FACTORS INFLUENCING THE LIBYAN INVESTMENTS

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Abstract

This paper investigates the determinants of investment (expenditure on plant and equipment) in Libya using annual data over the period of 1970-2008. The importance of this study comes from the ability to show the relative important factors that impact the Libyan domestic investment. This understanding would give indications to decision makers on which policy they must focus to stimulate investment. An Autoregressive Distributed Lag (ARDL) modelling process is employed to investigate the impact of the Gross Domestic Product (GDP), Monetary Base (MB) and trade openness on domestic investment in Libya, Our results reveal that there is a equilibrium relationship between investment and its determinants. The results of this study indicate that GDP and monetary base largely explain the pattern of investment in Libya. A stability test suggested that the estimated parameters do not suffer from structural instability. The findings and recommendations provide vital information relevant for policy formulation and implementation aimed at improve investment in Libya.

Keywords: cointegration, domestic investment, ARDL, bounds test, Libya

1   INTRODUCTION

Investment is defined by the International Monetary Fund (IMF) as the summation of gross fixed capital formation and increase (decrease) in stocks. To finance investment required for economic growth, the economy needs to generate sufficient saving or it should borrow from abroad. However, borrowing from abroad may not only have adverse effects on the balance of payments as these loans will have to be serviced in the future but it also carries a foreign exchange risk.

As capital formation is an important factor in economic growth, countries that were able to accumulate high levels of investment achieved faster rates of economic growth and development. The effects of investment on economic growth are two-fold. Firstly, demand for investment goods forms part of aggregate demand in the economy. Thus a rise in investment demand will stimulates production of investment goods which in turn leads to high economic growth and development. Secondly, capital

formation improves the productive capacity of the economy in a way that the economy is able to produce more output. Also investment in new plant and machinery raises productivity growth by introducing new technology, which would also lead to faster economic growth. (Ipumbu 1999)

The main purpose of the study is to investigate the short and long run effects of various macroeconomics variables on domestic investment in Libya as one of the developing economies that seeking to encourage domestic investment as well as enhancing the performance of its economy.

The reminder of the paper is organized as follows: section 2 reviews Libyan economic background. This is followed by the relevant theoretical and empirical consideration. Section 4 provides econometric method. Section 5 contains data description and empirical results. Finally, the last section contains the conclusion remarks.

2   BACKGROUND OF THE LIBYAN ECONOMY

Libya's development relies on a number of positive factors such as its abundance of oil and gas resources, its young and relatively small population (5.8 million of inhabitants) and a very useful geographical location between Europe, Africa and the Arab countries of the Gulf. Since 2003, the government wants to make of Libya a full market economy. The economy of Libya depends largely upon revenues from the oil sector, which contribute practically all export earnings. These oil revenues have allowed the government to accumulate gross official reserves worth 115 billion Libyan Dinar (L.D.) Oil production is 643.6 million barrels in 2008. Following the suspension of the United Nations (UN) sanctions in 1999, Libya has been trying to increase its attractiveness to foreign investors and several foreign companies have visited Libya in search of business opportunities. Therefore, sufficient domestic saving is necessary for economic growth because it provides the domestic resources needed to fund the investment effort of a country.

In Libya, the nominal GDP grew up from 1.28 billion L.D. in 1970, to 8.2 billion L.D. in 1990, and reached 105.7 billion L.D. in 2008 with an average growth rate of 6.5 over the period of study (1970-2008).

It is interesting to show the public investment behaviour in the country during this period, as can be seen in Figure 1, the general trend of aggregate investment exhibits upward trend, it grew at lower rates till 2000 from when it is on a high growth path. On the other hand the aggregate investment increased from 242.7 million L.D. in 1970 to 1135 million L.D. in 1990 and reaching a peak of 14515 million L.D. in 2008.
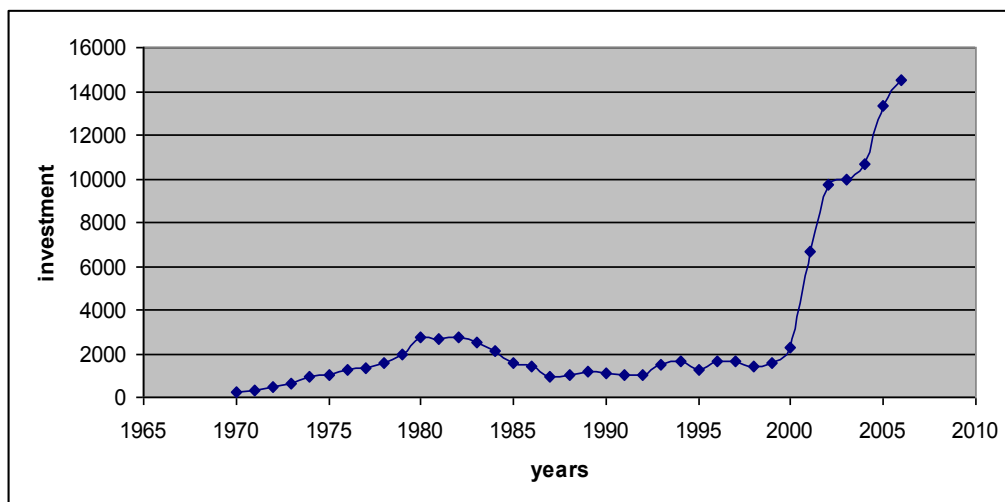
Figure 1 Aggregate Investment Trends in Libya 1970 - 2008

