

The Determinants of Employment in Jordan: A Time Series Analysis

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Abstract

This study investigated the impact of macroeconomic variables on labor employment in Jordan for the period 1980-2012 by using the fully Modified Ordinary Least Square approach (FMOLS). The economic model incorporated the labor employment as the dependent variable whereas the real Gross Domestic Product (GDP), real Foreign Direct Investment (FDI), and the value of total trade were the independent variables. The results of the time series properties unit root and the Johansen co-integration tests revealed that that all variables were integrated of order one, I(1) and cointegrated indicating the existence of long-run equilibrium among variables included in the econometric model. There empirical findings showed that all variables have positive and significant impacts on employment level in Jordan labor market. Moreover, the findings showed that real Gross Domestic Product had the substantial influence on employment and a 10% increase in real Gross Domestic Product caused a 6.78% increase in employment level. The employment elasticity with respect to real Foreign Direct Investment was 0.267. It was expected that the findings of this study could be utilized by the government for future follow-up and reassessment of economic development programs in Jordan. One important policy recommendation was the attraction of Foreign Direct Investment into Jordan by setting out some economic policies that would make Jordan more attractive to foreign investors.

Key Words: Co-integration, FMOLS, economic growth, FDI, Labor.

Introduction

Jordan economy has been witnessing a chronic unemployment in the labor market since the eighties of the 20th century due the excess supply of labor resulting from the substantial outcome of the educational system and the inflow of guest workers. The Jordan government had made a considerable efforts aiming at reducing unemployment; including attracting foreign direct investment, encouraging the private sector to increase its employment, and encouraging migration of workers to the neighboring countries in particular oil producing countries. Despite all the government strategies, Jordan economy is still experiencing an increase in unemployment which exceeded 12% in 2012. Digging into the reasons causing unemployment revealed that there are a number of reasons such as guest workers, the lack of job openings, the mismatch of the educational system outcomes and labor market needs, and to some extent the cultural prospects are among the mean reasons behind unemployment.

The motivation of the present research lies on the considerable high employment rate in Jordan labor market, and its socio-economic consequences. Moreover, based on the empirical result of the econometric model, this research attempts to suggest some policy recommendations which are thought to be helpful to

government' efforts in fighting unemployment. The objective of this study concentrates on determining the effects of economic growth, Foreign Direct Investment (FDI), and trade openness on employment.

The present paper is organized as follows. The next section discusses the development Jordan labor market. It will provide the theoretical background in section 3. Section 4 discusses the empirical evidence on labor demand. While section 5 presents the economic model and methodology, section 6 analyzes the empirical results. Finally, a conclusion and policy recommendations concludes the paper.

The Development of Jordan Labor Market

Jordan labor market has witnessed substantial fluctuations since the seventies of the 20th century. These fluctuations were motivated by internal or/and external conditions which made Jordan labor market unable to absorb the excess supply of labor. There are considerable suggested explanations for such excess supply over the study period. One important explanation is the mismatch between the educational institutions outcomes and the labor market needs especially the technical occupations. Jordan labor is saturated with graduates of academic institutions, and as a result Jordan is implementing a strategy to promote vocational training. Another important reason is the lack contribution of the private sector which heavily depends on foreign workers. Therefore, Jordan has followed the privatization policy to encourage private sector involvement in economic activities, and is expected to increase employment. Moreover, the outcomes of the global economic fluctuations inflicted negative effects on Jordan economy, and hence a setback in demand for labor especially in gulf countries. In addition, the limited productive resources, the rapid population growth rate due to the inflows of refugees from neighboring countries due to the gulf war, and the return of migrant workers caused a distortion in the local labor market. On the political side, the undesirable events in the surrounding region, and the series of wars the middle has witnessed during the study period affected the demand for labor and causing excess supply due to the return migration.

