 5 shows the coefficients, and their confidence intervals, in the model with all the controls. There is no clear pattern to be observed in terms of HEI characteristics and labor market outcomes, once observable differences are controlled for. If unobservable selection follows the pattern of observable selection, this means that private higher education may even have a negative effect that is being masked by selection, likely selection of families with higher socioeconomic status.

[Table 6 near here]

Table 7 presents the joint significance tests from the regressions for characteristics determining labor market outcomes in our full model with all the controls. In the full models, institution characteristics do not seem to affect labor market outcomes. Out of five outcomes and two countries, institution characteristics are never significant. The factors measuring higher education processes are also rarely and only marginally significant. Moreover, it is not the case that the problem is insufficient statistical power; other categories are significant, often highly significant. Additionally, in Figure 5 the point estimates do not show a clear or systematic pattern.

If the type of HEI 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 for time to first formal job in Egypt (but not Jordan), and significant for wages in the first job and wages after five years in both Egypt and Jordan. Demographics (age cohort and sex) are significant for everything except time to first formal job in Jordan. Geography matters for many of the outcomes. Basic and secondary schooling characteristics matter little. Notably, secondary performance of the graduate, which may be a signal of ability, does not affect time to first job or first formal job, nor does it affect wages in the long run in Egypt. However, it is significantly related to wages in the first job in both countries, and wage growth in Jordan (at the 10% level) as well as wages after five years in Jordan. The weak relationships between secondary performance and labor market outcomes, particularly in Egypt, 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.

[Table 7 near here]

A number of individual relationships between characteristics and labor market outcomes are significant and noteworthy. Fathers' education is significantly related to higher wages in Egypt, as much as 24.7% higher for a university educated father compared to an illiterate father. Those with fathers who were employers in the service sector have higher wages in their first job, and much higher wages after five years, 70.1% greater compared to those whose fathers were blue collar informal workers. Graduates who studied in English earn more in their first job, and in their job five years after graduation. Quite a lot of the variation, especially in wages, is explained by the models: 26.4% of the variation in log wages in the first job is explained by the model, and 41.8% 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.

We now turn to examining labor market outcomes in Jordan. A more educated father increases the wage five years after graduation. Refugees in Jordan have lower wages in their first jobs. As in Egypt, those with fathers who are employers in services earn higher wages in the first job, and after five years (36.7% higher after five years) compared to those with blue collar informally employed fathers. Secondary grades were significantly related to wages after five years. Notably, in Jordan none of the covariates were individually significant, and the model as a whole was not statistically significant for time to first formal job. Obtaining a formal job in Jordan is unrelated to the family characteristics we observe, which, while not terribly meritocratic, may be less nepotistic than in Egypt.

The relative roles of higher education institutional characteristics and family background in determining labor market outcomes are of great interest. While the regressions make clear that the characteristics of HEIs 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 HEI and then vary individuals' family background and grades. Figure 6 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 £E 800 per month. The differences by institutional characteristics are small, and wages range from approximately £E 750-900 per month. Additionally, all of these results have overlapping confidence intervals, consistent with the lack of significance in the underlying regression models.

However, when a 'good family' (father university-educated and a service sector 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 almost £E 1800 per month, nearly double. In contrast, good grades (test scores of 90) added to the reference case (or to the 'good family' case) increase wages only slightly. While good grades and type of higher education are statistically indistinguishable, the confidence intervals for the 'good family' background cases do not overlap with the reference case. For attendees of higher education,

family background determines wages far more than their test scores (and the ability they may signal) or the type of institution they attended.

[Figure 6 near here]

The pattern of simulations for first wages in Jordan is similar but less dramatic (Figure 7). The reference, public, non-selective, commerce graduate earns around JD 260 per month. There are moderate variations, down to JD 230 and up to JD 260 per month for different types of institutions. Adding a ‘good family’ to the reference case increases wages to more than JD 360. Adding good grades to the reference case (or to the ‘good family’ case) increases wages only slightly. The combination of good family characteristics is also only sometimes statistically distinguishable from the various higher education reference cases. For both Jordan and Egypt, the differences observed in wages in first job become further accentuated after five years, with family background mattering to an increasing extent.

Although in the regressions we use a rich set of characteristics to control for potential confounding factors in the relationship between HEI characteristics and labor market outcomes, we also use propensity score matching that can potentially better account for selection and provide a more flexible functional form for estimates of the impact of HEIs on labor market outcomes. Appendix 2 shows the distribution of propensity scores. As shown in Figure 8 and Figure 9 almost all observations have overlapping propensity scores (i.e., are in the region of common support). Table 16, in Appendix 2, shows the distribution of covariates before and after matching. Characteristics with a greater than 0.1 standardized difference tend to be considered a sign of imbalance (Austin, 2009). The number of characteristics with imbalance is substantially reduced after matching, particularly in Jordan. Although characteristics are not, in either case, perfectly balanced, the results indicate substantial improvement and there are a very large number of covariates being considered.

Table 8 presents propensity score matching estimates for treatment effects of private or selective HEIs on labor market outcomes, also broken down by specialization. The same overall result as in the regressions holds: HEIs 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 a public one increases the time to a first job, a result that holds for private commerce programs (although not significant) but not private IT programs. Being in a selective institution among IT programs decreases the time to first jobs in Jordan. There are no significant differences in wages in the first job. In terms of annual change in wages, no institutional characteristic is significant in either Egypt or Jordan. In Jordan, private institutions in the IT specialization have a significant effect on wages after five years, a 34.8% increase. In Egypt, the selective higher education effect is significant but negative in commerce, decreasing wages by 17.9% compared to non-selective commerce institutions. These few significant results are, notably, a similar number to what one would expect from simply random variation when assessing significance at the 10% level. 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 regression results demonstrated, family, not HEI, is what matters for labor market outcomes in both countries.

[Table 8 near here]

The role of family background in employment begins with how Egyptian and Jordanian graduates search for jobs. Table 9 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 search predominates (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, 2014), and this may be shaping the search process, as well as the education system and rewards on the labor market within Jordan. Overall, family and social networks clearly play a large role in finding the first job, especially in Egypt. The lack of meritocratic hiring in the labor market may be why family and not HEI characteristics or signals of ability (as measured by grades) drive labor market outcomes.

[Table 9 near here]

## **7. Discussion and Conclusions**

### *7.1. Findings*

The mismatch between the output of HEIs and labor market needs is a serious economic and social problem in Egypt and Jordan, manifested by high unemployment rates of higher education graduates (Mryyan, 2014; Assaad & Krafft, 2015a). If labor market supply-side problems, driven by poorer incentives for public HEIs, 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 HEIs. Thus, weaker incentives in public higher education do not seem to be the primary driver of poor labor market outcomes for graduates. Their different structures led us to expect that private higher education institutions would face stronger incentives (Barsoum, 2014; Barsoum & Mryyan, 2014). However, it may be the case, as in some other countries (Raboosi, 2011; Martins, 2013), that private and public higher education institutions function similarly and their incentives are not very different.

If incentives are different across public and private higher education, our findings suggest there may be potential problems on the demand side. Demand side problems would mean that employers or students (or both) fail to demand a variety of skills. Employers may face difficulty signaling to students, families, and education institutions what human capital they seek. With poor signals emanating from the labor market, neither public nor private institutions are able to adequately respond to labor market needs. The problem may also lie with students and their families failing to demand skills and seeking mere credentials in response to the strong signals emanating from the public sector, which they strongly favor. The phenomenon of demand for credentials over skills is well-known in the Middle East and has its origins in the hiring practices of the public sector, which had historically been the dominant employer of graduates (Assaad, 1997; Salehi-Isfahani, 2013). Public sector employees are not paid for productivity but based on the salary scales of the civil service codes. Under these circumstances students and their families

have little reason to seek out the type of higher education that builds productive skills and HEIs have little reason to produce them. The region thus remains stuck in a credentialist equilibrium.

We find that family background variables drive labor market outcomes.<sup>16</sup> The fact that a person's family network (*wasta*) is more important in employment than the type of higher education he or she attended indicates that the education system fails to provide useful signals of productivity. Employers thus rely instead on more easily observed attributes, such as family background and social class, which may or may not be correlated with worker quality.<sup>17</sup> The important role of social networks in employment of graduates, especially in Egypt, also may be related to the predominance of small firms in the private sector (Assaad, 2014b; Assaad & Krafft, 2015b), 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.<sup>18</sup> In Jordan access to formal employment is unrelated to observable family background characteristics, but could be related to characteristics, such as ethnicity, family or clan, which we do not observe in our data.

## 7.2. Limitations

Although our results suggest potential explanations for various labor market challenges in the region, there are several important limitations to note. First, our sample is inherently selective; it is only focused on two specific fields (which constitute 29-30% of higher education students across Egypt and Jordan). These are the fields with substantial private sector presence, but may not be representative of all private and public HEIs. Additionally, our sample only includes those who ever worked. For men, work is nearly universal, but for women, this is a selected sample. A number of our analyses focus on wages, and again, selection in to wage work versus other forms of work may be an issue, although the vast majority (88% in Egypt and 96% in Jordan) of our sample started in waged employment. Although there are issues of selection into the sample and various outcomes, these only pose a threat to the validity of our findings if the patterns of selection are related to our variables of interest. For instance, selection would be a problem if wage work in the first job were related to whether one attended a public or private institution, which is not the case.

A far more serious concern is selection into the different types of higher education. Although we gathered a particularly rich set of controls, they can only reduce, and not eliminate, the potential

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<sup>16</sup> Krafft and Assaad (2016) explore the extent and drivers of inequality of opportunity in the labor market for higher education graduates.

<sup>17</sup> A rich body of qualitative research demonstrates that social connections provide access to job opportunities, and that employers commonly inquire about a potential employee's socioeconomic background, for instance father's employment status, or whether the family owns a microwave oven (Moghadam, 2003; e.g. Barsoum, 2004; Shaalan, 2014; Salemi, 2015).

<sup>18</sup> Other research, comparing access to formal jobs across generations in Egypt, suggests that access to formal jobs for higher education graduates has become increasingly predicated on social class (Assaad & Krafft, 2014).

biases generated by selection. We do know that structurally, access to private versus public higher education is a function of test scores (acting through centralized placement) and ability to pay for private alternatives. We also demonstrated, through the stepwise models, that our controls do explain potential (primarily positive in relation to labor market outcomes) selection into private higher education. Yet unobservables that are related to the type of higher education and labor market outcomes can still bias our estimates. Signing the direction of the bias is challenging; for instance, those who are aiming for a credential may choose private higher education. Such individuals may be less ambitious and perform worse in the labor market, biasing the effect of private higher education downward. At the same time, unobservable social connections (*wasta*) may increase the chances of private higher education *and* pay off in the labor market, potentially biasing the private effect upward. Both are possible, and the estimating the true causal effect would require either a randomized experiment or a quasi-experiment. However, it remains notable that, in comparison to other factors such as family background, the characteristics of higher education matter very little, suggesting that more profound changes (not just changing the mix of HEIs) are needed to redress labor market problems in the region.

Additionally, the data are primarily retrospective in nature, which may introduce measurement error in terms of recall issues. Retrospective labor market histories in the region tend to be of good quality overall in validation studies (Assaad, Krafft, & Yassin, 2016), but some aspects are better captured than others; for instance regularity of work tends to be poorly measured. While measurement error in the outcome variables, if random, should not affect our estimates, there may also be recall error in other characteristics that can lead to attenuation bias. Additionally, the recall error may not be random. For instance, individuals may rate their educational experiences more positively in retrospect if they had good labor market outcomes. The lack of significance in these variables, as well as investigations in Assaad, Badawy, and Krafft (2016), suggest that these are not major issues.

### 7.3. Policy Implications

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, Al-Salamat, & Hanania, 2010; OECD/The World Bank, 2010). Our findings indicate that increasing the role of private higher education is unlikely to automatically improve labor market outcomes. Although they have different legal structures and funding streams (Barsoum, 2014; Barsoum & Mryyan, 2014), the public and private sector may not operate very differently. An important direction for future research will be applying more nuanced classifications of higher education institutions' incentives, beyond public and private. Although our accountability factor did not predict labor market outcomes, identifying what—if any—features of higher education institutions do contribute to labor market outcomes is a critical precursor to designing policies to encourage such features.

