



WP/15/191

IMF Working Paper

Comparing the Employment-Output Elasticities of Expatriates and Nationals in the Gulf Cooperation Council

by Alberto Behar

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Middle East and Central Asia Department

Comparing the Employment-Output Elasticities of Expatriates and Nationals in the Gulf Cooperation Council

Prepared by Alberto Behar¹

Authorized for distribution by Tim Callen

August 2015

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Abstract

We estimate the elasticity of private-sector employment to non-oil GDP in the Gulf Cooperation Council (GCC) for GCC nationals and expatriates using a Seemingly Unrelated Error Correction (SUREC) model. Our results indicate that the employment response is lower for nationals, who have an estimated short-run elasticity of only 0.15 and a long-run response of 0.7 or less. The elasticity is almost unity for expatriates in the long run and 0.35 in the short run. We interpret low elasticities as indirect evidence of labor market adjustment costs, which could include hiring and firing rigidities, skills mismatches, and reluctance to accept private sector jobs. Forecasts suggest that, absent measures to reduce adjustment costs, the private sector will only be able to absorb a small portion of nationals entering the labor force.

JEL Classification Numbers: J08, J01, J05, J21, J23

Keywords: Employment Elasticities, Labor Market Adjustment Costs, GCC, Gulf Cooperation Council, Inclusive Growth

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¹ Thank you to Robert Blotevogel, Davide Furceri, Gaele Pierre, Padamja Khandelwal and participants in the MCD Departmental Seminar Series for their comments on a 2013 draft of this paper; to the GCC country teams for verifying or helping to assemble the data; and to Sarah Knight for editorial assistance and extracting information from Arabic sources.

Contents

Page

Abstract	2
I. Introduction	2
II. Data and Descriptive Statistics	4
A. Sources	4
B. Descriptive Statistics	4
III. Econometric Analysis	7
A. Estimation Approach	7
B. Estimation Results	10
SUREC Estimation	10
The Short, Medium and Long Run	15
IV. Scenario Analysis For Nationals	16
In-Sample Forecasts of Private-sector Employment	16
Private-sector Employment Forecasts Under Multiple Scenarios	16
V. Diagnosis and Policy Implications	22
What the Elasticities Imply about Labor Market Characteristics	22
Possible Policy Responses	25
VI. Conclusions	27
References	28
 Tables	
1: Private-Sector Employment	7
2: Seemingly Unrelated Regressions	11
3: Single Equation Estimates, Expatriates	12
4: Single Equation Estimates, Nationals	13
 Figures	
1: Employment by Sector and Nationality	5
2: Percent of Nationals' Employment, Percent of Nationals' Employment	6
3: Private-sector Employment for Nationals, Percent of Private-Sector	6
4: Dynamics of Employment Responses	15
5: In-sample Forecasts, Nationals	17
6: Private-sector Employment Projections	19
7: Labor Market Projections, 2015-2020	21
8: Science and Mathematics Education Quality	24
9: Preferred Employer for Youth	25

I. INTRODUCTION

Since the 1970s, Gulf Cooperation Council (GCC) countries have used imported labor on a large scale to achieve development goals, while using public employment and other expenditures to raise living standards for GCC nationals (Baldwin-Edwards, 2011). Recent trends point to a large number of nationals entering the labor force in coming years. At the same time fiscal positions have been aggravated by the fall in the oil price by half in late 2014 (IMF, 2015), thus reducing the potential for public sector hiring to continue at its recent pace. Moreover, many countries' development plans or long-term strategy documents express a desire on the part of GCC authorities to increase the role of nationals in private sector activity. To gauge the capacity of the economy to generate private sector jobs for nationals, a useful analytical tool is the employment-output elasticity.

Since the seminal paper by Okun (1962) examining the responsiveness of unemployment to output, a number of studies on the responsiveness of employment or unemployment have been conducted on industrial or OECD countries. There are differing views on the absolute and relative magnitudes of employment-output elasticities in the Middle East² (and in general). Gulf Cooperation Council (GCC) studies include the CMI and others (2013), who find a GCC elasticity of approximately 0.8 that is equal to the Middle East and North Africa (MENA) average. The World Bank (2011), citing recent ILO calculations, presents GCC elasticities of 0.66, which are again the same as for the rest of the MENA region and higher than many other regions in the world.

GCC studies generally estimate the employment-growth relationship without stripping out the effects of oil GDP, which is problematic because hydrocarbon output uses very few workers. Furthermore, given the important role played by migrants in the region and the strong labor force growth of GCC citizens, a separate analysis of nationals and expatriates is warranted. Such an analysis is conducted by IMF (2011), generally finding an employment response that exceeds unity.

For many studies, notably IMF (2011) on the GCC, estimation is done on a country-by-country basis, leading to large variations in estimates, and there is seemingly little correlation in the ranks of the elasticities between studies. This instability of results may be attributable to the estimation approach. With the notable exception of Crivelli et al (2012), estimation appears to be limited to country-by-country analysis on a handful of observations with no allowance for potential trend terms or other dynamics.

² Kapsos (2005) finds elasticities of approximately unity for the Middle East, placing them amongst the highest in the world, while those for North Africa are also relatively high. Combined, Crivelli et al (2012) estimate an elasticity of approximately 0.25 for the Middle East and North Africa (and the subset limited to oil exporters), placing these estimates low relative to other regions.

To fill this gap, the aim of this paper is to distinguish (i) between the short-run, medium-run and long-run elasticities and (ii) between the employment responses of nationals and expatriates to non-hydrocarbon GDP using the econometric techniques required to do so. In particular, we estimate a system of seemingly unrelated error correction equations (SUREC) that allow us to estimate short-run responses together with any long-run responses associated with a potential cointegrating relationship and to test for statistically significant differences between nationals and expatriates. By including the speed of adjustment to long-run equilibrium, we generate medium-run (5-year) responses that are suitable for medium-run forecasts of employment outcomes. After assembling a dataset from the mid 1990s from multiple sources, our time series are now just about long enough to permit estimation of dynamics.

The methodological developments here have broader applicability beyond the GCC. For example, it could be used for similar analysis in other migrant dependent economies. For a broad sample of countries, it could be used to compare employment-output responsiveness across demographic groups, such as between men and women. Another reason why the results of this study may be of broader methodological interest is the GCC labor market structure, which mitigates reverse causality from employment to output. In particular, nationals comprise a small share of private sector employment, which is dominated by a practically unlimited supply of migrant labor.

The econometric results show that expatriates have a short-run elasticity of about 0.35 and a long-run elasticity of 0.95 with an implied medium-run elasticity of 0.75. Nationals have statistically significantly lower employment responses than expatriates. The long-run elasticity is about 0.7 or lower, the short-run elasticity is only 0.15, and the medium-run elasticity is about 0.55. In other words, the initial employment response to output for nationals is less than half of that for expatriates and the gap does not close materially in subsequent years.

Our scenario analysis indicates not enough private sector jobs will be created to absorb the labor force entrants from 2015 to 2020. To avert a significant increase in the unemployment rate, public sector employment would have to continue growing at unsustainable rates. Measures to increase the responsiveness of employment to growth could reduce the gap between new labor market entrants and private-sector job creation by almost one half.

We interpret the distinction between the short- and long-run elasticity as indirect evidence of labor market adjustment costs. In the case of the GCC nationals, these could be alleviated through labor market flexibility, skill acquisition, willingness to work in the private sector, and altering firms' incentives in favor of hiring citizens instead of foreign workers.

Section II describes the data sources and basic trends observed; Section III covers the econometric estimation of the elasticities; Section IV presents the resulting scenario analysis;

Section V offers an interpretation of the results as well as policy responses; and Section VI concludes.

II. DATA AND DESCRIPTIVE STATISTICS

A. Sources

The key information is total employment data disaggregated into nationals and expatriates and again disaggregated into private employment and public employment, resulting in four distinct series. The focus in this paper is on private-sector employment for nationals and expatriates. We employ annual data from 1995 to 2014 (from 1999 in the case of Qatar). We use data from five of the six GCC countries for econometric estimation and forecasts. In particular:

- For Bahrain, data from 2002 onwards are produced by the Labour Market Regulatory Authority and kindly provided by the Bahrain Economic Development Board. We assume all domestic workers are expatriates in the private sector. Older data were sourced from the country authorities on previous visits by IMF staff.
- Data for Kuwait are pieced together from various sources, which in turn refer to the Public Authority for Civil Information (PACI). 2014 data are taken directly from the PACI website, 2012 and 2013 data are sourced from the Gulf Research Center, and older statistics are from the National Bank of Kuwait.
- For Oman, data are sourced from the National Centre for Statistics and Information.
- Information for Qatar from 2006 onwards is provided by the Qatar Statistical Authority on their website; 2014 data are partially interpolated. Data for 1999-2004 is sourced from various “Persons Engaged by Sectors” publications released by what was then the Planning Council and General Secretariat, although sectoral coverage is limited.
- For Saudi Arabia, the main source is the Central Department of Information and Statistics. Gaps in the data are filled by interpolation – in some cases drawing on supplemental information kindly shared by the World Bank.
- The United Arab Emirates is excluded from the analysis because data are to our knowledge only available for 2009.

