

Labor Demand and Economic Growth in Saudi Arabia

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This study investigates the relationship between labor demand and economic growth in Saudi Arabia for the period 1990-2008 by using fully modified ordinary least squares (FMOLS) approach. The study analyzes also the unemployment rate and its development in the economy for men and women and economic sectors. Also, the study measures the effects of the components of economic growth represented in capital formation, government expenditure, total exports and total imports in labor demand by using FMOLS. The analysis is based on time series from 1990 to 2008. Time series properties of the processes that generated the data have been assessed to specify the order of integration for each series. The empirical results obtained show that, there are a positive and significant relationships between the labor demand and real income, real investment, real government expenditure and real value of exports. On the other hand, there are negative and significant relationships between labor demand and the real value of imports. It is expected that the findings of this study could be utilized by the government for their future follow-up and reassessment of economic development programs in Saudi Arabia.

Keywords: Saudi Arabia, FMOLS, labor demand, economic growth

Introduction

As global economic recovery lifted up oil prices in 2010, the Saudi economy recorded high growth and enlarged fiscal spending by the government boosted domestic demand and accelerated the growth in non-oil GDP. On the same line, the actual budget recorded a surplus of SAR 87.7 billion or 5.4 percent of GDP in 2010 against a deficit of SAR 86.6 billion or 6.2 percent of GDP in the previous year. On the other hand, the ratio of public debt to GDP declined from 16.1 percent in 2009 to 9.9 percent in 2010. The current account of the balance of payments recorded a surplus for the twelfth year consecutively amounting to SAR 250.3 billion or 14.9 percent of GDP in 2010 (Saudi Arabian Monetary Agency (SAMA), 2011).

According to Marshall (Oxford Dictionary of Sociology, 1998), Labor force refers to the number of people (over 16 or the working age 16-65 years) in work and unemployment and those seeking work, as a proportion of a specified baseline population. In this respect, during the early years of planned development, it was apparent that the Kingdom's population and the size of its national work force were insufficient to meet the total manpower requirements of the rapidly developing economy. Recognizing this constraint, the development strategy in the early phase opted for importing as many expatriate workers as were needed to facilitate achievement of the Kingdom's development objectives.

So, the relationship between labor demand and economic growth has been an extensive subject of empirical and theoretical researches for many years. These researches have highlighted the significance of absorbing the new entrances to the labor market. Table 1 indicates that the unemployment rate among Saudis is much higher than Non-Saudis which reached in 2009 to 5.2% among Saudis and 0.2% among Non-Saudis. That makes us facing very important question:

Is this high unemployment rate among Saudis dues basically to the existence of many professions that Saudis doesn't accept to work in? Saudis prefer to work at government sector not in private sector, as for the labor force in Saudi Arabia recent data issued by the ministry of Civil Service indicate that, the number of employees in the government sector (Saudi and non-Saudi) was 959.8 thousand at the end of 2010. However, the number of employees (Saudi and non-Saudi) in the private sector, as per ministry of labor's latest data, stood at 7 million at the end of 2010 against 6,9 million at the end of 2009 (Saudi Arabian Monetary Agency (SAMA), Annual Report, 2011). The second important question: Is the economic growth rate won't sufficient enough to absorb the new entrants to the Saudi labor market? The economic growth rate must be fostered to absorb the new entrants to the Saudi labor market; this study searches the relationship between labor demand and economic growth in Saudi Arabia.

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Table 1. Saudi and non-Saudi total employment and unemployment rate 2000-2009 (thousands of workers).

		2000	2005	2008	2009
Total Employment		5.713345	6.145564	7.121658	8.611001
Unemployment Rate (%)	Saudis	8.15	11.52	9.8	5.2
	Non-Saudis	1.11	0.8	0.4	0.2
Unemployment Rate (Total)		4.57	6.1	5	5.4

Source: Saudi Arabian Monetary Agency (2011, p. 3970).

Table 2 reveals that, the unemployment rate is much higher among females than among males, where the unemployment rate among females reached in 2009 to double it was in 1999, while the unemployment rate

remained among males almost about the same rate in 1999. Thus, the unemployment rate among females in 2009 was four times greater among males at the same year.

Table 2. Unemployment rate in Saudi Arabia (% of Labor Force).

Year	% of female labor force	% of male labor force	% of total labor force
1999	8.1	3.7	4.3
2000	9.3	3.8	4.6
2001	9.1	3.9	4.6
2002	11.5	4.2	5.2
2006	14.	4.7	6.3
2007	13.2	4.2	5.6
2008	13	3.5	5
2009	15.9	3.5	5.4

Source: World Bank (2011).