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 is unlikely to address labor market and education mismatches for graduates. Labor market outcomes appear disconnected from individuals' abilities and skills. This is likely, in part, due to the structure of the labor market for graduates as primarily government employment or employment in small enterprises. These structural features suggest that even if private institutions were conferring higher quality human capital (which other research suggests

may not be the case (Assaad, Badawy, & Krafft, 2016)), these skills are unlikely to be rewarded in the labor market. Given this context, changes in the composition of HEIs and their incentives alone are unlikely to be sufficient to solve the higher education and labor market mismatch. An important direction for both policy and future research is increasing the quality of information available about students' skills. It is also critically important to increase employers' incentives to act on such information, by encouraging dynamism and competition in the economy and labor market.

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## Tables

**Table 1. Employment Status and Sector of Employment for University Graduates by Field of Study and Sex (Percentages). Ever-Worked Urban Residents ages 25-40, 2011-2013**

Egypt	Male				Female			
	Commerce	IT	Other	Total	Commerce	IT	Other	Total
Public	25	20	37	32	51	49	69	66
Private Formal	36	31	26	29	25	25	15	17
Private Informal	16	23	13	15	11	10	7	7
Non-wage	17	15	20	18	1	1	3	3
Non-working	6	11	5	5	12	16	6	7
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<i>Row %</i>	<i>31</i>	<i>5</i>	<i>64</i>	<i>100</i>	<i>18</i>	<i>2</i>	<i>80</i>	<i>100</i>
N	3,614	604	7,476	11,694	1,068	134	4,942	6,144

Jordan	Male				Female			
	Commerce	IT	Other	Total	Commerce	IT	Other	Total
Public	26	32	52	43	34	47	55	53
Private	57	50	33	41	57	39	32	35
Non-wage	9	6	8	8	2	1	2	2
Non-working	8	11	7	8	8	14	11	10
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<i>Row %</i>	<i>26</i>	<i>11</i>	<i>63</i>	<i>100</i>	<i>11</i>	<i>6</i>	<i>83</i>	<i>100</i>
N	1,790	716	4,272	6,778	495	273	3,713	4,481

**Notes:** Percentages are based on weighted data, but number of observations (N) is unweighted. In Egypt, those not working include those who ever-worked only among both the unemployed and those out of the labor force. In Jordan, we are missing information on previous work experience among those currently out of the labor force, and, as a result, those not working only include the currently unemployed.

**Source:** Egypt: Authors' calculations based on data from the Labor Force Survey

Jordan: Authors' calculations based on data from the Employment and Unemployment Survey

**Table 2. Percentage of Sample by Public/Private, Specialization, and 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 3. Labor Market Outcome Descriptive Statistics by Type of Higher Education, Egypt and Jordan**

	Time to First Job (Months)		Time to First Formal Job (Months)			Wage in first job		Annual pct. chg. in wage		Wage in 5 year out job	
	Mean	N	25%	50%	N	Mean	N	Mean	N	Mean	N
<u>Egypt</u>											
Public Not Sel. Commerce	8.3	520	8	72	522	999	478	7.7	387	1609	251
Private Not Sel. Commerce	5.5	84	13	.	83	914	74	6.2	57	1630	29
Public Not Sel. IT	3.3	35	14	63	35	961	30	10.2	25	1674	13
Private Not Sel. IT	5.9	238	14	.	239	1176	212	6.5	161	2341	91
Public Sel. Commerce	7.8	486	1	65	478	1068	447	7.7	372	1723	270
Private Sel. Commerce	5.6	172	1	41	170	1189	135	8.3	124	1905	65
Public Sel. IT	10.8	18	22	54	18	1259	18	9.1	15	1347	10
Private Sel. IT	8.0	51	15	102	51	881	48	7.7	33	1990	22
Private	5.9	545	7	102	545	1108	469	7.2	375	2067	207
IT	6.2	342	14	108	343	1114	308	7.3	234	2147	136
Selective	7.4	727	1	54	719	1084	648	7.8	544	1761	367
Total	7.3	1,604	7	72	1596	1058	1,442	7.6	1,174	1774	751
<u>Jordan</u>											
Public Not Sel. Commerce	9.7	328	1	6	329	344	325	6.2	306	496	202
Private Not Sel. Commerce	8.1	408	1	1	405	353	401	6.6	381	714	277
Public Not Sel. IT	10.6	169	1	7	172	301	168	7.0	153	514	87
Private Not Sel. IT	6.5	165	1	8	165	353	160	6.7	153	834	109
Public Sel. Commerce	11.1	202	1	10	202	341	197	5.3	188	573	145
Private Sel. Commerce	16.4	31	1	14	31	319	31	6.9	27	347	21
Public Sel. IT	8.2	92	1	1	92	331	90	5.9	81	671	60
Private Sel. IT	6.3	16	1	1	16	384	16	5.4	16	569	12
Private	8.0	620	1	4	617	352	608	6.6	577	722	419
IT	8.4	442	1	5	445	329	434	6.6	403	682	268
Selective	10.6	341	1	7	341	338	334	5.6	312	577	238
Total	9.2	1,411	1	6	1412	341	1,388	6.3	1,305	625	913

**Source:** Authors' calculations

**Table 4. Variable Categories used in Joint Tests**

<u>Category</u>	<u>Variables</u>
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
Demographics	Female, Five-year cohorts
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.
HE Process Factors	Factors for Pedagogy, Accountability, and Perception of Quality. Also Language of Instruction

**Table 5. Tests for Joint Significance for Predictors of Private Higher Education**

	Egypt		Jordan	
	P-value	Sig.	P-value	Sig.
Family Background	0.058	+	0.032	*
Demographics	0.000	***	0.000	***
Geography	0.000	***	0.000	***
Basic Schooling	0.199		0.034	*
Secondary Schooling	0.000	***	0.858	
Secondary Performance	0.000	***	0.000	***

**Source:** Authors' calculations

**Note:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , +  $p < 0.1$

For propensity score for time to first job equation (others similar)

See Table 4 for definitions of categories.



**Table 6. Joint Significance Tests for Impact of HE Institution Characteristics on Labor Market Outcomes for Sequential Models**

	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.
HE Inst. Char. Only	+	*	+		**	*			***	**
+ HE Inst. Char. Interactions, Factors & Demographics					**					
+ Secondary performance					**					
+ Background										

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , +  $p < 0.1$

**Table 7. Joint Significance Tests for Characteristics Determining Labor Market Outcomes, Full Model**

	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			***		***	*			**	*
Demographics	***	***	*		***	***	**	***	***	***
Geography		***	***	+	***	***		***	***	+
Basic Schooling					*					
Secondary Schooling		+				**				
Secondary Performance					*	**		**		*
HE Institution Char.										
HE Institution Factors		+	+							

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , +  $p < 0.1$

Joint tests of significance based on the regressions in Table 12, Table 13, Table 14, and Table 15 in Appendix 1.

**Table 8. 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>	-0.252	1.581	0.037	-0.012	-0.514	0.743	0.171	0.081	
SE	(1.579)	(0.812)	+	(0.082)	(0.039)	(3.385)	(0.960)	(0.145)	(0.085)
N(observations)	1601	1409	1426	1386	1132	1303	724	890	
<u>Selective</u>	0.416	-0.800	-0.039	-0.014	0.629	0.474	-0.104	-0.014	
SE	(1.047)	(1.330)	(0.057)	(0.034)	(1.873)	(0.765)	(0.090)	(0.062)	
N(observations)	1514	1409	1354	1386	1105	1303	699	905	
<u>Private in Comm.</u>	-1.729	1.971	-0.112	-0.036	-0.659	0.173	0.195	-0.024	
SE	(1.924)	(1.264)	(0.107)	(0.059)	(5.195)	(1.153)	(0.255)	(0.100)	
N(observations)	1201	967	1043	952	866	900	463	627	
<u>Private in IT</u>	NA	-0.504	NA	0.016	NA	NA	NA	0.348 *	
SE	NA	(1.842)	NA	(0.07)	NA	NA	NA	(0.190)	
N(observations)	NA	427	NA	419	NA	NA	NA	261	
<u>Select. in Comm.</u>	0.234	2.287	-0.066	-0.074	-1.498	0.674	-0.179	-0.048	
SE	(1.185)	(1.725)	(0.067)	(0.050)	(2.684)	(0.903)	(0.100)	+	(0.084)
N(observations)	1178	967	1053	952	879	891	557	617	
<u>Selective in IT</u>	0.909	-5.175	NA	0.043	NA	NA	NA	0.021	
SE	(2.641)	(2.863)	+	NA	(0.073)	NA	NA	NA	(0.167)
N(observations)	290	405	NA	386	NA	NA	NA	240	

**Source:** Authors' calculations

**Note:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ , +  $p < 0.1$

NA if sample size inadequate for estimation.

Bootstrapped standard errors based on 400 replications.

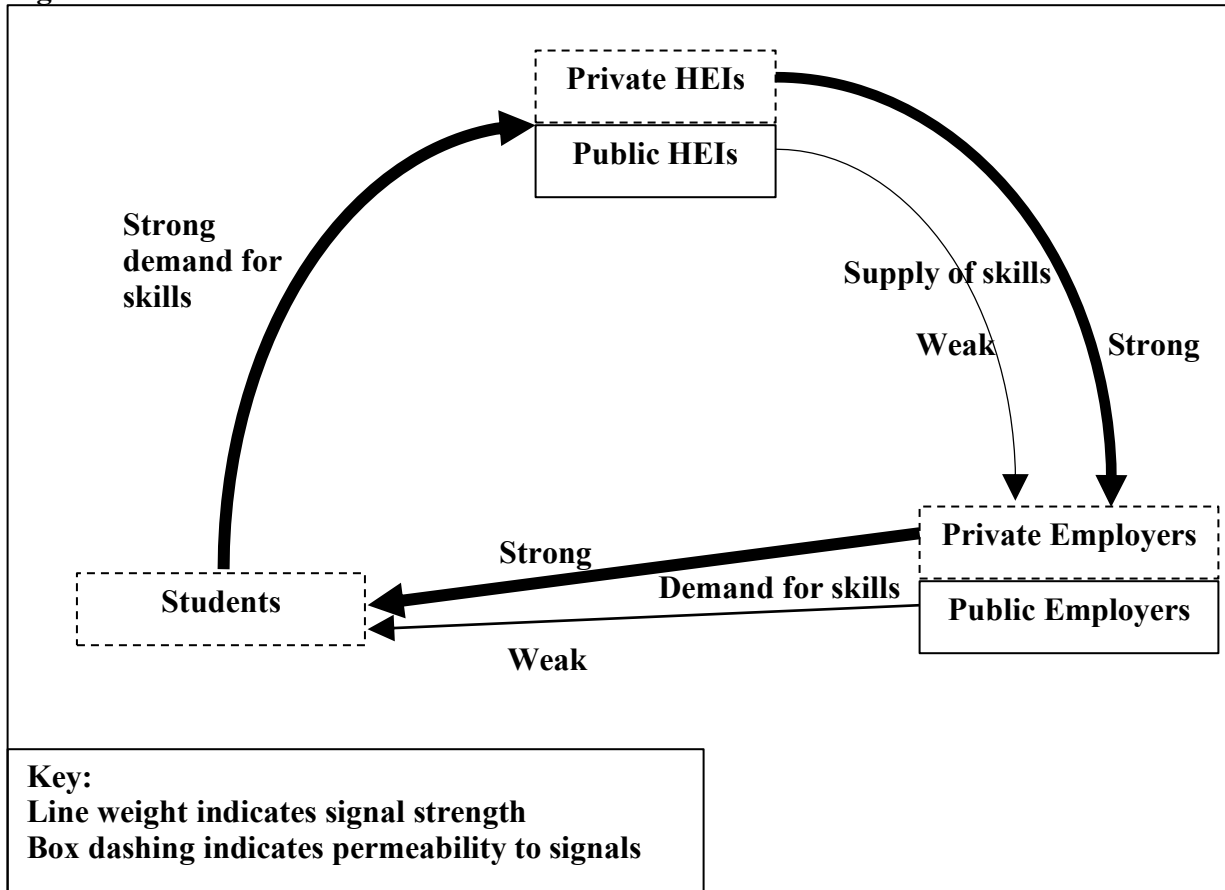
**Table 9. How Individuals Obtained their First Job, Egypt and Jordan**