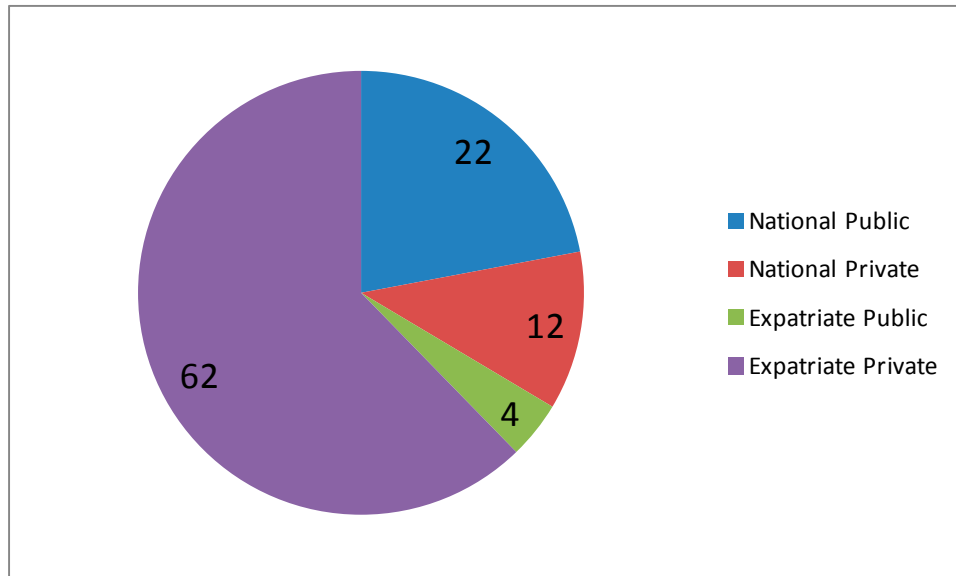
Labor force projections are based on extrapolations of IMF staff forecasts contained in Selected Issues Papers for Oman and Kuwait, of recent growth rates observed in Central Department of Information and Statistics data for Saudi Arabia, and on National Development Strategy publications for Bahrain and Qatar. Historical and projected non-oil GDP data are taken from statistics contained in the IMF’s Regional Economic Outlook Update for the Middle East and Central Asia published in May 2015 (IMF, 2015).

B. Descriptive Statistics

There is a large degree of segmentation in GCC labor markets. Economic growth has been rapid in the GCC due to government spending financed by high oil prices (IMF, 2014a).

Non-oil GDP growth has averaged 8 percent in the decade ending in 2014. Employment growth has exceeded that of emerging markets and almost 5½ million private sector jobs were created in the first decade of the century. However, almost 90 percent of these jobs were filled by foreign workers, resulting in a large influx of foreign labor, while nationals have been more likely to work in the public sector. As a result, nationals overwhelmingly work in the public sector and expatriates dominate the private sector workforce (Figure 1).³

Figure 1: Employment by Sector and Nationality, 2014, percent



The private sector accounts for only one third of nationals' jobs, a share that has barely risen since 2006 (Figure 2). Aggregate GCC values are influenced by Saudi Arabia, which is dominant in terms of economic and population size and which in this case represents the median ratio. Bahrainis and Omanis have a relatively high propensity to work in the private sector, while Kuwaitis and Qataris have a relatively low (albeit rising) ratio.

The ratio of nationals to expatriates in the private sector is less than 1-to-5, and this ratio has fallen slightly since 2006 (Figure 3). Saudi Arabia's nationals constitute a larger share of private employment than is the case in other GCC countries. Qatar's share is strikingly low and Kuwait's is almost as low despite a recent rise. Table 1 provides more detail on private sector employment, noting that growth rates for expatriates exceeded those for nationals in three out of the five countries and overall.

³ Numbers include public sector estimates based on 2013 data for Oman.

Figure 2: Private-sector Employment for Nationals,
Percent of Nationals' Employment

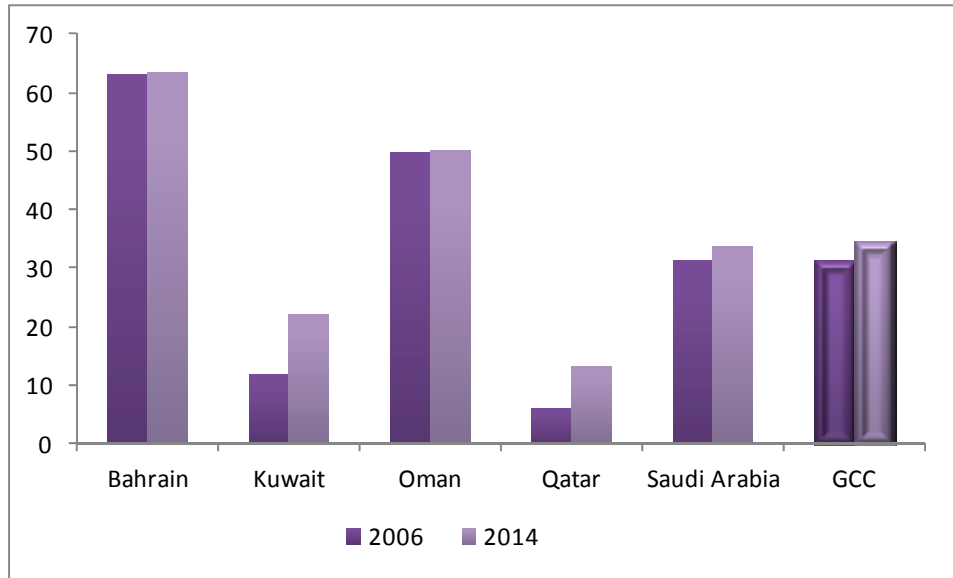


Figure 3: Private-sector Employment for Nationals,
Percent of Private-sector Employment

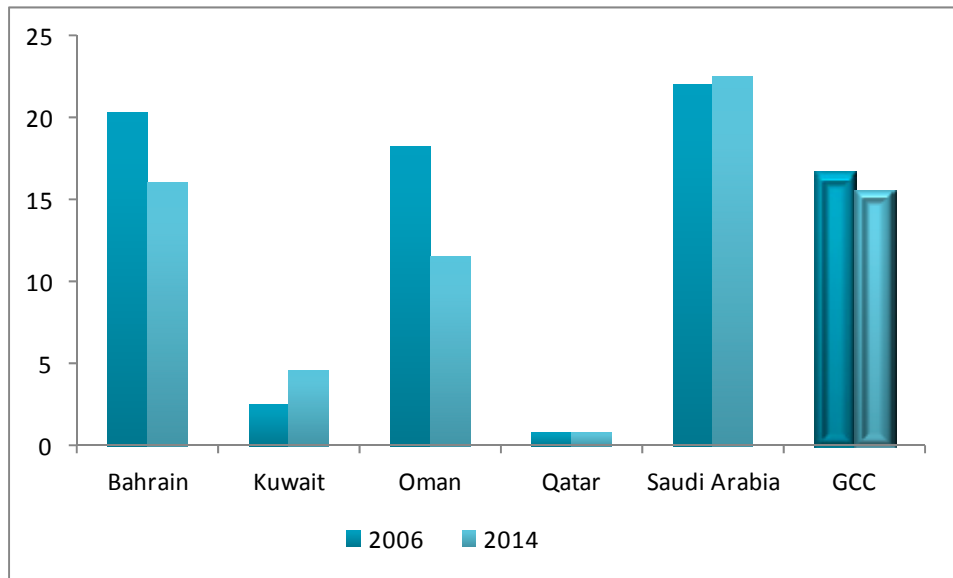


Table 1: Private-Sector Employment, Thousands

	Nationals				Expatriates			
	2006	2014	Change	Growth (%)	2006	2014	Change	Growth (%)
Bahrain	82	99	18	22	321	521	200	62.3
Kuwait	38	91	53	138	1515	1871	356	23.5
Oman	114	198	83	73	511	1510	1000	196
Qatar	3.6	12.4	9	248	417	1475	1058	254
Saudi Arabia	1073	1656	583	54	3791	5713	1922	50.7
Total	1311	2057	745	57	6555	11090	4535	69.2

III. ECONOMETRIC ANALYSIS

A. Estimation Approach

The econometric analysis is based on data for 1995 to 2014 for Bahrain, Kuwait, Oman, and Saudi Arabia. For Qatar, data with limited coverage start in 1999 and more complete data are available from 2006. The core analysis comprises estimating Error Correction Models for nationals (N) and expatriates (E) as a system.

$$\Delta l_{i,t}^N = \gamma_0^N + \gamma_1^N l_{i,t-1}^N + \gamma_2^N y_{i,t-1} + \gamma_3^N \Delta y_{i,t} + \gamma_4^N p^N + \gamma_i^N + e_{i,t}^N \quad (1a)$$

$$\Delta l_{i,t}^E = \gamma_0^E + \gamma_1^E l_{i,t-1}^E + \gamma_2^E y_{i,t-1} + \gamma_3^E \Delta y_{i,t} + \gamma_4^E p^E + \gamma_i^E + e_{i,t}^E \quad (1b)$$

$l_{i,t}^N$ is the log of employment for nationals, $l_{i,t}^E$ is the log of employment for expatriates and $y_{i,t}$ is the log of non-hydrocarbon GDP in country i in year t .⁴ p represents a possible trend term and γ_i represent possible country-specific terms. $e_{i,t}^N$ and $e_{i,t}^E$ are potentially correlated error terms. A number of dummies are used in cases where there is a known change of data source/coverage or observable levels shifts in the employment data series.⁵

Legitimacy of the specification requires all the variables to be stationary (albeit persistent) or any non-stationary variables to be cointegrated. The instantaneous (short-run) elasticity is given by γ_3 . The separate long-run elasticity, if any, is given by $-\gamma_2/\gamma_1$ for $\gamma_1 < 0$. If the variables are non-stationary and not cointegrated, then $\gamma_1 = 0$ and it is appropriate to omit any variables in (lagged) levels and perform estimation in first differences only such that the short-run and long-run elasticity are the same.

