

# External and Internal Determinants of Inflation: An Application to Libya, 1980-2019

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| Article Information  | Abstract   |
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| <p><i>Received 26 7 2023,<br/>Accepted 22 9 2023,<br/>Available online 12 10 2023</i></p> <p><b>Key Words:</b><br/>Inflation, export value index, budget deficit, velocity of money, Import Value index.</p> | <p>The study aims to conducts time series data to examine determinants of inflation in Libya's economy using the econometric methodology O.L.S from 1980 to 2019. The test consists of two models. The first model is the external determinants of inflation and assumes that inflation is related to export value index. The results revealed that inflation is positively related to export value index. The results suggest that export sector has not helped the country in insulating inflation from the impact of oil export. The second model is related inflation to internal determinants and assumes that inflation is related to budget deficit, and velocity of money, and import volume index. The results showed that inflation is positively related to budget deficit, that is negatively and insignificantly related to velocity of money, and that is positively related to import value index. The results suggest that any increase of budget deficit will increase public depth leading to an increase of imports of commodities and services, a deficit in the balance of payments and a decrease in foreign exchange reserves or leading to an increase in the domestic price level resulting in depreciation of the domestic currency. The results also suggest that inflation is not adjusted by velocity of money, and that Libya's economy does not yet produce enough capital and consumer commodities, and that the country is still heavily dependent on the foreign sector for providing capital and consumption commodities for public requires as well as supplying the funds to finance imports.</p> |

## 1. Introduction

Libya's economy depends heavily on oil exports that accounted for 92-98% of annual total Libyan exports and contributed 40-60% of annual of annual GDP. Libya's economy has been subject to several strong external shocks resulting from fluctuations in oil prices, was worsened in the 1980s and 1990s as a result of economic sanctions imposed by the U.S.A and UN which lifted in 2003 and adversely affected after 2014 due to the fall in oil production.

On the other hand, Libya's economy encounters inadequate domestic supply of technical man power, its total reliance on the import of both capital and consumer commodities and the over dependence of the economy on oil export.

Different theories were conducted in order to analyze and explain the inflation such as monetary theory, structural theory of inflation and Keynesian theory.

Monetary theory of inflation which related to the quantity of money argues that changes in price levels are linked to the growth of money supply. The equation of the quantity theory of money is as follows:

$$PY = VM \quad (1)$$

Where,

$P$  = Price level.

$Y$  =Real Income.

$V$  =Velocity of money.

$M$  = Money supply.

$$V = PY/M \quad (2)$$

According to Keynesian theory, decreased real money supply adversely affects the whole economy by shifting the aggregate supply curve to the left side resulting in higher production cost as reflected in the export value index. The reason for this is that changes in the prices of produced commodities are only affected by changes in import value index. On other words, most of raw material or products used in production process are imported. As a result, these changes raise inflation. Thus, interest rates adjusted for inflation.

Due to the fact that Libya has not established stock markets yet, and official interest rates do not reflect the real scarcity of loan-able funds because it is not determined according to market forces, an attempt will be made to inflation function by incorporating velocity of money and it is more relevant here to be as a proxy for interest rate. The velocity variable represents tightness of money and is more appropriate than interest rate (Michel, 1970)<sup>1</sup>.

In addition to this, an explanation of inflation that appears to blend both monetarist and structuralist arguments is the budget deficit. The government has to depend on its central bank to finance its deficit. This leads to further inflation (Fayad, 2000)<sup>2</sup>.

In general, the monetary theory suggests that velocity of money is the main variable influencing inflation.

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<sup>1</sup>. (Micheal, K. 1970, p.628).

<sup>2</sup>. (Fayad, 2000, p.119).

The structuralist hypothesis could be summarized as the main variables affecting the price level which are relative price of food to the consumer index, import prices, budget deficit, wage rate, foreign assets, and real income.

In Keynesian context of analysis, increased interest rates lead to lower inflation.

Other variables such as money supply and real GDP are not included owing to the existence of multi-collinearity and are taken into consideration as reflected to velocity of money.

In the Libya's economy, it seems that export volume index, import volume index, budget deficit, and velocity of money are the main determinants of inflation.

