WORKING P A P E R

The Role of Education in Preparing Graduates for the Labor Market in the GCC Countries

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LABOR AND POPULATION

**THE ROLE OF EDUCATION IN PREPARING GRADUATES FOR THE
LABOR MARKET IN THE GCC COUNTRIES**

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ABSTRACT

In the 21st century knowledge economy, education plays an increasingly important role in preparing new labor market entrants for the workforce and providing skill upgrading throughout the working career. The vital role of education is propelled by the rapid pace of technological change, as well as the interdependent, global economy, forces that together demand a workforce with the capacity for leadership, problem solving, and collaboration and communication in a wide range of economic sectors. Within this context, the education and workforce development systems are critical for supporting human capital development throughout the life course. This paper reviews these broader trends regarding the role of education in the labor market and then considers the implications for education in the countries of Gulf Cooperation Council (GCC), namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Where data are available, the paper examines patterns of educational attainment overall in these countries, evidence of the quality of the education systems and the graduates they produce, and the labor market benefits of higher educational attainment. We also assess gender differences, where possible, in each of these indicators of interest. The paper concludes by enumerating several key challenges facing the Gulf countries in promoting strong education systems and well functioning labor markets to meet the labor force needs in the private and public sectors in the 21st century global economy.

INTRODUCTION

In the 21st century knowledge economy, education plays an increasingly important role in preparing new labor market entrants for the workforce and providing skill upgrading throughout the working career. The vital role of education is propelled by the rapid pace of technological change, as well as the interdependent, global economy, forces that together demand a workforce with the capacity for leadership, problem solving, and collaboration and communication in a wide range of economic sectors (Károlyi and Panis, 2004). Within this context, the education and workforce development systems are critical for supporting human capital development throughout the life course.

In light of these trends, countries throughout the developed and developing world are examining the extent to which their current workforce meets their needs for human capital, now and into the future. Likewise, country governments are reexamining their education and workforce development systems in light of the critical role that education plays in the labor market and economy. The countries in the Arabian Gulf and the rest of the Arab world are no exception. Indeed, the 2003 *Arab Human Development Report* placed a spotlight on the need to develop a “knowledge society” that could meet the challenges associated with technological change and globalization (United Nations Development Programme (UNDP), 2003). Human capital development strategies are already well established in the region, as highlighted by Gonzalez et al. (2008) in their examination of education and labor market reforms underway in Lebanon, Oman, Qatar, and the United Arab Emirates (UAE).

To further support our understanding of these issues, this paper seeks to call attention to the importance of education in the 21st century in preparing individuals for the labor market,

with a specific focus on the six Gulf Cooperation Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. A full treatment of the education and labor market systems in each of these countries is beyond the scope of this paper. Instead, using a comparative perspective, the goal is to highlight some of the most important indicators of the production of human capital in each country and the role that human capital acquisition plays in the labor market. The paper draws on what we know from other research and what can be readily gleaned from publicly available data for the GCC countries to establish a set of stylized facts about the role of education in the labor market. These observations then form the basis for a discussion of the challenges that lie ahead for the GCC countries to ensure that those entering the labor market in the coming decades are well prepared for the world of work that they will encounter.

To begin, the paper reviews the broad trends regarding the role of education in the labor market. The work of economists in developing a human capital framework is used to illustrate the effect of investments in education on individual productivity and labor market success, as well as the benefits to the broader economy in terms of economic growth. That research base documents that there are theoretical reasons to expect increases in education to make individuals more productive, as well as empirical research to support that hypothesis. Moreover, factors such as technological change and globalization continue to increase the demand for skilled workers that can operate successfully in the global environment.

Next, the paper considers the role of education in the labor markets of the GCC states. Where data are available, the paper examines patterns of educational attainment overall in these countries, evidence of the quality of the education systems and the graduates they produce, and the labor market benefits of higher educational attainment. We also assess gender differences, where possible, in each of these indicators of interest. For this part of the analysis, we draw on a

number of different data sources, several of which—such as the World Development Indicators database compiled by the World Bank—provide data across countries that have been standardized, as much as possible, to support cross-national comparisons (World Bank, undated). Nevertheless, variation in measurement across countries may remain, so that small inter-country differences should be interpreted with care. Likewise, a number of the indicators reported in this paper come from data collected and compiled separately in each country, so there is no assurance of strict comparability. Nevertheless, an empirically-based comparative analysis is useful for highlighting meaningful similarities and differences across the GCC countries.

This analysis documents near universal education participation and gender parity at the primary level in the GCC countries and either parity or a gap that favors girls in enrollment at the secondary level. At the post-secondary level, women are more likely to be enrolled than their male counterparts, although some of those differences may be due to measurement issues. For two countries, Qatar and Saudi Arabia, where educational attainment data are available by age cohort, we can see substantial educational upgrading across the generations, so that more recent labor force entrants bring more human capital than earlier entrants. While the trends in educational attainment are positive, an examination of newly available internationally comparable academic assessments indicates that students in the GCC countries in the primary and secondary levels are far from attaining the knowledge in mathematics, science, and reading that is consistent with international standards. To the extent that there are gender differences in academic achievement at the primary and secondary levels, girls in the GCC countries consistently outperform boys, especially in science and reading and often by wide margins. Gender differences are also evident when examining degree fields among college graduates, with women in the GCC countries less likely to major in the sciences and engineering.

In terms of the relationship between education and labor market outcomes, we were limited to an examination of data from Qatar and Saudi Arabia. For those two GCC countries, there is an underutilization of labor overall for nationals and for women in particular as measured by labor force participation rates, although both men and women with more education are more likely to be in the labor force. The underutilization of the human capital of nationals in these two countries is further evidenced by relatively high unemployment rates at higher levels of education and for women. The relationship between wages and education in these two countries indicates that there is a positive return to acquiring more human capital in the form of schooling, but the returns are lower for women than men and for nationals compared with expatriates.

The paper concludes by considering several key challenges facing the GCC countries in promoting strong education systems and well functioning labor markets to meet the labor force needs in the private and public sectors in the 21st century global economy. Four themes frame our discussion of challenges: continuing the growth in educational attainment, improving the quality of education, addressing labor market imbalances, and providing information to assess education system performance and labor market outcomes. Many of these challenges are already being addressed in the GCC countries through reforms to education systems and the labor market. Those countries and others will benefit from identifying which reforms are having their intended effect and which are avoiding any unintended consequences. Such evaluations can ensure that the GCC countries engage in a continuous process of reform and refinement that advances their goals for producing a workforce with the knowledge and skills required to meet the needs of employers in the decades to come.

OVERVIEW OF THE ROLE OF EDUCATION IN THE LABOR MARKET AND ECONOMY

In the final decades of the 20th century and now in the opening decades of the 21st, the countries of the world have been experiencing a transition from production-based economies to ones based on knowledge and information. Just as the shift from agrarian to industrial economies required a new mix of skills for the workforce, so too has this most recent transition changed the nature of jobs and the skills required to be successful. Education, from the earliest ages until the transition to adulthood and even beyond, plays a role, as it has in the past, in advancing the productive capacities of the workforce, as known as human capital.

To set the stage for the more focused analysis of the GCC countries in the section that follows, this section first provides a brief tour of the research that provides both theoretical and empirical foundations linking human capital to labor market performance. This occurs through a discussion of the key elements of human capital theory, recent trends in technology and globalization that are affecting the demand for skilled labor, the link between education and individual labor market success, and the broader economywide benefits of investments in human capital.

Education and Skills Development

Economic models of the demand for education at the individual level, and hence the supply of educated labor in the job market, rest on the premise that education is a productive input through its effect on the skills and knowledge imparted through the education process (Freeman, 1986). Starting with seminal work of Becker (1964), individuals are assumed to be willing to invest current time and money in the production of human capital for a future return in the form of “monetary and psychic income” (Becker, 1964, p. 9). Time spent in education

imparts a set of skills and knowledge that, through the education production function, raise an individual's stock of human capital. More generally, human capital is understood to capture the productive capacities of individuals embodied through knowledge, skills, experience, health, and other characteristics. With more human capital, individuals are more productive and therefore command a higher wage in a competitive labor market.

