العنوان:	Gender Issues and Economic Diversification in The GCC
المصدر:	شؤون اجتماعية
الناشر:	جمعية الاجتماعيين في الشارقة
المؤلف الرئيسي:	Neaime, Simon
المجلد/العدد:	مج20, ع80
محكمة:	نعم
التاريخ الميلادي:	2003
الصفحات:	13 - 41
رقم MD:	668707
نوع المحتوى:	بحوث ومقالات
قواعد المعلومات:	EduSearch
مواضيع:	الذكور و الاناث، التنويع الاقتصادي، دول مجلس التعاون الخليجي
رابط:	http://search.mandumah.com/Record/668707

Gender Issues and Economic Diversification in the GCC

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This paper examines how enhanced economic diversification will impact gender issues in the Gulf Cooperation Council (GCC) region. It first highlights the region's historical and current economic diversification and gender issues. A vector autoregression model is used to show that reducing the size of the oil sector in favor of the services sector should reduce gender inequality in GCC countries. In addition, reducing foreign labor is also expected to positively effect national female employment rates. However, this presupposes that, as part of the diversification efforts in the GCC, the reduction in foreign labor will be matched by investments in female education, as well as the relaxation of some social and political rules. This will allow women greater access to economic resources and assume a greater role in the growth and diversification of the GCC countries.

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1. Introduction

This paper studies the effect of enhanced economic diversification on gender issues in the Gulf Cooperation Council (GCC) region. Section 2 highlights the impact of diversification on historical and current economic and social developments in GCC countries. This section is divided into four main parts. Part 2.1 gives an overview of the historical and current labor market conditions in the GCC region with emphasis on education and the

foreign labor force. Part 2.2 considers past and current economic diversification and gender inequality in GCC countries as well as women's contributions to the development of those countries. Part 2.3 analyzes the major economic sectors in GCC countries and how women contribute to these sectors. The impact of privatization on gender inequality in the GCC region is studied in Part 2.4. Section 3 presents an empirical model employed to test the impact of diversification on gender inequality and gives the main empirical findings. Section 4 concludes the paper and outlines some policy recommendations.

2. Historical Overview

2.1. Labor Markets Conditions in the Arab Region

In general, labor market conditions in the Arab world have been unfavorable during the last decade, with low GDP growth rates that could not accommodate adequately new entrants into the labor force. The various Arab governments have been trying to deal with this problem and its social, political, and economical ramifications. In the Gulf Cooperation Council countries, which have relatively non-diversified economies, the problem of labor absorption is accentuated by high foreign labor importation rates. Originally, the limited domestic labor supply had to be supplemented by importing large numbers of male expatriate workers to undertake skilled and semi-skilled jobs in both the public and private sectors, to staff the government bureaucracy, and to assume most managerial jobs. Thus, GCC countries[1] have come to rely heavily on foreign labor, which has contributed tremendously to the economic growth and development of these countries. However, recent efforts have been made to indigenize the GCC labor force. This trend is expected to increase the number of local women in the labor force. The diversification of the GCC economies can only come about by industrializing and upgrading the skills of the national labor force. In

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1. In this paper GCC countries are also referred to as the non-diversified economies of the Arab region in the sense that they produce and export mostly one commodity—oil. The other Arab countries are referred to as the diversified Arab economies of the region and these include Syria, Jordan, Lebanon, and Egypt.

addition, GCC countries have traditionally been characterized by a small domestic labor force coupled with with less than maximum involvement of local labor in basic production activities due to socialization factors. Initially, illiteracy rates in the region were high and the domestic female labor force was poorly trained (see Table 1). However, substantial investment in education and training should alleviate this problem to varying degrees in the different countries involved. This stems from the belief that women have an important role in achieving sustainable and equitable development. Hence, they should have equal access to education and credit. Additionally, all barriers, whether legislative, administrative or cultural, to women's rights to land ownership, to information and technology, and to access the revenues from natural resources (mainly the oil sector in GCC countries) should be dismantled.

So far, expenditures on education compared to the GCC countries' Gross National Product (GNP) have been disappointing and have remained below 5 percent with the exception of Saudi Arabia (see Table 1). Although the gap between female and male illiteracy rates has been closing in the last two decades, female illiteracy rates have remained fairly high in the GCC region. A successful economic diversification program should be coupled with enhanced education for the domestic population, especially for females.

Table 1. Selected Indicators for Education in GCC Countries

Country		Average Illiteracy Rates (Above 15 Years) in Percent				Expenditures on Education to GNP (%)			
	Years of Compulsory Schooling	Males 1980	Females 1980	Males 1998	Females 1998	1980	1985	1990	1997
Bahrain	9	--	--	10.4	22.0	2.9	4.1	3.8	3.4
Kuwait	8	26.0	39.0	17.0	22.0	2.4	4.5	3.5	5.0
Oman	--	49.0	84.0	22.0	43.0	2.1	4.0	3.5	4.5
Qatar	--	--	--	--	--	2.6	4.1	3.4	3.4
Saudi Arabia	--	33.0	67.0	17.0	36.0	4.1	6.7	6.0	8.5
UAE	6	33.0	42.0	17.5	10.5	1.3	1.7	1.7	1.8

Source: *Joint Arab Economic Report 2000.*

Within the context of globalization and liberalization in the international economic and financial environment, many Arab countries have undergone wide-ranging changes as they increasingly open their economies to trade and foreign direct investment (FDI). GCC countries have also formed a regional trading bloc. The plausible continuation of these trends would be for these countries to increasingly diversify their productive base and to commit themselves to the advancement of women and social development. As economies diversify, the female labor force can readily reduce the dependency on foreign workers. In this context, economic diversification will reduce the size of some sectors that require foreign (mostly male) workers and increase the size of those sectors that rely more on women. Thus, economic diversification, coupled with the increased indigenization of the GCC work force, should alleviate what are perceived as several major social and financial problems. Additionally, diversification would cushion the economies from oil price fluctuations.

2.2. Gender Issues in GCC Countries

Although sustainable efforts have been made recently to enhance gender equality in the GCC region with various degrees of success, yet, strides still need to be made in land ownership, property management and the conducting of business. Women continue to have systematically poorer command over productive resources, including oil, land, and other financial assets. They also remain vastly underrepresented in politics and policymaking, largely failing to hold a seat in parliament or to serve in high-ranking governmental positions.

