The Impact of Economic Sanctions and Oil Price Fluctuations on Labour Force: A Case Study from the North African*

Abstract

No empirical research exists that examines the impact of oil prices and economic sanctions on the Libyan and non-Libyan labour force. This study fills this gap by examining the links between fluctuating oil prices, economic sanctions and the labour force in the Libyan economy, using a multiple regression model and the Johansen approach to cointegration.

One of this paper's key findings is that fluctuating oil prices and economic sanctions have strongly affected both the Libyan and non-Libyan labour force. The periods of sharp decline in oil prices (1983–1998) and economic sanctions (1990–2003) had a negative impact on the movement of skilled non-Libyan labour. This resulted in a huge loss of this type of labour, which is almost impossible to replace in the short term. It could also negatively affect various other sectors in the country, such as oil production and industry, among others.

Our cointegration results show that the Libyan labour force is significantly cointegrated in the long term with fluctuating oil prices. However, there is no evidence of cointegration between the non-Libyan labour force and fluctuating in oil prices. This paper also discusses and reports on certain policy implications in regard to multinational companies and local government, and comments on fluctuating oil prices and economic sanctions.

JEL classification: C22, E20, E30.

Key words: economic sanctions, oil prices, labour force, cointegration, Libya.

* Jan Whitwell and Quality Assured

Introduction

Since the 1970s, research on oil shocks has focused on the relationship between oil prices and various macroeconomic variables, such as GDP, employment, investment and so on. The literature in this area is extensive (including Hamilton, 1983, 1985, 1988; Mork, 1989; Huntington, 1998; Tatom, 1988, 1993; and Brown and Yucel, 1999, among others), and according to these authors, the impact of oil price fluctuations on economic activity can be statistically estimated, measured and classified.

Hunt and others (2002) point out that high oil prices can exert a significant influence on economic activity through different channels, including the labour market. However, many researchers focus to evaluate the impact of oil price fluctuations on employment (such as Evangelia, 2001; Brown and Hill, 1988; Iledar, 2004; Gil-Alan, 2003, 2006; Keane and Prasad, 1996; Davise et al., 1997). Evangelia (2001) applied a VAR approach to assess the impact of oil price shocks on economic activity in Greece. The results show that oil shocks essentially affected economic sectors and employment.

Brown and Hill (1988) examined the long-term relationship between oil prices and employment in the US. Their main findings indicate that the regional distribution of employment there was deeply affected by the sharp declines in oil prices in late 1985 and early 1986. In other words, a sharp decrease in oil pieces has a significant impact on the redistribution employees across states, and many states will suffer sizable employment losses in the long term.

Keane and Prasad (1996) attempted to determine the effects of fluctuating oil prices on employment and wages at both aggregate and industry levels in the US economy. The

empirical results of this study show that oil prices negatively affect real wages at the aggregate level. Fluctuations in oil prices also resulted in changes in employment shares and relative wages across industries. This study concludes that there is little evidence that a higher oil price would *not* affect the employment rate at the aggregate level in the longer term.

Iledar and Olatubi (2004) evaluated the impact of changes in oil prices on the states in the Mexican Gulf, and the main results of their VAR technique indicate that oil prices are positively correlated with the rate of unemployment in all states there.

Davise and others (1997) attempted to quantify the contribution of various factors in order to determine the regional fluctuation in the labour force in the US during the period 1956–1992. This study confirms that the unemployment rate and employment growth are significantly affected by fluctuating oil prices. Gil-Alan (2003) applied a fractionally cointegrated technique to examine the relationship between the real oil price and unemployment in Australia, and concludes that the real oil price and unemployment are fractionally integrated.

More recently, Gil-Alana (2006) applied a fractionally cointegrated approach to assess the relationship between unemployment, interest rates and real oil prices in the UK. They found evidence that the three time series are fractionally cointegrated. Ferreira and Aguirre (2004) investigated the long-term relationship between oil prices, unemployment and interest rates in Brazil. The empirical results of their cointegration technique confirm that the sharp decline in oil prices resulted in an increase of 1.6 per cent in the unemployment rate.

Disagreement abounds regarding the transmission mechanism that operates to determine the interaction between oil prices and economic growth. Many researchers argue that the impact of fluctuations in oil prices on economic activity is overstated than previously expected. Therefore, most previous studies could be misleading in their estimations of the impact of fluctuating oil prices on economic activity (Lee, 1995; Hooker, 1996; Abeysinghe, 2001).

However, Hamilton (1996) re-examined the relationship between oil prices and macroeconomic variables and confirms that the correlation between changes in oil prices and macroeconomic indicators in the US is statistically significant. Moreover, Hamilton (2003) also attempted to determine which is the better model to assess the impact of fluctuating oil prices on economic activity, and concludes that a nonlinear model is superior for forecasting, and suggests using dummy variables for exogenous supply shocks.

