Estimating Import Function in Libya

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ABSTRACT

The major objective of this paper was to estimate the short run and long run effect of the level of gross national income (GNI) on the value of imports (M).

Annual data of (GNI) and (M) were collected for the period 1970-1988. The estimated function showed that the short run marginal propensity to import was 0.144, and the short run marginal propensity to import was 0.21. The short and long run elasticities were also computed. The short run import elasticity was 0.538, and the long run import elasticity was 0.900. These results confirmed the theoretical assumption.

INTRODUCTION

No country in the world could be considered self-sufficient for all goods and services. Therefore, imports is a very important component of the economic activity of every society (3).

Libya is one of the countries which imports most of its consumer and producer goods from international markets. In 1970, the total value of Libyan imports was 198 million Libyan dinars. By 1981, the value of imports had increased to 2841.4 million Libyan Dinars (5, 6).

The pattern of the value of Libyan imports did not maintain a stable trend over the period of the study. The mean value of imports during the period of this study was 1259.2 million Libyan Dinars. The minimum value of imports was 198 million Libyan Dinars, and the maximum value was 2841.4 million Libyan Dinars. Figure (1) shows the trend of the level of GNI and the value of imports during the period of the study.

The objective of this paper was to estimate the short run and the long run effect of the gross national income on the value of imports, more specifically to estimate the value of the «marginal propensity to import», and the value of the short and long run import elasticities.

MATERIALS AND METHODS

Folowing Evans (1969), and Houthakker & Magee (1969) work where they had assumed that the quantity of imports is influenced by the gross national income (GNI), price of imports (P_m). and price of domestic substitutes (P_d) (4). The general form can be written as follows:

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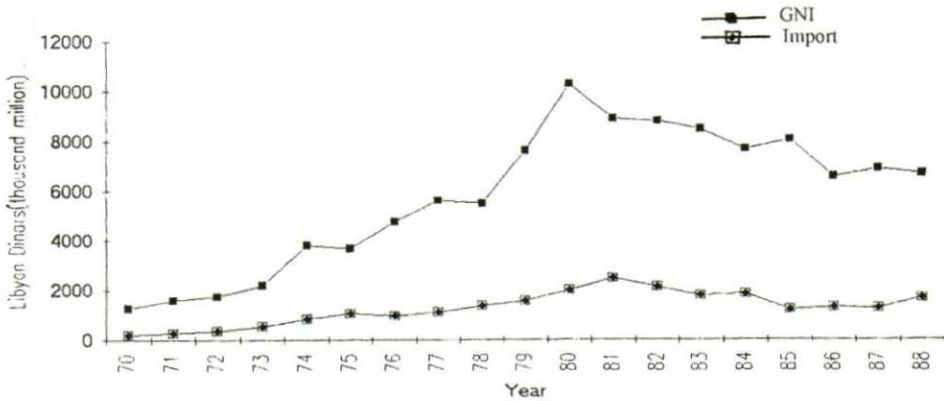
Fig. 1: The trend of Libyan GNI and the value of imports, 1970–88.

$$M = f\,(GNI,\ P_m\,/\,P_d) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\ 1$$

To simplify the estimation process, we assume that most of the imported goods **have** no domestic substitute, therefore, we can eliminate the effect of (P_m/P_d).

The theoretical model used in this study is based on the hypothesis that the value of **imports** is a function of the level of gross national income.

Two functions were used, one in a linear form, and the other in a non linear form. They could be expressed in general as follows:

$$M = \alpha_0 + \alpha_1\,GNI_t + \alpha_2\,M_{t-1} + \mu_t \dots\dots\dots\dots\dots\dots\ 2$$

$$Ln\,M = \beta_0 + \beta_1\,Ln\,GNI_t + \beta_2\,Ln\,M_{t-1} + V_t \dots\dots\dots\ 3$$

The variables are defined as follows:

M_t = Value of imports at year (t), measured in million of Libyan Dinars.

M_{t-1} = Values of imports at year (t–1), measured in millions of Libyan dinars.

GNI_t = Gross national income, measured in millions of Libyan dinars at year (t).

V_t = Error term.

The first equation will enable us to estimate the value of the «marginal propensity to import», in the short run and in the long run. It is assumed that there is a positive relationship between the gross national income and the value of imports. It is also expected that, the value of the «marginal propensity to import» must lie between zero and one, and the short run value must be less than the long run value (1).