With the exception of Kuwait, the rate of female participation in the GCC countries' labor force is much lower than the rates in many developing countries. Female participation ranged between 14.5 and 16.4 percent in 1999, compared to 28 percent in other Middle East and North African (MENA) countries and 44 percent in East Asia and the Pacific region (see Table 2). This is despite the fact that the GCC countries' labor forces grew at an average rate of 3.5 percent during the 1980-1999 period

compared to 3 percent in other MENA countries and 1.9 in East Asia. Figures for 2000 show a modest improvement, with female employment in GCC countries ranging between 11 and 20 percent, which is notably below that of other Arab countries. In the more diversified economies of the Arab region, these rates range between 21 and 30 percent.[2]

Table 2. Labor Force Structure in Selected GCC Countries and other Developing Regions

Country	Population Age 15-64		Labor Force						
	Millions		Total Millions			Average Annual Growth Rate (percent)		Female Percent of Labor Force	
	1980	1999	1980	1999	2010*	1980-1999	1999-2010*	1980	1999
Kuwait	1	1	--	1	1	2.3	4.4	13.1	31.3
Oman	1	1	--	1	1	3.4	2.6	6.2	16.4
Saudi Arabia	5	12	3	7	10	4.6	3.3	7.6	15.5
UAE	1	2	--	1	2	4.8	2.0	5.1	14.5
MENA	92	172	54	97	135	3.0	3.0	23.8	27.8
East Asia & Pacific	820	1220	720	1039	1171	1.9	1.1	42.5	44.4
Latin America	201	319	130	217	268	2.7	1.9	27.8	34.6

Source: *World Development Indicator*, The World Bank, 2001.
*Expected Figures. (--): not available.

In the past, governments have not encouraged women to find employment in the public sector, preferring to employ foreign male workers. Recently, however, GCC policy makers have considered strategies for economic diversification that first must consider expanding industrial production by recruiting domestic workers. For this reason, education, training, and development of the domestic labor force have recently been stressed

2. United Nations Economic and Social Commission for Western Asia (ESCWA) 2000, 9.

inpolicy. This may be in response to fears about excessive dependence on foreign labor. It is estimated that the average remittances of the foreign labor force in GCC countries amount to $25 billion every year.[3] Thus, economic diversification has become a major goal for most GCC countries, especially with diminishing and finite oil reserves and also since demand tends to fluctuate. Additionally, economic diversification will also accommodate the GCC population growth rates, which are among the highest in the developing world, and help curtail the dependence on foreign labor.

Economic diversification means less reliance on oil revenues for growth. The respective GCC governments have monopolized oil extraction; thus, most GCC countries have a large oil sector dominated by male employees. Therefore, reducing the size of the oil sector and increasing the private sector will restructure the labor force. In the private sector, the tendency is to employ a relatively proportional number of male and female workers. As diversification continues, the private sector should expand—mainly the agriculture, services, and manufacturing sectors. How the expansion of each of these sectors will affect female labor participation rates should vary considerably, since the nature of operations may favor more males over females. However, the overall proportion of female workers should increase.

There is strong empirical evidence that increased numbers of female workers contributes significantly to economic growth. The number of women in the labor market has been growing steadily in the Arab region, increasing from 22 percent in 1970 to 27 percent in 1995. Among the Arab economies, the highest percentages of employed females were in Lebanon (22.2 percent in 1997) and Egypt (22.15 percent in 1995). The lowest rates were in the GCC countries. In Saudi Arabia, the 1974 figure was 4.44 percent; in the United Arab Emirates, the 1975 figure was 3.33; in Oman, the 1986 figure was 10.48; and in Kuwait, the 1975 figure was 11.56 (see Table 3). By 1998, these rates had improved to 31.2 percent and 15.7

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3. ESCWA 2000, 11.

percent in Kuwait and Oman, respectively, and about 15 percent in Saudi Arabia and 14 percent in the United Arab Emirates (see Table 4).

Table 3. Activity Rates By Gender in GCC Countries (Population over 15 years 1970-1998)

Country	Year	Total Rate Percent	Male Rate Percent	Female Rate Percent	Active Female as a Percent of Total Active Population
Bahrain	1971	49.83	83.28	6.2	5.4
	1981	60.50	86.12	18.25	11.39
	1991	65.22	88.24	29.24	17.48
Kuwait	1975	54.98	84.27	15.03	11.56
	1985	62.52	83.18	31.08	19.71
	1988	60.49	80.08	34.33	24.30
	1998	55.1	--	--	31.2
Oman	1986	46.57	75.00	10.99	10.48
	1994	37.48	64.16	10.05	13.21
	1998	--	--	11.2	15.7
Qatar	1986	75.48	92.99	27.51	9.76
	1998	--	--	--	11.2
Saudi Arabia	1974	47.22	81.74	4.68	4.44
	1987	53.54	71.15	7.29	4.60
	1992	53.59	79.96	14.49	10.9
	1998	55.63	80.63	--	14.8
UAE	1975	73.31	93.31	10.14	3.33
	1998	57.5	75.5	--	14.1

Source: ESCWA, *Statistical Abstract of the ESCWA Region* 17 (1997) and 18 (1998). *Joint Arab Economic Report*, 2000. (--): not available.

While the proportion of employed women has increased within the GCC region, they are still underrepresented in the labor force when compared to men and to figures in other developing regions of the world. It is expected that development in tourism and banking will increase female employment rates.

Table 4. Development of the Labor Force in the GCC Region 1995-1998 (in %)

Country	Labor Force Participation Rate		Women's Participation Rate	
	1995	1998	1995	1998
Bahrain	45	41.7	17	--
Kuwait	42	55.1	23	31.2
Oman	26	29.3	12	15.7
Qatar	57	58.8	11	--
Saudi Arabia	34	32.2	10	14.8
UAE	51	57.5	12	14.1

Source: *Unified Arab Economic Report*, 1995 and 1997 (in Arabic); 1998 figures are from the *Joint Arab Economic Report*, 2000.

2.3 Gender Issues and GCC Economic Sectors
a. The Agriculture Sector

Although the GCC region is fairly homogenous economically, culturally, and politically, it differs in the availability of agricultural lands for crops and livestock. For example, of the total GCC land base, only 0.47 percent is suitable for crops and 35.37 percent is suitable for permanent pasture. Saudi Arabia, which relies heavily on desalinized water for agriculture, dominates agricultural production within the GCC, followed by Oman. Both countries have sufficient precipitation to allow some agricultural production without irrigation. According to Table 5, agriculture in Oman employed 42.1 percent of the total labor force in 1995. This figure declines slightly to 37.6 percent in 1998. While the figure in Saudi Arabia was 68 percent in 1965, it fell precipitously to 11.4 percent in 1998. In the four smaller GCC countries, the proportion of the labor force working in agriculture is relatively small, ranging between 1.1 to 8.0 percent.

Table 5. Employment by Sector in GCC Countries 1965-1998 (in %)

Country	Agriculture				Industry				Services			
	1965	1985	1995	1998	1965	1985	1995	1998	1965	1985	1995	1998
Bahrain	14	2.2	1.6	1.1	45	37.6	31.3	30.2	42	60.1	67.1	68.7
Kuwait	2	0.0	1.2	1.9	34	25.9	30.2	18.8	64	74.1	68.6	79.3
Oman	62	45.0	42.1	37.6	15	9.6	13.5	11.8	23	45.5	44.4	50.6
Qatar	17	0.0	2.6	1.6	24	13.5	7.6	7.6	59	85.6	89.8	90.8
Saudi Arabia	68	43.9	13.9	11.4	11	12.3	11.4	10.4	21	43.8	74.7	78.2
UAE	21	3.3	7.5	8.0*	32	21.6	29.6	14.7*	47	75.1	62.9	77.3*

Source: *Unified Arab Economic Report*, 1995 and 1997 (in Arabic); 1965 figures for Bahrain and Qatar are derived from *United Nations Human Development Report* 1997; 1998 figures are from the *Joint Arab Economic Report*, 2000. *Indicates 1999 figures.