The period 1980-1990 witnessed a substantial development in Jordan labor market represented by a major development the devaluation of JD in 1989 leading to an increase in price level and hence real wage fell, the increase in unemployment rate among educated young people, the fall in labor demand by gulf countries, return migration and the rise of foreign workers. During the eighties, the gross domestic product recorded a negative growth rate amounted to (-2.7%) in year 1987 as a reaction to the economic cycles that Jordan and the surrounding region had experienced due to the fall in oil price. These events negatively affected local and external demand for domestic Labor. Moreover, the fall in labor demand by gulf countries caused what is so called the reverse migration leading to an increase in unemployment level to reach 16.8% in year 1990, and as a result unemployment rate jumped to

The shadow of the political unrest in the Middle East as eruption of the second gulf war in years 1990-1991 had led to some major economic development that affected Jordan labor market. A sharp fall in workers' remittances, increased unemployment rate, all these events put a considerable pressure on Jordan economy.

A major event during this period was the pursuing of government economic authorities the economic liberalization policy represented by privatization policy of the public ownership of economic activities. The policy was aiming to increase the private sector participation in the economy in order to foster economic growth, and hence increase the labor demand and reduced unemployment. Another major development in this period was joining WTO represented by trade liberalization which is expected to enhance the labor demand. However, the second Gulf war in year 2003 exerted a noticeable pressure on Jordan economy where an increase in refugees influx causing a distortion in labor market. Moreover, the world financial crises had it toll on Jordan economy. In year 2010 Jordan implemented FDI attraction policy which Jordan raped its fruitful.

Table 1: Labor force, Employment, Unemployment rate, and foreign workers (2008-2011) (thousands)

Year	Total Labor Force	Employment	Foreign Workers	Unemployment Rate (%)
2008	1172701	1172.7	303.325	12.7
2009	1220520	1220.52	335.708	12.9
2010	1235948	1235.95	298.341	12.5
2011	1250971	1250.97	280.263	12.9

Table 1 reports data on labor market over the period 2008-2011. It is obvious that employment increases with time passage. It increased from 1172.7 thousands in year 2008 to 1250.97 thousands in year 2011 (Department of Statistics, 2012). The same token is true for the unemployment rate which increased from 12.9% in year 2008 to 12.9% in year 2011.

Table 2 reports the descriptive analysis for the some indicators of labor market for the period 1980-2011. It shows that the employment was on average 8123.34 workers, the unemployment rate turns out to be on average 11.9% which is relatively high. This points out that the labor market was unable to absorb the excess labor supply.

Table 2: descriptive analysis of model variables

	WORKERS	FDI	GDP	UNEMP
Mean	812333.6	771.3	6255.8	11.9
Median	874700.0	79.2	4143.7	13.0
Maximum	1268609.0	3544.0	21965.5	18.8
Minimum	405300.0	0.2	1058.7	3.5
Std. Dev.	296579.0	1010.6	5913.0	4.2

Theoretical Backgrounds

The labor demand theory states that the demand for labor is a derived demand, since workers are hired for their contribution in the production of goods and services. Moreover, the scale effect and the substitution effects indicate that the labor demand curve is downward sloping function of real wages. There are many factors among them is the trade volume. The debate over the role of international trade in labor demand and employment relies on the theorem that assumes a full employment level. One main feature of the classical doctrine is that price flexibility plays an important role in the correction of labor market disequilibrium and market clearing. And hence, according to the classical labor market, shortages or surplus of labor is eliminated by wage movement. However, wages are not the only factors affecting the demand for labor.

Trade liberalization and its relation with labor demand can be traced back to the standards Heckscher-Ohlin-Samuelson (HOS) model of two-sector two-factor two-countries. The HOS model describes the different channels through which trade liberalization affects labor demand (Lawrence *et al*, 2005). The centre core of the (HOS) model is the relationship between changes of product price and factor returns and between technological change and factor returns. The model suggested that trade liberalization will lead to an increase wage inequality in developing economies due to the increase in relative price of skill-intensive product, and reduce wage inequality as the relative price of unskilled-labor intensive product rises. The foreign direct investment (FDI) also plays an important role in determining the labor demand, through its spillover effects. The growth rate of economic performance measured by gross domestic product (GDP) affects the labor demand through increasing the aggregate demand for good and service which requires an increase in the productive capacity, and hence labor demand.

The Empirical Evidence

The Labor demand issue has been the center focus of the economic research, and as a result, a huge and a considerable body of economic research have been emerged over the few decades. The research interest focuses on the determinants of labor demand function using different econometric techniques applied to aggregate and microeconomic levels. All these research efforts provide both theoretical and empirical investigation of the different factors that determine the demand for labor and the unemployment issue. The empirical results were mixed due to the economic model, the nature of the data, the country, and the time span. The determinants of labor demand covers a wide range of factors such as: FDI, economic growth, exports, imports, guest workers, inflation and prices, factor prices, technical progress. The economic growth constitutes one of the major determinant of employment (Hazledine, 1981; Ostre, 1980) and it showed a positive impact labor employment.