⁴ This equilibrium correction formulation is isomorphic to the Autoregressive Distributed Lag (ARDL) format (Hendry, 1995).

⁵ The most striking example is Qatar. We also ran regressions only using Qatar's data since 2006 or omitting Qatar entirely.

For output and both measures of employment, conventional single time-series Augmented Dicky Fuller (ADF) tests (available on request) typically fail to reject the null of a unit root in each country. This is not surprising given the low power. We make use of the Taylor and Sarno (1998) panel unit root test, where the statistics fall well below the critical values needed to reject the null of a unit root. A more informative test in our context is the Kwiatkowski-Phillips-Schmidt-Shin (1992) test because it has stationarity as the null hypothesis. By rejecting this null hypothesis in an overwhelming number of cases, this test provides more convincing evidence that the series indeed have a unit root.⁶ As a result, the inclusion of levels terms will be contingent on their being cointegrated, which will be tested for in conjunction with the ECM estimation.

Our core results are based on estimates of the system of “Seemingly Unrelated” Regressions using the iterative procedure based on Zellner (1962) in an ECM framework. Compared to separate estimation of the equations, the Seemingly Unrelated Error Correction (SUREC) model offers potential efficiency gains because it incorporates information provided by likely correlation in error terms between the equations for nationals and expatriates. A more important advantage is that SUREC also facilitates the formal testing of hypotheses across equations, for example whether the elasticities for nationals and expatriates are equal.⁷ Dopke (2001) uses SURE for multiple countries in part to be able to test whether unemployment-output elasticities modeled in an ECM framework are the same in all countries. The approach we apply here could be applied in other contexts, such as other countries with a large proportion of foreign workers, a comparison between men and women, or across economic sectors.

In addition to SUREC, we will present a number of single equation ECM regressions to be able to gauge the robustness of the results using both least squares and other estimation approaches.

- An important feature of the data is the implausibly large positive or negative arc elasticities, which are the ratio of the change in employment to the change in output in any given year. Although the SUREC and other least squares estimation used carefully selected cutoffs (equivalent to about 5 percent of the highest and lowest values) for the elasticity, an alternative is robust regression (Hamilton, 1991a, 1991b).

⁶ Limited time series preclude such testing for Qatar. Elsewhere, for nationals, critical values are high enough to exceed 1% significance levels when no trend term is included, and 10% or better significance for when trends are included (except for Saudi Arabia). For expatriates, significance levels are 1% for three countries and 5% for Oman when no trend is included, but including a trend term means we fail to reject the null at 10% for two countries. For output, the null hypothesis is strongly rejected in all cases except for Kuwait when we include a trend term. Detailed results are available on request.

⁷ This is distinct from a Vector Error Correction Model in which there may be more than one cointegrating relationship among the variables.

This automatic procedure had the desired outcome of placing relatively low weights on high absolute values of arc elasticities.⁸

- Although the length of our sample means lagged dependent variable bias is likely to be limited, we also present results using an estimator due to Kiviet (1995) and Bruno (2005) designed to correct for such bias in a sample with a small cross-section dimension.⁹

We use the ECM framework to test for cointegration based on the significance of γ_1 . As argued in Banerjee and others (1998), ECM estimation can yield efficiency gains for cointegration tests relative to levels estimation. We test whether the coefficient on lagged employment is statistically significantly negative. Because conventional critical values do not apply under the null of no cointegration, we apply the t-statistic to critical values produced by Ericsson & MacKinnon (2002). Although estimated as a panel, we use the parameters associated with individual time series critical values (see Behar, and Hodge, 2008). As a result, this test is likely to under-reject the null.¹⁰

Cointegration would have two implications worth highlighting.

First, letting $\gamma_1 = \alpha_1$, $-\gamma_4/\gamma_1 = \beta_2$ and $-\gamma_2/\gamma_1 = \beta_1$, we can interpret the ECM as follows:

$$\Delta l_{i,t}^N = \gamma_0^N + \alpha_1^N (l_{i,t-1}^N - \beta_1^N y_{i,t-1} - \beta_2^N p^N) + \gamma_3^N \Delta y_{i,t} + \gamma_i^N + e_{i,t}^N \quad (2)$$

⁸ This approach automatically removes gross statistical outliers, if any, and then uses two sequences of iterative regressions that weight the remaining observations according to the size of the estimated residuals. The estimation procedure has efficiency losses relative to OLS, but these are countered by having additional observations.

⁹ As is well known in the dynamic panel data literature at least since Nickell (1981), the lagged dependent variable is by construction endogenous. For long time series, this is not an issue – the resulting bias is of the order $1/T$ or a modest 5 percent in our case. The use of GMM estimators used by Arellano and Bond (1991) and successors is inappropriate for our data because they are designed for panels that have large number of cross sectional units relative to time series units. Instead, a small sample bias approximation, the Least Squares Dummy Variable Corrected (LSDVC) estimator due to Kiviet (1995) and Bruno (2005) is implemented. Nonetheless, one disadvantage is the approximation is reliant on potentially inconsistent starting values. Moreover, this class of estimators is strictly speaking designed for data that, although persistent, is stationary.

¹⁰ As is the case for panel unit root tests, a number of panel cointegration tests have been developed (Pedroni, 1999). However, these are untested on panels with a small cross-sectional dimension. Westerlund (2007) develops panel ECM tests, but they are based on separate estimates for each country and hence need a large T dimension. Applying these, we found large variation across country estimates but they tended to support cointegration for both expatriates and nationals.

γ_3^N is as before the short-run elasticity. β_1^N is the long-run elasticity. $\alpha_1^N < 0$ is the equilibrium correction term on the cointegrated residual given in the parentheses.¹¹ Therefore, changes in employment are determined by simultaneous changes in output and by adjustment toward the long-run equilibrium given in the cointegrating vector. The speed of adjustment is determined by the size of α_1 .

As illustrated for nationals, the cointegrating vector means there are separate short-run and long-run coefficients. Any estimation of the long-run relationship would not be spurious, but would omit short-run dynamics. Estimation in first differences, by omitting the long-run relationship, can give biased estimates of the short-run and, of course, no estimates of the long-run.

The second implication of cointegration is that the (super-)consistency of the cointegrating estimate is not reliant on the absence of correlation between the residuals and the explanatory variables (Stock, 1987). This implies that potential endogeneity of output to employment does not lead to biased estimates.

Furthermore, some features of the GCC labor market reduce the potential for reverse causality from employment to output. To varying degrees, the small share of nationals in the private sector workforce reduces the influence of nationals' employment changes on GDP growth. Employers are able to draw on a seemingly elastic supply of foreigners in response to workforce needs, which also implies unidirectional causality from output to employment.

B. Estimation Results

SUREC Estimation

Table 2 presents six sets of SUREC estimates, each consisting of joint estimation of equations for expatriates and nationals.

For example, the first row of columns 2a and 2b show estimates of the coefficient on the change in GDP (GDP growth) that are substantially different for expatriates (0.362) and nationals (0.147). This difference is statistically significant, as indicated by the p-value (0.05) for the test that the short-run coefficients are the same. For expatriates, the coefficient on lagged employment (-0.186) is statistically significant using standard critical values and the formal ECM test for cointegration, which has a p-value of 0.04. The resulting long-run coefficient is 0.97. For nationals, the error correction term (-0.26) is also statistically

¹¹ The year term p has been placed inside the cointegrating vector, which implies the cointegrating relationship includes a trend term, but could just as easily have been left outside, which would mean that there is a linear trend in first differences and hence a quadratic trend in levels. The unconstrained estimation of the ECM does not distinguish between the two. Similarly, the country specific intercepts could be inside or outside the cointegrating vector.

significantly below zero. The long-run value of 0.68 is statistically significantly lower than that for expatriates, as shown by the p-value of 0.06.

Columns 3a and 3b restrict the expatriate long-run coefficient to unity without affecting the results. Columns 4a and 4b introduce a trend term. This raises the standard errors on the GDP terms, resulting in less precise short-run and long-run estimates. The coefficients suggest higher elasticities for both nationals and expatriates, where the long-run response for the latter is implausibly above 2. Columns 5a and 5b weight the regressions by non-oil GDP, thus giving larger countries like Saudi Arabia more weight. The results are similar to system 2, with short- and long-run elasticities of 0.39 and 0.91 for expatriates as well as short- and long-run responses of 0.16 and 0.70 for nationals. Excluding Qatar (columns 6a and 6b) does not change the results substantially. In all cases, the short-run elasticity is statistically significantly lower for nationals than for expatriates. In all cases, the long-run elasticity is lower for nationals than expatriates (and significantly so except for systems 1 and 4).

The country coefficients reflect controls for time-invariant country-specific fixed effects. The coefficients reflect country-specific constants (relative to the arbitrary constant for Qatar) and not country-specific employment-output elasticities. Although these coefficients are not of direct interest, their omission could induce bias in the estimates of the elasticity coefficients.