3   MODEL AND DATA ISSUE

3.1   The Model

In modelling the determinants of investment five broad approaches are generally considered. These major approaches of investment behaviour include the simple accelerator model, the liquidity theory, the expected profits theory, the Tobin's Q Theory, and the neoclassical flexible accelerator theory. The flexible accelerator model appears to be the most popular of these theories used in applied work. However, in the context of developing countries, due to data limitations and structural constraints, a variant of the flexible accelerator model has often been used in empirical research, including the literature on the determinants of investment in developing countries. Neoclassical investment theory suggests that investment is positively related to the growth of real GDP (Greene and Villanueva, 1991; Fielding, 1997).

Similarly, it has also been hypothesized that investment is affected positively by income level, as countries with higher income level would tend to dedicate more of their wealth to domestic savings which would then be used to finance investment (Greene and Villanueva, 1991).

Finally, Trade openness are suggested to be another important determinant of investment in developing countries. This variable is often used to proxy external shocks to the economy. A negative Trade openness implies that more units of exports are needed per unit of imports.

3.2   Data

The study used annual time series data covering the period from 1970 to 2008. Data on investment has been obtained from the Secretariat of Planning; data on GDP, TROPENS and monetary base are obtained from the Central Bank of Libya. Natural logs of the variables were taken for the estimation. Summary statistics of the variables are presented in Table 1.

Table 1 Summary Statistics of the Variables

	GDP	INV	MB	TROPENS
Mean	14305	2963	3043	71
Median	8757	1531	2307	60
Maximum	80729	14515	8158	252
Minimum	1288	242	199	37
Std. Dev.	17428	3705	2044	35
Skewness	2	2	0.4	3
Kurtosis	8	5	2	19

4   METHODOLOGY

Many time series are non –stationary and in general if the series is nonstationary, it is not possible to use traditional econometric techniques since models with nonstationary variables might lead to a problem of spurious regression. For this reason, it is important to establish the stationary properties of the series, cointegration implies the existence of meaningful long run equilibrium (Granger, 1988).

So many econometric methods have been proposed for investigating long-run equilibrium (cointegration) among time series variables; including Engle and Granger (1987), Phillips and Hansen (1990), and Johansen (1988), for the purpose of this study the autoregressive distributed lag (ARDL) modelling approach is utilized. Which developed by Pesaran and Pesaran (1997), Pesaran and Smith (1998), and Pesaran et al.. (2001), the ARDL modelling approach has several advantages in comparison with other single cointegration procedures, and result from the ability to estimate the long and short-run parameters of the model simultaneously, while avoiding the problems posed by non-stationary time series data. In addition, this approach does not require a prior determination of the order of the integration amongst the variables, unlike other approaches which require that the variables in the time series are integrated of the same order. Furthermore, the ARDL procedure is the more statistically significant approach to determine the cointegration relation in small samples, besides the ARDL procedure allows that the variables may have different optimal lags.

Following the empirical literature, the standard log-linear functional specification of long-run relationship for domestic investment equation may be expressed as:

$$INV_t = F(GDP_t, MB_t, TROPENS_t, U_t)$$

(1)

where at period t, INV is the investment, GDP is gross domestic product, MB monetary base, TROPENS is Trade openness is a measure of the total trade as a share of GDP, and U is error term.