The majority of previous studies focus on the effect of oil prices on aggregate employment. This study provides new evidence on both aggregate and disaggregates levels. While previous studies focus on aggregate data, our empirical findings are disaggregated thus:

(i) We examine the impact of fluctuating oil prices and economic sanctions on the Libyan labour force. It is important to know whether fluctuating oil prices and economic sanctions exert a significant impact on local labour.

(ii) The second part of our study evaluates the impact of changes in oil prices and economic sanctions on the foreign labour force in Libya.

By investigating the interaction of oil prices, economic sanctions and the non-Libyan labour force, we hope to shed some light on the effect of oil prices and economic sanctions on foreign workers in Libya. Further, it will allow us to draw a clear picture of the government's role in supporting (or not) non-Libyan workers — either regarding fluctuating oil prices or the economic stability of the country.

Having reviewed the literature and empirical studies in both developed and developing countries in regard to oil prices, economic sanctions and labour forces, the rest of the paper is structured as follows. Sections 2 and 3 briefly review the relationship between oil prices, economic sanctions and the labour force in the Libyan economy. Section 4 discusses the methodology and reports the empirical findings. Section 5 examines the long-run relationship between the Libyan labour force and oil prices. The final section presents a conclusion and some policy implications.

A Brief Review of Economic Sanctions, Oil Prices and the Labour Force in Libya

The Socialist People's Arab Jamahiriya [†] is a small oil-producing developing economy in the Middle East, and its economy is heavily dependent on oil revenues. Libya plays an important role as a member of OPEC in the supply of oil to the world market. [‡] Geological factors, such as the location of onshore oil fields close to Europe, the flow of oil toward the sea and the ease of drilling, have helped Libya to produce oil relatively cheaper than many other oil producers. The central geographical location of Libya, between the developed economies in the West and the growing economies of North Africa, has also

[†] The name of the state has changed many times. However, it has been officially called the "Socialist People's Libyan Arab Jamahiriya" for the last two decades (Bakar and Russell, 1999).

[‡] The Organization of Petroleum Exporting Countries (OPEC) was established in September 1960, and Libya has been a member since June 1962. See: http://www.opec.org/aboutus/history/history.htm

meant comparatively lower transport costs, and increased the significance of the Libyan oil market (World Bank, 1994).

In 2006 Libya produced approximately 1.7 million barrels of oil per day, or around seven per cent of the oil produced by all OPEC members. Libyan oil reserves were estimated at approximately 41.5 billion barrels (five per cent of OPEC members' reserves) at the end of 2005 (OPEC, 2005 and 2006).

Conditions in the Libyan economy worsened in the 1990s as result of international sanctions (Security Council, 2003).[§] Since the freezing of the UN's sanctions in 2003, Libya has rejoined the international community and has been implementing measures to reform and open up its economy, but progress in developing a market economy has been slow and erratic. Libya needs strong and sustained economic growth to meet the needs of its rapidly growing labour force, which requires high investment in physical and human capital and a more efficient use of the country's recourses. However, Fluctuating oil prices will affect the achievement of these objectives.

The Libyan government during the early 1980s implemented the policies of reducing imports; and decreasing the number of foreign workers (Altunisik, 1996, p. 50). The Libyan government has forcibly introduced austerity policies, rather than structure reforms in order to overcome the fiscal crisis (Altunisik, 1996).

Several researchers have analysed the impact of fluctuations in oil prices on the economic growth and performance of oil producers in the Middle East and North Africa

[3] The Libyan economy suffered for an extended time from strong economic sanctions imposed by the US (for example, during the 1980s, which were re-enforced in the 1990s), the UK in 1984 and also by the UN in 1992. See Bahgat, 2004.

(Balassa, 1978; Metwally and Tamaschke, 1980; Balassa, 1985; Metwally, 1991; Basu and Mcleod, 1992; Metwally, 2004). According to these authors, two major oil shocks have affected the world economy in general and members of OPEC in particular. The first major oil shock occurred after the oil embargo of 1973. The disturbances of the oil supplies by the Arabs in 1973 caused prices to rise significantly. After 1973, Middle East oil producers enjoyed high oil revenues, which lasted for almost a decade.

The second oil shock took place in 1981. World oil demand fell, because of the combined effects of the world recession, fuel switching and energy conservation. The price of oil fell dramatically and oil producers suffered huge revenue losses. Demand only returned to normal levels in the 1999s, but prices stabilised at much lower levels than during the boom years. Prices started rising sharply in 2003 and peaked in August 2006 (over $US68.8 per barrel — see OPEC, 2006).

The Libyan economy was severely affected by oil price fluctuations because of its heavy dependence on oil revenues. Several researchers have examined the impact of oil price fluctuations on economic growth and the performance of the Libyan economy (Yahay, 1980; Abohobiel, 1983; Abosedra, 1984; Keibah, 1987; Al-Abbasi, 1991). Yahay (1980) studied the labour migration determinants between two groups of Arabic countries. The first group was defined as being labour rich (for example, Jordan, Egypt and so on), while the second group was defined as oil rich (for example, Libya and Saudi Arabia). The empirical results of Yahay's studies show that oil revenue and destination income both have a strong impact on labour migration.