Table 2: Seemingly Unrelated Error Correction Regressions

VARIABLES	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b
	No break dummies		Break dummies		LR=1 (Expats)		Trend term		Weighted		Excl. Qatar	
	Expats	Nationals	Expats	Nationals	Expats	Nationals	Expats	Nationals	Expats	Nationals	Expats	Nationals
Non-oil GDP growth	0.347*** (0.06)	-0.081 (0.09)	0.362*** (0.08)	0.147* (0.08)	0.368*** (0.07)	0.147* (0.08)	0.611*** (0.11)	0.200* (0.12)	0.394*** (0.09)	0.156* (0.08)	0.346*** (0.08)	0.155* (0.09)
Lagged Employment	-0.076* (0.04)	-0.078** (0.03)	-0.186*** (0.05)	-0.260*** (0.03)	-0.187*** (0.05)	-0.260*** (0.03)	-0.156*** (0.05)	-0.245*** (0.04)	-0.217*** (0.06)	-0.268*** (0.04)	-0.177*** (0.05)	-0.263*** (0.04)
Lagged Non-oil GDP	0.102** (0.05)	0.061 (0.04)	0.181*** (0.06)	0.177*** (0.04)	0.187*** (0.05)	0.178*** (0.04)	0.398*** (0.09)	0.230** (0.09)	0.198*** (0.05)	0.188*** (0.03)	0.173*** (0.06)	0.181*** (0.04)
Bahrain	0.378* (0.20)	0.186 (0.14)	0.795*** (0.25)	0.634*** (0.13)	0.817*** (0.23)	0.634*** (0.13)	1.437*** (0.31)	0.797*** (0.29)	0.891*** (0.25)	0.673*** (0.12)	0.454** (0.18)	0.193 (0.13)
Kuwait	0.419* (0.23)	0.155* (0.09)	0.929*** (0.28)	0.472*** (0.10)	0.948*** (0.26)	0.472*** (0.10)	1.386*** (0.30)	0.610** (0.24)	1.058*** (0.29)	0.499*** (0.08)	0.581*** (0.20)	0.027 (0.11)
Oman	0.456** (0.22)	0.244* (0.13)	0.908*** (0.27)	0.743*** (0.13)	0.928*** (0.25)	0.743*** (0.13)	1.463*** (0.30)	0.882*** (0.26)	1.022*** (0.27)	0.781*** (0.12)	0.562*** (0.19)	0.301** (0.13)
Saudi Arabia	0.05 (0.09)	0.09 (0.06)	0.321*** (0.11)	0.452*** (0.07)	0.316*** (0.11)	0.452*** (0.07)	(0.19)	0.31 (0.25)	0.409*** (0.13)	0.457*** (0.08)		
Year							-0.018*** (0.01)	-0.005 (0.01)				
Constant	-0.073 -0.1	0.097 -0.116	0.027 -0.138	0.224* -0.132	-0.044	0.223* -0.132	34.595*** -10.974	9.284 -14.771	0.08 -0.11	0.197* -0.105	0.334* -0.177	0.668*** -0.184
Observations	61	61	61	61	61	61	61	61	61	61	53	53
R-squared	0.48	0.38	0.60	0.67	0.60	0.67	0.66	0.68	0.59	0.65	0.58	0.67
H0: Short Run Equality (p value)	0.00	0.00	0.05	0.05	0.04	0.04	0.01	0.01	0.05	0.05	0.11	0.11
Long Run Elasticity	1.34	0.79	0.97	0.68	1	0.68	2.54	0.94	0.912	0.703	0.973	0.69
H0: Long Run Equality (p value)	0.25	0.25	0.06	0.06	0.00	0.00	0.21	0.21	0.08	0.08	0.09	0.09
H0: Long Run = 1 (p value) [^]	0.23	0.46	0.84	0.00		0.00	0.04	0.90	0.34	0.00	0.85	0.00
H0: No Cointegration (p value) ^{^^}	0.34	0.15	0.04	0.00	0.03	0.00	0.14	0.02	0.03	0.00	0.04	0.00

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; ^ critical values on LR terms not valid under the null of no cointegration. System 1 has no dummies for structural breaks except for Qatar pre-2006; estimates of system 2 onwards include multiple dummies. System 3 restricts the expatriate long-run coefficient to 1. System 4 adds a trend term. System 5 is estimated using log non-oil GDP as weights while all others are unweighted. System 6 excludes Qatar due to its short and interrupted time series. ^^ using Ericsson & MacKinnon critical values.

Alternative Estimation Methods

In addition to the SUREC results, we present a number of ECM regressions that separately estimate responses for nationals and expatriates to be able to gauge robustness. These single equation results for expatriates are in Table 3.

Table 3: Single Equation Estimates, Expatriates

	-1	-2	-3	-4	-5	-6	-7
	OLS	WLS	Excl. Qat	ROLS	Robust	LSDVC	Trend
Non-oil GDP growth	0.359*** (0.08)	0.380*** (0.09)	0.343*** (0.08)	0.366*** (0.08)	0.682*** (0.13)	0.272 (4.97)	0.564*** (0.14)
Lagged Non-oil GDP	0.207*** (0.06)	0.208*** (0.08)	0.197*** (0.06)	0.214*** (0.07)	0.0979 (0.06)	-0.229 (5.05)	0.391*** (0.10)
Lagged Employment	-0.213*** (0.07)	-0.229*** (0.08)	-0.203*** (0.07)	-0.214*** (0.07)	-0.139** (0.05)	-0.047 (0.29)	-0.193*** (0.07)
Bahrain	0.912*** (0.29)	0.937** (0.36)	0.505*** (0.17)	0.938*** (0.34)	0.449* (0.27)		1.461*** (0.35)
Kuwait	1.057*** (0.35)	1.104** (0.42)	0.641*** (0.20)	1.080*** (0.39)	0.570* (0.30)		1.458*** (0.32)
Oman	1.043*** (0.33)	1.079*** (0.40)	0.631*** (0.19)	1.067*** (0.38)	0.576* (0.29)		1.524*** (0.33)
Saudi Arabia	0.381** (0.18)	0.437** (0.20)		0.376** (0.16)	0.268** (0.12)		-0.028 (0.34)
Year							-0.015* (0.01)
Constant	0.016 (0.18)	0.082 (0.17)	0.383 (0.30)	-0.018 (0.06)	0.213 (0.13)		28.630* (15.53)
Observations	67	67	59	67	66	55	67
R-squared	0.603	0.583	0.57		0.743		0.639
LR Coefficient	0.97	0.91	0.97	1.00	0.71	0.91	2.02
LR Std. Error	0.16	0.14	0.17		0.20	15.5	0.94

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column 1 is unweighted, column 2 is weighted by $\text{Log}(\text{Non-oil GDP})$, column 3 excludes Qatar, column 4 restricts the LR coefficient to 1, and column 5 uses robust regression. Column 6 uses the least squares dummy variables corrected estimator with the Anderson Hsiao initial values; this is estimated in ARDL levels format but restated in ECM format for ease of comparison and country specific effects are captured by within-groups estimation. Column 7 includes a trend variable. All specifications except columns 5 and 6 include dummies for structural breaks.

Column 1 is estimated by (unweighted) OLS, while column 2 employs weighted least squares (using the logarithm of non-oil GDP) in order to allow for the dominant size of Saudi Arabia. Column 3 uses OLS but excludes Qatar because of its data limitations. Column 4 makes use of restricted least squares with the long-run coefficient restricted to unity in order to reduce the number of parameters to be estimated and potentially improve identification. Across columns 1-4, elasticity estimates of about 0.35 in the short run and close to unity in the long run are very similar to those in the SUREC. Column 5 employs robust regression, which we noted earlier is an alternative approach to dealing with noisy data, resulting in a higher short-run elasticity that is almost the same as the long-run elasticity. In contrast, the LSDVC approach, which was described earlier as a method intended to address potential

lagged dependent variable bias, generates a slightly lower short-run elasticity than the SUREC table and a similar long-run elasticity. Allowing for a trend term again reduces the precision of the estimates, generating a long-run elasticity with wide confidence bands.

For nationals, the single equation estimates in Table 4 use the same methods as for expatriates.

Table 4: Single Equation Estimates, Nationals

	-1	-2	-3	-4	-5	-6	-7
	OLS	WLS	Excl. Qat	Robust	LSDVCAH	LSDVCAB	Trend
Non-oil GDP growth	0.097 (0.09)	0.129 (0.09)	0.100 (0.10)	0.218** (0.09)	0.221 (0.52)	0.219 (0.49)	0.085 (0.14)
Lagged Non-oil GDP	0.141*** (0.04)	0.168*** (0.04)	0.143*** (0.04)	0.0749*** (0.02)	-0.221 (0.47)	-0.215 (0.43)	0.129 (0.11)
Lagged Employment	-0.237*** (0.02)	-0.249*** (0.03)	-0.238*** (0.03)	-0.181*** (0.02)	-0.012 (0.30)	-0.018 (0.28)	-0.241*** (0.04)
Bahrain	0.519*** (0.15)	0.617*** (0.14)	0.085 (0.17)	0.253*** (0.08)			
Kuwait	0.381*** (0.11)	0.452*** (0.10)	-0.055 (0.13)	0.234*** (0.06)			
Oman	0.609*** (0.15)	0.702*** (0.14)	0.175 (0.16)	0.373*** (0.08)			
Saudi Arabia	0.438*** (0.05)	0.433*** (0.04)		0.376*** (0.04)			
Year							0.001 (0.01)
Constant	0.322* (0.17)	0.225 (0.14)	0.757*** (0.20)	0.424*** (0.08)			-1.992 (16.09)
Observations	69	69	61	86	67	67	69
R-squared	0.648	0.634	0.646	0.768			0.648
LR Coefficient	0.60	0.68	0.60	0.42	0.01	0.23	0.53
LR Std. Error	0.14	0.11	0.14	0.09	17.11	7.31	0.48

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Column 1 is unweighted, column 2 is weighted by Log(Non-oil GDP), column 3 excludes Qatar, and column 4 uses robust regression. Columns 5 and 6 uses the least squares dummy variables corrected estimator with the Anderson Hsiao and Arellano Bond initial values; this is estimated in ARDL levels format but restated in ECM format for ease of comparison and country specific effects are captured by within-groups estimation. Column 7 includes a trend variable. All specifications except columns 5 and 6 include dummies for structural breaks.