	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

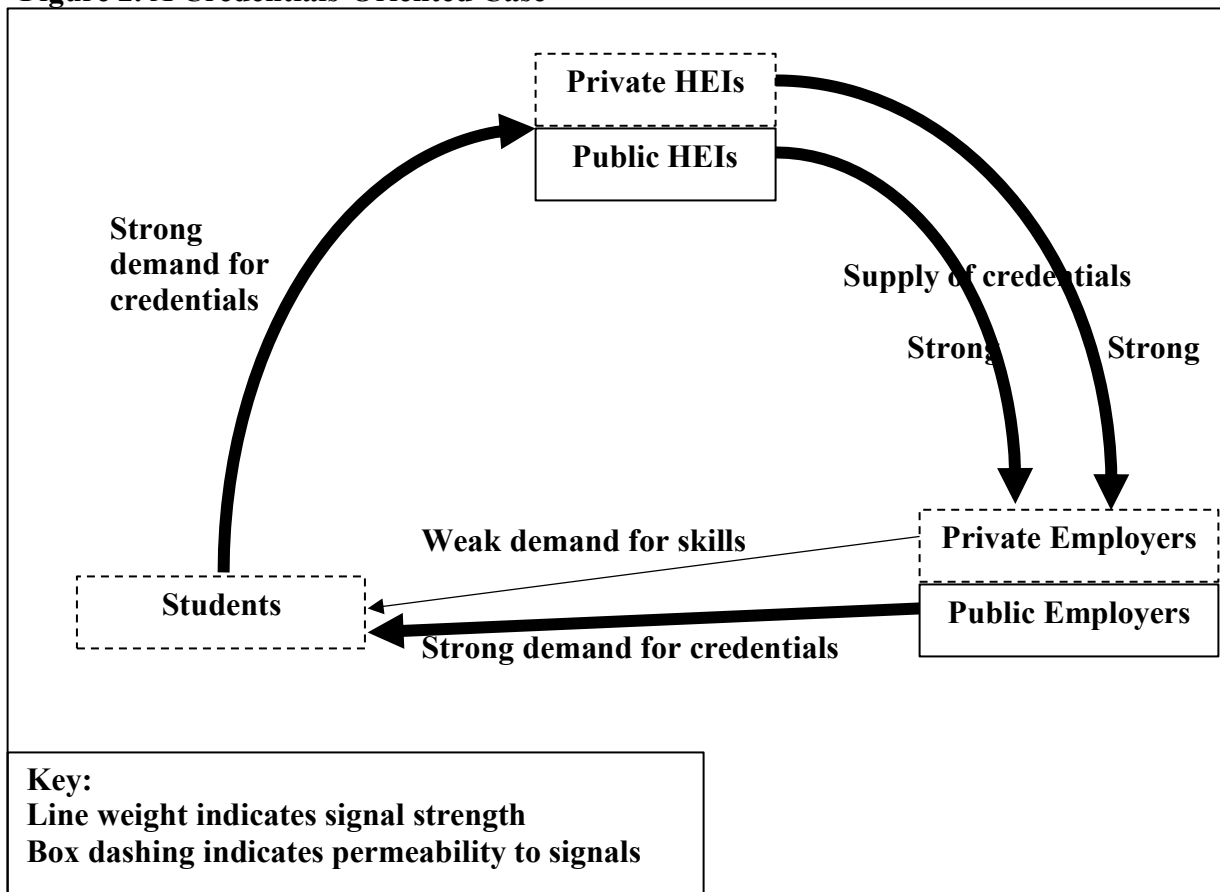
## Figures

Figure 1. A Skills-Oriented Case



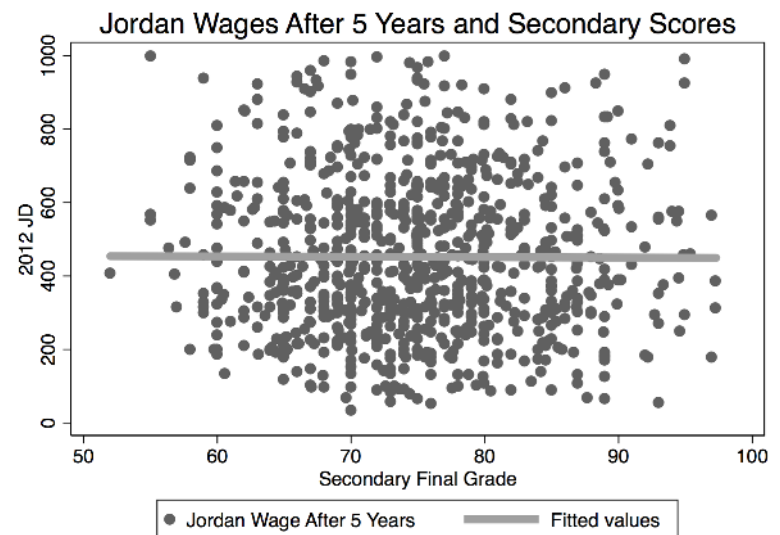
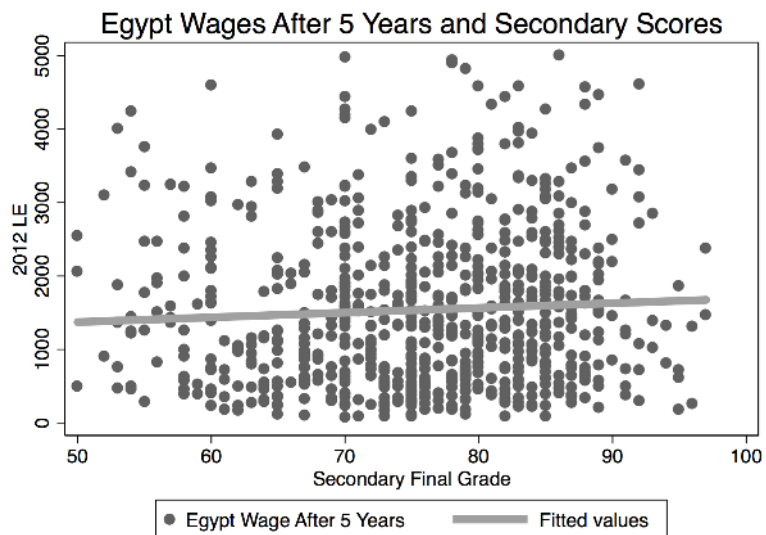
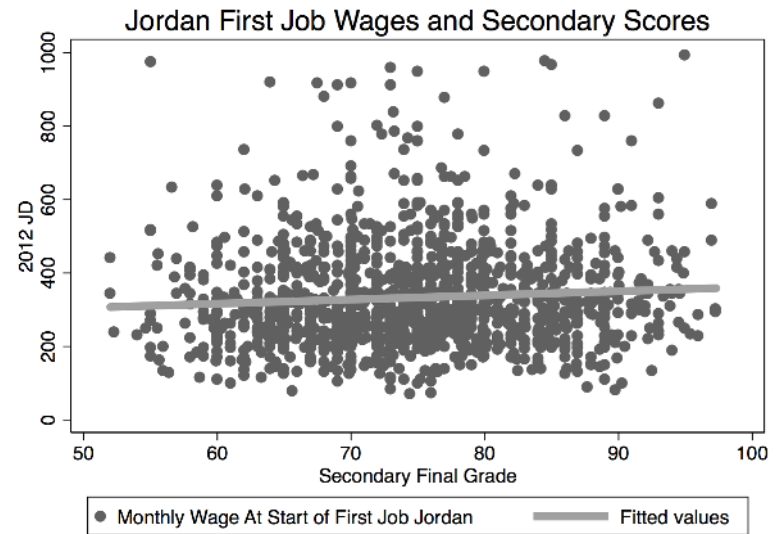
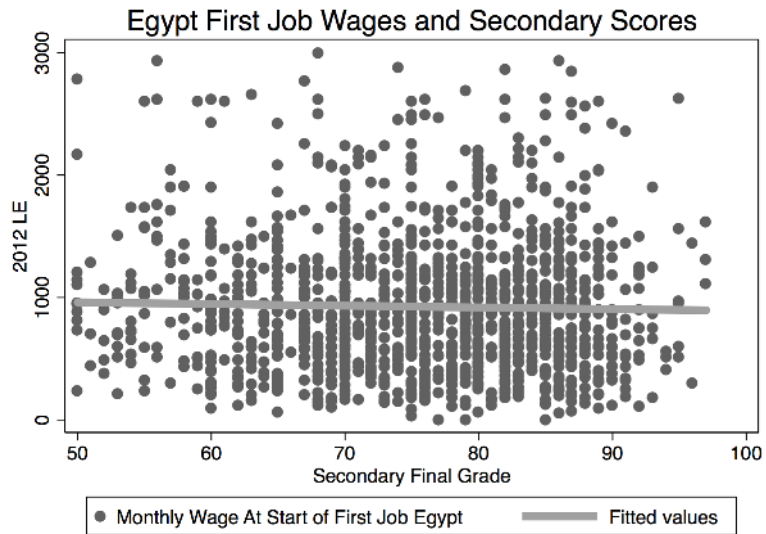
Source: authors' creations