Abohobiel (1983) constructed a macroeconomic model for the Libyan economy in order to determine the major macroeconomic variables that could lead to economic growth or maximise GDP, using quarterly data over the period 1962–1977. The model's main components were: final expenditure, foreign trade, balance of payment, the labour market, money supply and certain dummy variables. His main finding is that the most important variable that determines GDP growth in Libya is oil exports, while the taxation system is deemed insignificant in determining GDP growth.

Abosedra (1984) examined the impact of changes in oil prices on Libya's economic activity over the period 1962–1979. The model's main components were: government expenditure, terms of trade, employment markets and the money market. The model also employed lags for several variables. The empirical results indicate that fluctuations in oil prices in the world market have a significant impact on government expenditure and the money supply.

Keibah (1987) investigated the labour market in Libya over 1964–1983, using an equilibrium and disequilibrium model. He concludes that the shortage of labour in Libya allowed the proportion of foreign workers from different regions to increase sharply during the period under investigation.

Al-Abbasi (1991) examined the hypothesis that the instability of oil exports by oil-based economies in Middle Eastern countries (for example, Libya, Saudi Arabia and Kuwait) exerted a significant impact on the neighboring labour-exporting economies (for example, Yemen, Jordan and Egypt) during the period 1970–1986. The empirical results of this study indicate that a decline in oil exports has a significant impact on oil exporting economies, and negatively affects investment, government expenditure and GDP in the oil-

based economies. Al-Abbasi (1991) also concludes that the labour-exporting economies benefit from the workers' remittances transferred from the oil-producing nations.

Libyan Population and Labour Force

Table 1 reports the composition of the Libyan population over the period 1972–2005, and shows that it increased from 2.15 million persons in 1972 to 6.1 million in 2005. The growth rate of the Libyan population was estimated at 4.1 per cent during the period 1975–1995 (UN, 1993; 1998). Table 1 also reveals that Libyan's dependence on expatriates to conduct its economic activities declined sharply over the last four decades. This is because the Libyan fertility rate is one of the highest among OPEC members, after Saudi Arabia and Iraq (UN, 2000).

Oil price rises have attracted much attention from expatriates. During the eight years of the oil boom (1972 to 1980), the number of expatriates living in Libya increased by approximately 50,000 per annum. During the 18 years of oil revenue depreciation (1980–1998), the number of expatriates living in Libya declined by approximately 5,000 per annum. Despite oil price rises since 1999, the number of Libyan expatriates continued to decline (by approximately 20,000 per annum) due to the devaluation of the Libyan local currency (from over $US3 per Libyan dinar to less than $US1) and through government policies applied since 1999 (IMF, various years).

Table 1 Libyan Population

Year	1972		1980		1998		2005	
Total Population (thousand persons)	2,150		3,245.8		5,060		6,1	
Nationals	1,888	(87.8)	2,804.6	(86.)	3,957	(89.4)	5,321	(93.8)
Expatriates	262	(12.2)	441.2	(13.5)	511	(10.1)	349	(6.1)

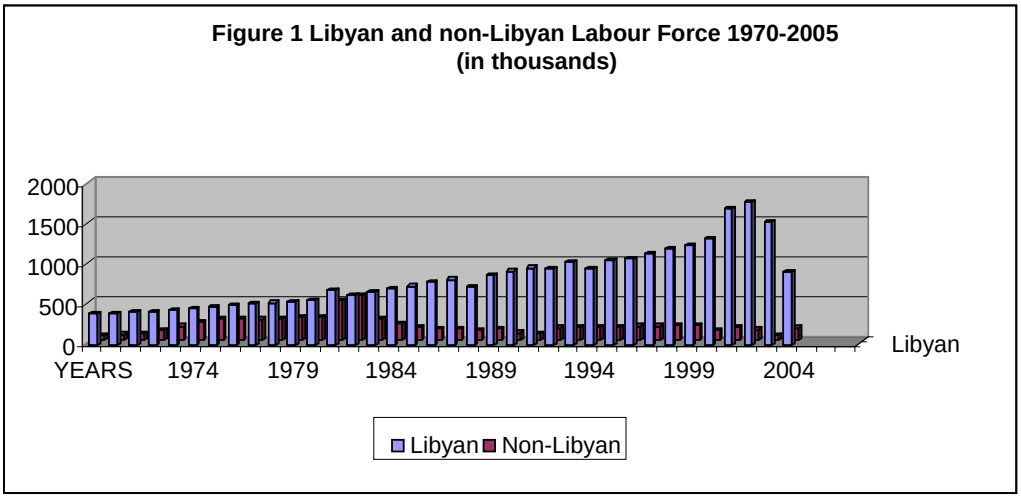
Note: figures in parentheses are percentages of total population.

Based on: National Authority for Information and Documentation, statistical yearbook (various issues); Ministry of planning, 1995, economic and social indicator 1970-1994, Tripoli; Arab League: Statistical Abstract for Arab Countries (various issues); Bhairi, 1981.