An essential feature of the human capital model is that investments in human capacities take place over time, building on prior stocks of human capital. Human capital formation may take place through formal schooling at multiple levels or training programs, but also through investments in on-the-job training, learning by doing, and other skill-formation activities. In analyses of human capital, educational attainment is typically used to measure skill capacities, but years of schooling is really only a proxy for capturing the range of skills required in the labor market. Other measures of skill may be reflected in general or specific job training, years of work experience, and various cognitive and non-cognitive skills (e.g., inter-personal or interactive skills) that can be assessed through standardized batteries.¹

Forces Changing the Demand for Skill

In recent decades, the world economy has been characterized by greater economic integration, as well as a more rapid pace of technological change. These two forces, among others, have helped to increase the demand for a more skilled workforce, particularly in more advanced economies (Károlyi and Panis, 2003). The increased demand for skill is driven by the nature of the technologies themselves and the need to further extend technological advances, and

¹ As one example, the Organisation for Economic Development (OECD) conducted the International Adult Literacy Survey (IALS), an internationally comparable assessment employed to evaluate the skills of adults age 16 to 65 in three areas relevant for performing in white collar jobs: prose literacy (the ability to process narrative text), document literacy (the ability to process forms, charts, tables, schedules, and maps), and quantitative literacy (the ability to perform practical arithmetic operations) (OECD, 2000).

also by how the technologies have changed the nature of the workplace and the associated skills required. Likewise, globalization, combined with the new information technologies, places a premium on interactive and communication skills, as well as the ability to gather and process information and adapt to changing circumstances. Thus, the knowledge-based economy that is emerging places a premium on such skills as abstract reasoning, problem solving, communication, and collaboration.

As a result of the rapid pace of technological change in recent decades, the demand has increased for more skilled workers who can develop the new technologies, determine applications in the production of goods and services, and use the technologies in the workplace. In some cases, the new technologies are replacing human labor and thereby shifting the mix of occupations, as some jobs become obsolete while other jobs gain in importance (Autor, Levy, and Murnane, 2003). In other cases, occupations continue to be in demand, but the skills required for the job have been changing, as workers need a higher degree of skill to integrate the technologies into their work.

The changing mix of skills demanded in the labor market is readily illustrated by a study conducted in the United States by Autor, Levy, and Murnane (2003). Using data covering a 40-year period, they defined five broad categories of skills that combined routine versus non-routine skills, and manual versus cognitive (i.e., analytic) or interactive (i.e., communication) skills. For each of these skill combinations, they determined the percentage of jobs at each point in time that required that skill, accounting for both the occupational mix at the time and the skill requirements of each occupation. Over time, their analysis captures the effects of both the changing mix of occupations, as well as the change skill requirements within specific occupations. The resulting trends in the skill requirements are shown in Figure 1. Notably, the

two upward trending lines capture non-routine cognitive and interactive skills, while the three downward trending lines reflect skills that are either routine or manual. In other words, a greater share of jobs in the U.S. economy in 1998 required workers with the ability to solve problems, work in teams, and effectively communicate with co-workers, clients, and customers. These jobs grew at the expense of jobs that required routine skills that could be more readily codified and performed by computers or other machinery, as well as manual jobs. This figure then validates the growing emphasis on the need for “knowledge workers” who are responsible for analyzing, problem solving, and communicating the information needed for decisionmaking (Reich, 2001).

Technology and other factors have also been changing the nature of the workplace, further increasing the demand for skilled workers. Research in the United States, for example, documents how the adoption of new technologies has shift the ways firms are organized across a broad array of “old economy” and “new economy” industries (Bresnahan, Brynjolfsson, and Hitt, 2000, 2002). Information technologies and their associated networks, for instances, have allowed firms to move away from vertically integrated command-and-control structures to more decentralized organizations that focus on their core functions, while outsourcing noncore functions to other organizations (Malone and Laubacher, 1998). Likewise, information technologies support the movement toward participatory “high performance” work place practices that grant workers more authority, flexibility, and teaming. These practices are then accompanied by performance-based pay systems (Kruse and Blasi, 1998). These changes in the workplace confer a premium on workers with the skills needed to successfully navigate these new environments, such as the ability to gather, interpret, and process information, the ability to collaborate and cooperate as part of a team, and the ability to integrate and synthesize knowledge across domains.

While various forces are increasing the demand for a skilled workforce, this does not imply that all jobs in the future will require a college degree. Indeed, depending on the industrial mix in any given country, the future labor market will still require a substantial share of lower-skill workers for occupations that may require on-the-job training but no post-secondary education (Karoly and Panis, 2003). Such jobs are often found in the services sector in areas like retail trade, food services, and other personal services, but they are also prominent in the manufacturing sector, as well as in construction, mining, and other extractive industries. Yet, even in jobs that do not require post-secondary training, workers will be more likely in the future to rely on new technologies in ways that require the ability to learn new software or hardware or to adopt to other changes in workplace processes or practices. Thus, lifelong learning, whether formally or informally acquired, will be a necessity for the vast majority of workers across industries and occupations.

Education and Individual Labor Market Success

The human capital model posits that individuals have an incentive to invest in acquiring human capital today, because there will be a future dividend in the form of higher earnings. Drawing on human capital theory, economists have created a veritable industry out of generating empirical estimates of the earnings advantage associated with higher levels of education to determine if education truly increases an individual's productive capacity (see Card, 1999, and Krueger and Lindhal, 2001, for reviews). As in the classic work of Mincer (1974), traditional earnings equations have been estimated to explain variation in individual earnings as a function of years of schooling, years of experience (in a quadratic form), and other personal characteristics such as sex, race, or ethnicity. In recent years, more sophisticated econometric models have addressed possible biases that would arise if years of schooling is simply a

proxy for unobserved ability or other unmeasured factors like motivation. In other words, individuals with higher earnings capacity, because they are endowed with more innate skills, may choose to acquire more education, so that estimates of the true returns to education might be biased upwards if such selectivity is not accounted for. The findings from this research on the causal relationship between education and earnings indicates that the simple regression models produce similar if not lower estimates of the returns to schooling than those that account for possible selectivity bias (Ashenfelter, Harmon, and Oosterbeek, 1999; Card, 1999, 2001). The bottom line is that more education creates more productive individuals, and that productivity advantage is rewarded in competitive labor markets.

The positive relationship between higher education and greater earnings is a consistent labor market phenomenon found for countries throughout the world and within countries over time (Psacharopoulos, 1994; Trostel, Walker and Woolley, 2002; Psacharopoulos and Patrinos, 2004). As an example, Figure 2 shows the wage premium as of 2001 associated with having a tertiary degree compared with an upper-secondary degree for male workers in 17 countries in the Organisation for Economic Co-Operation and Development (OECD) with comparable household data on hourly wages (Strauss and Maisonneuve, 2007). The estimated premium is highest for the United States, at 92 percent, but even the smallest premium, found for Spain, is nearly 30 percent. As a reference point, the global average private return to each additional year of schooling is estimated to be about 10 percent, a similar estimate as that found in studies of the U.S. labor market (Psacharopoulos and Patrinos, 2004). Beyond the earnings benefits, a host of other studies have documented an empirical relationship between higher levels of education and other favorable labor market benefits such as reduced rates of unemployment, higher occupational status, and increased job tenure (Card, 1999).

While the focus of this paper is the labor market, it is worth noting that higher educational attainment has been shown to be associated with other private and social benefits, beyond the advantages in the labor market. Wolfe and Haveman's (2002) survey of the literature identified research supporting spillover benefits in such areas as individual health (e.g., through a reduced likelihood of smoking), childbearing (e.g., better timing and spacing of births), personal behavior and consumer choices (e.g., reduced criminality, more efficient consumption), and the success of the next generation (e.g., higher educational attainment for one's children). These favorable effects of increased educational attainment produce private gains to the individuals themselves, as well as benefits to the government or society as a whole through lower public health system costs, lower criminal justice system costs, and so on.

Economywide Benefits of Educational Investments

While the human capital framework operates at the microeconomic level, economists have also sought to examine the broader macroeconomic benefits associated with a more skilled workforce. Theoretical economic models posit two possible mechanisms by which human capital can affect aggregate economic growth (Aghion and Howitt, 1998). One hypothesis is that human capital is a factor of production, just like physical capital. The growth of human capital, like physical capital or any other factor of production, then leads to higher rates of economic growth. A second hypothesis is that the current stock of human capital leads to higher growth by improving the ability of a country to develop, implement, and adopt new technologies. The resulting technological progress leads to sustained growth. In the first hypothesis, it is the change in human capital over time that affects growth, while under the second hypothesis, it is the stock of human capital that drives economic growth. The reverse causal relationship could also hold if

anticipated increases in economic growth in the future lead to increases in educational attainment (see, for example, Bils and Klenow, 2000).

An equally active empirical literature has looked for support of the two hypotheses for the social returns to education as has considered the private benefits in the form of earnings (see Krueger and Lindahl, 2001, for a review).² In the context of the first hypothesis, economists have examined the empirical relationship between growth in a country's stock of human capital—typically measured by a country's average level of education—and economic growth. Historical analyses for the United States, for example, indicate that the growth of human capital during the 20th century contributed about 0.3 percentage points per year to economic growth (Jorgenson, Ho, and Stiroh, 2002; DeLong, Goldin, and Katz, 2003). Such estimates from simple growth accounting may understate the contribution of the growth in human capital to economic growth to the extent that a more highly educated workforce also makes capital more productive, the second hypothesis (Kodrzycki, 2002).