The short-run elasticities vary from 0.09 to 0.22 and are on average the same as those in the SUREC estimates (Table 2). The long-run elasticities are generally lower than in the SUREC. In particular, the LSDVC regressions generate very low and imprecise estimates of the long-run coefficient; moreover, the LSDVC lagged employment terms are close to and

insignificantly different from zero, which is inconsistent with a long run cointegration relationship.¹²

To investigate country level heterogeneity, we ran individual country regressions in both levels and first differences, but the results were unreliable. Coefficients varied but not in systematic ways across countries or methods, while standard errors were too large to indicate any statistical significance in differences. Unfortunately, panel methods designed to allow for various degrees of short-run or long-run heterogeneity in coefficients (Pesaran and Smith, 1995) as well as cross-section dependence rely on larger datasets than we currently have available, so exploratory attempts to use these were unsuccessful.

In some countries, arc elasticities show signs of rising over time. These could reflect structural or policy changes in the labor market. Nonetheless, the number of observations preclude separate rigorous econometric identification of a structural change.

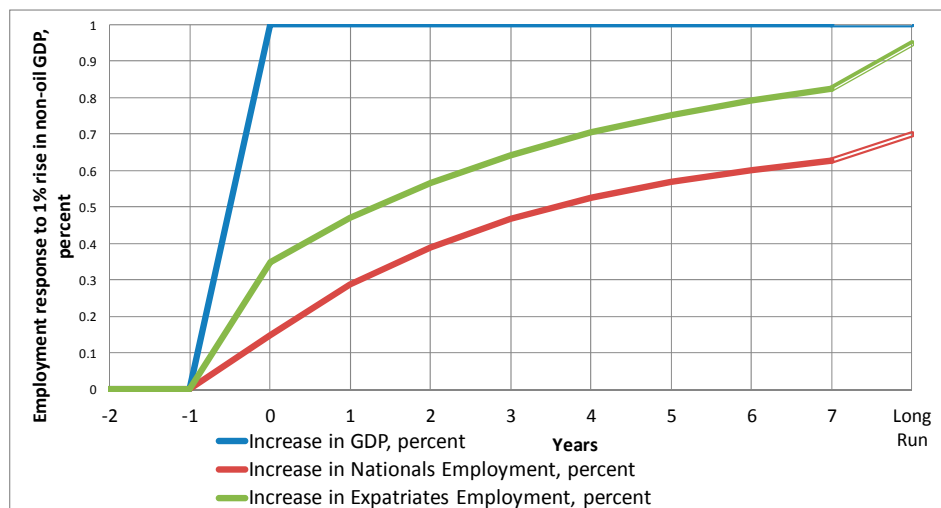
¹² In light of this, we estimated specifications in which the lagged output term is omitted. The estimates were similarly imprecise and yielded negligible short-run elasticities together with very slow adjustment to a low long-run elasticity.

The Short, Medium and Long Run

Overall, we have an employment elasticity of close to 1 for expatriates in the long run and about one third of that in the short run, with alternative methods occasionally producing higher or lower estimates. For nationals, short-run estimates are about 0.15 on average; long-run estimates 0.7 or slightly higher in the SUREC table and below 0.7 in the single equation procedures.

Figure 4 presents an illustration of the dynamic responses of employment using representative coefficient estimates, placing a low weight on estimates that were imprecise or appeared otherwise unreliable. For expatriates, we set the short-run response at 0.35, the error-correction term at -0.20, and the long-run response at 0.95. For nationals, the chosen short- and long-run elasticities are 0.15 and 0.70, respectively, with the caveat that a number of long-run estimates were lower than this. The ECM term for nationals of -0.25 implies a half-life of 2.4; in other words, half of the disequilibrium between employment and that implied by non-oil GDP is adjusted to in about 2½ years. For a permanent increase in output of 1 percent, the cumulative nationals' employment elasticity after 5 years (the medium run) would be only 0.57. For expatriates, the medium-run elasticity is 0.75. Therefore, the short-, medium and long-run elasticities are lower for nationals than for expatriates.

Figure 4: Dynamics of Employment Responses



IV. SCENARIO ANALYSIS FOR NATIONALS

Taking the results from the previous section, the stylized equations with no trend term used for forecasting are:

$$\Delta l_{i,t}^N = \hat{\gamma}_0^N - 0.25(l_{i,t-1}^N - 0.7y_{i,t-1}) + 0.15\Delta y_{i,t} + \hat{\gamma}_i^N \quad (3a)$$

$$\Delta l_{i,t}^E = \hat{\gamma}_0^E - 0.20(l_{i,t-1}^N - 0.95y_{i,t-1}) + 0.35\Delta y_{i,t} + \hat{\gamma}_i^E \quad (3b)$$

In-Sample Forecasts of Private-sector Employment

Using the common coefficients and country specific intercepts,¹³ we forecast private-sector employment for nationals for each country. The fit is good (Figure 5). In places, the forecast values appear smoother than the actual values, which may be due to measurement error as well as genuine unexplained variations in employment. In some cases, notably Qatar and Saudi Arabia, employment growth in recent years has exceeded that implied by the model; if sustained, this pace could lead to higher employment than forecast. On the other hand, using a long-run coefficient of less than 0.7 for nationals, as shown by the single-equation estimates, would produce lower employment forecasts.

Private-sector Employment Forecasts Under Multiple Scenarios

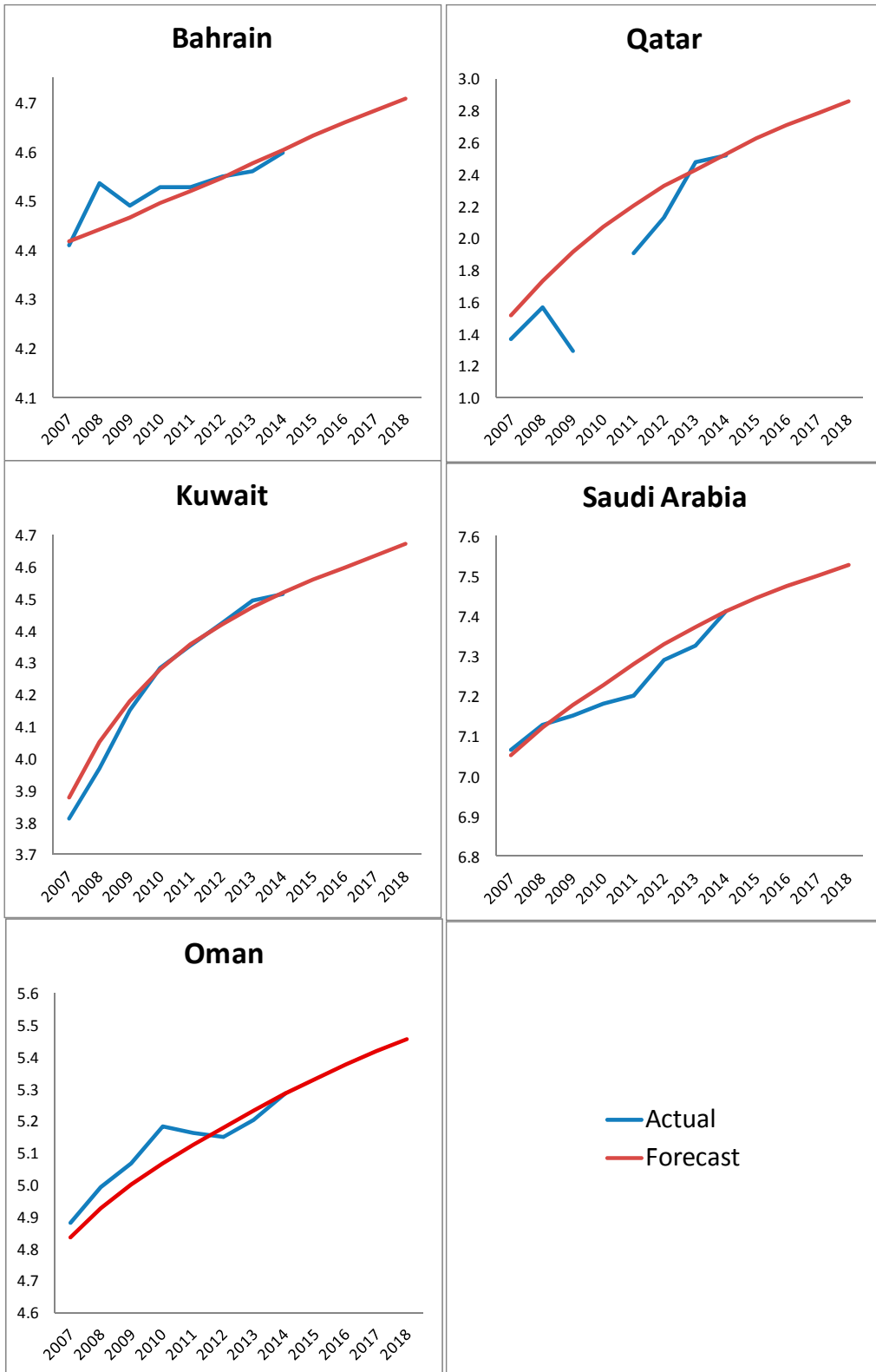
Using IMF forecasts of non-oil GDP growth for these countries, Figure 5 also contains the out-of-sample forecast of the log of nationals' employment for each country. The rest of this section forecasts the level of employment under four scenarios:

- i. Baseline growth forecast and baseline elasticity
- ii. Slower growth forecast and baseline elasticity
- iii. Faster growth forecast and baseline elasticity
- iv. Baseline growth forecast and higher elasticity

We generate forecasts for employment at a country level before summing the employment values to attain the GCC aggregate.