How the agriculture sector's growth will affect gender employment will vary by the size of this sector's labor force. In Oman and Saudi Arabia, despite the limited availability of suitable land, a significant portion of the population has been engaged, historically, in agriculture. This reflects the recent dominance of major urban centers. Thus, the impact of diversification on gender employment will be more pronounced in Saudi Arabia and Oman but will be minimal elsewhere in the GCC. Table 6 indicates that in both Saudi Arabia and Oman the agriculture sector employed about 25 percent of the total female labor force in 1980. These figures were lower in 1994 due to increased urbanization. The figures for the remaining GCC countries indicate that their agriculture sectors employ no women.

The low levels of education and job-related skills render female employment in advanced agricultural production problematic. Further development of agriculture would require skilled workers of both sexes to operate and maintain equipment and to adopt sophisticated irrigation practices and livestock management methods. Agriculture also necessitates increased investment and subsidies. And, since only GCC nationals can own land, these financial transfers will benefit citizens. However, in Bahrain, Kuwait, Qatar, and the United Arab Emirates, the proportion of the local population engaged in agriculture is so small that the impact of

such financial transfers is likely to be limited. In Saudi Arabia and Oman, the large populations engaged in agriculture would certainly benefit from such payments.

In Gulf society of years past, men would have been engaged in many activities outside the home, whereas women were engaged in many activities inside the home. As this basic public/domestic dichotomy is re-engineered, then female labor may be engaged in the development of the key agricultural sector. Most local farmers depend on females for harvesting and irrigation. If female participation is not encouraged, greater dependence on foreign labor will result.

Table 6. Percentage Distribution of Females in the Labor Force by Sector in GCC Countries

Country	Agriculture		Industry		Services	
	1980	1994	1980	1994	1980	1994
Bahrain	--	0	--	4	60	96
Kuwait	0	0	3	2	92	97
Oman	24	12	33	39	43	49
Qatar	--	0	--	0	98	100
Saudi Arabia	25	16	5	6	70	79
UAE	0	0	7	7	91	93

Source: For 1994, *The World's Women 1995, Trends and Statistics*,
The United Nations: New York. For 1980, *World Development Indicators*, The World Bank, 2001.

b. The Manufacturing Sector

Considering the traditional thinking about dichotomized public/domestic activities, it is not surprising that female participation in the GCC manufacturing sector has remained relatively low. With the exception of Oman, where manufacturing employs about 40 percent of women in the

labor force, the average rates in the other GCC countries have remained below 5 percent for the last two decades (see Table 6).

Although Saudi Arabia has recently expended considerable effort toward developing industry, employment in this sector comprised only about 11 percent of the total workforce in 1995. The 1995 figures were notably higher for Bahrain and Kuwait, at 31.3 and 30.2 percent respectively. In 1998, manufacturing employment declined, with a decrease of 12, 3, and 15 percent in Kuwait, Oman, and the UAE, respectively (see Table 5).

Saudi Arabia has successfully promoted its food industry, which includes a wide range of juice and milk products that have fared well in local and foreign markets. This has directly impacted women, who dominate the food industry work force. It is expected that this sector will increasingly seek local women employees at the expense of local male and foreign workers.

c. The Services Sector

Services are usually a female-dominated sector throughout the world, including in the Gulf region. Growth in services from enhanced economic diversification should spur female employment. As shown in Table 5, the services sector employs most of the nationals throughout the GCC. In 1998, this sector employed approximately 91 percent of Qatar's total labor force and 80 percent of Kuwait's labor force. Due to the size of their agriculture sectors, the figures are lower for Oman (50 percent) and Saudi Arabia (78 percent).

In Egypt, 67 percent of the total female labor force is employed in the services sector. In the Syria, Jordan, and Iraq, the rates are 45, 89, and 50 percent respectively.[4] In the GCC countries these percentages are even higher. In 1994, they equaled 96, 97, 49, 100, 79, and 93 percent in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE, respectively (see Table 6). It is also noteworthy that within the services sector in general, the

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4. Sulayman Al-Qudsi, "Labor Participation of Arab Women: Estimates of the Fertility to Labor Supply Link." Economic Research Forum for the Arab Countries Iran and Turkey, Working Paper No. 9622. 1995, 2

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proportion of females is highest in social services. In the 1980s, female employment in the social services reached 60 percent in Bahrain, 92 per cent in Kuwait, 98 percent in Qatar, and 91 percent in the United Arab Emirates.[5]

2.4. Privatization and Gender

The share of public sector employment in the Arab world is remarkably higher than elsewhere in the developed and developing world. Men dominate public sector employment generally, and within the GCC, males predominate in public employment even more than elsewhere in the Arab world. Nationals are particularly likely to be employed in the public sector in GCC countries, which reflects state policies for redistributing oil royalties to nationals. In Kuwait, for example, 91 percent of nationals are employed by the public sector. In Oman, the figure was 75 percent in 1993. However, such employment strategies may have created structural imbalances in the labor market, negatively impacting female employment. The government policies have also effectively eliminated many incentives to join the private sector, which leads to overstaffing in the public sector. Economic diversification and shrinking the size of the public and oil sectors should correct these imbalances and will positively impact female employment in the GCC countries.

The literature available on gender issues in the Arab world tends to emphasize the sharp role discrepancies, especially what outside social scientists consider to be issues of gender stratification in the cultural lifeways. This is especially true in Bahrain, Kuwait, and Saudi Arabia, where it is observed that a much larger proportion of the total number of males employed are in the public sector. This general pattern in GCC countries is a consequence of social and cultural factors that may predispose the types of economic activities and occupations appropriate for women. While national males hold most public sector jobs, they cannot fill the gap between demand and supply. Foreign male workers seldom fill this gap.

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5. Economic and Social Commission for Western Asia (ESCWA), *Survey of Economic and Social Developments in the ESCWA Region 1990-1991* (Amman, Jordan: 1992), 14.

It should be emphasized that a significant number of national women work in healthcare, education, and social services, which are still largely managed by government. Since men dominate other public occupations, such as those pertaining to the oil sector, it is expected that enhanced diversification would reduce the number of male-geared public sector occupations. In this scenario, the GCC female workforce would profit from expanding the services and other sectors where gender equality is encouraged.

Privatization, on the other hand, should manifest an unambiguous effect on gender discrimination. Even if health and education are privatized, greater female participation may be anticipated. Privatizing other public services that are now male dominated would also improve female equality in access to work. In the strict economic model underlying privatization, one might argue that lower paid and sometimes better educated and more conscientious female workers may provide a greater profit margin for the same services rendered by their male co-workers.