While no clear consensus has emerged regarding these competing hypotheses, education is nevertheless viewed as making a sizeable contribution to economic growth (DeLong, Goldin, and Katz, 2003). In their review and reanalysis of cross-country data, Krueger and Lindahl (2001) conclude that evidence in favor of the second hypothesis rests on assumptions not supported by the data. Their estimates, which support the first hypothesis, suggest that the social returns to education are at least as high as the private returns, although their estimates of the social returns may be biased upwards due to reverse causality.

² The empirical research must contend with the potential bias due to measurement error in cross-country data on the level and change in human capital (typically measured by average years of schooling). See the discussion in Krueger and Lindahl (2001) and Bosworth and Collins (2003).

Other macroeconomic analyses suggest that it is not only the quantity of schooling that matters but the quality as well. Hanushek and Kimko (2000) find that the quality of school as measured by math and science scores have a positive impact on economywide growth rates that exceeds that for the quantity of schooling. In their analysis, one standard deviation in test performance leads to a one-percentage point difference in the annual growth rate of real per capita GDP. Over a 50-year period, a one-percentage point difference in growth rates, for example 2 percent versus 1 percent, results in incomes that are higher by 64 percent (Hanushek, 2002). Thus, small differences in growth rates have a large cumulative impact over the long run.

EDUCATION AND THE LABOR MARKET IN THE GCC

As discussed in the prior section, there is both a theoretical expectation and empirical evidence that education plays a role in the labor market through its contribution to skill formation. On the supply side, individuals have an incentive to acquire more human capital because of the future economic return. On the demand side, a variety of factors have converged to demand an even more educated workforce in the 21st century.

With this background, we now narrow our focus to the role of education in the labor markets of the six GCC countries. We begin by examining patterns of education enrollment, which reflect the human capital investment through education for cohorts that have yet to reach adulthood. Overall educational attainment is also considered, as it provides one measure of the stock of human capital available to an economy at any given point in time. We then consider evidence of the quality of the educational experience of current students by examining evidence from international education assessments, as well as the degree fields for university graduates. We then shift our attention to the relationship between education and labor market outcomes like

participation rates, unemployment rates, and wages. Where possible, we also assess whether there are meaningful gender differences in the acquisition of education and the consequences for labor market outcomes.

In considering the patterns of education inputs and outputs in this section, it worth keeping in mind that all six GCC countries are classified by the World Bank in the upper income group of countries based on gross national income (GNI) per capita as of 2009, although GNI per capita is near the lower end of the range for Oman, Saudi Arabia, and Bahrain.³ Based on the Human Development Index (HDI), a broader measure of economic and social development prepared by the UNDP, Kuwait, Qatar, and the UAE are all classified as of 2009 as having “very high human development” (world rankings of 31, 33, and 35, respectively), while Bahrain, Oman, and Saudi Arabia are classified as having “high human development” (rankings of 39, 56, and 59, respectively).⁴ Thus, where outcomes like schooling investments are usually related to a country’s wealth levels, we might expect better outcomes for Kuwait, Qatar, and the UAE compared with Bahrain, Oman, and Saudi Arabia.

Tracing Patterns of Education Enrollment

One area of significant advance in recent decades in the Arab countries has been the push toward universal primary and secondary education and closure of the gender gap in school

³ The World Bank classifies countries into four income categories based on gross national income (GNI) per capita, a common measure of the level of economic well-being for a country (World Bank, 2009). The income cutoffs as of July 2009, measured in 2008 U.S. dollars are low income (\$975 or less), lower middle income (\$976 to \$3,855), upper middle income (\$3,856 to \$11,905) and upper income (\$11,906 or more).

⁴ The HDI, calculated by the UNDP, is a weighted index of life expectancy, education (measured by adult literacy and gross school enrollment at the primary, secondary, and tertiary levels), and the standard of living (gross domestic product (GDP) per capita) (for additional detail, see UNDP, 2009). While this measure is not intended to encompass all relevant aspects of human development, it captures other dimensions beyond having a high standard of living, namely having a long and healthy life and being educated. The composite index ranges from zero (worst outcome) to one (best outcome). Based on the HDI value, countries are classified by the UNDP as very high (38 countries), high (45 countries), medium (75 countries), or low (24 countries) human development.

enrollment (UNDP, 2003). The GCC countries are no exception, as seen in Table 1 where gross and net enrollment rates as of 2007 available through the World Bank are shown at the primary, secondary, and tertiary levels, along with the percentage-point gender gap in enrollment at each level.⁵ Net enrollment rates are potentially most meaningful in that they reflect enrollment rates at each level for children of official school age at that level, capturing therefore both enrollment patterns and school progression patterns (i.e., children will not be counted as enrolled if they delay school entry and/or repeat grades and are therefore enrolled at a level inconsistent with their chronological age).

With the exception of Oman, the other five GCC countries have gross enrollment rates of 98 or higher at the primary level and rates of 90 or above at the secondary level. Bahrain's primary net enrollment rate of 98 is the highest, indicating that their children are more likely to enter school and progress through school consistent with their age. Oman is farthest from universal primary enrollment with a primary gross enrollment rate of 80 and a net enrollment rate of 73. Notably, these rates for Oman mark an 8- to 10-percentage point decline from the levels attained in the first part of the decade. At the secondary level, Bahrain and Qatar have the highest net enrollment rate at 93, while Saudi Arabia is the lowest at 73.

Gender differences in enrollment are almost nonexistent at the primary level for the GCC countries, and that holds true for Kuwait, Oman, and Qatar at the secondary level as well. The gender differences in secondary net enrollment rates for Saudi Arabia and Bahrain, where girls have higher enrollment by 5 and 6 percentage points, respectively, are the largest gender

⁵ Gross enrollment rates measure the ratio of the number of children enrolled at a given education level divided by the number of children who are of official school age for that education level (multiplied by 100). Given delays in enrollment and grade repetition, gross enrollment rates (especially at the primary level) may exceed 100. Net enrollment rates, in contrast, measure the number of children of official school age for the education level

differences among the GCC countries. Interestingly, Saudi Arabia goes from an 8 percentage-point difference in gross enrollment rates favoring boys (94 for boys versus 86 for girls), to a gap that favors girls when the net enrollment rate is considered (70 for boys versus 76 for girls). Combined with the larger gross enrollment rate for Saudi boys at the primary level, these data indicate that boys are more likely to delay school entry or fall behind the normal school progression path through the secondary grades compared with girls. In the case of Bahrain, girls are ahead of boys at the secondary level in both gross and net enrollments.

Perhaps the most interesting patterns in educational enrollment occur at the tertiary level, where data are available only for gross enrollment rates. As seen in Table 1, rates of participation in post-secondary education vary across the GCC countries from a high of 32 percent in Bahrain to a low of 16 percent in Qatar. More striking are the gender gaps, which in every country indicate that women participate in post-secondary education at a higher rate than their male counterparts. That gap ranges from 28 percentage points in Bahrain to a more modest 4 percent in Oman. In Bahrain, there are 47 women enrolled in higher education for every 100 men of college age compared with just 19 enrolled men out of every 100. The contrast is even more extreme in Qatar where there are about 3 females in higher education for every male (based on gross enrollment rates of 27 for females versus 9 for males).

When interpreting these gender gaps, however, there are two cautions to invoke—concerning both the numerator and denominator that are used to calculate tertiary gross enrollment rates. First, presumably the figures produced by the World Bank are based on population counts in the denominator that include both nationals and nonnationals. Given the

enrolled at that level divided by the number of official school age children for that level (again multiplied by 100). Thus, net enrollment rates cannot exceed 100.

large absolute numbers of nonnationals in the GCC countries, a group that is disproportionately young and male, the figures may be distorted by the presence of college-age immigrant laborers who are in country to work and not to attend school. Second, the data do reflect the fact that many men in the GCC countries (and the Arab World more generally) attend higher education overseas (UNDP, 2005). Thus, if all higher education enrollment were accounted for and the figures were specific to nationals, we would expect some or all of the female advantage in enrollment rates at the post-secondary level to be eliminated.

Upgrading of Educational Attainment

The enrollment rates in Table 1 reflect the flow of students through the education system but it is equally important to assess the implications in terms of the stock of education in the country or for the potential work force (e.g., those of working age). However, such data are not included in the World Bank indicators database, nor are they regularly reported by country statistical agencies.⁶ Just as the presence of large shares of expatriate workers can affect tertiary enrollment rates, it will also shift the distribution of educational attainment. Thus, ideally for the GCC countries in particular, we would want to examine educational attainment separately for nationals and nonnationals. However, most of the GCC countries, if they make population data available at all, do not provide tabulations separately by citizenship status. Two exceptions are Qatar and Saudi Arabia, both of which are featured in Table 2. There we have calculated the distribution of the national population across four education levels for four 10-year age cohorts,

⁶ The most recent year available in the cross national database on average years of education by country compiled by Barro and Lee (2000) is 2000. Among the GCC countries, only Bahrain (average education of 6.09 in 2000 for those age 25 and above) and Kuwait (average education of 7.05 in 2000 for those age 25 and above) have data for that year.

starting with those age 25 to 34 (a group that will have reached or be close to reaching their highest level of education) and ending with those age 55 to 64.