¹³ For each country, these are based on the dummies in the regressions but further calibrated to nest the constant and such that the data matches the forecast in 2014.

Figure 5: In-Sample Forecasts and Projections, Nationals, 2007-2020, Ln (000s)



Using the 2011 labor force as the weight for our five GCC countries, the aggregate non-oil GDP growth rate is forecast to average 3¼ percent per annum from 2015 to 2020 inclusive.¹⁴ This would be a slowdown of almost 2 percent relative to the previous five years. Our slower growth scenario assumes non-oil GDP growth is a further 2 percentage points lower than under the baseline for each country from 2016 to 2020, with 2015 growth left unchanged. The fast growth scenario assumes that growth is 2 percentage points higher in 2016 to 2020.

The higher elasticity scenario comes from replacing the coefficients in equation (3a) for nationals with the following:

$$\Delta l_{i,t}^N = \hat{\gamma}_0^N - 0.25(l_{i,t-1}^N - 0.736y_{i,t-1}) + 0.33\Delta y_{i,t} + \hat{\gamma}_i^N \quad (4)$$

To be more precise, we assume the coefficients are as in (3a) for 2014 and rise in equal increments starting in 2015 to those shown in equation (4) by 2020. This has the effect of raising the short-run elasticity from 0.15 in 2014 to 0.18 in 2015 and 0.33 in 2020 such that it almost matches that of expatriates. Our emphasis is on the short run but we allow for a small rise in the long run elasticity from 0.70 in 2014 to 0.706 in 2015 and 0.736 in 2020. Equation (4) implies a medium-run elasticity of 0.64 instead of 0.57 although the adjustment we have programmed implies a de-facto medium-run elasticity that is closer to 0.60.

Figure 6 presents the results under different scenarios at the country level. The baseline scenario is illustrated by the grey lines. Under the baseline, relatively low employment growth of less than 3 percent per year is forecast for Bahrain and Kuwait, while the remaining countries could have employment growth rates of around 5 percent per year. This variation is due to differences in non-oil GDP growth rates – both the forecasts for 2015-2020 and recent growth performance, which affects the employment forecast via adjustment to the long-run cointegrating relationship. These lagged effects also explain why, in the context of slowing non-oil GDP growth rates, employment growth forecasts exceed output growth forecasts for some countries.

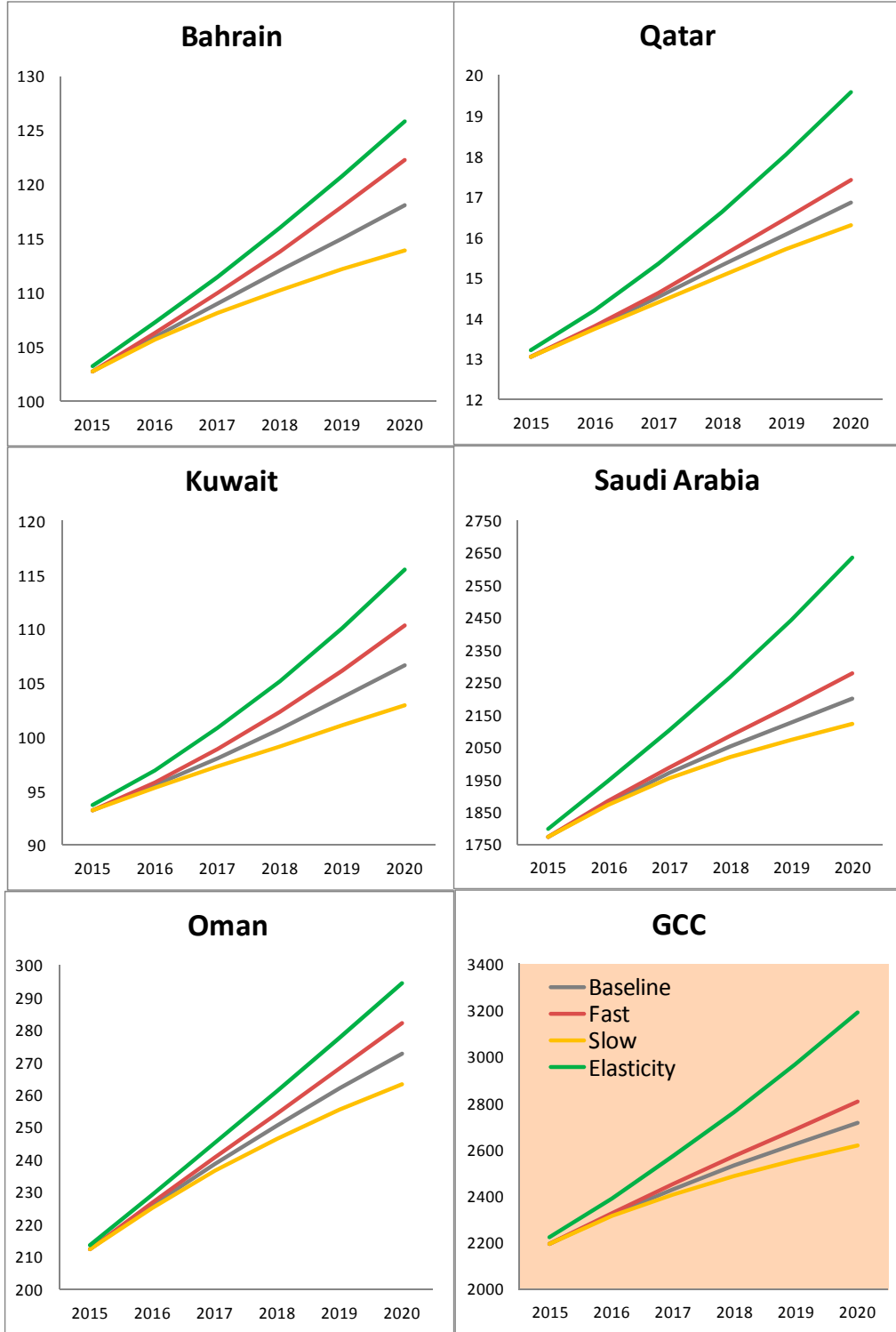
Similarly, for the GCC aggregate, employment growth of an expected 4¾ percent per year exceeds the output growth forecast because of the lagged effects of past high output growth rates. Under the baseline, private-sector employment rises by 650 000 from 2.05 million in 2014 to 2.7 million in 2020 for GCC nationals.

The red and yellow lines represent GDP growth rates that are 2 percent faster and slower, respectively, than baseline from 2016 onwards. For example, GCC employment would be about 100, 000 lower than the baseline by 2020 in the slow growth scenario and

¹⁴ For all six GCC countries, non-oil growth aggregated using purchasing power parity GDP weights is expected to average 4¾ percent per annum from 2015 to 2020 inclusive.

approximately equally higher in the fast growth scenario. As a rule of thumb, each percentage-point change in non-oil growth generates almost 50, 000 private-sector jobs for nationals by 2020 given historical employment elasticities and recent output growth.

Figure 6: Private-sector Employment Projections, Thousands



The green lines show the implications of higher employment elasticities. These changes have a bigger impact on employment growth than the high-growth scenario. For example, GCC employment would reach 3.2 million after generating 1.1 million jobs, which is about 500,000 (70 percent) more jobs than under the baseline. The mechanics of the model are such that the small change in the long-run coefficient makes a material contribution even in the short run,¹⁵ while the short-run coefficient alone would substantially reduce the employment gain to only 50,000.

Broader Implications for Employment

Some of these projected employment growth rates appear high and would be the envy of many countries with weak GDP growth outlooks, but may not be enough. For many GCC countries, large proportional changes do not make significant contributions to the countries' employment needs because of the low initial share of nationals in the private sector. To see the potential implications for GCC labor markets, we aggregate the forecasts across the scenarios and compare this to public-sector employment growth and labor force entry.

The 650,000 jobs generated under the baseline scenario would fall well short of the number of new job seekers. Labor force projections indicate an aggregate GCC growth rate of almost 4½ percent per year or 2 million labor market entrants between 2014 and 2020. Based on these projections, the number of private sector jobs would be only one third of the entrants.

Public sector hiring at historical rates (almost 4½ percent per annum) would create 1.2 million public sector jobs by 2020. This would leave the share of nationals' private-sector employment in nationals' total employment below 35 percent and barely unchanged from 2006. Moreover, another 175,000 people would be unemployed. Absorbing all labor market entrants would require public-sector employment to grow by 5¼ percent per year and would reverse the limited progress made so far in increasing the ratio of private- to public-sector employment. In the high-growth scenario, public sector hiring at historical rates would fail to prevent higher unemployment. However, the high elasticity scenario boosts private-sector job creation by more than enough for private sector-hiring at historical rates to absorb all additional expected labor market entrants.