To investigate the existence of a long-run relationship, Pesaran et. al. (2001) proposed the bounds test based on the Wald or F-statistic. The asymptotic distribution of the F statistic is non-standard under the null hypothesis of no cointegration relationship between the examined variables, irrespective of whether the explanatory variables are purely I(0) or I(1). The cointegration relationship for the domestic investment equation is estimated using the bounds test, which is based on the following Unrestricted Error Correction Model (UECM):

$$\Delta \ln INV = bo + \sum_{t=0}^{n} b_1 \Delta \ln GDP_{t-1} + \sum_{t=0}^{n} b_2 \Delta \ln MB_{t-1} + \sum_{t-1}^{n} b_3 \Delta \ln TROPENS_{t-1}$$
$$+ \sum_{t-1}^{n} b_4 \Delta \ln INV_{t-1} + b_5 \ln GDP_{t-1} + b_6 \ln MB_{t-1} + b_7 TROPENS_{t-1} + b_8 \ln INV_{t-1}$$

(2)

where ΔlnINV, ΔlnGDP, ΔlnTROPENS, and ΔlnMB are the first difference of the logarithms of the investment, gross domestic product, trade openness and monetary base respectively.

The null hypothesis is tested by considering the UECM for domestic investment equation in (2) excluding the lagged variables INV, GDP, TROPENS and MB; more formally, we perform a joint significance test, where the null and alternative hypotheses are:

$$H_O : b_5 = b_6 = b_7 = b_8 = 0$$
$$H_A : b_5 \neq b_6 \neq b_7 \neq b_8 \neq 0$$

Two sets of critical values are generated, the upper bound critical values refers to the I(1) series and the lower bound critical values to the I(0) series. For some significance level, if the F-statistic falls outside the critical bound, a conclusive inference can be made without considering the order of integration of the explanatory variables. For example, if the F-statistic is higher than the critical bound, then the null hypothesis of no cointegration is rejected. In the case when the F-statistic falls between the upper and lower bounds, a conclusive inference cannot be made. Here, the order of integration for the explanatory variables must be known before any conclusion can be drawn.

To ascertain the goodness of fit of the ARDL model, the diagnostic and stability tests are conducted. The diagnostic test examines the serial correlation, functional form, normality and heteroscedasticity associated with the model. The stability test of the coefficients of the regression parameters is undertaken using the Brown et al.

(1975) stability testing technique, also known as and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ).

5   EMPIRICAL RESULTS

The ARDL procedure starts with determining the appropriate lag order (p) in equation (1). For this purpose, we use the Akaike Information Criterion (AIC), the AIC indicates that p = 1 is the most appropriate lag length for the investment equation. We first examine the time series properties of the variables through the modified Dicky- Fuller test Dicky-Fuller Generalized Least Square (DF-GLS test). The DF-GLS unit root test has high power compared to standard Augmented Dicky-Fuller(ADF) unit root tests. We applied DF-GLS tests for both levels and their first differences and the results are shown in Table 2.

Table 2 Modified Dicky-Fuller (DF-GLS) Unit Roots Tests

Variables	Level	First difference
LINV	-0.447	-3.687*
LGDP	1.725	-4.293*
LMB	0.084	-4.239*
LOPENNS	-4.709*	-8.265*

- indicates significance at 5% level, -1.950

Table 2 reports DF_GLS unit root test results for stationarity of all the time series over the study period, all the time series are found to contain a unit root in their levels with the exception of the LOPENNS variable, and thus are difference-stationary.

In the first step of the ARDL analysis we tested for the presence of long run relationships in the investment model. The results of the bound test indicate that the calculated F statistics 3.877 at 5% is higher than the upper bound critical value. This implying that the null hypothesis of no co-integration cannot be accepted and that there is indeed a co- integration relationship among the variables. The relevant critical value bounds are obtained from Table CI(iii) in Pesaran et al. (2001). The short-run dynamics of domestic investment are given in Table 3.

Table 3 ARDL (0, 0, 1, and 0) selected based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LGDP	1.679	0.20261	8.286[0.000]
LMB	-1.179	0.174	-6.743[0.000]
LMB(-1)	0.783	0.156	4.996[0.000]
LOPENS	-0.106	0.091	-1.166[0.252]
C	-3.4050	0.688	-4.947[0.000]

Dependent variable is LINV
Adj.R^2=% 96, F-stat. 294[0.000]

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	*CHSQ(1) = 0.176[0.674]*	F(1,28)= 0.144[0.706]*
B:Functional Form	*CHSQ(1)= 2.026[0.155]*	F(1,28)= 1.746[0.196]*
C:Normality	*CHSQ(2)= 0.359[0.836]*	Not applicable*
D:Heteroscedasticity	*CHSQ(1)= 0.943[0.331]*	F(1,34)= 0.916[0.345]*

As shown in Table 3 above, most of the estimated coefficients have their expected theoretical or hypothesized signs except trade openness although not all are statistical significant. It shows that while the coefficient of trade openness is not statistically significant at the five percent level, the coefficients of other variables in the equation are. Also the results show that there is a positive short-run impact of GDP on investment.