A considerable body of empirical research has analyzed the demand function for labor in Jordan. The research concentrates on the determinants that are expected to impact the demand for labor (Al-Abdulrazag, 1998; Sharu' *et al*, 1994; Talafeh, 1990). The content of the research focused mainly on economic growth, real wages, and other macroeconomic variables as the determinants of labor employment in Jordan. Moreover, the research methodology relied mainly on the traditional OLS estimation technique to estimate the quantitative impact of the determinants besides the time span of the data is short.

Ibrahim (2013) investigated the determinants of demand for labor of the Egyptian private sector over the period 1997-2007 applying a fixed effects panel Seemingly Unrelated Regression (SUR) model. The estimation results revealed a positive relationship between the demand for labor and both real gross domestic product (GDP) and real private investment in both short-run and long-run. In addition, the results showed that real wages exerted a negative impact in the short-run, while it was unexpectedly positive in the long-run demand.

Malik and Sarwar (2013) analyzed the determinants of labor demand function for Pakistan for the period 1970-2011 using Johansen Co-integration approach which indicated a long-run equilibrium relationship among the variables. The empirical results showed that both FDI and GDP exerted positive impact on employment level. Meanwhile, exchange rate had a negative effect on employment level.

Mohammed Aljebrin (2012) investigated the effect of economic growth along with its components on the labor demand in Saudi Arabia for the period 1990-2008 using FMOLS model. The co-integration results obtained show that, there are a positive and significant relationships between employment and real income, real investment, real government expenditure, and real value of exports, whereas real value of imports exerted negative and significant effect.

Devashish & Shin, (2012) examined the impact of globalization on labor demand elasticities in Korean firms. The empirical findings showed evidence of the impact of imports on labor-demand elasticities when tariffs were replaced with import penetration ratios. Moreover, there was an evidence of exports effect on labor-demand elasticities.

Stan *et al* (2011) examined the FDI impact on employment level in Malaysia for the 1970-2007 using bound testing (ARDL) approach and ECM-ARDL model. The empirical result revealed a unidirectional causal relationship running from FDI to employment supporting the idea that FDI enhances employment level in Malaysia.

Chletsos (2005) examined the determinants of labor demand in Greece for the period 1980-2001 using the ARDL econometric technique. The empirical results revealed that in long run growth rate has positive and significant impact on the change in employment ratio through creating more jobs fulfilled by the unemployed, where the openness of the Greek economy had a significant negative impact causing a

deterioration of the competitiveness of the Greek economy. In addition, unemployment benefits exerted a negative effect on the change in employment ratio.

Ahmed Bin-Obaid (2003) investigated the main factors determining the labor demand for the government sectors in the GCC states for the period 1991-1996 using the pooled cross-section time-series technique. The Estimation results revealed that government labor demand responds in opposite directions to government and private employment compensations and to private employment size. Labor demand is inelastic with respect to these variables. Moreover, the results revealed that government labor and private labor are complements since the cross elasticity was about (-0.35%).

Efthymios, *et al*, (2003) examined the import–labor substitution in five European Union countries; UK, France, Greece, Italy, and Spain with an emphasis on the south. The regression results indicated that almost all long-run coefficients are statistically significant. The results showed that all own price elasticities are negative as expected and significant. Moreover, the empirical results reported that only for France and Italy the labor and imports are complements, while in the UK they are substitutes.

Pravin, *et al* (2001), examined the suggested positive impact of trade liberalization on labor-demand elasticities thus placing labor markets under increased pressure using Turkish plant-level data spanning the course of dramatic trade liberalization. This is then tested using data from the Turkish manufacturing sector from a period when there were large scale changes in the 5 level of trade protection (specifically, the trade reforms of 1984). The empirical findings did support the supposed theoretical link:

Al-Abdulrazag (1998) analyzed the factors affecting the demand for labor in Jordan for the period 1968-1993 using the OLS estimation technique. The estimation results revealed that labor demand is positively related to real GDP, Price level, the lagged period of the employment, and inversely related to real wages. Moreover, the study showed that the elasticities of all variables are inelastic.