## **2. The objectives of the study**

The purpose of this study is to answer the question of determinants of inflation adopting an appropriate econometric inflation model of the Libya's economy during the period 1980-2019. A crucial assumption of inflation in the monetary theory, structuralist hypothesis, and Keynesian context are determined by export value index, budget deficit, velocity of money, and import value index. It can be additionally used as a guide to enlighten the policy maker in Libya to implement the appropriate policy measures. This assumption was empirically carried out over the whole sample. As a result, the final results obtained are invalid due to the existence of multi-collinearity.

Therefore, the inflation model split into two equations. The first equation is external determinants of inflation. The export value index is the main independent variable. The second equation is internal determinants of inflation. The budget deficit, velocity of money, and import value index are the main independent variable.

## **3. Literature Review**

Abosedra (1994)<sup>1</sup> examined the impact of import price index and non-oil gross domestic product price index on consumer price index in Libya's economy from 1962 to 1985 using time series analysis. He revealed that impact import price index and non-oil gross domestic product price index have a positive impact on consumer price index. Kevin (2004)<sup>2</sup> differentiated between supply and demand inflation in South Africa using quarterly time series data for two periods, the first period was from 1973 to 1984 and the second period was from 1987 to 1998. The results showed that, for the first period, the long-run cause of inflation is demand-pull, while over the second period; the cause of inflation is cost-push and

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<sup>1</sup>. (Abosedra, 1994, p.268).

<sup>2</sup>. (Kevin, 2004, p.1431).

structural (supply). Andre and et al (2018)<sup>1</sup> examined the relationship between inflation and economic growth in sixty five countries using a panel data for the period of 2001- 2011. The results revealed that inflation is negatively related to portion of high-tech exports. Charles and et al (2010)<sup>2</sup> studied the determinants of inflation in Nigeria utilizing quarterly time series data during the period of 1985- 2007. They found that money supply and lending rate are the main determinants of inflation, and that inflation be basically caused by money supply and demand. Khazaei and Elite (2022)<sup>3</sup> showed the determinants of inflation in Iran and policies to curb it applying a vector error correction model using quarterly data from 2004 to 2021. They found that money growth drives inflation only in the long-term, and that currency depreciation, fiscal deficit and sanctions (proxy by oil exports) drive inflation both in the short and long-run.

#### **4. Data and methodology**

The study ignores the VAR model that allows the dependent variable to depend not only on past values of itself but past values of other values compared with ARMA models where the depended variables only depend on past values of itself. Moreover, VAR was basically adopted in this study but the variables included in the model were not related to each other as suggested by theory. Therefore, it should be emphasized that VAR is not recommended to be utilized in this case. In addition, explanatory variables in this study are not based on lagged variables in determining inflation. In general, the O.L.S performs better than the VAR model.

Our aim is to find estimates for the population values of slope coefficients that do the best job of describing the true relationship between dependent variable and all the explanatory variables. The study conducts time series data to examine determinants of inflation in Libya's economy using the econometric methodology O.L.S as an appropriate technique from 1980 to 2019. The test consists of two models. The first model is the external determinants of inflation and assumes that inflation is related to export value index. The second model is related inflation to internal determinants and assumes that inflation is related to import volume index, budget deficit, and velocity of money. Data on these variables are collected from the World Bank for the period of 1980-2019<sup>4</sup>.

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<sup>1</sup>. (Andre & et al, 2018, p.546).

<sup>2</sup>.(Charles & et al, 2010).

<sup>3</sup>. (Khazaei &Elite, 2022).

<sup>4</sup>. (World Bank. 2022).

## 5. Specification of the model

### 5.1 External determinants of inflation

The first model depends on main assumption. Since Libya's economy is heavily dependent on oil export and the price of its export is largely determined on world market, export value index could be considered as an external factor affecting the gross domestic product deflator and might be written in the following form:

$$GDPDEF = f(XVI) \quad (3)$$

$$GDPDEF = \alpha_0 + \alpha_1 XVI_t + \varepsilon_t \quad (4)$$

The coefficient in this equation is expected to be

$$\alpha_1 > 0$$

Where

$GDPDEF$  = gross domestic product deflator (2000=100)

$XVI$  = export value index (2000=100)

The O.L.S is applied to the estimation of external determinants by estimating equation (2) as in table (1).