Specifically, the results confirm a significant accelerator theory effect on investment in Libya at the aggregate level over the period 1970-2008. This means an increase in GDP or aggregate demand conditions has the potential of stimulating investment in Libya. From the results, the coefficient of GDP is statistically significant at the 5 percent level, indicating that if the country were to increase her GDP by 1 percent, investment will increase by 1.67 percent.

Diagnostic tests for serial correlation, functional form, normality and heteroscedisticity are conducted and the results are shown below Table 3. These tests show that short run model passes through all diagnostic tests in the first stage. The results also indicated that there is no evidence of serial correlation among variables because functional form of model is well specified and there is no evidence for white heteroscedisticity. The Error Correction Representation for the Selected ARDL Model is shown in Table 4.

Table 4 Error–Correction Estimates of Investment Model

| Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLGDP	1.679	0.202	8.286 [.000]
dLMB	-1.179	0.174	-6.743[.000]
dLOPENS	-0.106	0.091	-1.166[0.252]
dC	3.405	0 .668	-4.947[0.000]
ecm(-1)	-0.528	0.130	-3.5175[0.001]

Dependent variable is dLINV

The coefficient of ECM is found to be relatively large in magnitude and statistically significant and confirms the long-run relationship between the variables. And its value is -0.528 indicates a relatively rapid adjustment process, with over 50% of the disequilibrium of the previous year's shock adjusting back to the long-run equilibrium in the current year.

The results from the ECM reveal that GDP has significant implications for investment, this finding is consistent with the neo-classical investment theory which stipulates that greater output enhances investment.

In addition, the stability of the short-run and long-run coefficients is checked through the cumulative sum of squares (CUSUMSQ)test proposed by Brown et al. (1975). Unlike Chow test, requires break point(s) to be specified, the CUSUMQ test are quite general tests for structural change in that they do not require a prior determination of where the structural break takes place. Figs.2 presents the plot of CUSUMSQ test statistics for that fall inside the critical bounds of 5% significance. This implies that the estimated parameters are stable over the period of 1970–2008.

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
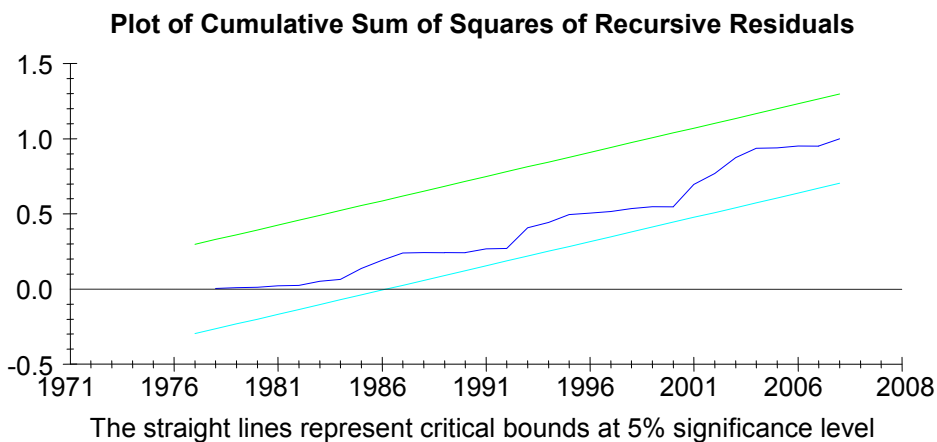
Figure 2 Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ)

6   CONCLUSION

The paper has investigated the long run determinants of investment in Libya over the Period of 1970-2008. The long run estimate of the investment function for Libya was derived using the ARDL bounds approach. Given the importance of investment for the economic development, the gross domestic product and monetary variables must be taken into account for their potential impact on investment decisions.

The results of this study indicate that GDP and monetary base largely explain the pattern of investment in Libya. The paper found evidence that investment, GDP, monetary base and trade openness are bound together in the long run. Also the results show that there is a positive short-run impact of GDP on investment. A stability test suggested that the estimated parameters do not suffer from structural instability.

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