Figure 2. A Credentials-Oriented Case



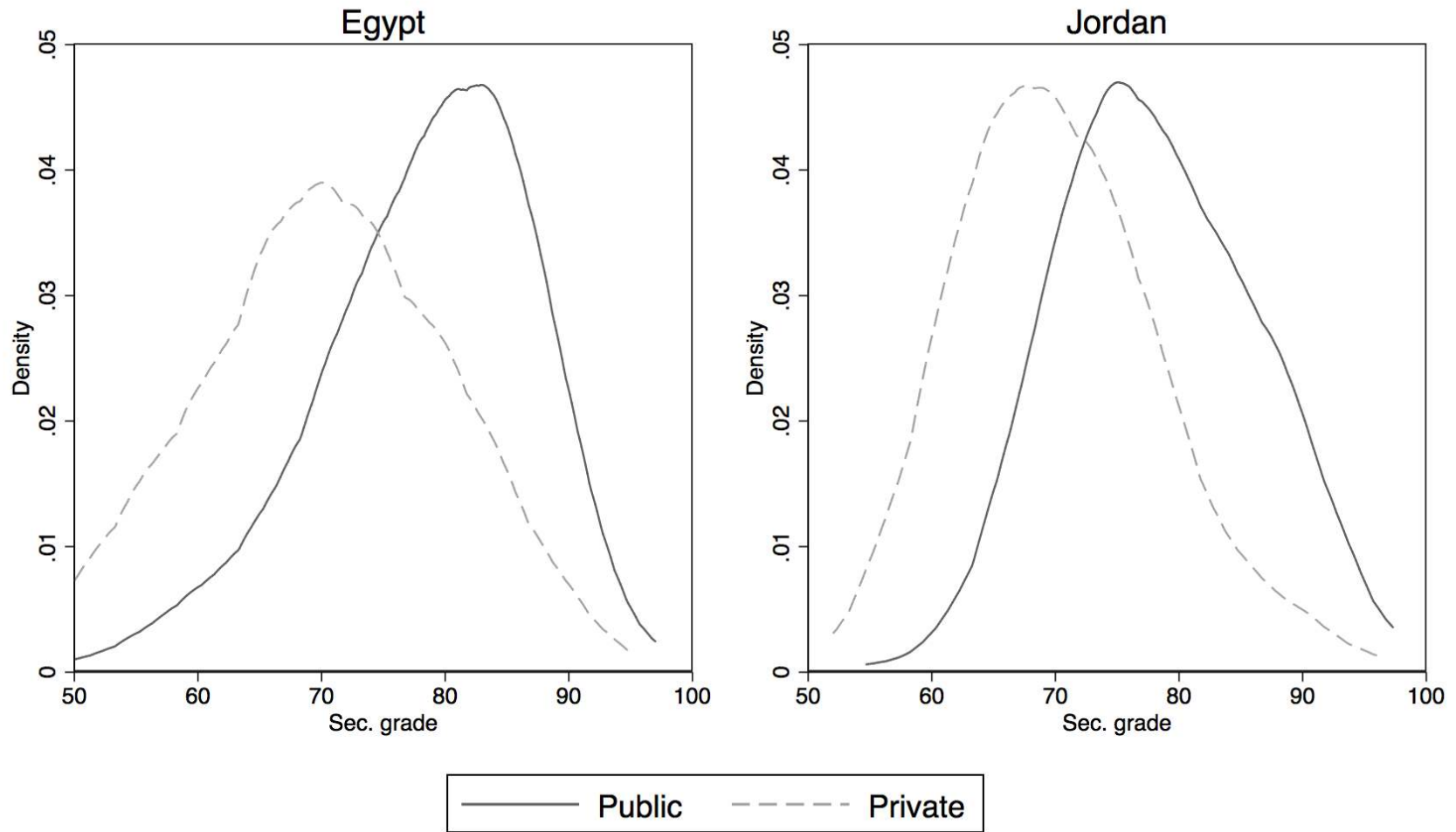
Source: authors' creations

**Figure 3. First Job and Five Year Out Wages and Secondary Test Scores, Egypt and Jordan**



**Source:** Authors' calculations

**Figure 4. Distribution of Secondary Test Scores by Type of Higher Education**

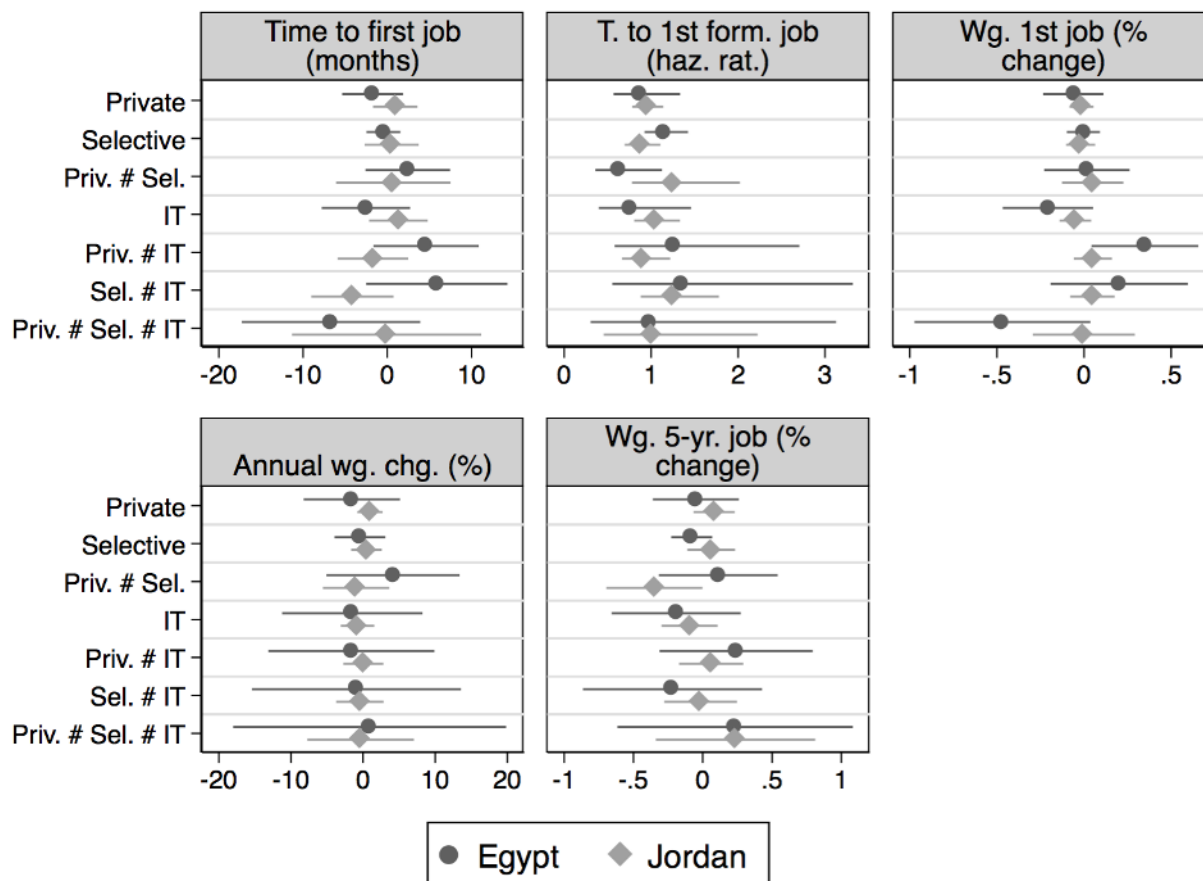


**Source:** Authors' calculations

**Notes:** Kernel density with bandwidth 0.3

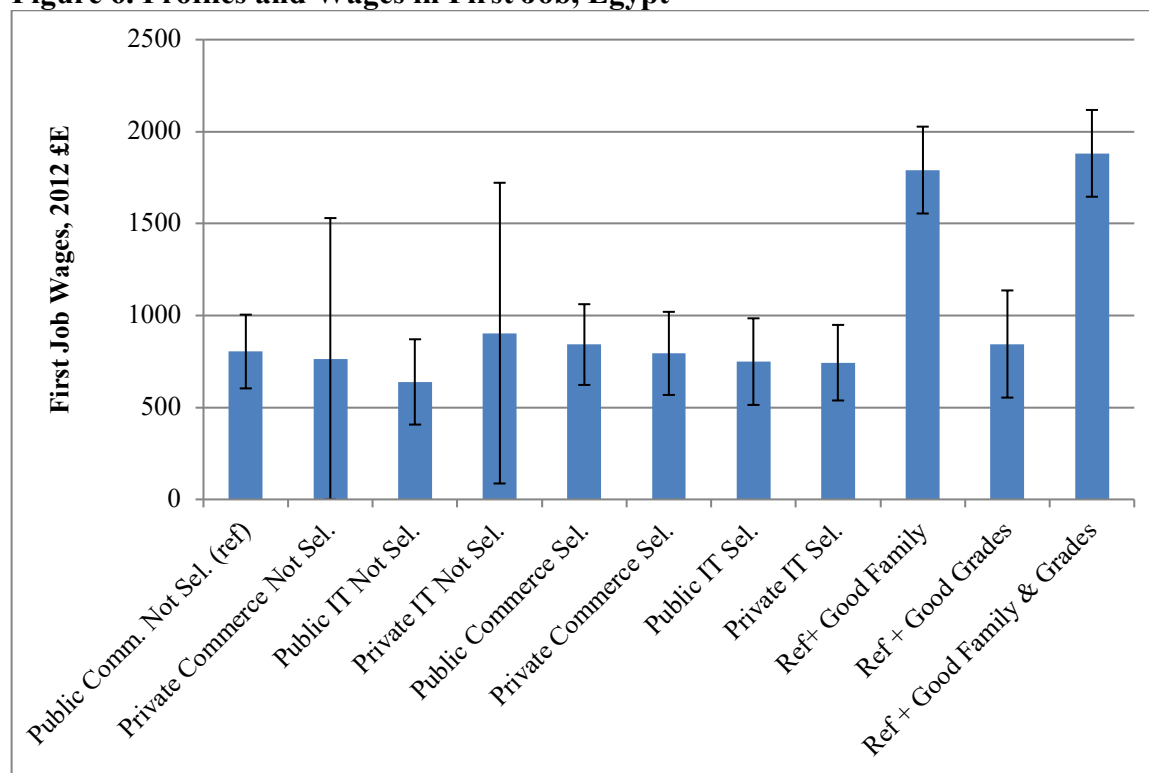


**Figure 5. Higher Education Institution Characteristics and Labor Market Outcomes (Coefficients and 95% Confidence Intervals), Egypt and Jordan**



**Source:** Authors' calculations, based on regressions in Table 12, Table 13, Table 14, and Table 15 in Appendix 1.

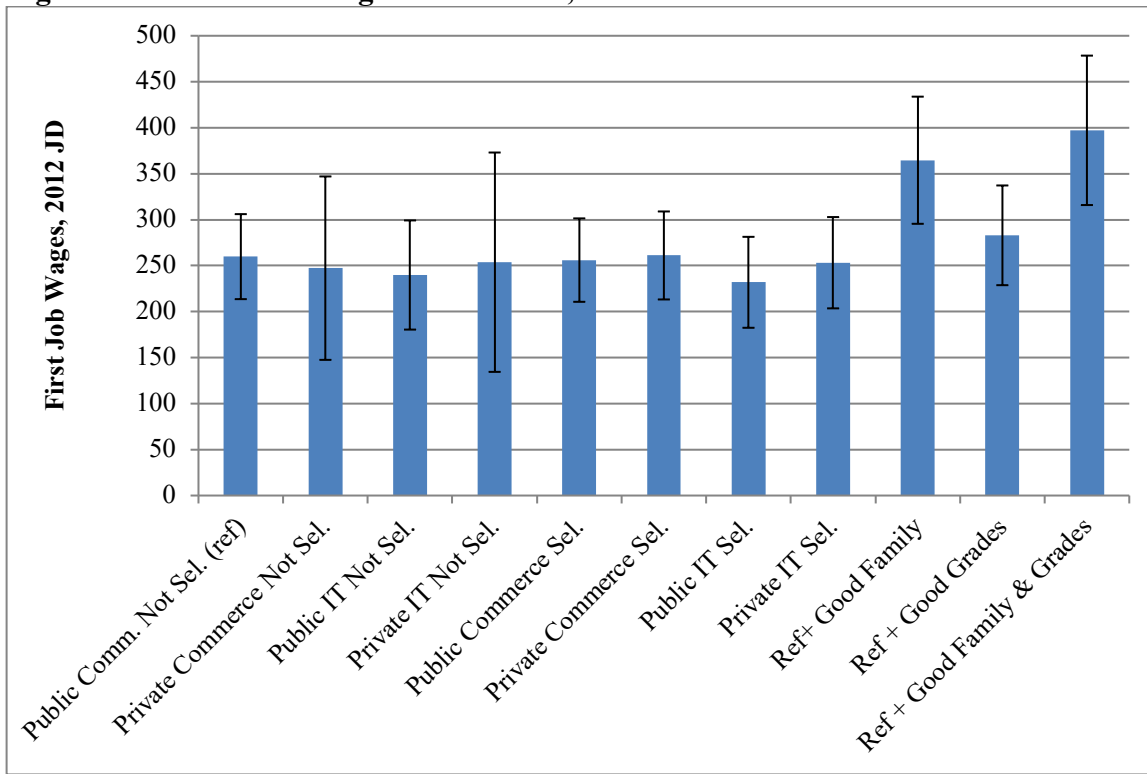
**Figure 6. Profiles and Wages in First Job, Egypt**



**Source:** Authors' calculations

**Notes:** Based on regressions presented in Table 12, Appendix 1.

**Figure 7. Profiles and Wages in First Job, Jordan**



**Source:** Authors' calculations

**Notes:** Based on regressions presented in Table 13, Appendix 1.

## APPENDIX 1: Additional Tables

**Table 10. Descriptive Statistics**

Cells are proportions or means

	Egypt	Jordan
Female	0.249	0.340
Cohort		
Born 1983-1987	0.668	0.516
Born 1978-1982	0.207	0.307
Born 1972-1977	0.124	0.177
Kindergarten Attendance	0.444	0.527
Private School		
Private Primary School	0.244	
Private Preparatory School	0.168	
Private Basic School		0.209
Private Secondary School	0.094	0.132
Secondary specialization		
Secondary specialization science	0.280	0.427
Secondary specialization arts	0.577	0.502
Secondary specialization tech.	0.143	0.071
Father's Education		
Father illiterate	0.209	0.104
Father basic	0.126	0.376
Father secondary or post-sec.	0.375	
Father secondary		0.189
Father post-secondary		0.108
Father university	0.276	0.181
Father above university	0.011	0.042
Unknown father's edu.	0.004	
Mother's Education		
Mother illiterate	0.364	0.219
Mother basic	0.136	0.414
Mother secondary or post-sec.	0.339	
Mother secondary		0.214
Mother post-secondary		0.093
Mother university	0.154	0.056
Mother above university	0.002	0.005
Unknown mother's edu.	0.005	
Age 15 Home Environment		
Access to computer at age 15	0.329	0.397
Access to internet at age 15	0.161	0.127
Access to magazines & books at age 15	0.758	0.763
Refugees in Jordan		0.050

Computer at Secondary School		
Never using Comp. at Sec School	0.522	0.179
Rarely using Comp. at Sec School	0.166	0.274
Sometimes using Comp. at Sec School	0.228	0.504
Daily using Comp at Sec School	0.084	0.043
Age when graduated secondary	17.691	17.987
Secondary Grade		
Secondary Final Grade	73.181	74.587
Sec Grade Sq/100	56.235	56.442
Don't Know Sec Grade	0.032	0.001
Father's age at birth		
Father's age at birth	22.561	33.269
Father's age at birth sq/100	7.659	11.921
Don't know father's age at birth	0.311	0.027
Mother's age at birth		
Mother's age at birth	18.130	27.471
Mother's age at birth sq/100	5.075	8.107
Don't know mother's age at birth	0.322	0.016
Egypt Governorates		
Cairo	0.354	
Alexandria	0.104	
Port-said	0.008	
Suez	0.020	
Damietta	0.008	
Dakhalia	0.043	
Sharkia	0.045	
Kalyoubia	0.070	
Kafir El Sheikh	0.009	
Gharbia	0.037	
Menoufia	0.008	
Behera	0.027	
Ismailia	0.009	
Giza	0.151	
Menia	0.009	
Asyout	0.027	
Suhag	0.019	
Aswan	0.010	
Beni-Suef & Fayoum	0.027	
Luxor & Qena	0.016	
Jordan Governorates		
Amman		0.562
Balqa		0.055
Zarqa		0.094