The discovery of oil and an increase in oil revenue in the 1970s, combined with an inadequate labour supply forced the government to attract foreign workers. Thousands of international employees were engaged in Libya over the period 1970–1990. However, the number of foreign employees sharply declined during the 1990s, due to the sharp decline in oil prices, as well as economic sanctions imposed by the UN on Libya.

Figure 1 details the participation of foreign workers in the Libyan labour market over the period 1970–2005. The number of foreign employees increased from 50,000 in 1970 to 280,000 in 1980 due to an increase in oil revenues. Following the sharp decline in oil prices, the participation of foreign employees dropped to 13 per cent. In 1990 the proportion of non-Libyans in the labour force was steady at 13 per cent until 2003.

> Libyan citizens represent about 13 per cent of the labour force in the private sector, and 87 per cent in the public sector (National Authority for Information and Documentation, 2005).



Based on references as indicated in footnote 4.

Methodology

This study uses data covering the period 1970–2005, which was obtained from various local, regional and international sources,[**] to analyse the impact of economic sanctions and fluctuations in oil prices on the labour market in Libya. The analysis focuses on the periods of various fluctuations in oil prices: 1972–1982, 1983–1998, 1999–2005, and the whole period of 1970–2005.

No empirical research exists on the impact of oil prices and economic sanctions on the Libyan and non-Libyan labour force. Neither are there extant empirical studies that investigate the long-run relationship between oil prices and the labour force in the Libyan economy. This study has two main objectives:

[**] Data related to the labour force were collected from: Libya: Ministry of planning, 1995, economic and social indicator 1970- 1994, Tripoli; Central Bank of Libya, annual report, various issues. National Authority for Information and Documentation, 2005, statistical yearbook, Tripoli; Bhairi, 1981; Bl-Tammar, 2003 and IMF. 2006. The data regarding oil prices were obtained from OPEC, 2005 and 2006.

(1) To identify a model that allows us to determine the dynamic linkages between oil prices an economic sanctions and labour force in the Libyan economy.

(2) To apply the Johansen procedure, (Johansen and Juselius, 1990) in order to examine the long-run relationship between these variables.

Drawing on the existing literature and following Hamilton's recommendation (2003), we specified the following multiple regression models that allowed us to identify the impact of fluctuating oil prices and economic sanctions on the labour force in the Libyan economy.

$$LL_t = b_0 + b_1(Lp_t) + b_2(LL_{t-1}) + D_t + u_t \qquad (1)$$

$$LNL_t = b_0 + b_1(LP_t) + b_2(LNL_{t-1}) + D_t + u_t \qquad (2)$$

$$LT_t = b_0 + b_1(LP_t) + b_2(LT_{t-1}) + D_t + u_t \qquad (3)$$

Where LL_t represents the log of the local labour force in Libya, and Lp_t represents oil prices at constant prices (2000 = 100). The lagged dependent variable gives the equations a dynamic character, allowing for partial adjustment (or lagged affects), following Koyck's geometrically declining weight scheme (Ramanathan, 1992; Griffiths, Hill and Judge, 1993; Guiarati, 2003). LNL_t represents the log of the non-Libyan labour force in Libya, and the dependent variable LT_t represents the log of the total labour force in Libya. The error term in each equation is explained by u_t and the dummy variable D_t (as

suggested by Hamilton, 2003) measures the external shock of economic sanctions (where D_t = 1 during 1990–2003, and D_t = 0 otherwise).

The regression results for the three models are given in Tables 2, 3 and 4. However, as shown in these tables, the three equations are well fitted, as evident from the values of R^{-2} and the "t" statistics (shown on parentheses under each coefficient). The Durbin "h" statistic was measured in periods of more than 30 observations (Gijarati, 2003; Wooldridge, 2006; Griffiths, Hill and Judge, 1993). However, during the period 1970–2005 the "h" statistic does not show any issues of serial correlation at the five per cent level of significance.

Table 2 Libyan labor force (in thousands) and oil prices (in real term $)
The model: $LL_t = b_0 + b_1(Lp_t) + b_2(LL_{t-1}) + D_t + u_t$

Period	$\hat{b}_0$	$\hat{b}_1$	$\hat{b}_2$	D1	R^{-2}	F	"h"
1972-1982	.85 -.58	.09 .17	.14 4*		.89	34	
1983-1998	2. 1.4	-.12 -1.7***	.73 3.7*		.85	39	
1999-2005	2.5 .68	-.64 -1.8***	.82 1.5		.46	1.74	
1970-2005	1.4 13.6	.043 1.6***	.75 11*	.20 3.2*	.94	170	1.6

Notes: ***, **,* indicate the t values at levels 10%; 5% and 1% respectively.

All coefficients carry the correct sign, and the coefficient of the variable LL_{t-1} lies between zero and one in all cases.