The table reveals a higher level of overall educational attainment in Qatar compared with Saudi Arabia, which might be expected given the higher level of per capita GNI in the former. Overall, 33 percent of Qataris age 25 to 64 report in the 2008 Labour Force Survey that they have a university degree or higher. As of the 2004 Census, 18 percent of Saudis age 25 to 64 had reached that level. The totals, however, mask an important pattern of educational upgrading over time across each successive cohort. In Qatar, for example, 16 percent of those age 55 to 64 have a university degree compared with 34 percent of those age 25 to 34. It is interesting to note that 40 percent of those in the 35- to 44-year-old age range report having a university degree, higher than the younger cohort. If the younger cohort continues to acquire more schooling, that cohort may eventually surpass those in the next age group.⁷ Saudi Arabia displays a monotonic pattern with 25 percent in the youngest age group having a post-secondary degree, falling to 4 percent for the oldest age cohort in the table. Thus, for at least these two GCC countries, the move toward universal education has resulted in substantial education upgrading over time.

Inferring Education Quality through Academic Assessments

The education enrollment data for the GCC countries indicate that most are near universal primary enrollment with no gender gap, and near universal secondary enrollment, albeit with a gender gap in several countries that tends to favor boys on gross enrollment rates but girls on net enrollment rates. These patterns show promise in terms of a flow of children and

⁷ When we break out the 25- to 34-year-old age group into 25- to 29-year-olds and 30- to 34-year-olds, we find that 30 and 39 percent, respectively, of each age group has reached the university level or higher. This indicates that those in the former group are likely to further increase their education and that both groups will eventually meet or exceed the college attainment rate of those age 35 to 44.

youth through the educational system that will generate the human capital of the next generation of workers. The data on educational attainment by cohort provide further evidence of increasing investments in human capital over time. However, enrollment rates and educational attainment figures do not provide any indication of the quality of education received at the primary, secondary, or tertiary level. To gain some insight into the issue of quality, we first turn to international academic assessments of elementary and secondary school-age students.

In particular, we draw on three sets of international student assessments in mathematics, science, and reading conducted in 2006 or 2007. The 2007 Trends in International Mathematics and Science Study (TIMSS) assessed students in 4th and 8th grades in 59 countries in the eponymous subjects (Mullis, Martin, and Foy, 2009), while reading was the focus of the 2006 Progress in International Reading Literacy Study (PIRLS) which was administered in 40 countries (Mullis et al., 2007). The 2006 Programme for International Student Assessment (PISA) assessed 15-year-olds in 57 countries in all three subjects (OECD, 2007). Each of these studies develop internationally comparable standardized test batteries that are then administered to representative samples of students in each country in their native language, following rigorous data collection standards to ensure comparability. In each of these recent international studies, a subset of the GCC countries participated, a relatively new phenomenon.⁸ We discuss the results in chronological order by the age of the students assessed.

Table 3 begins with results for students assessed in the TIMSS and PIRLS in 4th grade. Kuwait and Qatar were full participants in all subjects, while Dubai in the UAE was a benchmarking participant (i.e., testing only a region of a country) for TIMSS only. As indicated

⁸ Kuwait participated in the first wave of TIMSS in 1995, while Bahrain and Saudi Arabia were participants in the third wave in 2003. Qatar was the first GCC participant in the PISA in 2006.

in Table 3, four other Arab countries also participated in the TIMSS 4th grade assessments but only one other Arab country was part of PIRLS at that grade. For each subject area and country, the table shows the number of students tested, the overall mean scale score, the separate score for girls and boys, and the point difference between girls and boys. The scale scores are standardized to an international mean of 500 and standard deviation of 100. The table also shows how students within each country, and at the international level, are distributed across four internationally benchmarked achievement levels.⁹ At the advanced level, students “can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning,” while at the other extreme, students who reach the low benchmark only “have some basic mathematical knowledge” ((Mullis, Martin, and Foy, 2009, p. 68).

Several notable patterns emerge from the test results shown in Table 3. First, the two full participating GCC countries Kuwait and Qatar fall well below the international average in 4th grade mathematics, science, and reading achievement, with scale scores in the 300 to 350 range, upwards of two standard deviations from the mean. On each test, their mean scale scores rank near the bottom of the countries in the study, usually in the company of Morocco, South Africa, Tunisia, or Yemen. The scores for Dubai are in the 445 to 460 range, closer to the international mean. However, the results for the one emirate may or may not reflect what would be found for the entire UAE. Notably, the Dubai sample of students tested in fourth grade stands apart from all other countries in having 72 percent of children with neither parent being born in the country. By comparison, that rate is 25 percent for Qatar and 13 percent for Kuwait. Thus, the relatively higher scores for Dubai may reflect the large share of international students in the study sample.

⁹ The four benchmark levels of advanced, high, intermediate, and low correspond to scale scores of 625, 550, 475, and 400, respectively.

Second, the low mean scale scores correspond to very low levels of attainment with respect to the international benchmarks. For example, on average 90 percent of students across the countries tested attain the low benchmark in mathematics, yet just 21 percent of Kuwaiti students and 13 percent of Qatari students perform at this level. The fraction reaching the low threshold is higher in science and reading, but effectively no students in Kuwait or Qatar reach the high or advanced level in any of the subjects. Again, performance is higher for Dubai but this may again be affected by the composition of the test-taking sample.

Third, the performance of 4th grade students in Kuwait and Qatar is roughly on par with their counterparts in the other Arab countries participating in the TIMSS and PIRLS, despite the considerably higher income levels in the two GCC countries. This is evident on both the mean scale scores and the distribution across achievement levels. Notably, on the mathematics assessment, Algeria, Morocco, and Tunisia all have mean scale scores that exceed those for Kuwait and Qatar, despite having lower levels of economic development.¹⁰ Only Yemen consistently ranks at the bottom of the Arab countries participating in the international assessments.

Fourth, there are sizeable and statistically significant gender gaps in student performance in the two GCC countries that almost always outstrip those found for the other Arab countries. In each subject area, Kuwait has the largest gender gap across all the countries tested, and Qatar has the second or third highest gap on the international comparison. (Tunisia has the second largest gender gap on the science assessment.) In science and reading, the gender gap reaches 64 and 67 scale points for Kuwait, respectively, about two-thirds of a standard deviation. Even more

¹⁰ Algeria is classified by the World Bank in the upper middle income group; Morocco and Tunisia are in the lower middle income group.

striking is the fact that the gender gap in academic achievement almost universally favors girls.¹¹ Where the gap exists, the performance advantage for girls is usually higher in science and reading compared with math. Only in Morocco on the mathematics assessment is there near parity for girls and boys.

These same patterns—low performance overall for the GCC countries, low performance of the GCC countries relative to other Arab countries, and better academic performance for girls over boys in the GCC countries, especially in science and reading over math—are replicated when we consider performance in the 8th grade in math and science as measured in the TIMSS (Table 4) and performance by 15-year-olds in math, science, and reading as assessed in PISA (Table 5). The 8th grade results for TIMSS have the advantage of covering all six GCC countries (although UAE is again limited to Dubai, with the same large share of international students) and seven other Arab countries. The PISA covers just Qatar in the GCC and only Jordan and Tunisia among the other Arab countries.

The 8th grade test results in Table 4 further call attention to the low performance of the higher income GCC countries of Kuwait and Qatar (setting aside the results for the UAE because of the sample issue). On the math and science assessments, both Bahrain and Oman out-rank Kuwait and Qatar and Saudi Arabia has higher performance than Qatar. Furthermore, in both subject areas, Qatar falls below the performance of the other seven Arab countries, all countries with lower levels of per capita GNI. Kuwait ranks below the other Arab countries on the math assessment but performs better than Algeria, Egypt, Lebanon, and Morocco in science. Interestingly, at 8th grade, the stronger performance of girls is not a universal phenomenon in the

¹¹ The patterns of superior academic performance for girls over boys in the primary and secondary grades is confirmed in other studies as well (see UNDP, 2005, for examples from Bahrain and Kuwait).

participating Arab countries. The gender gap is always high in the GCC countries in favor of girls. In several of the other Arab countries, there is either near-parity in performance (e.g., Algeria and Morocco) or a larger gap that favors boys (e.g., Lebanon, Syria, and Tunisia).