Madaba		0.016
Irbid		0.098
Mafraq		0.032
Jarash		0.030
Ajlun		0.020
Karak		0.055
Tafiela		0.023
Aqaba		0.015
Father's Employment		
Formal Professional Father	0.299	0.238
Employer Professional Father	0.103	0.015
Informal Professional Father	0.061	0.008
Formal Technician Father	0.182	0.279
Employer Technician Father	0.015	0.030
Informal Technician Father	0.030	0.041
Formal Craft Father	0.139	0.101
Employer Craft Father	0.032	0.044
Informal Craft Father	0.091	0.090
Unknown Father's Employment	0.048	0.154
University Private	0.340	0.438
University IT	0.213	0.315
Selective University	0.452	0.242
Teaching Language		
Arabic Language	0.844	0.176
English Language	0.025	0.081
Arabic and English Language	0.131	0.743
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N(Observations)	1616	1418

**Source:** Authors' calculations

**Table 11. Marginal Effects from Probit Models for Attending Private Higher Education Institution**

	Egypt	Jordan
Baseline Probability	0.224	0.296
Father's Education (Illit. Omit.)		
Father basic	0.024 (0.049)	-0.136* (0.064)
Father secondary or post-sec.	0.067 (0.045)	
Father secondary		-0.139 (0.072)
Father post-secondary		-0.110 (0.078)
Father university	0.129* (0.062)	-0.035 (0.079)
Father above university	0.042 (0.154)	-0.054 (0.102)
Unknown Father's Edu.	-0.003 (0.210)	
Mother's Education (Illit. Omit.)		
Mother basic	-0.046 (0.047)	0.145** (0.044)
Mother secondary or post-sec.	0.010 (0.041)	
Mother secondary		0.161** (0.055)
Mother post-secondary		0.150* (0.065)
Mother university	-0.017 (0.057)	0.144 (0.078)
Mother above university	0.362 (0.302)	-0.205 (0.222)
Unknown Mother's Edu.	0.090 (0.173)	
Age 15 Home Env.		
Access to computer at age 15	0.073 (0.041)	-0.001 (0.035)
Access to internet at age 15	-0.040 (0.047)	-0.101* (0.050)
Access to magazines & books at age 15	-0.003 (0.033)	-0.030 (0.035)

	Egypt	Jordan
Refugees in Jordan		0.030 (0.063)
Parents' Age at birth		
Father's age at birth	-0.001 (0.021)	-0.004 (0.013)
Father's age at birth squared/100	0.005 (0.029)	0.004 (0.017)
Don't Know Father's age at birth	0.057 (0.365)	0.034 (0.253)
Mother's age at birth	-0.031 (0.024)	-0.026 (0.016)
Mother's age at birth squared/100	0.046 (0.041)	0.052 (0.027)
Don't know mother's age at birth	-0.531 (0.343)	-0.408 (0.270)
Father's Emp. Stat. (Blue Coll. Informal Omit.)		
Formal Professional Father	0.012 (0.059)	0.045 (0.068)
Employer Professional Father	0.041 (0.063)	0.245* (0.124)
Informal Professional Father	0.070 (0.065)	-0.125 (0.163)
Formal Service Father	0.042 (0.055)	0.036 (0.054)
Employer Service Father	0.331* (0.128)	0.199* (0.093)
Informal Service Father	-0.175 (0.111)	0.098 (0.079)
Formal Craft Father	0.070 (0.053)	0.105 (0.061)
Employer Craft Father	0.064 (0.080)	0.079 (0.078)
Unknown father's Employment	-0.080 (0.084)	0.045 (0.057)
Sex (Male Omit.)		
Female	-0.073* (0.037)	-0.166*** (0.039)
Cohort (1983-1987 omit.)		
Born 1978-1982	-0.178** (0.055)	0.129*** (0.033)
Born 1972-1977	-0.289*** (0.084)	0.160*** (0.041)



	Egypt	Jordan
<b>Basic Education</b>		
Kindergarten Attendance	0.032 (0.031)	0.056 (0.031)
Private Primary School	0.077 (0.049)	
Private Preparatory School	-0.049 (0.057)	
Private Basic School		0.073 (0.045)
<b>Secondary Education</b>		
Private Secondary School	0.184** (0.066)	0.023 (0.054)
Secondary specialization science	0.188 (1.689)	-1.916 (2.061)
Secondary specialization tech	-3.605 (2.499)	-2.781 (4.120)
Rarely using Comp at Sec School	0.004 (0.041)	0.007 (0.044)
Sometimes using Comp at Sec School	0.054 (0.036)	-0.018 (0.044)
Daily using Comp at Sec School	0.113* (0.056)	-0.077 (0.084)
<b>Secondary Performance</b>		
Age when graduated secondary	0.003 (0.013)	0.011 (0.015)
Secondary Final Grade	0.018 (0.029)	-0.188*** (0.040)
Sec Grade SQ/100	-0.035 (0.022)	0.106*** (0.025)
Don't Know Sec Grade	-0.606 (0.964)	
Interaction: Sec Grade & Sci Spec	-0.019 (0.048)	0.050 (0.054)
Interaction: Sec Grade & Tech Spec	0.084 (0.067)	0.072 (0.110)
Interaction: Sq-Sec Grade & Sci Spec	0.022 (0.033)	-0.032 (0.036)
Interaction: Sq-Sec Grade & Tech Spec	-0.041 (0.045)	-0.045 (0.073)
Interaction: Sci Sec Grade & DK Sec Grade	-0.173 (1.702)	
Interaction: Tech Sec Grade & DK Sec Grade	3.750	

	Egypt	Jordan
	(2.513)	
Governorates	Yes	Yes
N	1601	1409
Pseudo R-squared	0.498	0.298

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

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.

**Table 12. 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	3.572** (1.294)	-0.077 (0.062)	4.457 (2.324)	-0.035 (0.096)
Father secondary or post-sec.	-0.010 (1.176)	0.137* (0.056)	3.053 (2.087)	0.247** (0.090)
Father university	0.655 (1.509)	0.247*** (0.074)	1.812 (2.722)	0.310** (0.119)
Father above university	0.598 (3.809)	0.269 (0.179)	-7.509 (7.092)	-0.138 (0.352)
Unknown father's edu.	-5.753 (6.081)	0.219 (0.279)	4.526 (12.993)	0.417 (0.402)
Mother's Education (Illit. Omit.)				
Mother basic	0.464 (1.176)	-0.006 (0.056)	0.521 (2.069)	0.082 (0.090)
Mother secondary or post-sec.	0.743 (1.084)	-0.050 (0.052)	-2.455 (1.937)	-0.119 (0.084)
Mother university	0.753 (1.487)	-0.101 (0.072)	-0.319 (2.646)	-0.049 (0.119)
Mother above university	3.592 (7.278)	-0.303 (0.332)	-15.224 (15.476)	0.751 (0.620)
Unknown mother's edu.	1.952 (5.225)	0.075 (0.256)	-9.219 (10.112)	-0.696 (0.387)
Age 15 Home Environment				
Access to computer at age 15	0.109 (1.025)	0.094 (0.049)	0.026 (1.804)	0.128 (0.081)
Access to internet at age 15	0.438 (1.245)	-0.080 (0.060)	1.178 (2.236)	0.077 (0.110)
Access to magazines & books at age 15	0.709 (0.866)	0.106* (0.041)	-3.850* (1.547)	0.082 (0.069)
Parents' Age at birth				
Father's age at birth	0.795 (0.525)	-0.026 (0.026)	0.451 (1.022)	0.005 (0.042)
Father's age at birth Sq/100	-1.031 (0.737)	0.035 (0.036)	-0.631 (1.461)	-0.026 (0.061)
Don't Know Father's age at birth	14.863 (9.314)	-0.552 (0.454)	7.703 (17.793)	-0.131 (0.734)
Mother's age at birth	-1.740** (0.556)	0.021 (0.026)	-0.996 (0.982)	0.011 (0.040)

	Time to first job (months)	Log Wages in First Job	Annual percent change in wages	Log Wages Five Years After Graduation
Mother's age at birth Sq/100	2.834** (0.979)	-0.034 (0.046)	1.789 (1.723)	-0.002 (0.071)
Don't know mother's age at birth	-25.352** (7.816)	0.354 (0.373)	-13.269 (13.894)	0.267 (0.563)
Father's Emp. Stat. (Blue Coll. Informal Omit.)				
Formal Professional Father	-2.431 (1.529)	-0.095 (0.073)	2.936 (2.721)	-0.052 (0.115)
Employer Professional Father	-3.086 (1.670)	0.008 (0.081)	4.817 (3.046)	0.114 (0.128)
Informal Professional Father	1.268 (1.861)	0.017 (0.092)	4.383 (3.431)	0.159 (0.156)
Formal Service Father	-1.121 (1.475)	-0.108 (0.070)	2.737 (2.636)	-0.082 (0.109)
Employer Service Father	0.419 (3.149)	0.445** (0.161)	-0.033 (5.799)	0.701** (0.255)
Informal Service Father	0.195 (2.379)	-0.238* (0.115)	6.944 (4.252)	-0.157 (0.204)
Formal Craft Father	-0.417 (1.510)	-0.064 (0.072)	-0.326 (2.725)	-0.076 (0.116)
Employer Craft Father	-4.488* (2.286)	0.183 (0.112)	0.189 (4.022)	0.429* (0.171)
Unknown Father's Employment	-2.929 (2.024)	-0.122 (0.098)	2.419 (3.691)	0.216 (0.160)
Sex (Male Omit.)				
Female	7.529*** (0.834)	-0.495*** (0.039)	-0.883 (1.513)	-0.667*** (0.067)
Cohort (1983-1987 omit.)				
Born 1978-1982	2.656** (0.954)	0.150** (0.046)	-5.348** (1.676)	-0.384*** (0.067)
Born 1972-1977	6.219*** (1.262)	0.452*** (0.061)	-7.224** (2.249)	-0.516*** (0.090)
Basic Education				
Kindergarten Attendance	-0.488 (0.823)	-0.040 (0.039)	1.579 (1.454)	0.009 (0.064)
Private Primary School	1.901 (1.266)	-0.061 (0.060)	-0.219 (2.272)	-0.138 (0.096)
Private Preparatory School	-1.930 (1.516)	0.195** (0.072)	2.337 (2.734)	0.281* (0.121)
Secondary Education				

	Time to first job (months)	Log Wages in First Job	Annual percent change in wages	Log Wages Five Years After Graduation
Private Secondary School	0.023 (1.462)	0.073 (0.069)	0.551 (2.618)	-0.166 (0.123)
Secondary Spec. (Arts Omit.)				
Secondary specialization science	54.934 (42.285)	-3.017 (1.971)	56.614 (74.405)	-5.221 (3.036)
Secondary specialization tech	-53.447 (66.054)	2.078 (3.127)	-97.285 (129.877)	4.855 (5.761)
Computers in Secondary (Never Omit.)				
Rarely using Comp. at Sec School	-1.985 (1.053)	-0.041 (0.050)	0.881 (1.896)	0.024 (0.085)
Sometimes using Comp. at Sec School	-1.464 (0.975)	-0.076 (0.046)	0.999 (1.761)	0.046 (0.081)
Daily using Comp at Sec School	-2.761 (1.448)	-0.045 (0.068)	-3.247 (2.546)	-0.181 (0.122)
Secondary Performance				
Age when graduated secondary	-0.732* (0.336)	-0.056*** (0.016)	1.276* (0.627)	0.049 (0.026)
Secondary Final Grade	0.535 (0.631)	-0.031 (0.030)	0.387 (1.185)	-0.024 (0.055)
Sec Grade Sq/100	-0.396 (0.435)	0.022 (0.021)	-0.269 (0.814)	0.022 (0.038)
Don't Know Sec Grade	15.824 (22.864)	-0.994 (1.087)	10.439 (43.078)	-0.485 (2.006)
Interaction Sec Grade & Sci Spec	-1.613 (1.145)	0.081 (0.054)	-1.654 (2.016)	0.147 (0.083)
Interaction Sec Grade & Tech Spec	1.432 (1.754)	-0.052 (0.083)	2.412 (3.428)	-0.118 (0.151)
Interaction Sec Grade Sq/100 & Sci Spec	1.132 (0.768)	-0.054 (0.036)	1.155 (1.352)	-0.101 (0.056)
Interaction Sec Grade Sq/100 & Tech Spec	-0.992 (1.158)	0.029 (0.055)	-1.462 (2.246)	0.068 (0.099)
Interaction Sci Spec & Sec Grade DK	-55.535 (42.511)	3.396 (1.983)	-69.199 (74.775)	5.372 (3.060)
Interaction Tech Spec & Sec Grade DK	55.552 (66.274)	-2.138 (3.137)	92.933 (130.181)	-5.044 (5.775)
HE Char. (Public Not Sel. Comm.)				
Private	-1.740 (1.842)	-0.061 (0.088)	-1.558 (3.401)	-0.050 (0.158)
Selective	-0.458	-0.004	-0.439	-0.080