3. Empirical Model and Methodology

To empirically test the hypothesized relationships offered in this paper, the following static growth regression model[6] will be used to explain gender equality in employment in each GCC country and to numerically describe how gender equality affects growth. To test the proposed relationships between gender inequality and a set of annual exogenous variables for the period 1970-1998, I begin by presenting the regression equation

$$G_t = \alpha + \beta y_{jt} + \Omega W_t + u_t \ , \tag{1}$$

where G_t measures gender equality in employment as the female-to-male participation rate in the labor force, y_{jt} measures economic diversification, and W_t is a vector of independent variables that affects gender equality. The exogenous variables are selected based on their potential

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6. For a detailed discussion of endogenous growth models see Simon Neaime, ed., *The Macroeconomics of Exchange Rate Policies, Tariff Protection and the Current Account: A Dynamic Framework* (Toronto, Canada: APF Press, 2000).

relevance to this model and for their importance in depicting the impact on gender inequality.

To gauge the impact of economic diversification on gender equality we also calculate the variable $y_{j,\,t}$, which represents the GDP of oil ($y_{1,\,t}$), services ($y_{2,\,t}$), and agriculture ($y_{3,\,t}$), respectively, in each GCC country. It is expected that as the share of the services sector in total GDP increases, gender equality will also increase (and is indexed by a higher female-to-male labor force ratio). Also, as the share of the oil sector increases, gender equality is expected to decrease as evidenced by a lower female-to-male participation ratio. The constant is the fact that the oil sector employs more men than women. As a cautionary note, however, the effects of the agriculture sector on gender equality might not be statistically significant and will vary among GCC countries. One important variable, which is included in W_t, is the foreign labor factor in the total labor force. This variable will correspondingly increase or decrease the indigenization of the GCC labor force and thus impact gender equality. It is expected that a lower foreign labor participation rate ($q_{1,\,t}$) will augment gender equality by increasing the female-to-male participation in the labor force. Another important variable reflecting increased investment in the education of females is their mean years of schooling ($q_{2,\,t}$). Therefore, the more educated females will more greatly participate in the labor force will contribute more to economic growth and development.

Table 7 summarizes the results of running the regression model (1) for the different variables. It indicates, for instance, that in Saudi Arabia a one-percentage point increase in the contribution of the oil sector reduces the female-to-male labor participation ratio by 0.67 percent. This relationship is also negative and significant for Bahrain and Kuwait. Moreover, an increase in the services sector's contribution to GDP positively impacts the female-to-male ratio in employment in the above three countries. With the exception of Saudi Arabia, the impact of the agriculture sector's contribution to GDP on gender inequality seems statistically insignificant.

On the other hand, in Saudi Arabia and Kuwait a decrease in foreign labor has a positive impact on gender equality. In particular, a one-percentage point decrease in the foreign labor factor increases the female-

to-male participation rate by 0.65 and 0.23 in Kuwait and Saudi Arabia, respectively. Finally, an increase in the mean years of female schooling increases the female-to-male participation rates in Bahrain, Kuwait, Saudi Arabia, and the UAE.

Table 7. The Static Regression Model

Sample 1970-1998	Bahrain	Kuwait	Qatar	Saudi Arabia	UAE
Intercept	0.9 (1.7)	1.2 (5.4)*	0.04 (3.1)*	1.8 (1.2)	1.4 (0.9)
$Y_{1,t}$	-0.8 (2.5)*	-0.7 (5.5)*	-0.02 (1.7)	-0.67 (3.4)*	0.009 (1.2)
$Y_{2,t}$	0.05 (2.9)*	0.08 (4.2)*	0.65 (1.8)	0.08 (3.8)*	0.94 (2.1)*
$Y_{3,t}$	1.2 (0.02)	-1.5 (1.1)	0.005 (0.2)	0.4 (2.9)*	-0.03 (0.34)
$Q_{1,t}$	-0.3 (0.4)	-0.65 (2.3)*	0.06 (0.9)	-0.23 (6.5)*	0.008 (0.76)
$Q_{2,t}$	0.45 (4.5)*	0.67 (3.1)*	-0.03 (1.3)	0.098 (3.8)*	-0.98 (2.01)
R^2	0.67	0.87	0.45	0.98	0.69
DW	0.03	1.2	0.45	0.05	0.65

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Heteroscedastic-Consistent Standard Errors and Covariance.
Numbers in parentheses are the t-statistics.
(*) Denotes statistical significance at the 5 percent level.

3.1. Time Series Properties

3.1.1. Unit Root Tests

On a more rigorous level we examine the time series properties of the statistically relevant variables in our model to test for the existence of a significant dynamic long-run relationship between them in Bahrain, Kuwait, and Saudi Arabia. For this purpose we first establish whether the economic series in Bahrain, Kuwait, and Saudi Arabia contain a unit root (i.e. are non-stationary) by applying the Augmented Dickey-Fuller

Unit Root Test. It is common for time-series data to demonstrate signs of non-stationarity; typically, both the mean and variance of macroeconomic variables trend upward over time.

Table A.1 of the appendix reports the ADF test for unit roots. It is clear that the measure of gender equality (G_t), the oil sector's contribution to GDP ($y_{1,t}$), the services sector's contribution to GDP ($y_{2,t}$), and the foreign labor participation rate ($q_{1,t}$) are sufficiently non-stationary that one cannot reject the hypothesis that a unit root factors into the series, indicating that all four series contain a unit root. Table A.2 indicates strong evidence against the hypothesis that the series ΔG_t, $\Delta y_{1,t}$, $\Delta y_{2,t}$, and $\Delta q_{1,t}$ contain a second unit root at the 5 and 10 percent levels of significance.

3.1.2. Cointegration Tests

Given the evidence on the unit roots, we next examine whether the economic series are cointegrated. Testing for cointegration among economic variables has been widely used to analyze economic interrelationships in the long run. Its existence would imply that the economic series would never drift too far apart (i.e. a long-term relationship exists between them).

The empirical findings in Table A.3 indicate the lack of a steady-state relationship between gender equality, the oil sector's and services sector's contributions to GDP, and the foreign labor participation rate. The very weak cointegration is confirmed by "reverse regression" tests in which the oil and service contributions to GDP and the foreign labor participation rate are the dependent variables (see rows 2, 3, and 4 of Table A.3). Since the series are not cointegrated, the OLS estimates are no longer consistent. Under such circumstances, inferences with t-distributions can be highly misleading.[7] We thus explore the short-run dynamics by using a VAR approach.

7. Clive W. Granger and Paul Newbold, "Spurious Regression in Econometrics," *Journal of Econometrics* 2 (1974): 111-20; Peter C. B. Phillips, "Understanding Spurious Regressions in Econometrics," *Journal of Econometrics* 33 (December 1986): 311-40; and John Y. Campbell and Pierre Perron. "Pitfalls and Opportunities: What Macroeconomists Should Know about Unit Roots," in *NBER Macroeconomics Annual*, ed. O. J. Blanchard and S. Fischer (Cambridge, MA: MIT Press, 1991), 141-200.