Table 3 and Figure 1 shows that the services sector is the most sectors that absorb labor in Saudi Arabia, as it accounted for three-quarters of employees during the period 1999-2009. While the industrial sector

absorbed about fifth of employees, finally the agriculture sector absorbed only about 5% of total employment during the same period.

Table 3. Employment structure by economic activities in Saudi Arabia (% of total employment)

Year	Agriculture (%)	Industry (%)	Services (%)
1999	6.3	21	72.7
2000	6.1	19.9	74
2001	6.1	21.1	72.8
2002	4.6	21	74.4
2006	4	20.2	75.8
2007	4.3	20.8	74.9
2008	4.3	19.8	75.9
2009	4.1	20.4	75.5

Source: Source: World Bank (2011).

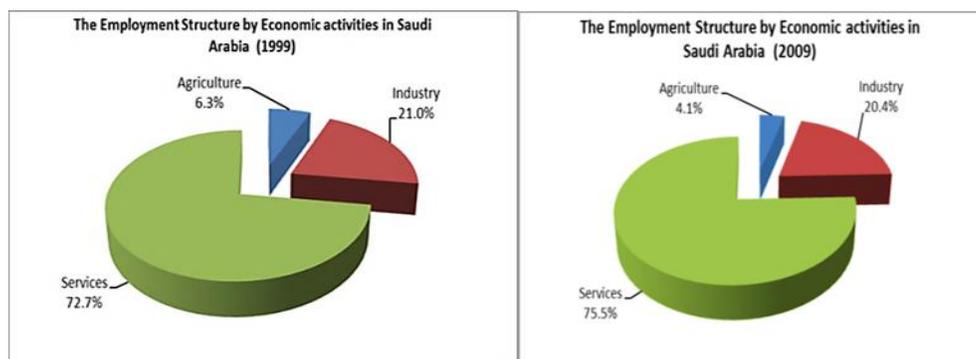


Figure 1. The employment Structure by economic activity in Saudi Arabia (1999- 2009).

Table 4 and Figure 2 shows the employment rate for both males and females in various economic Activities, where data indicate that the services sector is the most sector that absorbing the female employees by more than 96% of total female employment during the period 1999-2009. On the other side, we find that the services sector also

absorbed more than two-thirds of employment among males, while the industrial sector absorbed about a quarter of total male employment, and finally, the agricultural sector absorbed a proportion of male employment during the same period ranged between 4.5% and 7%.

Table 4. Employment rate in economic activities by sex in Saudi Arabia (% of Total Employment).

Year	Agriculture (%)		Industry (%)		Services (%)	
	Male	Female	Male	Female	Male	Female
1999	7.1	1	24.1	1.7	68.8	97.3
2000	6.7	2.3	22.8	1.5	70.5	96.2
2001	6.9	0.9	24.2	1.3	68.9	97.8
2002	5.3	0.6	24	1.2	70.7	98.2
2006	4.6	0.4	23.4	1	72	98.6
2007	4.9	0.4	24	1.4	71.1	98.2
2008	5	0.1	22.7	1.3	72.3	98.6
2009	4.7	0.2	23.3	1.5	72	98.3

Source: Source: World Bank (2011).