From table (1) , it can be seen that the D.W statistics suggests significant presence of autocorrelation. Therefore, we include AR (1) as an explanatory variable as displayed in table (2).

$$GDPDEF = \alpha_0 + \alpha_1 XVI_t + AR(1) + \varepsilon_t \quad (5)$$

The D.W statistics suggest no significant presence of autocorrelation, and the coefficient in this equation is as expected:

$$\alpha_1 > 0$$

The results obtained indicates that inflation is positively related to export value index, and that for every 1% increase in export value index the inflation level increases by 73%. The impact of export value index on inflation would be explained by the user cost of capital that resulted in higher production costs. On other words, the increased value index export raises inflation by shifting the aggregate supply curve to left side. Accordingly, the results suggest that export value index has a positive impact on inflation through influencing the money volume which is a function of interest rate (velocity of money). Therefore, the more money supply results in more inflation. The results also suggest that export has not helped the country in insulating inflation from the impact of oil export, and that Libya's economy is largely driven by oil revenue availability which is extremely prone to fluctuations that contribute to overall economic instability.

**Table (1) Estimated external determinants of inflation**

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| C                  | -12.19881   | 37.74400              | -0.323199   | 0.7483   |
| XVI                | 1.212312    | 0.144613              | 8.383151    | 0.0000   |
| R-squared          | 0.649049    | Mean dependent var    |             | 244.3341 |
| Adjusted R-squared | 0.639813    | S.D. dependent var    |             | 232.8412 |
| S.E. of regression | 139.7409    | Akaike info criterion |             | 12.76616 |
| Sum squared resid  | 742045.7    | Schwarz criterion     |             | 12.85061 |
| Log likelihood     | -253.3233   | Hannan-Quinn criter.  |             | 12.79670 |
| F-statistic        | 70.27722    | Durbin-Watson stat    |             | 0.382384 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

**Table (2) Estimated external determinants of inflation**

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| C                  | 93.62716    | 123.8114              | 0.756208    | 0.4544   |
| XVI                | 0.730859    | 0.077421              | 9.440020    | 0.0000   |
| AR(1)              | 0.903506    | 0.073171              | 12.34794    | 0.0000   |
| R-squared          | 0.913878    | Mean dependent var    |             | 244.3341 |
| Adjusted R-squared | 0.906701    | S.D. dependent var    |             | 232.8412 |
| S.E. of regression | 71.12108    | Akaike info criterion |             | 11.50365 |
| Sum squared resid  | 182095.5    | Schwarz criterion     |             | 11.67254 |
| Log likelihood     | -226.0730   | Hannan-Quinn criter.  |             | 11.56471 |
| F-statistic        | 127.3369    | Durbin-Watson stat    |             | 1.941638 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

## 5.2 Internal determinants of inflation

The second model assumes that the country is competitive in the world market for its imports and thus it assumes that import value index is internal factor as well as budget deficit, and velocity of money. Therefore, the possibility that inflation is largely determined by internal factors might be written in the following form:

$$GDPDEF = f(DS, V, MVI) \quad (6)$$

$$GDPDEF = \beta_0 + \beta_1 DS_T + \beta_2 V_t + \beta_3 MVI_t + U_t \quad (7)$$

The coefficients in this equation are expected to be

$$\beta_1 > 0, \beta_2 < 0, \beta_3 > 0$$

Where

$DS$  = budget deficit

$V$  =velocity of money

$MVI$  =import value index (2000=100)

The O.L.S is also applied to the estimation of internal determinates by estimating equation (4) as in table (3).

From table (3) , it can be seen that the D.W statistics suggests significant presence of autocorrelation. Therefore, we include AR (1) as an explanatory variable as displayed in table (4).

$$GDPDEF = \beta_0 + \beta_1 DS_T + \beta_2 V_t + \beta_3 MVI_t + AR(1) + U_t \quad (8)$$

The D.W statistics suggest no significant presence of autocorrelation, and the coefficients in this equation are as expected:

$$\beta_1 > 0, \beta_2 < 0, \beta_3 > 0$$

The results obtained indicates that inflation is positively related to budget deficit, and that for every 1% increase in budget deficit the inflation level increases by 1%. The results also suggest that any increase of budget deficit will increase public debt leading to an increase of imports of commodities and services, a deficit in the balance of payments and a decrease in foreign exchange reserves or leading to an increase in the domestic price level resulting in depreciation of the domestic currency<sup>1</sup>. In addition to this, inflation is negatively and insignificantly related to velocity of money. The results suggest that inflation is not adjusted by velocity of money. In contrast, the results obtained indicates that inflation is positively related to import value index, and that for every 1% increase in import value index the inflation level increases by 83%. The results suggest that the Libya's economy does not yet produce enough capital and consumer commodities and that the country is still heavily dependent on the foreign sector for providing capital and consumption commodities for private and public requires as well as supplying the funds to finance imports.