For each subject in the PISA study shown in Table 5, Qatar falls below Jordan and Tunisia, both lower middle income countries. The PISA defined six proficiency levels and Qatar has the largest share of students in each subject below the lowest threshold and almost no students reaching the two highest levels (levels five and six combined). Again, achievement for girls exceeds that for boys in Qatar, especially for reading where there is a 66 scale-point difference.

Gaining Further Perspective on Education Results: Degree Field for University Graduates

The achievement data available through TIMSS, PIRLS, PISA, and other sources highlight the deficits in education quality in the GCC countries, at least through the secondary level. Achievement tests are not usually conducted at the post-secondary level. Hence, to shed some light the nature of the education content received at that level, we turn to data on the fields of specialization or degree fields among university graduates. The U.S. National Science Foundation (NSF) compiles comparable figures for over 90 countries on the number of first university degrees by field, with a focus on degrees in the sciences and engineering (S&E). The share of degrees in the S&E fields is an important indicator of the ability of a country to generate a skilled workforce in the fields that are particularly in demand in light of technological change.

Table 6 reports the number of degrees by field, in total and separately for males and females, for the four GCC countries represented in the NSF data: Bahrain, Oman, Qatar, and Saudi Arabia. The table also reports the percentage of degrees overall in the various fields. In absolute terms, Saudi Arabia has the largest number of degree graduates and the large

number in the S&E field each year and Qatar the smallest, consistent with the relative size of each country's population. The share of degrees in the S&E field range from a low of 13 percent in Oman to a high of 29 percent in Bahrain. A consistent pattern in each country, however, is that women are less likely than men to have an S&E degree, with percentage-point gaps of 7 points (in Qatar and Saudi Arabia) to 14 points (in Oman). Even though women are less likely to major in an S&E field, because they have a higher likelihood of being in higher education overall, the absolute number of female S&E graduates equals or exceeds that for males in all but Oman. Although not shown in Table 6, women tend to be concentrated in fields such as the humanities and social sciences, majors that are not as much in demand in the labor market, although the patterns are gradually changing (UNDP, 2005). When women do major in an S&E field, they gravitate toward different subspecialties than their male counterparts (e.g., pediatrics versus surgery in medicine) (UNDP, 2005).

Understanding the Labor Market Consequences of More Education

In order to examine the relationship between human capital and labor market outcomes in the GCC, we would ideally have access to individual-level data from Census or labor force surveys with information on educational attainment and labor market outcomes such as labor force participation, unemployment, and earnings. Given the potential for differences in education distributions and labor market outcomes between nationals and nonnationals, it would also be preferable to examine those two groups in the population separately. However, while such data are collected periodically by the GCC countries through Censuses or labor force surveys, the microdata are generally not publicly available for analysis. Several of the GCC countries publish tabulations from such data sources, but they do not always provide stratification by citizenship status, by education, or even by gender.

Two of the GCC countries—Qatar and Saudi Arabia—do make such information available for recent surveys. In the case of Qatar, the Statistics Authority publishes tabulations from the 2008 Labor Force Survey which collected information on education, labor force status, and wages. Likewise, the Saudi Arabia Central Department of Statistics and Information provides tabulations for the 2008 Labour Force Survey which also covers education and labor force status. The most recent published information for Saudi Arabia on wages by education level comes from the 2000 Employment and Wages Survey. In the remainder of this section, we focus on the relationship between education and labor market outcomes—labor force participation rates, unemployment rates, and wages—for nationals in these two GCC countries, in aggregate and separately for men and women.

Labor force participation by education level

We begin by considering labor force participation rates, the number of individuals who are either employed or looking for work as a share of the population. Table 7 reports labor force participation rates by education level as of 2008 for Qatari and Saudi nationals age 15 and above, in total and separately for men and women. Results are shown for four strata of educational attainment: up through primary education (a group that also includes those who report they are illiterate or can read and write), preparatory or intermediate (also sometimes called junior secondary), secondary (which also includes those who may have some post-secondary education but no university degree), and university degree or higher. This grouping allows for comparison between the two countries since they otherwise provide results for slightly different levels of disaggregation of education groups.

Overall, as seen in Table 7, labor force participation rates for nationals reach 48 percent for Qataris and 36 percent for Saudis. These differences are primarily because of

differential rates of labor force participation for female nationals in the two countries: just 12 percent for Saudi women compared with 35 percent for Qatari women. The labor force participation rates for men in the two countries are almost identical at just above 60 percent. Most importantly, given our focus, each country shows a positive relationship between education level and labor force participation. For male nationals in the two countries, the patterns by education show almost identical rates at each education level, starting from 45 to 48 percent for those attaining the two lowest levels of education reported in Table 7, climbing to about 90 percent for those at the highest level, a university degree.

For female nationals in the two countries, the differential in labor force participation rates from the lowest to the highest education level is even greater than the differential for men and, at each education level, Qatari women participate in the labor force at a higher rate than their Saudi counterparts. Again, rates for women in the two lowest education levels are very similar and very low, but start to increase in moving to the next two education levels. Interestingly, although Qatari women with less than a university degree participate in the labor force at lower rates than Qatari men, participation rates by gender are nearly equal for those with a university degree or higher (92 percent for Qatari women versus 90 percent for men). In Saudi Arabia there is a 30 percentage-point differential in labor force participation rates for women with a university degree or higher compared with their male counterparts at the same education level (61 versus 92 percent). The female-male gaps in labor force participation rates in Saudi Arabia are even larger at lower levels of education.

Unemployment by education level

Individuals in the labor force may be classified as either employed or unemployed, so the unemployment rate is the percentage of the labor force that is not working but actively

looking for work. Table 8 reports unemployment rates for nationals in Qatar and Saudi Arabia age 15 and above, again stratified by sex and education level. For this labor market outcome, there are sharper differences across the two countries and the relationship with educational attainment is more complex. Consider first the unemployment patterns for Qatari nationals. Overall, the rate of 2.4 percent is quite low and there is a smaller gender differential of about 2 percentage points (1.6 percent unemployment for men versus 3.8 percent for women). Looking across education groups, unemployment is highest for the most educated Qatari men (5.9 percent), but the rate is also relatively high for those with the lowest education level (4.3 percent). For Qatari women, the highest unemployment rate occurs for those with secondary education but no university degree (9.1 percent), but it is also relatively high for university graduates (6.6 percent). When men and women are combined, the unemployment rate is highest for the most educated workers (6.6 percent).

In Saudi Arabia, as seen in Table 8, the unemployment rate overall for nationals is higher than for Qatar at just under 10 percent. Like Qatar, the overall rate in Saudi Arabia is higher for women compared with men but the contrast is even sharper at nearly 25 percent for the former compared with about 7 percent for the latter. Among male Saudi nationals, the unemployment rate is highest for those in the two middle education groups (7.5 and 9.8 percent, respectively) and it is lowest for those in the highest education group (3.5 percent), a pattern that differs from that for Qatari men. The pattern also differs from that for female Saudi nationals where there is a strong positive gradient between education level and unemployment. Just 5 percent of Saudi women in the lowest education group are unemployed compared with 29 percent of those in the highest education group. The unemployment rate for Saudi women rises monotonically with each education level in between (13 and 19 percent, respectively).

Wages by education level

To assess the incentives to invest in education, we consider the pattern of wages by education level for Qatar and Saudi Arabia as reported in Table 9. The table shows monthly average wages (Qatar) or average wages per hour (Saudi Arabia) for paid workers age 15 and above by education level and sex. The table also reports the ratio of wages for those with a university degree or higher versus those with a secondary degree, a simple indicator of the returns to acquiring a college degree. One limitation in the data for Qatar is that the wage information from the 2008 Labor Force Survey is only reported for nationals and nonnationals combined. This is problematic in that nationals are much more likely to be employed in the public sector, where the returns to education may be very different than they are for the private sector where nonnationals are concentrated.¹² The data for Saudi Arabia are available separately for nationals and nonnationals, so we can see if the returns differ by citizenship status.

Based on the data shown in Table 9, we can make several inferences about the returns to additional schooling in these two GCC countries. First, for both men and women, aside from a few exceptions in Saudi Arabia, wages increase monotonically as the level of education increases. This holds whether we look at monthly wages in Qatar, a measure that does not control for differentials in hours worked per month (which may vary by education level), or whether we look at hourly wages in Saudi Arabia, potentially a more accurate measure of productivity differences by education level. Second, the returns to education as measured by the ratio of wages for university graduates versus secondary school graduates is higher for men than for women in both countries, and it is higher for nonnationals than nationals in Saudi Arabia

¹² The tabulations from the 2008 Labor Force Survey in Qatar show that 71 percent of nationals are employed in the government sector compared with just 3 percent for nonnationals (Qatar Statistics Agency, undated, Table 23). In contrast, 82 percent of nonnationals are employed in the public sector versus 7 percent of nationals.

where that comparison is possible. For example, in Qatar where the results are for nationals and nonnationals combined, the wages of college graduate women on average are 174 percent of those earned by secondary school graduate women, whereas that differential is 230 percent for men. In Saudi Arabia, the college-secondary school earnings premium for male nationals is 176 percent compared with 242 percent for nonnationals. The premium differential between national and nonnational Saudi women is somewhat smaller (131 percent for nationals versus 145 percent for nonnationals). The gender differences can be attributed, in part, to differences in the occupational mix across these groups, while the differences by citizenship status may be a combination of the occupational mix as well as the sectoral mix (e.g., public versus private).