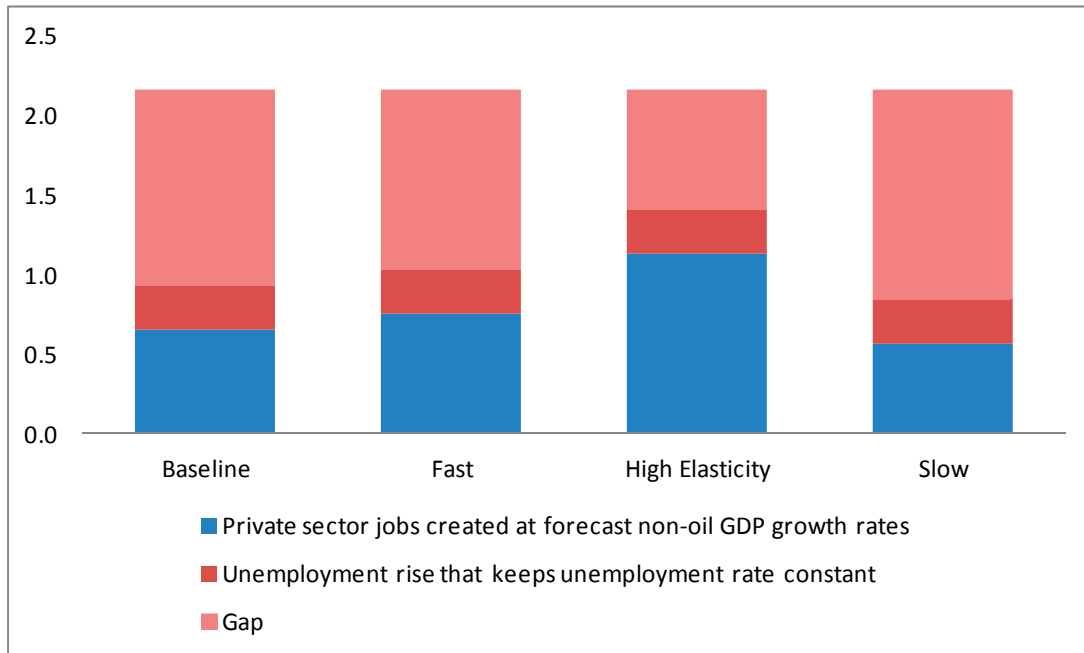
The recent fast pace of public hiring is not fiscally sustainable. Having been a feature of GCC economies since the 1970s (Baldwin-Edwards, 2011), public employment rose following events associated with the 2011 Arab Spring in neighboring countries. Together with pay increases, the hiring burst inflated GCC public-sector wage bills to around 10

¹⁵ This is because a change in the long-run coefficient immediately generates a disequilibrium between actual employment and that implied by the cointegrating relationship. Even for our modest increase, a staggered period of adjustment is needed to avert a spike in employment.

percent of GDP in 2014. Indeed, as shown in most GCC country staff reports and in IMF (2011, 2014), GCC spending was well above optimal levels despite the large fiscal surpluses enjoyed by most of its members when oil prices averaged about \$100 per barrel in 2011-2014. With the sharp fall in oil prices in late 2014 and early 2015, fiscal positions have weakened, and addressing the jobs shortfall through public hiring is therefore not feasible.

Rather than absorbing all labor market entrants, Figure 7 shows the increase in unemployment by 2020 (275,000) that would keep the unemployment rate constant at the recent estimated rate of almost 13 percent.¹⁶ It also shows the forecast private-sector employment growth generated in each of the four scenarios. Holding labor force participation constant, the resulting gap is the shortfall, which would be a combination of public sector hiring, which is not fiscally affordable, and additional unemployment that would raise the unemployment rate.

Figure 7: Labor Market Projections, 2015-2020, Millions



In particular, with the 650,000 private-sector jobs generated under the baseline, it would take an additional 1.2 million public sector jobs (a growth rate of $4\frac{3}{4}$ percent per year) to prevent a rise in the unemployment rate. A second interpretation is that, in the absence of any public sector hiring, the estimated unemployment rate would double to 26 percent in 2020. A third

¹⁶ This rate is calculated by subtracting nationals' private and public employment figures from the labor force. Not all GCC countries publish unemployment numbers. Our calculations yield unemployment rates of $12\frac{3}{4}$ percent in 2013 and 2014.

interpretation is that public hiring growth of 4.7 percent per year, which is about the same unsustainable rate as in the recent past, would be needed to prevent a rise in the unemployment rate.

Growth that is 2 percentage points higher than forecast yields more jobs than under the baseline but by a small amount when compared to the rise in the labor force. Under the slow growth scenario, the gap would be almost 1.3 million jobs, which would imply an unemployment rate of 27 percent in 2020 in the absence of public hiring.

A higher elasticity would generate an estimated 1.1 million private sector jobs for nationals, which would reduce the gap by almost $\frac{1}{2}$ million relative to the baseline. Absent public sector hiring, the unemployment rate would be 21 percent in 2020 (6 percentage points lower than under the baseline but still 8 percentage points higher than in 2014). Alternatively, public sector hiring growth of 3 percent would be needed to contain the unemployment rate.

It is clear that all scenarios lead to a combination of rising unemployment rates and unsustainable additional public sector hiring. The quantitative scenarios demonstrate that modest rises in employment elasticities would not remove the gap over the medium term, but would at least reduce it. The next section links the elasticities to specific policy measures.

V. DIAGNOSIS AND POLICY IMPLICATIONS

What the Elasticities Imply about Labor Market Characteristics

For expatriates, the long run elasticity was estimated at close to 1. In the long run, a coefficient of unity is consistent with low or no labor productivity growth and is related to poor total factor productivity growth. Indeed, the GCC countries have relied on a development model that has employed low-wage and less-educated foreign workers without prioritizing productivity (Espinosa, 2013; IMF, 2014b). It is also consistent with increasing returns to scale in the production technology (Kapsos, 2005; Chami et al, 2012).

For nationals, the long-run elasticity is about 0.7. A coefficient of less than unity is consistent with labor productivity gains. However, even in the absence of productivity growth, it could also be an observed long-run implication of low short-run coefficients (Sims, 1974; cited in Nickell, 1986).

Low short-run elasticities and low error correction coefficients are consistent with high adjustment costs, with the important caveat that our estimates are reduced form and not derived from a particular model. In fully specified firm-level labor demand equations, adjustment costs faced by firms imply lower coefficients on the output variable and error-correction coefficients that are closer to zero (Nickell, 1986). At the macroeconomic level, short-run elasticities of below unity are consistent with a countercyclical labor share. There is

international evidence that the counter-cyclicality of the labor share is associated with multiple measures of labor market rigidities (Giammarioli et al., 2002), and Vermuelen (2007) calibrates estimates of firm-level demand with adjustment costs to explain macro fluctuations.

Many GCC countries rank reasonably well on indicators of labor market flexibility, but some labor market restrictions may be a constraint. The World Economic Forum's index of labor market flexibility places GCC countries quite well by global standards and in line with other oil producers and migrant-dependent countries. However, this likely conflates the labor markets for nationals and expatriates; the statistically significant difference in short-run coefficient estimates implies that labor market flexibility or other sources of adjustment costs differ between the two groups. Furthermore, executives surveyed place restrictive labor regulations at the top of the list of obstacles to doing business in the GCC. This is in some cases attributable to redundancy costs, which exceed 4 months' salary in Kuwait, Qatar and Saudi Arabia but are 1 month's salary in Oman, Bahrain and the United Arab Emirates (Hanouz and Dusek, 2013; IMF, 2014b).

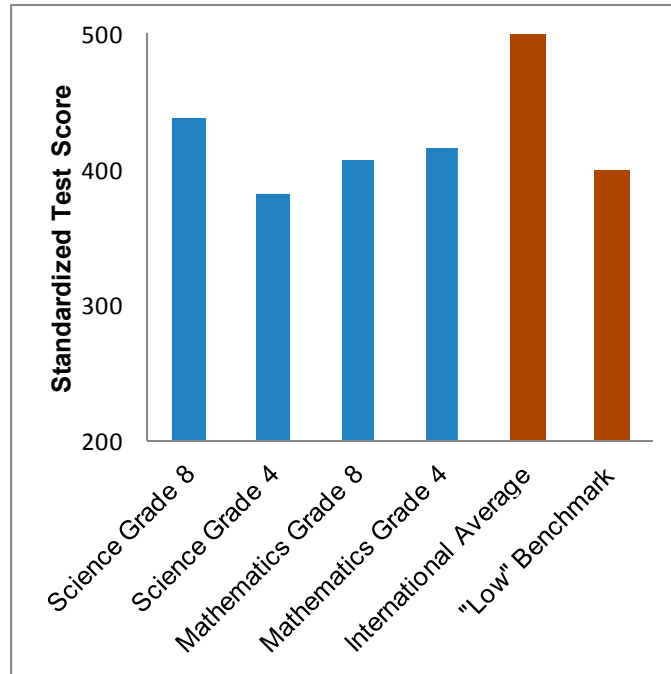
There is evidence that advanced and emerging countries with more flexible labor markets have sharp but short-lived unemployment responses during financial crises, but countries with more rigid labor markets have subdued but persistent unemployment effects (Bernal-Verdugo and others, 2012a). With the same data, Bernal-Verdugo and others (2012b) find that labor market rigidities tend to result in higher long-run unemployment. However, there is still considerable debate regarding the role of rigidities and other labor market institutions in explaining labor market outcomes, as shown by an extensive literature that includes Freeman (2005), Baker and others (2007), Nickell (1997), and Blanchard and Wolfers (2000). Crivelli et al (2012) find evidence that employment responsiveness is higher in countries with more labor market flexibility, but Kapsos (2005) finds that employment rigidities are not associated with responsiveness.¹⁷ Moreover, a thorough investigation of how much of the variation in employment outcomes between the Middle East and the rest of the world or within the Middle East can be attributed to labor market rigidities has to our knowledge not been conducted.