The data in Table 2 suggests that the coefficient of the variable Lp_t, which represents the oil prices in real terms, was statistically significant in all periods, with the exception of

the period 1972–1982. The significant lagged oil price variable suggests the existence of a partial adjustment mechanism in all cases, with the exception of the period 1999–2005. This finding can be explained by the relatively significant effect of the economic sanctions represented by the coefficient D_t, or it could be explained by the economic reforms applied by the government after these sanctions were frozen. The relatively higher value of the coefficient D_t in Table 2, in comparison with the data in Table 3, supports the substitution of foreign workers by local workers.

The regression results in Table 3 suggest that non-Libyan labour in the Libyan economy was growth driven during the boom period of 1972–1982 and in the whole period of 1970–2005. The coefficient b_1 indicates that an increase in oil price by one unit led to an increase in foreign workers by approximately 30,000. The lagged LNL_{t-1} variable (representing all lagged oil prices via Koyck's geometrically declining weight assumption) is statistically significant at least at one per cent and five per cent levels in all periods, with the exception of the period 1999–2005. Accordingly, it can be said that non-Libyan workers benefited from opportunities generated by increases in oil prices during the boom periods. The coefficient of the D_t variable that represents the impact of economic sanctions imposed by the international community (UN) is statistically significant at least at the five per cent level. This indicates that approximately 19,000 foreign workers were substituted by 20,000 domestic workers each year during the sanction period. In other words, more than 65 per cent of the fluctuation in the non-Libyan labour force can be explained by economic sanctions, fluctuating oil prices and lagged oil prices.

Table 3 Non-Libyan Labor force (in thousands) and oil prices in real term ($)

The model: $LNL_t = b_0 + b_1(LP_t) + b_2(LNL_{t-1}) + D_t + u_t$

Period	$\hat{b}_0$	$\hat{b}_1$	$\hat{b}_2$	D1	R^{-2}	F	"h"
1972-1982	1.8 2.7	.31 1.7.***	.55 2.9*		.91	42	
1983-1998	1.5 1.8	-.007 -.028	.68 3*		.65	12	
1999-2005	6.5 1.3	-.48 -.41	-.15 -.22		.044	.09	
1970-2005	2. 3.9	.29 1.9***	.53 4.2*	-.19 -1.8***	.68	22	1.8

Notes: ***, **,* indicate the t values at levels 10%; 5% and 1% respectively.

Table 4 represents the regression results of the total impact of fluctuating oil prices on the labour market in Libya. These results suggest that the coefficient LP_t, which represents the impact of fluctuating oil prices on the total of labour force in Libya, was statistically significant at least at the 10 and five per cent levels in all cases.

Table 4 Total Libyan labour force (in thousands) and oil prices in real $

The model: $LT_t = b_0 + b_1(LP_t) + b_2(LT_{t-1}) + D_t + u_t$

Period	$\hat{b}_0$	$\hat{b}_1$	$\hat{b}_2$	D1	R^{-2}	F	"h"
1972-1982	1.3 .83	.11 1.6***	.78 3.*		.87	28	
1983-1998	1.7 1.4	-.10 -2.2**	.77 4.5*		.68	14	
1999-2005	2.8 .75	-.52 -1.6***	.74 1.4		.45	1.65	
1970-2005	1.8 3.8	.077 1.7***	.18 8.7*	.18 2.8*	.90	102	1.3

Notes: ***, **,* indicate the t values at levels 10%; 5% and 1% respectively.

The significant lagged oil price variable suggests the existences of a partial adjustment mechanism in all cases, with the exception of the period 1999–2005. This could be mainly explained by the fact that the fluctuation in the labour market in this period is related more to economic sanctions, rather than to oil prices; or, it may be explained by the process of economic reform which took place in 1999.

Long-Term Relationship between the Libyan Labour Force and Oil Prices

This section examines whether there is a long-term relationship between oil prices and the labour force in the Libyan economy. If such a relationship exists, then the two variables may not drift too far apart from each other over time. In other words, there may be evidence of cointegration between the two variables. This could imply that growth in the labour market in Libya is simply a reflection of fluctuating oil prices. However, if there is no evidence of cointegration, the relative magnitude of the Libyan labour force could be increased or decreased over time due to reasons such as the devaluation of the local currency, economic sanctions or government policies.

This section utilizes the cointegration procedure to examine the long-term relationship between the labour force in Libya and oil prices. According to Engle and Granger (1987), two variables will be cointegrated if they have a long-term relationship or equilibrium. Thus, if a long-run relationship exists, the two variables must form a unique cointegrating vector.

In order to test for cointegration, and in particular, to investigate whether a unique cointegrating vector can be identified, this study applied the maximum likelihood estimation technique developed by Johansen (1988) and Johansen and Juselius (1990). This approach does not have the well-documented drawbacks of the Engle and Granger (1987) approach to cointegration, and can be used in a multivariate setting to establish the numbers of distinct counteracting vectors (Ng and Perron, 1997).