	Time to first job (months)	Log Wages in First Job	Annual percent change in wages	Log Wages Five Years After Graduation
	(1.026)	(0.048)	(1.796)	(0.075)
Selective and Private	2.429	0.016	4.144	0.111
	(2.564)	(0.125)	(4.712)	(0.218)
IT	-2.544	-0.207	-1.485	-0.192
	(2.677)	(0.132)	(4.963)	(0.237)
Private and IT	4.607	0.350*	-1.640	0.241
	(3.191)	(0.156)	(5.871)	(0.281)
Selective and IT	5.875	0.202	-0.904	-0.219
	(4.266)	(0.201)	(7.392)	(0.329)
Selective Private and IT	-6.676	-0.468	0.914	0.234
	(5.403)	(0.258)	(9.645)	(0.433)
<b>Process Factors</b>				
Pedagogy Factor	0.541	-0.014	3.570	0.007
	(1.170)	(0.057)	(2.232)	(0.098)
Accountability Factor	-0.524	0.018	-4.926*	0.047
	(1.100)	(0.052)	(2.167)	(0.104)
Perception Factor	0.068	0.013	1.185	0.015
	(1.102)	(0.053)	(2.063)	(0.091)
English Language	0.474	0.269*	-3.049	0.355*
	(2.381)	(0.113)	(4.213)	(0.171)
Arabic and English Language	-0.628	0.012	0.450	0.137
	(1.121)	(0.053)	(2.021)	(0.091)
Constant	11.917	8.908***	-21.727	6.948***
	(24.942)	(1.187)	(46.518)	(2.049)
Governorates Included	Yes	Yes	Yes	Yes
P-value model	0.000	0.000	0.078	0.000
N (observations)	1600	1435	1172	750
R- Squared	0.134	0.264	0.085	0.418
Adjusted R- Squared	0.088	0.220	0.016	0.347

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

**Table 13. Regressions for Labor Market Outcomes, Jordan**

	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	0.855 (1.587)	0.038 (0.041)	1.546 (1.045)	0.201** (0.078)
Father secondary	2.551 (1.850)	-0.020 (0.049)	0.619 (1.230)	0.199* (0.093)
Father post-secondary	-1.686 (2.135)	-0.017 (0.056)	0.604 (1.423)	0.260* (0.109)
Father university	1.298 (2.316)	-0.044 (0.061)	1.001 (1.526)	0.104 (0.119)
Father above university	-1.254 (3.008)	-0.004 (0.079)	0.455 (1.996)	0.169 (0.154)
Mother's Education (Illit. Omit.)				
Mother basic	-1.229 (1.252)	0.043 (0.033)	0.246 (0.827)	-0.029 (0.062)
Mother secondary	-1.861 (1.590)	0.074 (0.042)	1.141 (1.057)	0.008 (0.081)
Mother post-secondary	-1.001 (1.909)	0.104* (0.050)	0.159 (1.286)	0.127 (0.101)
Mother university	-2.872 (2.311)	0.094 (0.061)	1.156 (1.542)	0.044 (0.124)
Mother above university	1.369 (5.916)	0.193 (0.154)	9.577* (4.064)	-0.673 (0.378)
Age 15 Home Environment				
Access to computer at age 15	-1.733 (1.016)	0.035 (0.027)	-1.082 (0.672)	-0.006 (0.053)
Access to internet at age 15	-0.419 (1.431)	-0.005 (0.037)	0.049 (0.963)	-0.018 (0.090)
Access to magazines & books at age 15	-0.664 (0.973)	-0.004 (0.025)	-0.528 (0.645)	-0.042 (0.050)
Refugees in Jordan	0.021 (1.892)	-0.121* (0.049)	0.896 (1.249)	-0.135 (0.100)
Parents' Age at birth				
Father's age at birth	0.759* (0.385)	0.006 (0.010)	0.201 (0.256)	0.030 (0.019)
Father's age at birth sq/100	-0.924 (0.519)	-0.005 (0.014)	-0.279 (0.345)	-0.022 (0.025)
Don't know father's age at birth	8.317 (7.478)	0.145 (0.195)	4.566 (5.040)	0.621 (0.372)
Mother's age at birth	-0.360 (0.485)	-0.024 (0.013)	0.450 (0.324)	-0.031 (0.024)
Mother's age at birth sq/100	0.316 (0.818)	0.038 (0.021)	-0.718 (0.547)	0.045 (0.040)
Don't know mother's age at birth	-6.108 (7.761)	-0.239 (0.204)	6.653 (5.315)	-0.211 (0.396)
Father's Emp. Stat. (Blue Coll. Informal Omit.)				
Formal Professional Father	1.490 (2.029)	0.035 (0.053)	-1.037 (1.337)	0.121 (0.107)

	Time to first job (months)	Log Wages in First Job	Annual percent change in wages	Log Wages Five Years After Graduation
Employer Professional Father	0.694 (3.679)	0.138 (0.098)	-1.435 (2.534)	0.002 (0.201)
Informal Professional Father	5.142 (5.010)	0.118 (0.130)	2.289 (3.224)	-0.056 (0.265)
Formal Service Father	2.804 (1.596)	-0.011 (0.042)	-2.031 (1.058)	0.039 (0.086)
Employer Service Father	0.983 (2.740)	0.232** (0.073)	-1.895 (1.873)	0.367* (0.143)
Informal Service Father	3.142 (2.427)	0.041 (0.063)	0.088 (1.622)	0.195 (0.127)
Formal Craft Father	-1.591 (1.870)	-0.049 (0.049)	-0.930 (1.235)	0.057 (0.099)
Employer Craft Father	1.274 (2.370)	-0.027 (0.063)	-2.038 (1.597)	0.157 (0.123)
Unknown Father's Employment	1.179 (1.700)	0.033 (0.044)	-3.126** (1.129)	0.022 (0.090)
Sex (Male Omit.)				
Female	7.958*** (0.917)	-0.160*** (0.024)	-0.791 (0.607)	-0.256*** (0.049)
Cohort (1983-1987 omit.)				
Born 1978-1982	2.548* (1.017)	0.160*** (0.027)	-4.634*** (0.669)	-0.366*** (0.053)
Born 1972-1977	2.853* (1.345)	0.214*** (0.035)	-5.709*** (0.893)	-0.516*** (0.067)
Basic Education				
Kindergarten Attendance	-1.409 (0.901)	-0.010 (0.024)	-0.732 (0.606)	0.048 (0.048)
Private Basic School	-0.156 (1.324)	0.007 (0.035)	1.429 (0.891)	0.088 (0.068)
Secondary Education				
Private Secondary School	0.757 (1.610)	0.166*** (0.042)	-1.957 (1.074)	0.020 (0.082)
Secondary Specialization (Arts Omit.)				
Secondary specialization science	6.885 (52.157)	-0.192 (1.358)	-36.111 (34.513)	-3.572 (2.779)
Secondary specialization tech	-41.556 (111.900)	-6.333* (2.950)	-7.802 (89.840)	-9.027 (10.554)
Computers in Sec. School (Never Omit.)				
Rarely using Comp at Sec School	-0.478 (1.301)	-0.014 (0.034)	-0.191 (0.862)	0.025 (0.061)
Sometimes using Comp at Sec School	2.470 (1.281)	0.011 (0.034)	-0.165 (0.846)	0.001 (0.062)
Daily using Comp at Sec School	-0.423 (2.375)	-0.086 (0.062)	2.910 (1.564)	0.035 (0.131)
Secondary Performance				
Age when graduated secondary	-0.459 (0.443)	-0.026* (0.012)	0.992** (0.312)	0.034 (0.035)
Secondary Final Grade	-0.254 (0.895)	0.003 (0.023)	-0.701 (0.601)	-0.111* (0.053)
Sec Grade Sq/100	0.142	0.000	0.411	0.070*



	Time to first job (months)	Log Wages in First Job	Annual percent change in wages	Log Wages Five Years After Graduation
Don't Know Sec Grade	(0.599) 2.204 (36.678)	(0.016) -0.071 (0.954)	(0.402) -12.518 (24.445)	(0.035) -4.224* (2.100)
Interaction Sec Grade & Sci Spec	-0.179 (1.386)	0.003 (0.036)	0.869 (0.918)	0.082 (0.074)
Interaction Sec Grade & Tech Spec	0.849 (3.002)	0.172* (0.079)	-0.222 (2.452)	0.237 (0.285)
Interaction Sec Grade Sq/100 & Sci Spec	0.097 (0.914)	-0.000 (0.024)	-0.512 (0.606)	-0.043 (0.049)
Interaction Sec Grade Sq/100 & Tech Spec	-0.375 (1.996)	-0.116* (0.053)	0.430 (1.660)	-0.149 (0.191)
HE Char. (Public Not Sel. Comm.)				
Private	0.938 (1.342)	-0.015 (0.035)	0.955 (0.884)	0.082 (0.075)
Selective	0.516 (1.635)	-0.019 (0.043)	0.478 (1.081)	0.061 (0.088)
Selective and Private	0.714 (3.463)	0.050 (0.090)	-0.968 (2.340)	-0.349* (0.177)
IT	1.310 (1.772)	-0.050 (0.046)	-0.769 (1.185)	-0.095 (0.103)
Private and IT	-1.717 (2.130)	0.051 (0.056)	0.043 (1.418)	0.061 (0.118)
Selective and IT	-4.152 (2.488)	0.048 (0.065)	-0.440 (1.676)	-0.016 (0.133)
Selective Private and IT	-0.091 (5.729)	-0.001 (0.149)	-0.343 (3.775)	0.237 (0.293)
Process Factors				
Pedagogy Factor	0.663 (1.171)	-0.012 (0.031)	-0.215 (0.770)	-0.051 (0.072)
Accountability Factor	-0.400 (1.127)	0.003 (0.029)	0.166 (0.748)	0.057 (0.069)
Perception Factor	-1.656 (0.937)	0.014 (0.025)	0.405 (0.617)	0.034 (0.058)
English Language	0.452 (1.832)	0.018 (0.048)	1.489 (1.227)	-0.003 (0.098)
Arabic and English Language	2.665* (1.138)	0.009 (0.030)	-0.201 (0.757)	0.013 (0.059)
Constant	11.707 (35.553)	6.096*** (0.925)	11.063 (23.901)	9.637*** (2.149)
Governorates Included	Yes	Yes	Yes	Yes
P-value model	0.000	0.000	0.000	0.000
N (observations)	1410	1387	1304	913
R-Squared	0.156	0.192	0.138	0.243
Adjusted R-Squared	0.112	0.149	0.089	0.180

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

**Table 14. Cox Proportional Hazard Model for Time to First Formal Job, Egypt**  
Coefficients are hazard ratios

Father's Education (Illit. Omit.)	
Father basic	0.760 (0.116)
Father secondary or post-sec.	1.008 (0.133)
Father university	1.239 (0.203)
Father above university	1.649 (0.618)
Unknown father's edu.	1.831 (1.045)
Mother's Education (Illit. Omit.)	
Mother basic	1.021 (0.133)
Mother secondary or post-sec.	0.962 (0.115)
Mother university	1.017 (0.161)
Mother above university	1.153 (0.869)
Unknown mother's edu.	0.405 (0.302)
Age 15 Home Environment	
Access to computer at age 15	1.157 (0.126)
Access to internet at age 15	0.807 (0.111)
Access to magazines & books at age 15	0.964 (0.093)
Parents' Age at birth	
Father's age at birth	0.934 (0.050)
Father's age at birth Sq/100	1.105 (0.081)
Don't Know Father's age at birth	0.358 (0.344)
Mother's age at birth	1.047 (0.063)
Mother's age at birth Sq/100	0.936 (0.099)
Don't know mother's age at birth	2.044