Beyond the tabulations presented in Table 9, there is a paucity of information available on the returns to education for the GCC countries or even for most of the other countries in the Arab world. For example, the estimates of education returns by Psacharopoulos (1994) and Psacharopoulos and Patrinos (2004) cover nearly 100 countries, respectively, yet only a few Arab countries are included and the data are often several decades old for those countries that are represented.¹³ This is largely a function of data availability, both the existence of internationally comparable population-based data on educational attainment and labor market earnings, as well as access to those data for research purposes. In addition, as noted by Psacharopoulos and Patrinos (2004), it can be problematic to calculate internationally comparable rates of return to education in countries where large shares of university graduates are employed by the public sector and where wages are not subject to market forces. At the same time, estimates of returns to schooling for individual countries can reveal the private incentives to individuals to invest in

¹³ For example, Psacharopoulos (1994) reports private returns to education as of 1985 for Yemen of 10, 41, and 56 percent for primary, secondary, and tertiary education, respectively. The same study reports the return to

further education, given the prevalence of the public sector in the labor market. The results presented in Table 9 indicate that, for at least two of the GCC countries, the return to investing in education is lower for women than for men and, in the case of Saudi Arabia (where the data are available), lower for nationals than for nonnationals.

DISCUSSION AND CONCLUSIONS

There has been no shortage of efforts to examine the issues of the education systems and labor markets in the Arab world (UNDP, 2003; World Bank, 2004; Gonzalez et al., 2008; League of Arab States and UNDP, 2009; Mohammed bin Rashid Al Maktoum Foundation and UNDP, 2009). This paper has placed a spotlight on issues of human capital development and labor market success from the standpoint of the six GCC countries, which often differ in ways from other Arab countries and which can even differ from one another. To conclude, we first summarize the key insights or stylized facts regarding the GCC countries that emerge from this analysis. We then discuss several of the key challenges that confront decisionmakers in the public and private sectors in the GCC countries as they seek to ensure that the work force of the future will be prepared for the world of work that awaits them.

What We Know About Education and the Labor Market in the GCC Countries

The broader economic trends highlighted at the outset of the paper point to the growing importance of education in preparing young people for labor market entry and for supporting adults in continuous life-long learning. There is a large foundation of empirical research that documents the role that education can play in increasing productive capacity that is rewarded in

each additional year of schooling was 16 percent for Morocco as of 1970, 8 percent for Tunisia as of 1980, and 5 percent as of 1983 for Kuwait.

the labor market. Such investments are made by individuals when there are economic incentives to do so. Governments may choose to investment in education because of the broader societal benefits such as the effect on economic growth, among other outcomes.

The GCC countries, like others in the Arab world, recognize these realities, and the data we have examined show areas of progress, but also areas of concern. Indications of progress include the following:

- With the exception of Oman, the GCC countries have achieved universal primary education with no gender gap in enrollment;
- There has been substantial upgrading of educational attainment over time, at least in the two GCC countries we examined, although much of this gain has come through the relatively higher rates of participation in secondary and post-secondary education by girls and women;
- Young women in the GCC countries are participating at high rates in post-secondary education;
- Labor force participation rates rise with education levels for both male and female nationals the two GCC countries we could examine, and in the case of Qatar, there is gender parity in the rates of labor force participation for nationals with university degrees;
- There is evidence of positive returns to education in the labor market as evidence by higher wages for those who have more years of schooling in two of the GCC countries with data.

Areas for concern, on the other hand, include:

- The GCC countries have yet to achieve universal enrollment at the secondary level

and the distance from universal enrollment is greater for boys than girls;

- All six GCC countries are far from imparting the knowledge of mathematics, science, and reading consistent with international standards for achievement in both the primary and second grades, and again boys are even farther from reaching international expectations than girls, especially in science and reading;
- At the post-secondary level, young men in the GCC countries appear to be participating at lower rates than young women, although there is some uncertainty in the size of the gender participation gap given data concerns;
- Despite higher academic performance in the primary and secondary grades, including in science, women in the GCC countries who attain a college degree are less likely to major in the sciences and engineering and those who do major in those fields are disproportionately represented in certain subspecialties;
- Female nationals in the two GCC countries we could examine are underrepresented in the labor force overall, and their unemployment rates are higher on average and usually higher for more educated women;
- The economic rewards to acquiring more education in the two GCC countries with data are lower for women than for men and for nationals compared with nonnationals.

Key Challenges for the GCC Countries

Like other countries in the Arab world, policymakers in the GCC countries view investments in education as a priority and recognize the need to focus on the areas for concern enumerated above. Doing so will require addressing the four key challenges we discuss in this final section.

Continuing the growth in educational attainment

While great advances in education participation have been achieved, the GCC countries need to continue their push toward universal education, especially at the secondary level. For Oman, universal primary enrollment needs to be a priority as well. The differentials in gross versus net enrollment rates, a gap that is particularly high in Saudi Arabia, also indicate that there is a need to ensure that girls and boys first enter school when they reach the age of eligibility and that strategies are adopted to minimize grade repetition or other events that slow a student's progress through the primary and secondary grades. One approach that has proven promising in other countries for ensuring that children are ready to enter formal schooling and progress from grade to grade is high quality early learning programs such as one or two years of preschool before the start of elementary education (Karoly, Kilburn, and Cannon, 2005).

Participation in post-secondary education is another area where advancements are still needed in the GCC countries. As noted earlier, some of the differences in participation rates at the tertiary level across the six GCC countries and by gender within each country may be attributable to differential enrollments in degree programs overseas and the relative size of the expatriate population who are in country to work rather than attend school. Nevertheless, as other countries push to advance the share of young people who acquire a college degree, the GCC countries will also need to view this as a priority. This may mean addressing issues such as the affordability of a university education and the economic incentives to invest in further education given the labor market opportunities available to graduates, an issue discussed further below.

Improving the quality of education

The results of the international student assessments presented in this paper raise significant concerns about the quality of the educational experience of students in the GCC

countries. These assessments indicate that students in the GCC countries would not be competitive in the global market, given their knowledge and capabilities in key subjects like math, science, and reading. Indeed, the 2002 *Arab Human Development Report*, in its call to build a knowledge society, identifies poor quality education as the “Achilles heel” of the Arab world (UNDP, 2002, p.54). In light of these results, the priority needs to be to reform the education system, from the content of the curriculum to the instructional approach to the duration and intensity of time spent in school, so that students can obtain the skills needed for what the UNDP identifies as the “full cycle of knowledge acquisition,” namely accessing information, organizing information, extracting knowledge, employing knowledge, and generating knowledge (UNDP, 2002, p. 73). Moreover, efforts at reform need to recognize that boys have even further to go to reach international standards than girls. This issue is even more critical given the large cohorts that will be entering the school-age years and then transitioning to the labor market.

Addressing shortfalls in quality at the post-secondary level needs to be a priority as well, including the fields of concentration for university graduates. The fact that girls perform better in science than boys on international assessments, yet they are less likely to graduate with science and engineering degrees, points to the existence of barriers, whether extrinsic or intrinsic, that are affecting educational choices. For example, in some GCC systems, there are constraints on the majors available to women versus men, and there are also likely to be real or perceived gender differences in the labor market opportunities available to graduates (Berrebi, Martorell, and Tanner, 2009). Some of these barriers can be addressed in the higher education systems themselves, while others will require adjustments on the part of employers.

Addressing labor market imbalances

While we have presented some information for the GCC countries in this paper regarding the economic incentives to invest in further education, our knowledge is far from complete. The simple tabulations available for Qatar and Saudi Arabia demonstrate that the human capital of female nationals is underutilized as a result of low rates of labor force participation, at least at some levels of education and through relatively high rates of unemployment. For male nationals as well, high rates of unemployment, especially for those with more education, mean that their potential labor contribution is not utilized. However, we need a much deeper understanding of how the economic incentives to invest in further education vary for nationals by gender and other personal characteristics and how those incentives vary across occupations and industries such as those related to science and engineering and across the public versus private sectors.

Addressing these labor market imbalances will require reforms to labor market structures such as those in the GCC countries that provide greater long-run economic security for nationals employed in the public sector, in the form of better pensions, longer tenure, less intensive working conditions, and other benefits, compared with the jobs in the private sector (Berrebi, Martorell, and Tanner, 2009). There is also the potential for a virtuous cycle as raising education quality at all levels would be expected to make nationals more attractive in the labor market, relative to nonnationals and thereby boost participation rates, reduce unemployment rates, and raise productivity and hence wages. With increases in the rewards for more education because of increases in education quality, students in turn will see the advantages of making those investments.