The first step in conducting this approach is to test for the order of integration of each variable included in the model. The common practice is to apply the augmented Dickey-Fuller test (ADF) given by the following equation for variable Z.

$$\Delta Z_t = \alpha_1 + \alpha_2 t + \rho\, Z_{t-1} + \rho_1 \sum_{i=1}^{k} \Delta Z_{t-i} + \varepsilon_t \qquad (4)$$

Where, ε_t is an error term (Dickey and Fuller, 1979; Dickey and Rossana, 1994).

The cumulative distribution of the ADF test statistic is provided by Mackinnon (1991). If the calculated (absolute) statistic is greater than its critical value, then Z is said to be stationary or I(0) (Gujarati, 2003).

Table 5 reports the results of the augmented Dickey-Fuller test. The estimation is based on 36 observations for the period 1970 to 2005. The augmented Dickey-Fuller regressions include an intercept and a linear trend.

Table 5 Unit Root Test of Various Components of Labor Market in the Libyan Economy 1970-2005

Variable	ADF		5% Level
	Level	1st Diff	
LL	-1.541460	-4.028337	-2.948404
LNL	-2.769857	-5.269445	-2.948404
LT	-2.271860	-3.345250	-2.948404
LP	-2.326194	-5.729706	-2.948404

It is clear that the calculated (absolute) statistics are greater than the critical value for the variables representing LL, LNL, LT and LP only for the differenced variables. This indicates the non-stationary nature of these variables at that level, and shows that the variables have become stationary after being differenced once. Thus, the variables are

integrated of order one I(1). This fact enables us to conduct the cointegration analysis (Johansen, 1990). This result suggests a maximum likelihood estimation procedure which provides two test statistics for determining the number of cointegrating vectors which could exist among a set of variables.

The trended case, with a trend in DGP, which has higher critical values, was considered in this analysis (Wickens, 1996; Wooldridge, 2006). The first step was to specify a lag length for the VAR, on the basis of the likelihood ratio test. In order to test the sensitivity of the results for choice of lags, we tried different lag orders. According to our annual data, the method was applied using one, two, three and four VAR lags. However, the two and three lags produced the best results, which are reported in Table 6.

Table 6 reports the cointegration results for the long-term relationship between the Libyan labour force and oil prices.

Table 6 Johansen-Juselius Co integration results between Oil Prices and Labor Force in Libyan Economy 1970-2005.

variable	Null	Alternative	λ =MAX		C. Value		TRACE		C. Value	
			2-lag	3-lag	95%	90%	2-lag	3-lag	95%	90%
LLI	r=0	r=1	15.69	24.60	18.33	16.28	21.66	32.64	23.83	21.23
	r<=1	r=2	5.96	8.03	11.54	9.75	5.96	8.03	11.54	9.75
LNLI	r=0	r=1	11.35	10.08	16.28	18.33	18.9	13.63	23.8	21.23
	r<=1	r=2	7.63	3.54	11.54	9.75	7.63	3.54	11.54	9.75
LTOT	r=0	r=1	22.78	18.55	18.33	16.28	29.68	28.40	23.83	21.23
	r<=1	r=2	6.89	9.85	11.54	9.75	6.89	9.85	11.54	9.75

Notes: (1**)** Co integration with unrestricted intercepts and unrestricted trends in the VAR
(2) 36 observations from 3 to 36 and 4 to 36.
(3) r =Number of co integration vector

The results in Table 6 show that the LR tests based on the maximal eigen value of the stochastic matrix and the trace of the stochastic matrix suggest that the null hypothesis of no cointegration is strongly rejected in the cases of variables LL and LT by both the λ-max

and the trace test at the five per cent level. In contrast, the null hypothesis of no cointegration between oil prices and the non-Libyan labour force cannot be rejected by both λ-max and trace tests, indicating the lack of cointegration between two variables.

Furthermore, as shown in Table 6, the results are quite sensitive to the choice of lags in all cases, with the exception of non-Libyan labour. The finding of no long-run relationship between oil prices and the non-Libyan labour force can be explained by the fact that increasing or decreasing the number of foreign employees in the Libyan economy is subject to the political stability there, reflected in government caps, rather than fluctuating oil prices. This could be explained by the small proportion of foreign workers in Libya, or the strong effect of economic sanctions imposed during 1992–2003. This finding also supports the conclusions reached by Keibah (1987) and Bhairi (1981): that the shortage of labour in Libya allowed the proportion of foreign workers from different regions to increase sharply during the oil boom of 1972–1982.

Conclusion and Policy Implications

This study was motivated by the need for an in-depth empirical analysis determining the impact of fluctuating oil prices and economic sanctions on the labour market in Libya. We used a specified multiple regression model and cointegration procedure analysis to examine the relationship between these variables, and to identify whether this relationship exists in the long term.

Our results from the regression models suggest that oil prices exert a significant impact on the labour market in Libya. Oil prices positively affected Libyan and non-Libyan labour during the period 1972–1982. Oil prices also negatively affected the labour market in

Libya during the recession period 1983–1998. The significance of the lagged oil prices also suggests the existence of a partial adjustment mechanism in all cases.