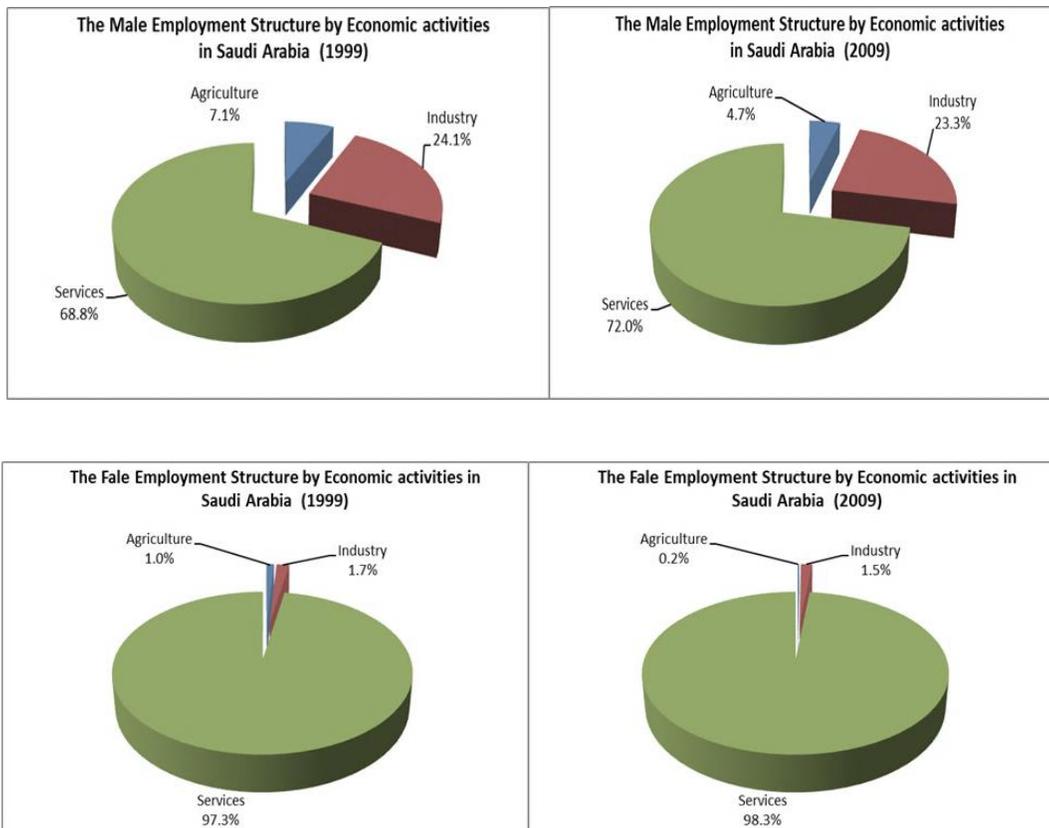


Figure 2. The employment Structure by economic activity for males and females Saudi Arabia (1999 -2009).

Given the limited resource base of Saudi Arabia, economic growth required large imports of materials and labor. Changes in the pace and composition of economic activity were reflected in the inflow of foreign labor. Expatriate workers comprise about 65-70 percent of the Saudi labor force (Nur, 1995).

The objective of this study concentrates on determining the effects of economic growth components on labor demand and then can increase the employment level and avoiding the harmful effects of unemployment problems. Labor demand represented by the number of employees; on the other hand, the variables that represented the economic growth included gross domestic product, capital formation, total exports and total imports. All these variables have been expressed by real terms.

Economic Literature

There is a huge literature about the labor demand and its determinants. All these papers provide both theoretical and empirical investigation and explanation of the employment / unemployment level and its determinants in various countries (Flaig & Steiner, 1989; Nickel, 1986; Hall & Henry, 1987; Nymoen, 1989; Disney & Kiang, 1990; Arestis & Biefang – Frisancho Mariscal, 1994).

The determinants of labor demand vary from model to model and from country to country. Growth rate is considered as one of the determinants of labor demand (Hazledine, 1981; Salter, 1960, Oster, 1980 and Ibrahim, 2012). Recent contributions in dynamic analysis of labor demand suggest that employment can be regarded as dependent on firms' output expectations, factor prices, the level of fixed factors, technical progress and the business conditions at large (Nickell, 1986; Darby & Wren-Lewis, 1991; Pehkonen, 1992).

As far as the relationship between growth rate and employment is concerned, Salter (1960) found that a positive relationship existed between these two variables. Roberts and Skoufas (1997) using microdata for a panel of plants found that the output and wage elasticity estimates correspond to the employment response of individual producers.

Ross and Zimmerman (1999) used a unique and large firm-specific data set covering 31 two-digit German manufacturing industries with qualitative responses on employment plans and evaluations of demand, labor costs and technical progress. They found that changes of employment demand seem to be primarily caused by exogenous changes of demand, whereas technological advance and labor costs place second and third. Labor costs directly affect the demand for labor. According to main

stream economic theory wages are assumed to have a negative impact on the demand for labor since wage-costs affect entrepreneurial investment decisions. A number of papers use wage as explanatory variable in determining the employment level (Flaig & Steiner, 1989; Hazledine, 1981; Disney & Kiang, 1990). The effect of the wage rate on employment levels depends on the nature of the wage rate (nominal or real) and on the structure of the wage-bargaining system.

Calmfors and Driffill (1988) and Freeman (1988) have shown that both centralized and decentralized wage-bargaining systems can produce favourable employment outcomes. Appelbaum and Schettkat (1993) argued that the different sectoral patterns in employment trends could be explained by the institutional differences in wage bargaining which shape employment outcomes during periods of excess supply of labor.