3.1.3. The Vector Autoregression (VAR) Model

Given the relatively strong evidence of unit roots in our variables and the very weak evidence of cointegration, it is appropriate to estimate a vector autoregression (VAR) with the first differences of gender inequality, the contributions of the oil and services sectors to GDP, and the foreign labor participation ratio.[8] The VAR model allows assessment of short-run dynamic interrelationships between the four variables. It also reliably estimates the relevant parameters and allows us to test whether the service and oil contributions to GDP and the foreign workforce factors significantly affect gender equality.[9] As before, $\Delta G_t = G_t - G_{t-1}$ denote gender equality between period t-1 and t, and let $\Delta y_{1,t}$, $\Delta y_{2,t}$ and $\Delta q_{1,t}$, denote the first differences of the contribution of both oil and services to GDP and the foreign labor rate, respectively. The estimated reduced-form VAR is

$$\Delta G_t = \kappa_G + \sum_{i=1}^{4} \psi_{GG-i} \Delta G_{t-i} + \sum_{i=1}^{4} \psi_{Gy_1r-i} \Delta y_{1-i} + \sum_{i=1}^{4} \psi_{Gy_2-i} \Delta y_{2,t-i} + \sum_{i=1}^{4} \psi_{Gq_1-i} \Delta q_{1,t-i} + \varepsilon_{Gt}, \quad (2)$$

$$\Delta y_{1,t} = \kappa_{y_1} + \sum_{i=1}^{4} \psi_{y_1G-i} \Delta G_{t-i} + \sum_{i=1}^{4} \psi_{y_1y_1-i} \Delta y_{1,t-i} + \sum_{i=1}^{4} \psi_{y_1y_2-i} \Delta y_{2,t-i} + \sum_{t=1}^{4} \psi_{y_1q_1-i} \Delta q_{1,t-i} + \varepsilon_{y_1t}, \quad (3)$$

$$\Delta y_{2,t} = \kappa_{y_2} + \sum_{i=1}^{4} \psi_{y_2G-i} \Delta G_{t-i} + \sum_{i=1}^{4} \psi_{y_2y_1-i} \Delta y_{1,t-i} + \sum_{i=1}^{4} \psi_{y_2y_2-i} \Delta y_{2,t-i} + \sum_{t=1}^{4} \psi_{y_2q_1-i} \Delta q_{1,t-i} + \varepsilon_{y_2t} \quad (4)$$

$$\Delta q_{1,t} = \kappa_q + \sum_{i=1}^{4} \psi_{qG-i} \Delta G_{t-i} + \sum_{i=1}^{4} \psi_{q_1y_1-i} \Delta y_{1,t-i} + \sum_{i=1}^{4} \psi_{q_1y_2-i} \Delta y_{2,t-i} + \sum_{i=1}^{4} \psi_{qq-i} \Delta q_{1,t-i} + \varepsilon_{q_1t}, \quad (5)$$

8. This VAR specification to estimating relationships among variables that are non-stationary and lack cointegration employed here is used elsewhere in the recent empirical literature. See, for instance, Johnson D. Ostry and Andrew K. Rose, "An Empirical Evaluation of the Macroeconomic Effects of Tariffs," *Journal of International Money and Finance* 11 (1992): 63-79; Bankim Chadha and Eswar Prasad, "Real Exchange Rate Fluctuations and the Business Cycle: Evidence from Japan," *IMF Staff Papers* 44 (September 1997): 328-355; Simon Neaime and J. Paschakis. "The Future of the Dollar-Euro Exchange Rate," *The North American Journal of Economics and Finance* 13 (March 2002): 57-72; and A. Mansoorian and S. Neaime, "Habits and Durability in Consumption and the Effects of Tariff Protection," *Open Economies Review* 11 (July 2000): 195-204.

9. The presence of unit roots in the variables under consideration has rendered the static regression model used in Equation (1) not sufficient in explaining the dynamic relationships between the variables of interest. Therefore, a VAR model is the only mean by which one can obtain reliable and efficient coefficients estimates between gender equality (G_t), the oil sector's contribution to GDP ($y_{1,t}$), the services sector's contribution to GDP ($y_{2,t}$), and the foreign labor participation rate ($q_{1,t}$). The VAR estimation is carried out with the first differences of the series that do not contain unit roots.

where each equation is specified with lagged values of ΔG_t, $\Delta y_{1,t}$, $\Delta y_{2,t}$, and $\Delta q_{1,t}$ on the right side. The four lagged first differences of the dependent variables included in the right side of these equations ensure that any serial correlation in the residuals is corrected. Thus, we have a four-equation VAR containing 48 unknown parameters, 12 in each equation. Constants are also included in the VAR specification. The VAR system is estimated over the 1970-1998 study period, and the results are shown in Table 8.

The VAR results for Kuwait indicate that lagged changes in the oil sector's contribution to GDP significantly and negatively impacted gender equality by reducing the female-to-male participation rate in the labor force during the first three years. These findings are statistically insignificant and positive in the fourth year. The estimated coefficients of $\Delta y_{1,t-1}$, $\Delta y_{1,t-2}$, $\Delta y_{1,t-3}$ and $\Delta y_{1,t-4}$ in the gender equation are respectively -0.06, -0.10, -0.06, and 0.13 with corresponding t-statistics of -3.55, -2.77, -3.25, and 1.35. Also, lagged changes in the services sector's contribution to GDP have significantly and positively impacted gender equality by increasing the rate of females in the labor force. The estimated coefficients of $\Delta y_{2,t-1}$, $\Delta y_{2,t-2}$, $\Delta y_{2,t-3}$ and $\Delta y_{2,t-4}$ in the gender equation are 0.05, 0.04, 0.06, and 0.08 with corresponding t-statistics 1.9, 4.1, 2.5, and 1.5. Finally, the lagged changes in the foreign labor force participation rates have significantly and negatively impacted gender equality by reducing the female employment. The estimated coefficients of $\Delta q_{1,t-1}$, $\Delta q_{1,t-2}$, $\Delta q_{1,t-3}$ and $\Delta q_{1,t-4}$ in the gender equation are, respectively, -0.05, -0.23, -0.09, and -0.05 with corresponding t-statistics -2.3, -1.9, -3.5, and -0.5. The rest of the results are reported in Table 8. Overall, they show that the lagged differences of the oil and services sectors' contributions to GDP and the foreign labor force participation rate predict gender equality in Bahrain, Kuwait, and Saudi Arabia (see also Tables A.4 and A.5). Thus, statistically significant dynamic relationships exist between the four variables over a period of not more than four years.