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<sup>1</sup>. (Central Bank of Libya, 1993).

**Table (3) Estimated internal determinants of inflation**

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| C                  | -182.4688   | 47.63602              | -3.830481   | 0.0005   |
| DS                 | 0.011328    | 0.002038              | 5.558251    | 0.0000   |
| V                  | 0.000186    | 0.000314              | 0.593345    | 0.5568   |
| MVI                | 2.395360    | 0.265487              | 9.022504    | 0.0000   |
| R-squared          | 0.751681    | Mean dependent var    |             | 239.6392 |
| Adjusted R-squared | 0.730397    | S.D. dependent var    |             | 233.9591 |
| S.E. of regression | 121.4794    | Akaike info criterion |             | 12.53428 |
| Sum squared resid  | 516503.6    | Schwarz criterion     |             | 12.70490 |
| Log likelihood     | -240.4185   | Hannan-Quinn criter.  |             | 12.59550 |
| F-statistic        | 35.31592    | Durbin-Watson stat    |             | 1.036676 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

**Table (4) Estimated internal determinants of inflation**

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.    |
|--------------------|-------------|-----------------------|-------------|----------|
| C                  | 146.5690    | 200.2792              | 0.731823    | 0.4694   |
| DS                 | 0.007491    | 0.000510              | 14.68343    | 0.0000   |
| V                  | -0.000288   | 0.000349              | -0.826463   | 0.4145   |
| MVI                | 0.833606    | 0.099161              | 8.406597    | 0.0000   |
| AR(1)              | 0.986035    | 0.051376              | 19.19254    | 0.0000   |
| R-squared          | 0.976657    | Mean dependent var    |             | 239.6392 |
| Adjusted R-squared | 0.973120    | S.D. dependent var    |             | 233.9591 |
| S.E. of regression | 38.35773    | Akaike info criterion |             | 10.38177 |
| Sum squared resid  | 48553.42    | Schwarz criterion     |             | 10.63770 |
| Log likelihood     | -196.4444   | Hannan-Quinn criter.  |             | 10.47359 |
| F-statistic        | 276.1402    | Durbin-Watson stat    |             | 1.596661 |
| Prob(F-statistic)  | 0.000000    |                       |             |          |

## 6. Summary and conclusion

The study is on the determinants of inflation and empirically has investigated the external and internal determinants of inflation. The first model assumes that export value index could be considered as external factor affecting the gross domestic product deflator. The second model assumes that the country is competitive in the world market for its imports



and thus it assumes that import value index is internal factor as well as budget deficit and velocity of money. The two models were tested using O.L.S approach for the period 1980-2019.

The results obtained by estimating the first model showed that inflation is positively related to export value index, and that for every 1% increase in export value index the inflation level increases by 73%. The results suggest that export has not helped the country in insulating inflation from the impact of oil export, and that Libya's economy is largely driven by oil revenue availability which is extremely prone to fluctuations that contribute to overall economic instability. The policy recommendation of this impact for Libya's economy is that the government should diversify the export sector and increase reliance on non-oil exports, and that money supply also should be reduced.

In addition to this, inflation is negatively and insignificantly related to velocity of money. The results suggest that inflation is not adjusted by velocity of money. The policy recommendation of this result is that it may be unwise for the authority to keep increasing velocity of money.