The Economic Model and Methodology

The economic theory reveals that demand for labor is a derived demand related to the demand for the good and services it produces. Moreover, the demand for labor is most likely treated as any other demand model in the economic theory literature and econometric literature as the number of labor demanded as the dependent variable and a set of major determinants as the independent variables.

The objective of the present research is to investigate the factors affecting employment in Jordan for the period 1980-2012 using the fully modified ordinary least square (FMOLS) approach. The FMOLS approach was proposed by Philip and Hansen (1990) to provide optimal estimates of Co-integration regression. The basic idea of the FMOLS approach is to account for the serial correlation and test for the endogeneity in the regressors that result from existence of cointegrating relationship.

Based on the economic and econometric literature, the labor demand function takes the following model is estimated by fully modified ordinary least square approach (FMOLS):

$$L = F(GDP, FDI, OPEN) \quad (1)$$

- L is the labor force has been expressed by the number of employees.
- GDP is expressed by the real domestic product RY.
- FDI is the real foreign direct investment RFDI.
- OPEN is real value of ratio of total foreign trade to GDP.

Taking the logarithmic form of the real variables, the relationship is written as follows:

$$\ln L = \alpha_0 + \alpha_1 \ln RY + \alpha_2 \ln OPEN + \alpha_3 \ln RFDI + \varepsilon_t \quad (2)$$

Employment level (L): is the dependent variable measured as the number people employed on the annual basis.

Gross Domestic Product: GDP reflects the effect of demand for goods and services on the demand for labor. It can be defined as approximation of the value of all goods and services produced in Jordan on the annual basis. It is expected that GDP exerts a positive impact on labor demand.

Foreign Direct Investment: FDI is defined as direct investment in productive assets by the company established in foreign country. It is well established that foreign direct investment would have a positive impact on the labor demand.

Trade Liberalization (Openness): open is the dependent variable defined as the ratio of the value of the total foreign (exports + imports) to the GDP. It is expected that trade openness would have a positive effect on labor demand.

The research methodology employs the aggregate annual data spanning from 1980 to 2012 obtained from Central bank of Jordan. The data on the independent variables were converted to real values by the consumer price index, CPI, (2006=100).

Empirical Results

The Unit Root Test Results

It is suggested that when dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on another time series variable using the Ordinary Least Squares (OLS) estimation, can obtain a very high R^2 although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, it is recommended that stationarity (unit root) test is carried to test for the order of integration.

Dickey and Fuller (1981) developed an approach for testing the existence of unit root in the time series. The objective of applying the Augmented Dickey-Fuller unit root test (ADF) for individual series included in the model is provide evidence as to whether or not the variables used in the regression process are stationary and to indicate the order of integration.

Table (3) reports the results of the unit root test (ADF) for the variables for their levels and at the first-difference. The Akaike Information criterion (AIC) determines the lag number that is required to eliminate the serial correlation in the residuals, and hence make the error term white noise.

As shown in table (3) the ADF results indicate that the null hypothesis of a unit root cannot be rejected for the given variables at 5% significant, and hence, the variables are non-stationary at their levels.

Table (3): The results of the ADF test

Variable	level			First-difference		
	ADF	C.V 5%	AIC	ADF	C.V 5%	AIC
LEMP	-0.939	-2.957	0	-4.744*	-3.967	0
LRGDP	1.214	-2.9678	3	-3.6747*	-3.6647	0
LRFDI	-0.9051	-2.9601	1	-6.0761*	-3.6701	1
LOPEN	0.0689	-2.957	0	-5.419*	-3.6617	0

*SIG. at 1%

However, the results revealed that the ADF value is greater than the critical t-value at 95% level of significance for all variables in the first-differenced data. Based on these results, the null hypothesis that the series have unit roots in their first-differenced is rejected, and the variables are integrated of first order, I(1).

Cointegration Results

Following the unit root test results shown in table (1&2) which indicate that the time series variables are integrated of order one I(1), the next step is to examine whether or not there is at least one linear combination of the variables that is integrated of order zero, I(0), and hence, if there exists a stable and non-spurious cointegrated relationship in the long run between time series variables (Miguel, 2000).