The dummy variable, which represents external shocks, suggests that economic sanctions have negatively affected non-Libyan workers. As a result, around 20,000 local workers replaced 18,000 foreign workers. The Johanson-Juselius approach of cointegration also suggests the existence of a long-run relationship in the case of local labour and the total labour force in Libya.

Our results show that there is no evidence of a long-term relationship between oil prices and the amount of foreign labour in Libya. This finding can be explained by the fact that the number of foreign workers was subject to government caps and economic sanctions imposed on the country during the 1990s.

Some key policy implications regarding the fluctuations in oil prices and economic sanctions can be summarised as follows:

1. Libyan policy makers should be aware that fluctuations in oil prices could have a severe impact on the movement of the labour force and result in a huge loss of skilled non-Libyan labour. Therefore, Libyan authorities should plan for such losses' impact on certain economic sectors. This might include training and educating the local labour force through government and private sector programs, in order to replace the shortage of skilled foreign labour.

2. Our results indicate that economic sanctions, fluctuations in oil prices and instability in the Libyan economy have had adverse effects on the non-Libyan

labour force. Multinational companies could also suffer from the loss of skilled non-Libyan labour. Multinational companies should plan for such situations when considering operating in countries which are susceptible to economic instability and are heavily dependent on oil revenues.

References:

Abeysinghe, T. (2001). "Estimation of direct and indirect impact of oil price on growth." Economics Letters 73(2): 147.

Abohobiel, A. A. (1983), *an econometric model for the Libyan economy*, 1962-1977, Indiana University, US.

Abosedra, S. S. (1984), *a simulation study of the impact of the world oil prices on the development of the Libyan economy*. United States - Colorado, University of Colorado at Boulder.

Al-Abbasi, M. A. (1991), *the effect of oil revenues instability on the oil-based and labor-exporting economies: The case of the Arab region. United States* - Missouri, University of Missouri - Columbia.

Arab League, *Statistical Abstract for Arab Countries* (various issues), Cairo.

Altunisik, M. B. (1996), A Rentier State's Response to Oil Crisis: Economic Reform Policies in Libya**,** *Arab Studies Quarterly, 18(4):49*

Bahgat, G. (2004), "Oil Terrorism and Weapons of Mass Destruction: The Libyan Diplomatic Coup." *The Journal of Social, Political, and Economic Studies* 29(4): 373.

Balassa, B. (1985), "Export, Policy Choices and Economic Growth in Developing Countries After the 1973 Oil Shock." *Journal of Development Economics* 18: 23-35.

Balassa, B. (1978), "exports and economic growth." *Journal of Development. Economics*, 5: 181-189.

Basu, P. and D. McLeod (1991), "Terms of trade fluctuations and economic growth in developing economies." *Journal of Development Economics* 37(1-2): 89.

Bhairi, A. (1981), *Foreign Labor in Libya*, US, Oklahoma State University.

Bl-Tammar, A. (2003), I*nvestment of Labour force in Libya*, working paper, Al-Tahadi University, Sert, Libya, [in Arabic].

Brown, S. and M. yucel (1999), "Oil prices and US aggregate economic activity a quetion of non-linearity." *economic and financial review second quarter*: V.16.

Brown, s. and K. Hill (1988), "Lower Oil Price and State Employment." *Contemporary Policy Issues **6**(3): 60-68.*

Davis and Others (1997), "Regional Labor Fluctuations: Oil Shocks, Military Spending, and Other Driving Factors." *International Finance Discussion Papers.*

Dickey, D and W. A. Fuller, (1979), 'Distribution of the Estimates for Autoregressive Time Series with a Unit Root', *Journal of the American Statistical Association*, 74 (June): 427.

Dickey, D. A. and Rossana, R. J. (1994), 'Practitioners' Corner', Cointegrated Time Series:A Guide to Estimation and Hypothesis Testing, *Oxford Bulletin of Economies and Statistics*, 56: 325-53.

Engle, R. F. and C. W. J. Granger (1987), 'Co-Integration and Error Correction: Representation, Estimation and Testing', *Econometrics*, 55(March):143-159.

Esfahani, H. S. (1991), "Exports, Imports, and Economic Growth in Semi-Industrialized Countries." *Journal of Development Economics* 35(1): 93.

Evangelia, P. (2001), "Oil prices shocks, stock market, economic activity and employment in Greece." *energy economics* 23: 511-532.

Eswar and Michale (1996), "The Employment and Wage Effects of Oil Pric Changes: A Sectoral Analysis." *The Review of Economics and Statistics* 78(3): 389-400.

Ferreira, A. and A. Aguirre (2004), "Oil Prices and Unemployment: Empirical Evidence from Brazil." *Journal of Applied Economics* **8**(3): 401-11.

Gil-Alana, L. A. (2006), "UK Unemployment Dynamics: A Fractionally Cointegration pproach." *Economia Internazionale* **59**(1): 33-50.

Gil-Alana, L. A. (2003). "Unemployment and Real Oil Prices in Australia: a fractionally Co integration approach" *Applied Economics Letters* **10**: 201-204.