Providing information to assess education system performance and labor market outcomes

Designing appropriate policies to address the challenges regarding educational attainment, the quality of education, and the structure of labor markets requires information about the current education system and the labor market and the incentives and barriers in each that affect the outcomes observed and the outcomes targeted for change. Thus, for example, more indepth studies are needed of the economic incentives in the labor market to acquire more education and education in particular fields and how those incentives vary across different sectors of the economy, like private versus public sector employment or employment across different industries and occupations.

The GCC countries have made great strides in increasing their collection of essential education and labor market data. These include routine national censuses, labor market surveys, and collection of information about inputs and outputs of the education system. For example, each of the GCC countries has collected a census in the last decade and together they are committed to a coordinated census in 2010. Labor Force surveys are routinely collected, sometimes annually. And the GCC countries are to be commended for their past participation in internationally comparable academic achievement assessments like TIMSS, PIRLS, and PISA and their planned participation in future waves of these programs, such as the 2011 TIMSS and PIRLS.

In terms of supporting research and policy analysis, then, the issue is less one of having the data on hand, but rather a need to make the data available for research and analysis with results that are made publicly available. In some cases, more specialized data collection will be required to collect the information required to evaluate a particular policy or program. Collecting the required data and making it readily accessible to researchers will support the conduct of

studies that examine a given country, as well as cross-country comparisons within the GCC so that countries can learn from one another about what works and what doesn't.

These challenges are, no doubt, well known to leaders in the GCC countries and, indeed, reforms to education systems and labor market structures are underway in the GCC countries. For example, Gonzalez et al. (2008) compiled information about the types of human capital investment strategies being initiated or underway in Oman, Qatar, and the UAE. Those countries are actively engaged in broad-based and more specific reforms to their primary, secondary, and post-secondary education systems, as well as their training systems. They are also seeking to introduce changes in labor market structures and institutions to increase employment of nationals in the private sector and to diversify their economies. As these reforms are underway, the GCC countries can benefit from understanding which reforms are having their intended effect and avoiding any unintended consequences. Thus, undertaking evaluations of reforms and broadly sharing the results can become part of an advancing cycle of improvements in the GCC countries, to ensure that future labor market entrants have the knowledge and skills required to meet the needs of employers in the decades ahead.

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Figure 1— Economywide Measure of Occupational Task Input: The United States from 1960-1998

SOURCE: Autor, Levy, and Murnane (2003), Table II.

NOTES: Each line in the figure plots the mean task input in each year as a percentile of the base year (1960) distribution. Data for 1960 and 1970 are from the U.S. Census; data for 1980, 1990, and 1998 are from the U.S. Current Population Survey.

Figure 2—Gross Return to Tertiary Education for Male Workers: Selected OECD Countries in 2001

SOURCE: Strauss and Maisonneuve (2007), Table 4.

NOTES: Gross return measures the percentage hourly wage advantage for those with a tertiary education degree compared with upper-secondary degree holders. The estimates are based on a Mincerian wage equation that also includes controls for gender, marital status, job tenure, type of work contract, public vs. private sector employment, and plant size. Data for Poland are for 2000.

Table 1—Gross and Net School Enrollment Rates by Schooling Level: GCC Countries in 2007

Country	Total Enrollment Rate		Female-Male Difference in Enrollment Rate	
	Gross	Net	Gross	Net
Primary Education				
Bahrain	111 ^a	98 ^a	-1 ^a	0 ^a
Kuwait	98	88	-2	-2
Oman	80	73	1	2
Qatar	109	93	-1	0
Saudi Arabia	98	85	-4	-1
UAE	107	91	-1	-1
Secondary Education				
Bahrain	101 ^a	93 ^a	5 ^a	6 ^a
Kuwait	91	80	1	1
Oman	90	79	-3	1
Qatar	103	93	-2	-2
Saudi Arabia	94	73	-8	5
UAE	92	83	3	3
Tertiary Education				
Bahrain	32 ^b	–	28	–
Kuwait	18 ^b	–	15	–
Oman	25	–	4	–
Qatar	16	–	17	–
Saudi Arabia	30 ^b	–	11	–
UAE	23 ^c	–	20	–

^a Year is 2005

^b Year is 2006

^c Year is 2008

SOURCE: World Bank (undated) and author's calculations.

NOTES: – = not available.

**Table 2—Distribution of National Population by Age Cohort and Education Level:
Qatar in 2008 and Saudi Arabia in 2004**

Age Group	Percentage Distribution by Educational Level			
	Up to Primary	Preparatory	Secondary	University or Above
Qatar (2008)				
Age 25 – 34	13	16	38	34
Age 35 – 44	21	14	24	40
Age 45 – 54	37	14	19	30
Age 55 – 64	62	10	12	16
Age 25 to 64	26	14	27	33
Saudi Arabia (2004)				
Age 25 – 34	26	18	31	25
Age 35 – 44	46	16	21	17
Age 45 – 54	66	11	13	10
Age 55 – 64	84	6	6	4
Age 25 to 64	44	15	23	18

SOURCE: Qatar 2008 Labor Force Survey (Qatar Statistics Authority, undated), Table 8 and Saudi Arabia 2004 Census, (Saudi Arabia Central Department of Statistics and Information, undated-a) Table 12-1, and author's calculations.

Table 3—Mathematics, Science, and Reading Performance in 4th Grade: GCC and Other Arab Countries in 2006 or 2007

Country	Number of Students Tested	Mean Scale Score				Percentage Achieving International Benchmark			
		Total	Girls	Boys	Gender Gap	Advanced	High	Inter-mediate	Low
2007 TIMSS 4 th Grade Mathematics									
<u>GCC</u>									
Kuwait	3,803	316	333	297	36 *	0	0	5	21
Qatar	7,019	296	307	285	22 *	0	0	2	13
UAE (Dubai)	3,064	444	452	438	14	2	12	37	69
<u>Other Arab Countries</u>									
Algeria	4,223	378	380	375	5	0	2	14	41
Morocco	3,894	341	339	343	-4	0	2	9	26
Tunisia	4,134	327	337	319	18 *	0	1	9	28
Yemen	5,811	224	236	214	22 *	0	0	1	6
International average	—	500	473	473	0	5	26	67	90
2007 TIMSS 4 th Grade Science									
<u>GCC</u>									
Kuwait	3,803	348	379	315	64 *	0	4	16	37
Qatar	7,019	294	307	281	26 *	0	2	8	23
UAE (Dubai)	3,064	460	473	448	25 *	4	21	48	72
<u>Other Arab Countries</u>									
Algeria	4,223	354	359	349	10 *	0	2	11	33
Morocco	3,894	297	302	292	10	0	2	9	21
Tunisia	4,134	318	335	304	31 *	0	3	14	32
Yemen	5,811	197	209	188	21	0	0	2	8
International average	—	500	477	474	3 *	7	34	74	93
2006 PIRLS 4 th Grade Reading									
<u>GCC</u>									
Kuwait	3,958	330	364	297	67 *	0	2	10	28
Qatar	6,680	353	372	335	37 *	0	1	11	33
<u>Other Arab Countries</u>									
Morocco	3,249	323	332	314	18 *	0	1	9	26
International average	—	500	509	492	17 *	7	41	76	94

*Difference in mean scale score for girls versus boys is statistically significant.

SOURCE: Mathematics: Mullis, Martin, and Foy (2009), Exhibits 1.1, 1.5, 2..2, and A.6; Science: Martin, Mullis, and Foy (2009), Exhibits 1.1, 1.4, 2.2, and A.6; Reading: . Mullis et al. (2007), Exhibits 1.1, 1.4, 2.1, and A.6.