The results obtained indicates that inflation is positively related to budget deficit, and that for every 1% increase in budget deficit the inflation level increases by 1%. The results also suggest that any increase of budget deficit will increase public debt leading to an increase of imports of commodities and services, a deficit in the balance of payments and a decrease in foreign exchange reserves or leading to an increase in the domestic price level resulting in depreciation of the domestic currency. Consequently, one of the policy recommendation is that the policymakers should take into account the revenue shortfalls unless the government has other instruments to supplement the loss of revenues. Therefore, the diversification of the non-oil sector could reduce the revenue shortfalls. In contrast, the results obtained indicates that inflation is positively related to import value index, and that for every 1% increase in import value index the inflation level increases by 83%. The results suggest that the Libya's economy does not yet produce enough capital and consumer commodities, and that the country is still heavily dependent on the foreign sector for providing capital and consumption commodities for public requires as well as supplying the funds to finance imports. Hence, the policy implication is that the government should privatize firms in the economy so as to induce the inflow of private capital.

## References

- Abosedra, S. (1994). Imported inflation in an oil-exporting country: an empirical investigation, *OPEC Rev*, 180(94). 265-274.
- Andre, R. and et al, (2018). Economic Development and Inflation: A Theoretical and Empirical Analysis, *International Review of Applied Economics*, 32(4). 546-505.
- Central Bank of Libya. (1993). Research and Statistics Department: Thirty-Seven Annual Report, Fiscal Year 1992-1993, Tripoli, Libya.
- Charles & et al. (2010). Macro-econometric Model of the Nigerian Economy, Central Bank of Nigeria. <https://www.cbn.gov.ng>.
- Fayad, M. (2000). *Government Expenditure and Growth in Libya*. Unpublished PhD Thesis, p.119, John Moores University, The U.K.
- Kevin, S, (2004). The Structuralist Theory of Imported Inflation: An Application to South Africa, *Applied Economics*, 36(13). 1431-1444.
- Khazaei, A.& Elite, H. (2022). Determinants of Inflation in Iran and Policies to Curb it, IMF Working Paper, WP/22/181, Washington; International Monetary Fund. <https://www.imf.org>.
- Michel, K. (1970). An Econometric Model of the Israel Economy, 1952-1963. *Econometrica*. 38(5): 624-660.
- World Bank. World Development Indicators, Washington, 2022. <http://data.worldbank.org>.

# المحددات الخارجية والداخلية للتضخم: تطبيق لحالة ليبيا، 1980-2019

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## المخلص

توظف هذه الدراسة بيانات السلاسل الزمنية لكشف المحددات التضخم للإقتصاد الليبي وذلك باستخدام المنهج القياسي بطريقة المربعات الصغرى العادية خلال الفترة من سنة 1980 إلى 2019. ويتألف الإختبار من نموذجين. النموذج الأول يتعلق بالمحددات الخارجية للتضخم والذي يفترض بأن التضخم ينسب لمؤشر قيمة الصادرات. أما النموذج الثاني فينسب التضخم لمحددات داخلية وتتكون من عجز الميزانية وسرعة تداول النقود ومؤشر قيمة الواردات. وكشفت الدراسة بوجود علاقة طردية بين مؤشر قيمة الصادرات والتضخم، وعلاقة طردية بين عجز الميزانية والتضخم، وعلاقة عكسية غير معنوية بين سرعة تداول النقود والتضخم، وعلاقة طردية ف يما بين مؤشر قيمة الواردات والتضخم. وتقترح الدراسة بأن قطاع التصدير لم يساعد البلد بعزل التضخم من تأثير الصادرات النفطية. وكذلك تقترح الدراسة بأن أي زيادة بعجز الميزانية تؤدي لزيادة الدين العام والذي بدوره الى زيادة الواردات من السلع والخدمات والذي يؤدي لعجز ميزان المدفوعات وانخفاض الإحتياجات من النقد الأجنبي أو يؤدي لزيادة مستوى الأسعار المحلية الناجمة عن انخفاض قيمة العملة المحلية. النتائج أيضا تقترح بأن التضخم لم يتم تعديله مع سرعة تداول النقود كذلك لم يتم انتاج سلع استهلاكية ورأسمالية كافية بالإقتصاد الليبي. وبأن الإقتصاد الليبي مازال يعتمد بشكل كبير على القطاع الخارجي من حيث توفير الإحتياجات العامة من السلع الرأسمالية والإستهلاكية إضافة للإعتمادات المالية للواردات.

## الكلمات المفتاحية:

التضخم، الرقم القياسي لقيمة الصادرات، عجز الميزانية، سرعة تداول النقود، الرقم القياسي لقيمة الواردات.