The Model and Methods

This study investigates the relationship between labor demand and economic growth for Saudi Arabia for the period 1990-2008 by using fully modified ordinary least squares (FMOLS) approach. FMOLS was originally designed first time by Philips and Hansen (1990) and Philips and Moon (1999) to provide optimal estimates of Co-integration regressions. This technique employs kernel estimators of the Nuisance parameters that affect the asymptotic distribution of the OLS estimator.

In order to achieve asymptotic efficiency, this technique modifies least squares to account for serial correlation effects and test for the endogeneity in the regressors that result from the existence of a Co-integrating Relationships

The following model is to be estimated by fully modified ordinary least squares (FMOLS) approach:

$$L = f(GDP, I, GC, X, M)$$

Where

L is the labor force

GDP is the gross domestic product,

I is the value of capital formation (investment),

GC is the Government consumption expenditure,

X is the value of exports,

M is the value of imports,

The variable of labor force has been expressed by the number of employees, while GDP have been expressed by the real Gross Domestic Product (RGDP). I proxied by real gross capital formation (RI), GC proxied by real government expenditure, X proxied by the real value of exports (RX) and M proxied by the real value of imports (RM).

This study used the annual data from 1990 to 2008 for Saudi Arabia. All data in this study was obtained from Saudi Arabian Monetary Agency (SAMA) and World Bank Development Indicator, the data has

been converted to real values (1999 constant prices) by using consumer price indices (1999=100). All these factors are illustrated in Table (5).

Table 5. Labor and economic data (1990-2008).

Period	Number of Employees (L) (Million)	Real Gross Domestic Product (RGDP) (1999=100) (Billion Riyal)	Real Gross Capital Formation (RI) (1999=100) (Billion Riyal)	Real Value of Exports (RX) (1999=100) (Billion Riyal)	Real Value of Imports (RM) (1999=100) (Billion Riyal)	Real Government Consumption RGC (1999=100) (Billion Riyal)
1990	5.045273	476.2439	97.04646	207.1299	161.1099	39.78808
1991	5.138399	521.0112	115.9385	218.8777	207.9219	52.10894
1992	5.241622	542.7138	118.8723	229.5823	211.2566	46.62298
1993	5.404931	542.9067	121.9785	191.7432	186.7273	39.20114
1994	5.586089	547.7923	99.64518	184.4175	141.4029	35.06172
1995	5.770004	549.9833	111.1628	215.6601	160.0152	36.17795
1996	5.957306	567.5702	109.7332	253.7325	168.8324	41.24849
1997	6.177818	582.4184	115.7070	257.7899	171.3579	45.76012
1998	6.404380	598.1219	113.9646	164.5509	146.9123	41.75294
1999	6.666048	593.9550	118.1960	210.2310	140.5700	41.09200
2000	6.900011	623.2180	123.8095	309.6875	176.6658	49.20737
2001	7.177481	629.2625	126.9663	275.5682	166.3607	50.66638
2002	7.475779	629.7750	130.6273	296.9781	171.4763	50.18862
2003	7.738820	678.1551	152.7401	382.7197	200.1211	54.49571
2004	8.005792	713.9152	163.0644	515.6632	253.7714	61.68671
2005	8.294356	753.5182	203.6149	749.2816	342.0934	72.95520
2006	8.571061	777.2304	241.1017	873.6434	439.6945	85.93029
2007	8.845333	802.9888	301.5075	963.6071	561.4992	88.62906
2008	9.089880	839.0202	357.8090	1239.873	678.5355	95.45671

Source: Saudi Arabian Monetary Agency (2011) and World Bank (2011).

Empirical Results

Augmented Dickey- Fuller unit root test is calculated for individual series to provide evidence as to whether the variables are stationary and integrated of the same order.

The results of Augmented Dickey-Fuller (ADF) test for each variable appear in Table 6. The lag parameter in the ADF test is selected by Akaike information criterion (AIC) to eliminate the serial correlation in residual. As shown in Table 5, the null hypothesis of a unit root can't be rejected for all series at 5% significance level with the exception of log (RM) which can't be rejected at 10%. However, the unit root hypothesis is rejected for all variables in the first-differenced data. Therefore, we conclude that the series are integrated of order one.

Table 6. Unit root test.