Table 8. Vector Auto-Regression Model: Kuwait

Exogenous Variable	Dependent Variable			
	ΔG_t	$\Delta y_{1,t}$	$\Delta y_{2,t}$	$\Delta q_{1,t}$
Constant	0.049	-0.54	-0.0044	0.00087
t-stat.	(3.45)	(-0.76)	(-2.06)	(0.41)
ΔG_{t-1}	0.31	0.91	0.37	0.16
t-stat.	(2.69)	(2.69)	(2.97)	(1.32)
ΔG_{t-2}	0.05	0.05	0.14	-0.16
t-stat.	(2.1)	(3.51)	(1.08)	(-1.20)
ΔG_{t-3}	0.61	0.85	-0.14	0.10
t-stat.	(1.77)	(2.79)	(-1.05)	(0.74)
ΔG_{t-4}	0.58	0.58	0.09	-0.09
t-stat.	(1.65)	(0.59)	(0.67)	(-0.70)
$\Delta y_{1,t-1}$	-0.06	0.68	-0.05	-0.0055
t-stat.	(-3.55)	(3.55)	(-0.60)	(-0.06)
$\Delta y_{1,t-2}$	-0.10	4.10	-0.31	-0.02
t-stat.	(-2.77)	(0.77)	(-3.68)	(-0.29)
$\Delta y_{1,t-3}$	-0.06	0.06	-0.13	-0.05
t-stat.	(-3.25)	(2.95)	(-1.62)	(-0.55)
$\Delta y_{1,t-4}$	0.13	0.83	-0.05	0.06
t-stat.	(1.35)	(2.95)	(-0.59)	(0.73)
$\Delta y_{2,t-1}$	0.05	0.06	0.07	0.28
t-stat.	(1.9)	(1.9)	(0.79)	(3.25)
$\Delta y_{2,t-2}$	0.04	0.32	-0.17	0.02
t-stat.	(4.1)	(3.51)	(-2.04)	(0.25)
$\Delta y_{2,t-3}$	0.06	0.75	0.13	0.34
t-stat.	(2.5)	(2.59)	(1.50)	(3.93)
$\Delta y_{2,t-4}$	0.08	0.06	0.08	-0.14
t-stat.	(1.5)	(5.5)	(1.5)	(-1.60)
$\Delta q_{1,t-1}$	-0.05	0.59	-0.75	0.006
t-stat.	(-2.3)	(1.3)	(-3.3)	(1.3)
$\Delta q_{1,t-2}$	-0.23	-0.64	0.67	0.32
t-stat.	(-1.9)	(-2.9)	(3.9)	(4.9)
$\Delta q_{1,t-3}$	-0.09	0.95	0.19	0.53
t-stat.	(-3.5)	(2.4)	(1.5)	(5.5)
$\Delta q_{1,-4}$	-0.05	-0.05	0.50	0.008
t-stat.	(-0.5)	(-2.5)	(1.5)	(2.5)
ADJ.R-Squared	0.56.	0.65	0.18	0.43
S.E.of Regression	0.0098	0.014	0.023	0.086

Looking at the standard errors of the regressions, we see that the standard error for the gender equality equation is substantially lower than those for the first difference oil sector contribution to GDP, the services contribution to GDP and the first difference foreign participation rate in the labor force

equation: $\sigma_{\varepsilon G} = 0.0098$, compared with $\sigma_{\varepsilon y1} = 0.014$, $\sigma_{\varepsilon y2} = 0.023$ and $\sigma_{\varepsilon q1} = 0.086$. Therefore, shocks to gender equality are less volatile than shocks to the oil and services sectors' contributions to GDP and the first difference of the foreign labor rate.

4. Conclusions and Policy Recommendations

This paper reveals that enhanced economic diversification will affect gender stratification and gender hierarchy in the GCC region. More specifically, increased diversification would reduce the size of the oil sector in favor of the services sector. This will significantly impact the participation of women in the labor force. The social and economic problems emanating from excessive reliance on foreign labor might be partly solved by increasing female employment. However, first the social and economical constraints that so far have slowed women from participating in economic development might be further relaxed. It also requires increased investment in women's education as well as the public in generally patriarchal societies. This speaks to the very core of the social fabric.

Thus, any move toward enhancing economic diversification should be coupled with a restructuring of the educational system. Doubts have been raised about whether the current gender composition of university student bodies can accommodate a fairly quick reduction in the size of the oil sector and an increase in the size of the services sector. Economic diversification efforts in the GCC region should move in tandem with social diversification, so that increasingly more spaces should be made for female students in the now largely male-dominated universities of the GCC countries. It will thus be important for policy makers to introduce change at the social level first and then deal with the economics of the problem.

The empirical evidence from a range of countries shows that societies that remunerate on a gender basis, pay a significant price in terms of higher poverty, lower quality of life, slower economic growth, and more autocratic governance. In the GCC region the problem of gender inequality is worsened by heavy reliance on foreign labor, which developed to meet the needs of the instantly created oil economy in a region at that time with low

populations, insufficiently developed education and skills, and high gender stratification. This paper argues that enhanced diversification and the resulting positive impact on female participation in the GGC's labor force should help to improve economic growth and alleviate aspects of the social and financial problems.

Gender inequalities also reduce output and productivity in agriculture and manufacturing. These losses result from inefficiencies that arise from systematically excluding women from access to productive resources, public services, and employment. Furthermore, the economic literature has shown that in countries where women have more equal rights or greater participation in public life, corruption is lower.

Among its well-known objectives, diversification efforts in the GCC region should also promote gender equality. For this, the following should be undertaken: (1) alter the rules and regulations to further promote equal rights and equal opportunities for women and men; (2) reform institutions to address persistent disparities in the command of resources and political participation; and (3) promote gender equality to enhance growth and more equal resource participation.

It is now firmly established that strengthening institutions and promoting economic development are critical for sustainable development. In the context of promoting gender equality, however, it is important that institutional reforms and development policy account for existing gender differences and disparities within the context of sustained economic diversification in the GCC region.

Finally, as a byproduct of economic diversification, improved privatization would benefit female participation in the labor force in oil producing Arab countries. Female employment in GCC countries will enhance the services sector and reduce the size of the public sector. Subsequently, as diversification develops, we can expect to see the private sector expand at the expense of the public sector. Reducing the size of the oil sector in favor of the private sector will also decrease the reliance on the foreign labor.

APPENDIX: Unit Root and Cointegration Tests

To determine the presence of a unit root in the auto-regressive representation of each of the individual series, we employ the Augmented Dickey-Fuller (ADF) tests.[10] The test statistics are constructed by performing ordinary least squares regressions on the following augmented Dickey-Fuller equations either in the presence of a time trend or without a trend

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + \varepsilon_{1t} \,,$$

and

$$\Delta y_t = \pi_0 + \beta t + \delta y_{t-1} + \sum_{i=1}^{p} \pi_i \Delta y_{t-i} + \varepsilon_{2t} \,,$$

where Δ is the first difference operator (i.e., $\Delta y_t = y_t - y_{t-1}$); α_i β, γ, δ, π_i are constant parameters; and ε_{1t} and ε_{2t} are random error terms. The above equations are to be estimated by replacing y_t with each of the following variables: the oil sector's contribution to GDP ($y_{1,t}$), the services sector contribution to GDP ($y_{2,t}$), and the foreign labor participation rate ($q_{1,t}$). Up to four lags of the first difference of the dependent variable are included in the test regressions ($i = 1, 2, 3, 4$) to ensure that ε_{1t} and ε_{2t} are white noise (zero mean) disturbances.