Table 4—Mathematics and Science Performance in 8th Grade: GCC and Other Arab Countries in 2007

Country	Number of Students Tested	Mean Scale Score				Percentage Achieving International Benchmark			
		Total	Girls	Boys	Gender Gap	Advanced	High	Inter-mediate	Low
2007 TIMSS 8 th Grade Mathematics									
<u>GCC</u>									
Bahrain	4,230	398	414	382	32 *	0	3	19	49
Kuwait	4,091	354	364	342	22 *	0	0	6	29
Oman	4,752	372	399	344	55 *	0	2	14	41
Qatar	7,184	307	325	288	37 *	0	0	4	16
Saudi Arabia	4,243	329	341	319	22 *	0	0	3	18
UAE (Dubai)	3,195	461	461	461	0	3	17	47	74
<u>Other Arab Countries</u>									
Algeria	5,447	387	384	389	-5	0	0	7	41
Egypt	6,582	391	397	384	13 *	1	5	21	47
Jordan	5,251	427	438	417	21 *	1	11	35	61
Lebanon	3,786	449	443	456	-13 *	1	10	36	74
Morocco	3,060	381	377	385	-8	0	1	13	41
Syrian Arab Republic	4,650	395	387	403	-16 *	0	3	17	47
Tunisia	4,080	420	410	431	-21 *	0	3	21	61
International average	—	500	453	448	5 *	2	15	46	75
2007 TIMSS 8th Grade Science									
<u>GCC</u>									
Bahrain	4,230	467	499	437	62 *	2	17	49	78
Kuwait	4,091	418	441	391	50 *	0	6	28	60
Oman	4,752	423	452	391	61 *	1	8	32	61
Qatar	7,184	319	354	284	70 *	0	2	11	29
Saudi Arabia	4,243	403	426	383	43 *	0	2	18	52
UAE (Dubai)	3,195	489	495	483	12	6	27	58	82
<u>Other Arab Countries</u>									
Algeria	5,447	408	408	408	0	0	1	14	55
Egypt	6,582	408	417	400	17 *	1	7	27	55
Jordan	5,251	482	499	466	33 *	5	26	56	79
Lebanon	3,786	414	410	417	-7 *	1	8	28	55
Morocco	3,060	402	403	401	2	0	3	18	51
Syrian Arab Republic	4,650	452	448	457	-9 *	1	9	39	76
Tunisia	4,080	445	436	455	-19 *	0	4	31	77
International average	—	500	469	463	6 *	3	17	49	78

*Difference in mean scale score for girls versus boys is statistically significant.

SOURCE: Mathematics: Mullis, Martin, and Foy (2009), Exhibits 1.1, 1.5, 2.2, and A.6; Science: Martin, Mullis, and Foy (2009), Exhibits 1.1, 1.4, 2.2, and A.6.

Table 5—Mathematics, Science, and Reading Performance for 15-Year-Olds: GCC and Other Arab Countries in 2006

Country	Number of Students Tested	Mean Scale Score				Percentage Achieving Proficiency Level	
		Total	Girls	Boys	Gender Gap	Below Level 1	Above Level 5
2006 PISA Mathematics							
<u>GCC</u>							
Qatar	6,224	318	325	311	14 *	71.7	0.6
<u>Other Arab Countries</u>							
Jordan	6,509	384	388	381	7	36.9	0.2
Tunisia	4,640	365	358	373	-15 *	48.5	0.5
OECD average	—	498	492	503	-11 *	7.7	13.3
2006 PISA Science							
<u>GCC</u>							
Qatar	6,224	349	365	334	32 *	47.6	0.3
<u>Other Arab Countries</u>							
Jordan	6,509	422	436	408	29 *	16.2	0.6
Tunisia	4,640	386	388	383	5	27.7	0.1
OECD average	—	500	499	501	-2 *	5.2	9.0
2006 PISA Reading							
<u>GCC</u>							
Qatar	6,224	312	346	280	66 *	61.1	2.3
<u>Other Arab Countries</u>							
Jordan	6,509	401	428	373	55 *	22.7	3.5
Tunisia	4,640	380	398	361	38 *	31.5	2.8
OECD average	—	492	511	473	38 *	7.4	29.3

*Difference in mean scale score for girls versus boys is statistically significant.

SOURCE: OECD (2007), Tables 2.1a, 2.1c, 6.1a, 6.1c, 6.2a, 6.2c, and A2.3.

Table 6—First University Degrees by Field: GCC Countries in 2004

Field	Bahrain ^a			Oman			Qatar			Saudi Arabia		
	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females
Number of Degrees												
All fields	1,434	384	1,050	5,028	1,903	3,125	668	157	511	62,379	24,069	38,310
All S&E fields	419	137	282	662	419	243	156	45	111	8,692	4,327	4,365
Physical/ biological sciences	54	10	44	79	34	45	41	2	39	2,065	896	1,169
Mathematics/ computer sciences	159	42	117	252	101	151	57	13	44	2,724	1,140	1,584
Agricultural sciences	0	—	—	11	5	6	3	0	3	154	154	0
Social/ behavioral sciences	96	15	81	35	35	0	30	5	25	2,878	1,343	1,535
Engineering	110	70	40	285	244	41	25	25	0	871	794	77
All non-S&E fields	1,015	247	768	4,366	1,484	2,882	512	112	400	53,687	19,742	33,945
Percentage of All Degrees												
All S&E fields	29.2	35.7	26.9	13.2	22.0	7.8	23.4	28.7	21.7	13.9	18.0	11.4
Natural sciences	14.9	13.5	15.3	6.8	7.4	6.5	15.1	9.6	16.8	7.9	9.1	7.2
Other sciences	6.7	3.9	7.7	0.7	1.8	0.0	4.5	3.2	4.9	4.6	5.6	4.0
Engineering	7.7	18.2	3.8	5.7	12.8	1.3	3.7	15.9	0.0	1.4	3.3	0.2

^a Data are for 2003.

SOURCE: NSF (2008), Tables 2-37 and 2-39 and author's calculations.

NOTES: — = not available. The category natural sciences includes physical/biological sciences, mathematics/computer sciences, and agricultural sciences.

**Table 7—Labor Force Participation Rate by Sex and Education Level for Nationals:
Qatar and Saudi Arabia in 2008**

Sex	By Education Level				All Education Groups
	Up Through Primary	Preparatory/ Intermediate	Secondary	University or Above	
Qatar (2008)					
Males	46	45	68	90	62
Females	6	9	33	92	35
Total	24	30	50	91	48
Saudi Arabia (2008)					
Males	48	48	67	92	61
Females	1	1	13	61	12
Total	20	28	43	77	36

SOURCE: Qatar 2008 Labor Force Survey (Qatar Statistics Authority, undated), Tables 9, 10, 21, and 102, Saudi Arabia 2008 Labour Force Survey (Saudi Arabia Central Department of Statistics and Information, undated-b), Table 8, 21, and 22, and author's calculations.

NOTE: Population is age 15 and above.

**Table 8—Unemployment Rate by Sex and Education Level for Nationals:
Qatar and Saudi Arabia in 2008**

Sex	By Education Level				All Education Groups
	Up Through Primary	Preparatory/ Intermediate	Secondary	University or Above	
Qatar (2008)					
Males	4.3	1.8	1.4	5.9	1.6
Females	5.5	4.1	9.1	7.3	3.8
Total	4.4	2.1	3.9	6.6	2.4
Saudi Arabia (2008)					
Males	4.6	7.5	9.8	3.5	6.9
Females	5.0	13.3	18.9	29.3	24.9
Total	4.7	7.6	11.0	13.1	9.8

SOURCE: Qatar 2008 Labor Force Survey (Qatar Statistics Authority, undated), Tables 21 and 102, Saudi Arabia 2008 Labour Force Survey (Saudi Arabia Central Department of Statistics and Information, undated-b), Table 8, and author's calculations.

NOTE: Population is age 15 and above.

**Table 9—Wages by Sex and Education Level and College-Secondary Wage Premium:
Qatar and Saudi Arabia in 2008**

Educational Level	Males	Females	Total
Monthly Average Wage, Qatar Nationals and Nonnationals, 2008 (Qatari Riyals)			
Illiterate	2,485	1,727	2,154
Read and Write	2,496	1,768	2,183
Primary	4,735	2,407	4,258
Preparatory	5,506	3,080	5,088
Secondary	7,362	6,984	7,289
Pre-University Diploma	8,351	7,230	7,987
University and Above	16,907	12,180	15,346
Ratio University to Secondary	2.30	1.74	2.11
Average Wages Per Hour, Saudi Arabian Nationals, 2000 (Saudi Riyals)			
Illiterate	10.04	5.78	–
Read and Write	11.26	4.68	–
Primary School	14.65	5.60	–
Intermediate School	18.12	7.05	–
Secondary School	22.83	10.35	–
Intermediate College	21.80	11.22	–
University Graduate	40.10	13.60	–
Post Graduate	69.33	67.79	–
Ratio University to Secondary	1.76	1.31	–
Average Wages Per Hour, Saudi Arabian Nonnationals, 2000 (Saudi Riyals)			
Illiterate	3.46	2.17	–
Read and Write	3.85	3.76	–
Primary School	4.10	3.24	–
Intermediate School	4.60	4.81	–
Secondary School	7.48	8.67	–
Intermediate College	9.19	7.13	–
University Graduate	18.07	12.59	–
Post Graduate	39.27	33.17	–
Ratio University to Secondary	2.42	1.45	–

SOURCE: Qatar 2008 Labor Force Survey (Qatar Statistics Authority, undated), Table 26, Saudi Arabia 2000 Employment and Wages Survey (Saudi Arabia Central Department of Statistics and Information, undated-c), Table 3..

NOTES: – = not available. Population is employees age 15 and above.