		ADF
Log(L)	Level	-3.420094
	First Diff.	-3.324520 ^b
Log(RGDP)	Level	-0.623774
	First Diff.	-3.445873 ^b
Log(RI)	Level	0.372892
	First Diff.	-3.138286 ^b
Log(RGC)	Level	-0.048461
	First Diff.	-3.420094 ^b
Log(RX)	Level	-0.950034
	First Diff.	-3.431324 ^b
Log(RM)	Level	-0.452305
	First Diff.	-2.899356 ^c

Notes: ADF-Dickey DA, Fuller WA., (1979) unit root test with the Ho: Variables are I (1); a, b and c indicate significance at the 1%, 5% and 10% levels, respectively.

Tables 7 and 8 give the results of the Likelihood Ratio tests based on the Maximum Eigenvalue and the Trace of the stochastic matrix respectively. Both

these tests confirm the existence of three cointegrating vectors between the variables, i.e. the existence of long-run relationship between them

Table 7. Cointegration test based on Trace of the Stochastic Matrix.

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.939486	105.3816	69.81889	0.0000
At most 1 *	0.750024	52.08887	47.85613	0.0190
At most 2 *	0.560195	25.74744	29.79707	0.1364
At most 3 *	0.398679	10.14038	15.49471	0.2701
At most 4 *	0.024766	0.476486	3.841466	0.4900

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Table 8. Cointegration test based on Maximal Eigenvalue of the Stochastic Matrix.

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.939486	53.29271	33.87687	0.0001
At most 1 *	0.750024	26.34144	27.58434	0.0714
At most 2 *	0.560195	15.60706	21.13162	0.2486
At most 3 *	0.398679	9.663895	14.26460	0.2349
At most 4 *	0.024766	0.476486	3.841466	0.4900

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level ;

* denotes rejection of the hypothesis at the 0.05 level

Since the five variables are cointegrated, they can be represented equivalently in terms of a long run FMOLS framework.

$$\log L = \alpha_1 + \beta_1 \log RGDP + \beta_2 \log RI + \beta_3 \log RGC + \beta_4 \log RX + \beta_5 \log RM + \xi \quad (1)$$

In Table 9, we see the results of the long run FMOLS estimates for equation 1. The explanatory power is high ($R^2=99.4$). All the explanatory variables are significant at 1% level.

Table 9. FMOLS estimates in the long run (1990-2008).

Variable	Coefficient
	Long Run
LOG(RGDP)	0.6 ^a
LOG(RI)	0.49 ^a
LOG(RGC)	0.17 ^a
LOG(RX)	0.17 ^a
LOG(RM)	-0.57 ^a
$R^2 = 0.994$ Durbin-Watson: 2.87	

a. indicates significance at the 1%.

Table 10. Fully modified ordinary least squares (FMOLS) Regression Results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(RY)	0.602622	0.090551	6.655046	0.0000
LOG(RI)	0.493276	0.064936	7.596286	0.0000
LOG(RM)	-0.572120	0.045711	-12.51591	0.0000
LOG(RX)	0.170080	0.021900	7.766087	0.0000
LOG(RGC)	0.172065	0.035666	4.824275	0.0003
c	-3.006759	0.409056	-7.350479	0.0000
R-squared	0.993667	Mean dependent var	1.901224	
Adjusted R-squared	0.991231	S.D. dependent var	0.194599	
S.E. of regression	0.018223	Sum squared resid	0.004317	
Durbin-Watson stat	2.867312	Long-run variance	0.000112	

Notes: Dependent Variable: LOG(L); Method: Fully Modified Least Squares (FMOLS); Sample (adjusted): 1990 2008; Cointegrating equation deterministic: C; Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Conclusion and Implications

The primary objective of this study has been to investigate the relationship between labor demand and economic growth in Saudi Arabia for the period 1990-2008 by using fully modified ordinary least squares (FMOLS) approach.

The empirical results obtained show that, there are a positive and significant relationships between the labor demand and real income, real investment, real government expenditure and real value of exports. On the other hand, there are negative and significant relationships between Labor demand and the real value of imports.

Saudis prefer to work with government sector not in private sector; Government must stimulate Saudis to work in private sector. On the other hand it must encourage the private sector to employ nationals, either through the creation of new job opportunities and/or through replacing national for foreign employees.

The services sector is the most sectors that absorbing female employees but the services and industrial sectors absorbs the most of male employment. Employment levels in agriculture sector are very small in Saudi Arabia either for male or female, although it absorbs males more than females. On another side, government must encourage employers to increase female employment in the industrial sector, and promotion to make the Saudis accept some socially under-evaluated jobs.

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