We will test the null hypothesis of a unit root against the alternative of stationarity. Rejection of a unit root, which implies that the series is stationary, requires the coefficients on y_{t-1}, γ and δ to be negative and significant. The Dickey-Fuller statistics are the ratios of the estimated γ and δ to their standard errors in the presence and without a time trend. Critical values of $\hat{\tau}_\tau$ and $\hat{\tau}_\mu$ have been provided by Fuller.[11]

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10. Unit root tests are based on the work of Wayne Fuller, D.A. Dickey, and Phillips and Perron (1988). See Wayne A. Fuller, *Introduction to Statistical Time Series* (New York: John Wiley and Sons, 1976); D. A. Dickey and Wayne A. Fuller, "Distribution of the Estimators for an Autoregressive Time Series with Unit Root," *Journal of the American Statistical Association* 74 (June 1979): 430; D. A Dickey and W. A. Fuller, "Likelihood Ratio Statistics for an Autoregressive Time Series with a Unit Root," *Econometrica* 49 (July 1981): 1072. These tests involve the calculation of t-statistics for $\rho = 1$ in OLS regressions of the form: $X_t = \rho X_{t-1} + u_t$ (1), where X_t is the variable of interest and u_t is independent and identically distributed (iid,), N $(0,\sigma^2)$. The t-statistic does not have the standard t distribution; critical values under the null hypothesis that $\rho = 1$ are found in Fuller (table 8.5.2). If u_t violates the iid assumption, modifications to (1) must be implemented in conducting the test. The Augmented Dickey-Fuller (ADF (p)) test supplements (1) with p lagged changes in the dependent variable as additional regressors. Equation (1) is often expressed in an alternative form as $\Delta X_t = (\rho - 1) X_{t-1} + u_t = \delta X_{t-1} + u_t$, where $\delta = (\rho - 1)$ and where Δ is the first difference operator. This equation is equivalent to equation (1), however, now the null hypothesis is that $\delta = 0$. This is the line I follow in the paper.

11. Fuller, 373.

Table A.1. Augmented Dickey-Fuller Unit Root Tests in Series Levels

Bahrain			Kuwait			Saudi Arabia		
Dependent Variable	τ_μ	τ_τ	Dependent Variable	τ_μ	τ_τ	Dependent Variable	τ_μ	τ_τ
G_t	-1.53	-1.96	G_t	-1.09	-0.47	G_t	-0.16	-0.22
$y_{1,t}$	-2.76	-0.46	$y_{1,t}$	-1.68	-2.85	$y_{1,t}$	-2.33	-2.56
$y_{2,t}$	-2.12	-2.45	$y_{2,t}$	-0.69	-1.99	$y_{2,t}$	-2.54	-1.27
$q_{1,t}$	-1.94	-2.55	$q_{1,t}$	-1.89	-2.56	$q_{1,t}$	-0.12	-0.59

Sample 1970-1998.

The critical values for τ_τ are –3.45, –3.15, and for τ_μ they are -2.89, -2.58. Table A.1 reports the ADF test for unit roots with a trend and without a trend. The point estimates of γ and δ have ADF t-statistics that fall below the 5 percent and 10 percent critical values (in absolute value), indicating that the series contains a unit root.

To determine the order of integration of the individual series, we run the same model with second differences on lagged first differences and four lags of second differences. That is

$$\Delta^2 y_t = \phi_0 + \mu \Delta y_{t-1} + \sum_{i=1}^{p} \phi_i \Delta^2 y_{t-i} + \varepsilon_t \,,$$

where $\Delta^2 y_t = \Delta y_t - \Delta y_{t-1}$. Table A.2 represents ADF tests for the null hypothesis that a second unit root exists in the first differences of the original series. It indicates that there is strong evidence against the hypothesis at both the 5 and 10 percent levels of significance that the series ΔG_t, $\Delta y_{1,t}$, $\Delta y_{2,t}$, and $\Delta q_{1,t}$ contain a second unit root. The point estimates of μ have ADF t-statistics that are all greater (in absolute value) than their respective 5 percent and 10 percent critical values. We may then conclude that the first differences are stationary (are integrated of order zero, or I (0), establishing that the series G_t, $y_{1,t}$, $y_{2,t}$ and $q_{1,t}$ are integrated of order one, or I (1).

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Table A.2 Augmented Dickey-Fuller Unit Root Tests with the First Differences of the Series

Bahrain			Kuwait			Saudi Arabia		
Dependent Variable	τ_μ	τ_τ	Dependent Variable	τ_μ	τ_τ	Dependent Variable	τ_μ	τ_τ
ΔG_t	-4.19	-6.57	ΔG_t	-7.85	-9.56	ΔG_t	-6.88	-7.33
$\Delta y_{1,t}$	-6.11	-4.76	$\Delta y_{1,t}$	-5.21	-4.65	$\Delta y_{1,t}$	-5.37	-6.56
$\Delta y_{2,t}$	-10.84	-5.82	$\Delta y_{2,t}$	-5.91	-4.91	$\Delta y_{2,t}$	-7.63	-4.86
$\Delta q_{1,t}$	-4.73	-6.54	$\Delta q_{1,t}$	-4.59	-5.67	$\Delta q_{1,t}$	-6.76	-4.27

Sample 1970-1998.

Given the evidence on the existence of unit roots, we next examine whether the economic series are cointegrated. According to Engle and Granger,[12] two or more variables are said to be cointegrated if each variable individually is integrated of order one (say) but a linear combination of the variables is integrated of lower order (say zero).

We test for cointegration using the augmented Dickey-Fuller (ADF) test. The test is computed by performing two types of regressions. The first, called the cointegrated regression, fits the static model, which is similar to equation (1). At the second stage, the ADF test is obtained as the t-statistic of ρ_0 in the following regression:

$$\Delta u_t = \rho_0 u_{t-1} + \sum_{i=1}^{p} \rho_i \Delta u_{t-i} + \sigma_t \quad ,$$

where u_t is the residual from the cointegrating regression and $\Delta u_t = u_t - u_{t-1}$. Four lags on the first difference of the cointegration residuals are included in the test regression to ensure the residuals from the ADF regression are serially uncorrelated.

The null hypothesis of no cointegration is tested against the alternative of co-integration. A large negative test statistic is consistent with the hypothesis of co-integration. Engle and Yoo[13] give critical values.

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12. Robert F. Engle and C. W. J. Granger, "Cointegration and Error Correction: Representation, Estimation, and Testing." *Econometrica* 55 (March 1987): 260-261.

13. Robert F. Engle and Byung Sam Yoo, "Forecasting and Testing in Cointegrated Systems." *Journal of Econometrics* 35 (May 1987): 144-145.

Table A.3. Augmented Dickey-Fuller (ADF) Cointegration Tests

Bahrain			Kuwait			Saudi Arabia		
Dependent Variable	ADF Statistics	Lags	Dependent Variable	ADF Statistics	Lags	Dependent Variable	ADF Statistics	Lags
G_t	-0.76	4	G_t	-1.68	4	G_t	-2.33	4
$y_{1,t}$	-1.12	4	$y_{1,t}$	-0.13	4	$y_{1,t}$	-0.56	4
$y_{2,t}$	-2.15	4	$y_{2,t}$	-1.12	4	$y_{2,t}$	-1.89	4
$q_{1,t}$	-2.94	4	$q_{1,t}$	-2.64	4	$q_{1,t}$	-0.12	4

Sample 1970-1998.