The Johansen approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order. The Johansen's maximum likelihood test based on maximal eigenvalue of stochastic matrix and the trace of the stochastic matrix are shown in table (4). Both tests confirm the existence of a long-run equilibrium relationship between the variables.

Table (4) provides the trace test statistics of the null hypothesis ($r=0$) of no cointegration vector against the alternative hypothesis ($r=1$) of one cointegrating vector. The trace tests statistic suggest that there are three cointegrating vectors.

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.701762	84.08009	47.85613	0.0000
At most 1 *	0.581728	47.78420	29.79707	0.0002
At most 2 *	0.511307	21.63550	15.49471	0.0052
At most 3	0.005148	0.154854	3.841466	0.6939

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values

Similarly, one can infer the number of cointegration vectors based on eigenvalue test statistic. As can be seen from table (5), it points out that there are three co-integrating vectors.

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.701762	36.29589	27.58434	0.0030
At most 1 *	0.581728	26.14870	21.13162	0.0090
At most 2 *	0.511307	21.48064	14.26460	0.0031
At most 3	0.005148	0.154854	3.841466	0.6939

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level. L **MacKinnon-Haug-Michelis (1999) p-values

The Long-Run FMOLS Results

Since the model variables are cointegrated, they can be presented by long-run FMOLS estimate of equation 1. The Fully Modified Ordinary Least Square method (FMOLS) was originally proposed by Phillip and Hansen (1990). The method employs the semi-parametric correction to eliminate the long-run correlation between the cointegrating equation and the innovations. Table (6) reports the estimated results of the FMOLS approach.

According to the Fully Modified Ordinary Least Square (FMOLS) results, all variables are having positive and significant impacts on labor demand, moreover, it can be seen that adjusted R^2 value is 0.704 indicating a good fit. The real Gross Domestic Product variable (LRGDP) exerts a significant positive impact on labor demand (employment). The result suggests that a 10% increase in the real GDP will increase the employment level by 7.2%. This result emphasizes the important role of economic growth in reducing

unemployment rate in Jordan. The real FDI variable has positive and significant impact on employment, where a 10% increase in the FDI inflow increases employment by 0.43%.

Table (6): Fully modified ordinary least squares (FMOLS) Regression Results.

Dependent Variable: LEMP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRGDP	0.717242	0.057295	12.51849	0.0000
LRFDI	0.042911	0.011982	3.581248	0.0013
OPEN	0.227683	0.113148	2.012263	0.0539
C	-4.511757	1.244341	-3.625820	0.0011
R-squared	0.733005	Mean dependent var		13.55567
Adjusted R-squared	0.704398	S.D. dependent var		0.383376
S.E. of regression	0.208439	Sum squared resid		1.216508
Durbin-Watson stat	0.269428	Long-run variance		0.009764

However, the trade openness shows a considerable significant positive impact on employment, whereas as 10% increase in the trade value causes a 2.27% increase in employment. According to Chang *et al.* (2005), trade openness promotes the efficient allocation of resources through comparative advantage, allows the dissemination of knowledge and technological progress, and encourages competition in domestic and international markets. This implies that openness is expected to have a positive impact on export growth.

Conclusion

Jordan labor has experienced excess demand for labor during the late seventies and early eighties of the 20th century due the increased demand for labor in the Gulf region. However, starting from the mid eighties Jordan labor started to experience excess supply and hence increasing unemployment rate which reached around 13% in 2012. The objective of this research was to investigate the impact of macroeconomic variables on employment in Jordan labor market for the period 1980-2012 using the Fully Modified Ordinary Least Square (FMOLS) approach.

The major empirical findings revealed that all time series variables as indicated by ADF test were integrated of order one, I(1). Moreover, the Johansen cointegration test approach confirmed that the time series variables were cointegrated, and hence, there existed a long-run equilibrium relationship between the time series variables.

The empirical results indicated positive and significant impact of all included variables (GDP, FDI, and trade openness) on employment level, and real GDP impact on employment level was very substantial.

The present paper recommends that policy makers can build economic strategy to increase employment and hence reducing unemployment problem by promoting economic growth. Another economic policy is the attraction of the Foreign Direct Investment and trade openness by exploring their major determinants.

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