Gujarati, D. (2003), *Basic Econometrics*, (4th Ed), McGraw-Hill, New York.

Hamilton, J. D. (1983), Oil and the macro economy since world war II*, Journal of political Economy, 91(April):228-248*

Hamilton, J. D. (1985), "Historical causes of post war oil shocks and recessions." *The energy Journal*, 6(1): 97-116.

Hamilton, J. D. (1996) this is what happened to the oil price-macroeconomic relationship, journal of monetary economicas, V.38, PP.215-220

Hamilton, J. D. (1988),A Neoclassical Model of Unemployment and the Business Cycle, *Journal of Political Economy*, 96(June): 593-617

Hamilton, J. D. (2003), "What is an oil shock?" *Journal of Econometrics* 113(2).

Hooker, M. A. (1996), "What happened to the oil price-macroeconomy relationship?" *Journal of Monetary Economics* 38(2).

Hunt, B., P. Isard, et al. (2002), "The macroeconomic effects of higher oil prices, *National Institute Economic Review* 87(17).

Huntington, H. (1998), "Crude oil prices and U.S. economic performance: Where does the asymmetry reside?" *The Energy Journal* 19(4).

Iledare, O. and W. Olatubi (2004). "The Impact of Changes in Crude Oil Prices and Offshore Oil Production on the Economic Performance of US Coastal Gulf States." *The Energy Journal* 25(2): 97.

Johansen, S. (1988), 'Statistical Analysis of Cointegration Vectors', *Journal of Economic Dynamic and Control*, 12(July): 231-254.

Johansen, S. and K. Juselius (1990), "Maximum Likelihood Estimation and Inference on cointegration with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, 52: 169-201.

IMF, (2006), *The Socialist People's Libyan Arab Jamahiriya: Selected Issue-Medium- Term Economic Reform strategy, and Statistical Appendix*, Washington, D.C,

IMF: *International Financial Statistics Yearbook*, Various Issues, Washington, D.C.,

National Authority for Information and Documentation, statistical yearbook (various issues), Tripoli.

Keibah, M. S. (1987), *An Econometric Investigation of International Labour Migration of Equilibrium and Disequilibrium*, University of Leeds, UK.

Lee, K, S. Ni and R.A. Ratti. (1995), "Oil Shocks and the Macroeconomy: the rol of Price Variability." The Energy *Journal 16*(4): 39-56.

Mackinnon, J. J. (1991), '*Critical Values for Cointegration Tests' in Long-run Economic Relationships: Readings in Cointegration*, ed. R. F. Engle and C. W. Granger, Oxford, Oxford University Press, pp. 267-276.

Ministry of Planning. (1995), economic and social indicator 1970-1994, Tripoli.

Metwally, M. (2004), "Impact of Fluctuation in Oil Revenue on Investment in the GCC Countries." *Economia Internazionale* Lvii(2): 173-188.

Metwally, M, (1991), the effect of the oil boom on privet consumer expenditure in the Middle East and North Africa Countries, *Middle East business and economic review,3(1)*

Metwally, M. and R. Tamaschke (1980), "oil exports and economic growth in the middle east." *international review for social sciences* 33: 499-522.

Mahmud, M. and A. Russell (1999), An analysis of Libya's revenue per barrel from crude oil upstream activities, 1961-93, *OPEC Review*, 23(3).

Mork, k. a. (1989), "oil and macro economy when prices go up and down; an extension of hamilton`s results." *the journal of political economy* 97(3): 740-744.

Ng, S. and P. Perron (1997), "Estimation and Inference in Nearly Un- balanced Nearly Cointegrated Systems", *Journal of Econometrics*, 79: 53-81.

OPEC. (2006), Brief History, Available Online, http://www.opec.org/aboutus/history/history.htm

OPEC . (2006), *oil price Bulletin*, online available at http://www.opec.org/home/, retrieved on 01/04/07.

OPEC. (2004-2005), *Annual Statistical Bulletin*, online available at http://www.opec.org/home/, retrieved on 02/04/06.

Security Council. (2003), *Resolution* N: 1506, US. [In Arabic].

Tatom, J. A. (1988), "Macroeconomic Effects of the 1986 Oil Price Decline." *Contemporary Policy Issues* 6(3).

Tatom, J. A. (1993), "Are there useful lessons from the 1990-91 oil price shock?", 14(4): 129-150

United Nations, Human *Development Report*, (various issues)

Wickens, M. R. (1996), "Interpreting Cointegrating Vectors and Common Stochastic Trends", Journal *of Econometrics*, 74: 255-271.

Wooldridge, J.M. (2006), *Introductory Econometrics*, Thomson South- Western, UK

World Bank (1994). "*Adjustment in Africa: Reforms, results, and the Road Ahead*", Oxford University Press: Oxford.

Yahya, Hussein. (1980), Human Capital Migration from Labor-Rich Arab State to Oil-Rich Arab States and the Consequences for the Jordanian Economy, Oklahoma State University, US.