The critical values for the ADF-test are -3.62 for the 5 percent level and -3.32 for the 10 percent level. We will reject the null hypothesis of cointegration if the computed ADF t-statistic is less than the critical values (in absolute value).

The ADF tests reported in Table A.3 provide no evidence against the null hypothesis of no cointegration among gender equality, the oil sector's contribution to GDP, the services sector's contribution to GDP, and the foreign labor participation rate. The computed ADF t-statistic for Bahrain, Kuwait, and Saudi Arabia are -0.76, -1.68, and –2.33 respectively, with four lagged changes in the residual, which falls below the 5 percent and 10 percent critical values of -3.62 and -3.32. Thus, there is little evidence in favor of a cointegrating relationship among the series in equation (1) in all three GCC countries.[14]

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14. Failure to obtain cointegration may reflect the omission of one or more variables from equation (2).

Table A.4. Vector Auto-Regression Model: Bahrain

Exogenous Variable	Dependent Variable			
	ΔG_t	$\Delta y_{1,t}$	$\Delta y_{2,t}$	$\Delta q_{1,t}$
Constant	0.84	-0.72	-0.54	0.012
t-stat.	(1.45)	(-0.56)	(-7.32)	(0.25)
ΔG_{t-1}	0.79	-0.006	-0.78	0.003
t-stat.	(0.43)	(-10.22)	(-3.56)	(5.36)
ΔG_{t-2}	-0.05	-0.003	1.3	-0.007
t-stat.	(-3.2)	(-2.36)	(0.022)	(-2.66)
ΔG_{t-3}	0.28	-0.008	-0.56	1.23
t-stat.	(3.65)	(-1.79)	(-0.05)	(0.02)
ΔG_{t-4}	-0.84	0.49	-2.1	-0.002
t-stat.	(-1.65)	(0.55)	(-0.24)	(-4.33)
$\Delta y_{1,t-1}$	-0.35	0.0057	-0.33	-0.077
t-stat.	(-2.59)	(7.45)	(-0.352)	(-2.33)
$\Delta y_{1,t-2}$	-0.01	5.2	-0.65	-0.06
t-stat.	(-2.77)	(0.07)	(-4.65)	(-5.29)
$\Delta y_{1,t-3}$	-0.009	0.98	-0.12	-0.21
t-stat.	(-4.26)	(1.98)	(-4.25)	(-4.55)
$\Delta y_{1,t-4}$	0.0013	0.004	-0.003	0.078
t-stat.	(2.35)	(11.23)	(-0.51)	(2.73)
$\Delta y_{2,t-1}$	0.002	0.007	0.62	0.006
t-stat.	(2.9)	(3.9)	(0.056)	(4.25)
$\Delta y_{2,t-2}$	0.56	0.57	-0.49	0.34
t-stat.	(2.1)	(6.54)	(-4.32)	(7.25)
$\Delta y_{2,t-3}$	0.032	0.008	0.044	0.12
t-stat.	(4.5)	(0.59)	(0.03)	(7.93)
$\Delta y_{2,t-4}$	0.005	0.01	0.36	-0.005
t-stat.	(0.5)	(2.5)	(2.3)	(-2.60)
$\Delta q_{1,t-1}$	-0.36	0.001	-0.56	0.74
t-stat.	(-10.3)	(1.9)	(-4.4)	(2.56)
$\Delta q_{1,t-2}$	-0.081	-0.24	0.43	0.69
t-stat.	(-11.8)	(-0.9)	(8.65)	(1.9)
$\Delta q_{1,t-3}$	-0.65	0.002	0.45	0.24
t-stat.	(-2.87)	(7.4)	(5.6)	(2.3)
$\Delta q_{1,-4}$	-0.73	-0.04	0.002	-0.12
t-stat.	(-0.06)	(-0.54)	(4.5)	(-1.5)
ADJ.R-Squared	0.57.	0.45	0.81	0.35
S.E.of Regression	0.007	0.0001	0.077	0.096

Table A.5. Vector Auto-Regression Model: Saudi Arabia

Exogenous Variable	Dependent Variable			
	ΔG_t	$\Delta y_{1,t}$	$\Delta y_{2,t}$	$\Delta q_{1,t}$
Constant	1.2	-0.25	-0.023	1.2
t-stat.	(0.21)	(-0.36)	(-9.33)	(2.36)
ΔG_{t-1}	0.11	1.3	3.2	0.003
t-stat.	(1.23)	(0.35)	(5.63)	(4.56)
ΔG_{t-2}	0.56	0.008	0.0033	-0.05
t-stat.	(2.23)	(1.23)	(0.8)	(-2.6)
ΔG_{t-3}	0.007	0.003	-0.25	0.004
t-stat.	(2.77)	(5.79)	(-1.23)	(2.56)
ΔG_{t-4}	0.36	0.005	0.125	-0.014
t-stat.	(0.65)	(3.59)	(0.45)	(-2.55)
$\Delta y_{1,t-1}$	-0.47	0.56	-0.75	-0.48
t-stat.	(-4.55)	(2.99)	(-0.88)	(-2.39)
$\Delta y_{1,t-2}$	-0.32	6.32	-0.002	-0.25
t-stat.	(-1.98)	(0.74)	(-4.58)	(-5.59)
$\Delta y_{1,t-3}$	-0.25	0.0045	-0.044	-0.008
t-stat.	(-5.25)	(1.99)	(-1.35)	(-2.95)
$\Delta y_{1,t-4}$	0.13	0.44	-0.78	0.0085
t-stat.	(0.02)	(3.65)	(-5.00)	(1.73)
$\Delta y_{2,t-1}$	0.47	0.95	0.54	0.58
t-stat.	(1.56)	(0.9)	(2.79)	(2.59)
$\Delta y_{2,t-2}$	0.03	0.0085	-0.23	0.0047
t-stat.	(1.1)	(4.56)	(-3.45)	(5.24)
$\Delta y_{2,t-3}$	0.47	0.95	0.007	0.47
t-stat.	(2.5)	(3.69)	(2.32)	(3.48)
$\Delta y_{2,t-4}$	0.07	0.42	0.35	-0.78
t-stat.	(6.35)	(2.4)	(3.65)	(-0.03)
$\Delta q_{1,t-1}$	-0.24	0.87	-0.48	0.07
t-stat.	(-5.3)	(3.44)	(-2.65)	(3.65)
$\Delta q_{1,t-2}$	-0.78	-0.005	0.14	0.0012
t-stat.	(-2.9)	(-3.55)	(2.66)	(2.88)
$\Delta q_{1,t-3}$	-0.56	0.44	0.006	0.05
t-stat.	(-2.47)	(7.65)	(3.65)	(2.49)
$\Delta q_{1,-4}$	-0.006	-0.0007	0.75	0.0001
t-stat.	(-0.007)	(-1.96)	(5.5)	(1.35)
ADJ.R-Squared	0.77	0.17	0.65	0.54
S.E.of Regression	0.054	0.021	0.099	0.048

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