	(1.747)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	1.485*
	(0.269)
Employer Professional Father	0.910
	(0.188)
Informal Professional Father	0.963
	(0.224)
Formal Service Father	1.653**
	(0.289)
Employer Service Father	0.772
	(0.320)
Informal Service Father	0.493
	(0.182)
Formal Craft Father	1.751**
	(0.310)
Employer Craft Father	1.210
	(0.328)
Unknown Father's Employment	1.359
	(0.315)
Sex (Male Omit.)	
Female	0.955
	(0.086)
Cohort (1983-1987 omit.)	
Born 1978-1982	1.219
	(0.124)
Born 1972-1977	1.445**
	(0.188)
Basic Education	
Kindergarten Attendance	0.959
	(0.088)
Private Primary School	1.121
	(0.150)
Private Preparatory School	1.034
	(0.165)
Secondary Education	
Private Secondary School	0.903
	(0.144)
Secondary Spec. (Arts Omit.)	
Secondary specialization science	0.027
	(0.125)
Secondary specialization tech	87.628

	(647.320)
Computers in Secondary (Never Omit.)	
Rarely using Comp. at Sec School	1.232
	(0.140)
Sometimes using Comp. at Sec School	1.150
	(0.125)
Daily using Comp at Sec School	1.543**
	(0.234)
Secondary Performance	
Age when graduated secondary	1.046
	(0.037)
Secondary Final Grade	0.942
	(0.066)
Sec Grade Sq/100	1.044
	(0.051)
Don't Know Sec Grade	0.207
	(0.529)
Interaction Sec Grade & Sci Spec	1.096
	(0.137)
Interaction Sec Grade & Tech Spec	0.901
	(0.177)
Interaction Sec Grade Sq/100 & Sci Spec	0.945
	(0.079)
Interaction Sec Grade Sq/100 & Tech Spec	1.063
	(0.138)
Interaction Sci Spec & Sec Grade DK	19.583
	(91.965)
Interaction Tech Spec & Sec Grade DK	0.009
	(0.065)
HE Char. (Public Not Sel. Comm.)	
Private	0.870
	(0.190)
Selective	1.149
	(0.127)
Selective and Private	0.635
	(0.186)
IT	0.761
	(0.253)
Private and IT	1.253
	(0.492)
Selective and IT	1.357
	(0.620)
Selective Private and IT	0.976

	(0.580)
Process Factors	
Pedagogy Factor	1.059 (0.131)
Accountability Factor	0.927 (0.118)
Perception Factor	1.266 (0.155)
English Language	1.411 (0.313)
Arabic and English Language	0.999 (0.126)
<hr/>	
Governorates Included	Yes
P-value model	0.000
N (observations)	1600

**Source:** Authors' calculations

**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

**Table 15. Cox Proportional Hazard Model for Time to First Formal Job, Jordan**  
Coefficients are hazard ratios

Father's Education (Illit. Omit.)	
Father basic	1.035 (0.115)
Father secondary	1.008 (0.133)
Father post-secondary	1.084 (0.167)
Father university	0.986 (0.163)
Father above university	1.126 (0.237)
Mother's Education (Illit. Omit.)	
Mother basic	0.950 (0.085)
Mother secondary	1.065 (0.121)
Mother post-secondary	1.172 (0.160)
Mother university	1.259 (0.207)
Mother above university	0.936 (0.374)
Age 15 Home Environment	
Access to computer at age 15	0.917 (0.067)
Access to internet at age 15	0.894 (0.096)
Access to magazines & books at age 15	0.918 (0.064)
Refugees in Jordan	
	0.964 (0.132)
Parents' Age at birth	
Father's age at birth	0.977 (0.026)
Father's age at birth sq/100	1.030 (0.036)
Don't know father's age at birth	0.648 (0.338)
Mother's age at birth	1.041 (0.036)
Mother's age at birth sq/100	0.946 (0.054)
Don't know mother's age at birth	2.231 (1.241)
Father's Emp. Stat. (Blue Coll. Informal Omit.)	
Formal Professional Father	0.986 (0.143)
Employer Professional Father	1.203 (0.302)
Informal Professional Father	0.747

	(0.265)
Formal Service Father	0.856
	(0.098)
Employer Service Father	0.958
	(0.190)
Informal Service Father	0.839
	(0.144)
Formal Craft Father	0.881
	(0.120)
Employer Craft Father	0.816
	(0.141)
Unknown Father's Employment	0.937
	(0.114)
Sex (Male Omit.)	
Female	0.919
	(0.061)
Cohort (1983-1987 omit.)	
Born 1978-1982	0.966
	(0.071)
Born 1972-1977	0.995
	(0.096)
Basic Education	
Kindergarten Attendance	0.933
	(0.059)
Private Basic School	1.057
	(0.101)
Secondary Education	
Private Secondary School	0.923
	(0.106)
Secondary Specialization (Arts Omit.)	
Secondary specialization science	0.233
	(0.868)
Secondary specialization tech	0.001
	(0.007)
Computers in Sec. School (Never Omit.)	
Rarely using Comp at Sec School	1.057
	(0.099)
Sometimes using Comp at Sec School	1.040
	(0.096)
Daily using Comp at Sec School	1.377
	(0.235)
Secondary Performance	
Age when graduated secondary	0.995
	(0.032)
Secondary Final Grade	0.988
	(0.060)
Sec Grade Sq/100	1.013
	(0.041)
Don't Know Sec Grade	0.674
	(1.666)
Interaction Sec Grade & Sci Spec	1.044
	(0.103)
Interaction Sec Grade & Tech Spec	1.175
	(0.301)

Interaction Sec Grade Sq/100 & Sci Spec	0.968 (0.063)
Interaction Sec Grade Sq/100 & Tech Spec	0.912 (0.154)
HE Char. (Public Not Sel. Comm.)	
Private	0.944 (0.090)
Selective	0.877 (0.104)
Selective and Private	1.255 (0.305)
IT	1.036 (0.133)
Private and IT	0.900 (0.140)
Selective and IT	1.252 (0.224)
Selective Private and IT	1.005 (0.407)
Process Factors	
Pedagogy Factor	0.950 (0.079)
Accountability Factor	1.042 (0.085)
Perception Factor	0.967 (0.066)
English Language	1.024 (0.135)
Arabic and English Language	0.996 (0.084)
Constant	11.707 (35.553)
<hr/>	
Governorates Included	Yes
P-value model	0.226
N (observations)	1410

**Source:** Authors' calculations

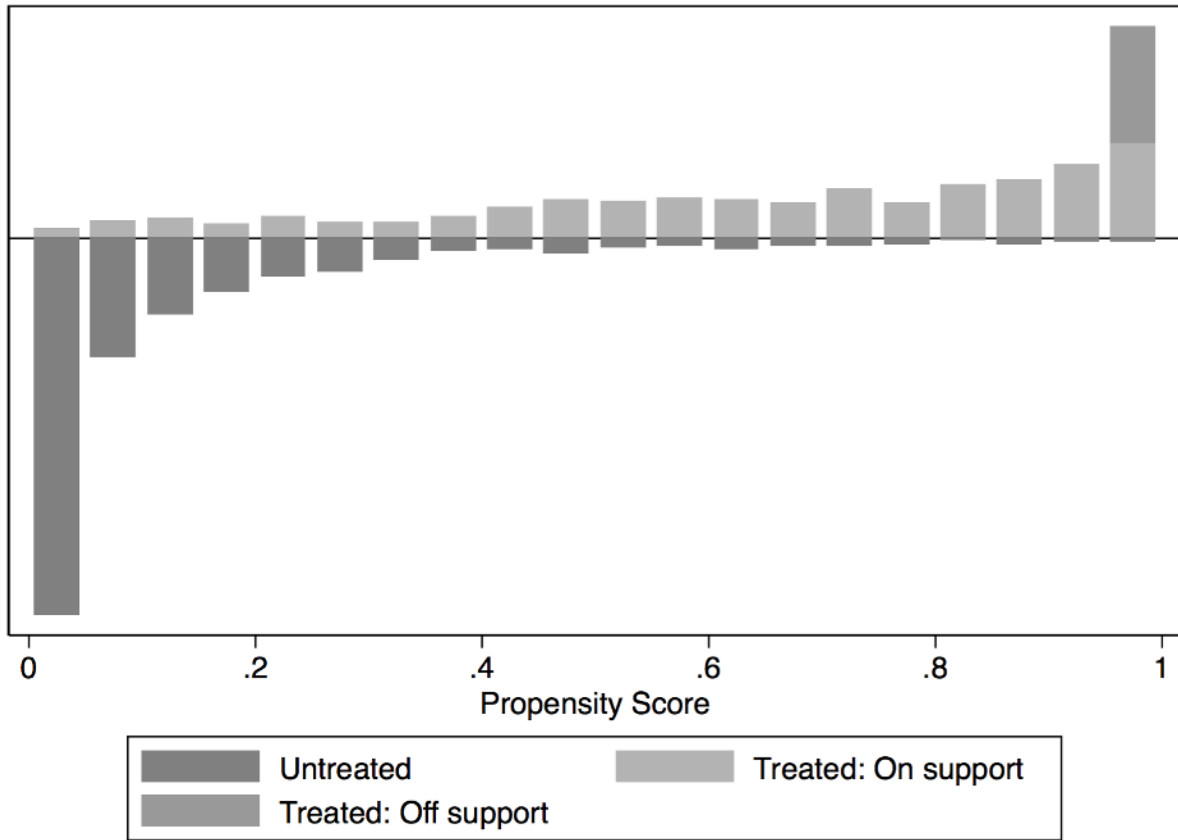
**Notes:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$



## APPENDIX 2: Matching Tests

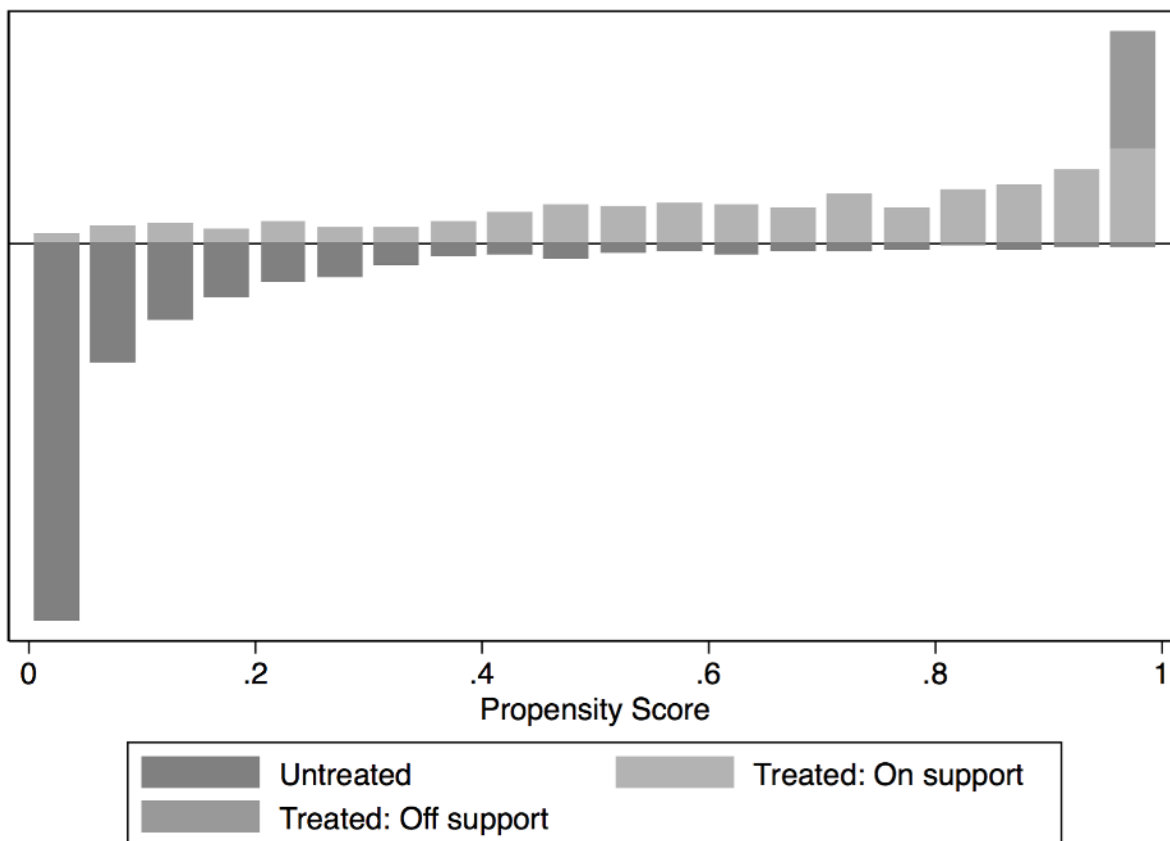
All tests are for the (universe of) the time to first job outcome.