Adjustment costs need not reflect rigidities resulting from labor market policy, but can be a function of effective supply. Even from a young age, measures of educational achievements are below those of comparator countries, as indicated for example by the most recent Trends in International and Mathematics Study (TIMSS) scores (Mullis and others, 2009) shown in Figure 8. In standard search models of the labor market, skills mismatches – whether

¹⁷ Both papers refer to medium- to long-run employment elasticities, and Crivelli et al discourage the application of their results to short-run elasticities. However, preliminary work on short-run Okun coefficients indicates short-run elasticities are larger in countries with more flexible labor markets (Ball, 2013).

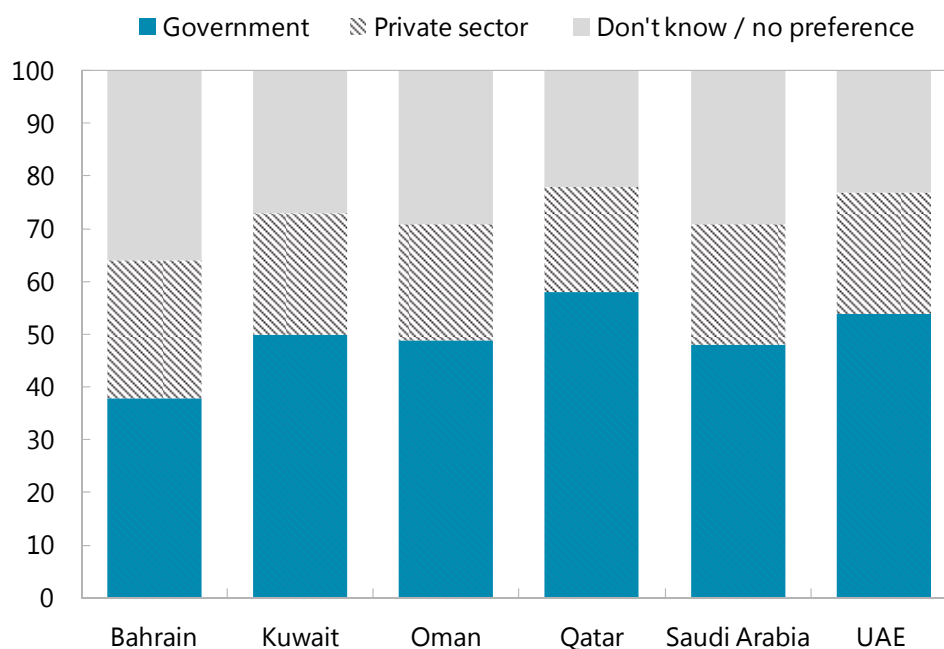
foundational or due to shortages of the specific competencies desired by particular firms – impair the rate of hiring. In many economies, this can result in higher overall unemployment together with vacancies (Cahuc & Zylbeberg, 2004; ILO, 2013). The availability of substitute expatriate work can result in slightly modified outcomes, where the vacancies are fewer but unemployment and/or public sector employment among nationals is higher.

Figure 8: Science and Mathematics Education Quality, GCC Average, 2011



In addition to suitability, a low elasticity of the labor supply can be the result of preference. It has been documented that the public sector remains a more attractive option than the private sector for many nationals in the Gulf (World Bank, 2012). According to the ASDA's Burson-Marsteller (2013) Arab Youth Survey, young workers would prefer employment in the government than in the private sector by a ratio exceeding 2-1 (Figure 9). As a result, labor market entrants may search for private-sector jobs with little or no intensity or have high reservation wages (Behar and Mok, 2013; Behar and Mok, 2015; Espinosa, 2013). For many GCC countries, public-sector work is an entitlement for men, which limits investment in education by males (ILO and UNDP, 2012). This would imply that nationals are neither willing nor able to respond to demand from private-sector firms rapidly.

Figure 9: Preferred Employer for Youth, Percent of Respondents, 2013



Source: ASDA'A Burson-Marsteller (2013)

In contrast, the supply of expats with requisite skills is plentiful; GCC firms currently have a seemingly unlimited supply of workers from abroad on temporary contracts (ILO and UNDP, 2012). Their higher short-run coefficients could imply lower adjustment costs compared to nationals, which may make it easier for firms to hire expatriates in response to demand increases or to terminate temporary contracts if demand falls. There is evidence that short-run labor market responses to output are higher in countries with more temporary contracts (IMF, 2010).

Possible Policy Responses

The discussion above implies the following sets of measures for consideration as part of a broader package, which is detailed in IMF (2014b).

- 1) Policymakers need to contain public sector employment quantities and wages and adjust expectations of guaranteed public employment in the future. This would alter the incentives for nationals to prepare for, seek, and/or accept work in the private sector. Lower oil prices also make this a question of fiscal sustainability.
- 2) Consideration could also be given to measures that would raise the take-home private-sector wages of nationals but without an undue impact on the cost of doing business for firms and without further incentivizing firms to hire more expatriates. A number of GCC countries have implemented wage subsidy schemes; generalized subsidies can be

expensive, but well-targeted and temporary subsidies could be a cost-effective alternative to public-sector employment.

- 3) Private-sector wages could rise in response to carefully considered phased implementation of restrictions on some expatriate workers combined with increases in expatriate mobility across firms. To varying degrees and with some reversals, some GCC countries have taken steps to increase internal mobility, which could increase foreigners' bargaining power and close some of the wage gap relative to nationals. The cost of hiring expatriates relative to nationals could be increased by imposing higher fees on firms for hiring expatriates, provided the incidence is borne by the firms and not the workers. The Saudi *Nitaqat* system for example aims to make it burdensome or impossible for firms with insufficient nationals to retain or hire expatriates. Other GCC countries also impose levies. This could increase incentives for firms to employ nationals, provided that nationals and expatriates are substitutes and not complements in production.¹⁸
- 4) Skills mismatches should be reduced by improving the quality of education and on-the-job training. While incentives for nationals to invest in skills appropriate to the private sector can be addressed through reduced availability of public sector employment, continued investments in the education system to improve the quality of education supplied are critical. In addition, most GCC countries have some form of on-the-job training program in place, although it can be hard to address education weaknesses through these measures.
- 5) Investigating potential labor market rigidities faced by nationals, potentially including the costs of dismissing inadequate performers. Ease of firing can imply big job losses during downturns, but there is evidence that this leads to better long-run employment outcomes. Furthermore, there is increasing acceptance that the emphasis should be on protecting workers and not jobs.

In our framework, the above measures could help raise the short-run employment elasticity and the speed of adjustment to the long-run equilibrium. It would also likely have knock-on effects to the long-run elasticity such that there would be an increase in the employment response to output in the short, medium and long run without necessarily implying a fall in productivity growth. Moreover, a number of the factors in Crivelli et al (ibid) thought to increase the employment intensity of growth are also considered conducive to long-run productivity growth, so such reforms can also increase long-run output growth rates.

¹⁸ For an example of analysis of whether capital and multiple labor inputs are complements or substitutes in production, see Behar (2010).

VI. CONCLUSIONS

The econometric analysis has estimated a long-run elasticity of nationals' private-sector employment with respect to non-oil GDP of about 0.7 (or possibly less) and a short-run elasticity of only 0.15. These are statistically significantly lower than for expatriates, for whom estimates are 0.95 and 0.35 in the long run and short run, respectively. In other words, the immediate private-sector employment response to growth is much higher for expatriates than for nationals, and the gap persists over the long run.

Using forecasts of non-oil GDP growth and the estimated elasticities, the number of private-sector jobs created for nationals will cover about one third of the labor market entrants expected from 2015 to 2020. Preventing a rise in the unemployment rate would require sustaining public-sector hiring at a pace that is no longer fiscally affordable. Our simulations indicate that a gradual rise in the short-run elasticity towards that estimated for expatriates, together with a slight rise in the long-run response, would reduce the gap between new job seekers and new private-sector jobs by almost half.

We have argued the low elasticities for nationals are symptoms of high labor market adjustment costs, which could include labor market inflexibility, skills mismatches, and an initial preference for public-sector work. Measures to reduce adjustment costs could therefore go some way to making output growth more conducive to job-creation for nationals. Fortunately, many of these measures could also increase the pace of non-oil GDP growth with employment impacts beyond those estimated in the scenario presented.

Our analytical framework has treated nationals and expatriates independently without allowing for interactions between them. For example, although our discussion hinted at how changes in the costs of hiring expatriates could affect incentives for hiring nationals, more explicit empirical analysis of the relationship between these forms of employment, including whether they are complements or substitutes in production, would be a promising line of future research.

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