**Figure 8. Distribution of Propensity Score for Private Higher Education and Common Support, Egypt**



**Source:** Authors' calculations

**Figure 9. Distribution of Propensity Score for Private Higher Education and Common Support, Jordan**



**Source:** Authors' calculations

**Table 16. Distribution of Covariates Before and After Matching**

	Egypt						Jordan					
	Before		After		Before Std. Diff.	After Std. Diff.	Before		After		Before Std. Diff.	After Std. Diff.
	Private	Public	Private	Public			Private	Public	Private	Public		
Female Cohort	0.215	0.264	0.220	0.195	-0.115 §	0.059	0.216	0.438	0.228	0.211	-0.485 §	0.037
Born 1983-1987	0.789	0.607	0.774	0.756	0.402 §	0.038	0.452	0.563	0.461	0.468	-0.223 §	-0.015
Born 1978-1982	0.145	0.238	0.150	0.162	-0.238 §	-0.030	0.346	0.277	0.334	0.310	0.148 §	0.052
Born 1972-1977	0.066	0.154	0.077	0.082	-0.284 §	-0.017	0.202	0.159	0.205	0.221	0.110 §	-0.042
Kindergarten Attendance	0.555	0.385	0.534	0.516	0.346 §	0.036	0.570	0.495	0.560	0.548	0.151 §	0.024
Private School												
Private Primary School	0.338	0.194	0.301	0.268	0.331 §	0.077						
Private Preparatory School	0.250	0.125	0.212	0.168	0.325 §	0.112 §						
Private Basic School							0.271	0.161	0.261	0.288	0.271 §	-0.067
Private Secondary School	0.186	0.047	0.135	0.144	0.441 §	-0.030	0.163	0.109	0.153	0.155	0.159 §	-0.006
Secondary specialization												
Secondary specialization science	0.204	0.317	0.186	0.173	-0.259 §	0.029	0.407	0.444	0.417	0.448	-0.075	-0.062
Secondary specialization arts	0.605	0.565	0.592	0.591	0.081	0.001	0.519	0.487	0.506	0.490	0.062	0.031
Secondary specialization tech.	0.191	0.118	0.222	0.236	0.203 §	-0.037	0.074	0.068	0.077	0.062	0.023	0.058
Father's Education												
Father illiterate	0.173	0.226	0.192	0.239	-0.134 §	-0.117 §	0.110	0.099	0.106	0.100	0.036	0.018
Father basic	0.114	0.132	0.118	0.142	-0.056	-0.074	0.355	0.392	0.360	0.367	-0.076	-0.015
Father secondary or post-sec.	0.360	0.382	0.370	0.368	-0.045	0.003						
Father secondary							0.178	0.200	0.188	0.157	-0.057	0.080
Father post-secondary							0.107	0.110	0.101	0.114	-0.011	-0.041
Father university	0.340	0.244	0.308	0.240	0.212 §	0.150 §	0.207	0.161	0.200	0.217	0.119 §	-0.044
Father above university	0.011	0.010	0.011	0.008	0.006	0.027	0.044	0.038	0.045	0.045	0.029	0.000
Unknown father's edu.	0.002	0.005	0.002	0.003	-0.051	-0.023						

	Egypt						Jordan					
	Before		After		Before Std. Diff.	After Std. Diff.	Before		After		Before Std. Diff.	After Std. Diff.
	Private	Public	Private	Public			Private	Public	Private	Public		
<b>Mother's Education</b>												
Mother illiterate	0.305	0.394	0.325	0.401	-0.186 §	-0.160 §	0.179	0.247	0.184	0.204	-0.165 §	-0.048
Mother basic	0.143	0.132	0.150	0.151	0.032	-0.003	0.428	0.406	0.435	0.410	0.044	0.050
Mother secondary or post-sec.	0.360	0.328	0.344	0.319	0.067	0.052						
Mother secondary							0.237	0.195	0.224	0.203	0.103 §	0.051
Mother post-secondary							0.090	0.096	0.094	0.111	-0.020	-0.059
Mother university	0.182	0.139	0.175	0.121	0.117 §	0.147 §	0.061	0.049	0.059	0.071	0.053	-0.050
Mother above university	0.006	0.001	0.002	0.002	0.081	0.010	0.003	0.006	0.003	0.001	-0.045	0.033
Unknown mother's edu.	0.004	0.006	0.004	0.006	-0.029	-0.026						
<b>Age 15 Home Environment</b>												
Access to computer at age 15	0.382	0.303	0.389	0.395	0.168 §	-0.014	0.365	0.422	0.370	0.360	-0.116 §	0.022
Access to internet at age 15	0.191	0.146	0.201	0.242	0.122 §	-0.111 §	0.110	0.142	0.115	0.128	-0.096	-0.040
Access to magazines & books at age 15	0.811	0.732	0.803	0.810	0.187 §	-0.016	0.750	0.775	0.750	0.768	-0.059	-0.044
Refugees in Jordan							0.057	0.044	0.057	0.044	0.056	0.063
<b>Computer at Secondary School</b>												
Never using Comp. at Sec School	0.498	0.534	0.498	0.540	-0.071	-0.085	0.197	0.163	0.198	0.209	0.088	-0.029
Rarely using Comp. at Sec School	0.129	0.185	0.145	0.121	-0.156 §	0.066	0.278	0.270	0.289	0.304	0.018	-0.034
Sometimes using Comp. at Sec School	0.250	0.216	0.250	0.236	0.081	0.034	0.490	0.518	0.478	0.429	-0.056	0.099
Daily using Comp at Sec School	0.123	0.065	0.107	0.103	0.199 §	0.013	0.036	0.049	0.035	0.058	-0.069	-0.115 §
Age when graduated secondary	17.761	17.658	17.750	17.746	0.096	0.004	18.066	17.923	18.016	18.032	0.146 §	-0.017
<b>Secondary Grade</b>												
Secondary Final Grade	67.546	76.031	67.697	68.604	-0.528 §	-0.057	70.197	78.139	71.074	71.205	-1.008 §	-0.017
Sec Grade Sq/100	48.336	60.247	48.455	49.005	-0.727 §	-0.034	49.921	61.652	51.093	51.261	-0.987 §	-0.014
Don't Know Sec Grade	0.039	0.029	0.036	0.020	0.051	0.089						

	Egypt						Jordan						
	Before		After		Before Std. Diff.	After Std. Diff.	Before		After		Before Std. Diff.	After Std. Diff.	
	Private	Public	Private	Public			Private	Public	Private	Public			
Father's age at birth													
Father's age at birth	24.634	21.376	24.019	22.394	0.207 §	0.103 §	33.212	33.291	33.412	32.891	-0.009	0.057	
Father's age at birth sq/100	8.350	7.248	8.089	7.739	0.177 §	0.056	11.836	11.976	11.957	11.542	-0.024	0.072	
Don't know father's age at birth	0.248	0.346	0.263	0.331	-0.216 §	-0.149 §	0.024	0.029	0.023	0.021	-0.030	0.009	
Mother's age at birth													
Mother's age at birth	20.884	16.693	20.030	17.720	0.320 §	0.176 §	27.562	27.367	27.748	27.674	0.026	0.010	
Mother's age at birth sq/100	5.982	4.602	5.639	4.971	0.315 §	0.152 §	8.101	8.089	8.204	8.127	0.003	0.019	
Don't know mother's age at birth	0.237	0.367	0.256	0.342	-0.286 §	-0.189 §	0.008	0.022	0.009	0.007	-0.111 §	0.010	
Egypt Governorates													
Cairo	0.335	0.360	0.380	0.379	-0.054	0.003							
Alexandria	0.292	0.009	0.197	0.149	0.864 §	0.146 §							
Port-said	0.002	0.011	0.002	0.003	-0.118 §	-0.014							
Suez	0.026	0.017	0.028	0.021	0.060	0.044							
Damietta	0.006	0.009	0.006	0.003	-0.046	0.041							
Dakhalia	0.009	0.061	0.011	0.010	-0.286 §	0.001							
Sharkia	0.006	0.064	0.006	0.004	-0.324 §	0.011							
Kalyoubia	0.031	0.090	0.036	0.038	-0.248 §	-0.007							
Kafr El Sheikh	0.007	0.010	0.009	0.012	-0.033	-0.038							
Gharbia	0.013	0.050	0.015	0.011	-0.214 §	0.024							
Menoufia	0.002	0.011	0.002	0.002	-0.118 §	-0.001							
Behera	0.053	0.013	0.060	0.149	0.225 §	-0.498 §							
Ismailia	0.004	0.011	0.004	0.008	-0.089	-0.041							
Giza	0.180	0.137	0.203	0.166	0.118 §	0.100							
Menia	0.004	0.012	0.004	0.007	-0.097	-0.030							
Asyout	0.004	0.037	0.004	0.005	-0.237 §	-0.009							

	Egypt						Jordan					
	Before		After		Before Std. Diff.	After Std. Diff.	Before		After		Before Std. Diff.	After Std. Diff.
	Private	Public	Private	Public			Private	Public	Private	Public		
Suhag	0.009	0.023	0.011	0.004	-0.108 §	0.051						
Aswan	0.006	0.012	0.006	0.006	-0.072	0.008						
Beni-Suef & Fayoum	0.004	0.040	0.004	0.006	-0.249 §	-0.011						
Luxor & Qena	0.009	0.020	0.011	0.016	-0.089	-0.042						
Jordan Governorates												
Amman							0.641	0.505	0.635	0.653	0.278 §	-0.037
Balqa							0.048	0.061	0.050	0.062	-0.054	-0.052
Zarqa							0.124	0.071	0.118	0.117	0.181 §	0.006
Madaba							0.019	0.014	0.021	0.023	0.043	-0.016
Irbid							0.069	0.118	0.073	0.059	-0.166 §	0.048
Mafraq							0.013	0.048	0.014	0.007	-0.205 §	0.043
Jarash							0.031	0.027	0.033	0.031	0.025	0.011
Ajlun							0.015	0.022	0.014	0.013	-0.052	0.007
Karak							0.031	0.075	0.033	0.023	-0.198 §	0.047
Tafiela							0.003	0.038	0.003	0.003	-0.246 §	0.002
Aqaba							0.005	0.023	0.005	0.010	-0.154 §	-0.038
Father's Employment												
Formal Professional Father	0.256	0.322	0.265	0.206	-0.146 §	0.131 §	0.258	0.222	0.256	0.243	0.087	0.029
Employer Professional Father	0.153	0.077	0.130	0.135	0.240 §	-0.016	0.021	0.010	0.017	0.016	0.088	0.010
Informal Professional Father	0.068	0.057	0.073	0.087	0.046	-0.061	0.008	0.008	0.009	0.020	0.005	-0.128 §
Formal Technician Father	0.164	0.192	0.165	0.154	-0.074	0.027	0.229	0.316	0.237	0.235	-0.196 §	0.004
Employer Technician Father	0.029	0.008	0.024	0.009	0.163 §	0.106 §	0.044	0.020	0.040	0.028	0.133 §	0.066
Informal Technician Father	0.015	0.037	0.017	0.016	-0.140 §	0.010	0.044	0.039	0.042	0.055	0.022	-0.069
Formal Craft Father	0.147	0.135	0.145	0.184	0.034	-0.112 §	0.116	0.090	0.117	0.102	0.087	0.048
Employer Craft Father	0.042	0.026	0.045	0.085	0.087	-0.220 §	0.052	0.038	0.052	0.075	0.066	-0.110 §
Informal Craft Father	0.075	0.099	0.081	0.088	-0.085	-0.025	0.079	0.099	0.082	0.067	-0.069	0.053

	Egypt						Jordan					
	Before		After		Before Std. Diff.	After Std. Diff.	Before		After		Before Std. Diff.	After Std. Diff.
	Private	Public	Private	Public			Private	Public	Private	Public		
Unknown Father's Employment	0.051	0.047	0.056	0.035	0.019	0.096	0.149	0.158	0.150	0.159	-0.027	-0.025
N(Observations)	468	1057	468	1057			575	790	575	790		

**Source:** Authors' calculations

**Notes:** § denotes an 0.1 or greater standardized difference.