The second equation will enable us to estimate the value of import elasticity at the

short run and at the long run. We also assume that, the value of the short run elasticity must be less than the value of the long run elasticity.

Annual data for the period from 1970 to 1988 were used in this paper including the value of Libyan imports, and Libyan gross national income. The data were collected from the statistics published by the General Department of Social and Economic Planning, and by the Libyan Central Bank. Ordinary Least Squares (OLS) was used to estimate the two equations (2).

RESULTS AND DISCUSSION

The results of estimating the two import equations are reported as follows:

Equation 1:

$$M_t = 64.242 + 0.144 \ GNI_t + 0.312 \ M_{t-1}$$

$$(0.429) \quad (2.562) \quad (1.404)^*$$

$R^2 = 0.87$ Adjusted $R^2 = 0.86$

Durbin-Watson = 2.2

F-stat = 115.4

Equation 2:

$$Ln \ M_t = -0.36 + 0.538 \ Ln \ GNI_t + 0.402 \ Ln \ M_{t-1} \ .... \ 5$$

$$(-0.316) \quad (1.685) \quad (1.623)^*$$

$R^2 = 0.93$ Adjusted $R^2 = 0.92$

Durbin-Watson = 1.8

F–stat = 105.6

(*) (figures in parentheses are the calculated t-value).

The results of equation 1 showed that 87 percent of imports at year (t) is explained by the variation in the gross national income at year (t) and the variation in value of imports at year (t-1). As expected, the relationship between the GNI and M was positive. The estimated coefficient of the GNI at year (t) was significantly different from zero at the 5 percent level of significance. The constant term was not significantly different from zero at 5 percent level of significance. It means that the Libyan economy does not receive any subsidies or free imports from the international markets.

The value of the «marginal propensity to import» at the short run was 0.144 which means that, on average, 0.144 of each Dinars of the gross national income is spent on imports.

The value of the «marginal propensity to import» at the long run can be obtained by dividing the value of the short run marginal propensity to import by the value of the adjustment factor (t), where the value of the adjustment factor could be obtained from the estimated coefficient of M_{t-1} as follow:

$$t = 1 - 0.312 = 0.688$$

Therefore, the long run marginal propensity to import is 0.209 which simply means that in the long run, the Libyan economy will spend, on average, 0.209 of each Libyan Dinars out of its gross national income on imports.

The results of equation 2 showed that, 93 percent of the variation in the value of log of the import in year (t) is explained by the variation in log of GNI at year (t) and the log of import in year (t-1). The constant term also was not significantly different from zero at the 5 percent level of significance. However, the coefficient of log of GNI at year (t), and log of import at year (t-1) were both significantly different from zero at the 5 percent level. The short run import elasticity was 0.538 meaning that if the gross national income is increased by 10 percent, the value of imports, on average, will increase by 5.38 percent. The long run import elasticity can be computed by dividing the short run elasticity by the value of the adjustment factor (t), where:

$$t = 1 - 0.402 = 0.598$$

Therefore, the long run import elasticity is equal to 0.9, which simply means that, if the gross national income increased by 10 percent then, the value of imports, on average, will increase in the long run by 9.00 percent.

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تقدير دالة الاستيراد في ليبيا

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المستخلص

تهدف هذه الورقة البحثية إلى تقدير الميل الحدي للاستيراد بالمدى القصير والمدى الطويل بالإضافة إلى تقدير مرونة الاستيراد بالمدين القصير والطويل. وقد تم تجميع البيانات عن الدخل القومي الإجمالي وقيمة الواردات عن الفترة 1970 حتى 1988 من أمانة اللجنة الشعبية العامة لتخطيط الاقتصاد ومن منشورات مصرف ليبيا المركزي حيث تم استخدام طريقة المربعات الصغرى لتقدير دالة الاستيراد. وجد أن الميل الحدي للاستيراد بالمدى القصير يساوي 0.144، أما في المدى الطويل فيساوي 0.21. ووجد أيضاً أن مرونة الاستيراد بالمدى القصير تساوي 0.538، أما في المدى الطويل فكانت 0.899، وتعتبر هذه القيم متطابقة مع الفروض النظرية المستخدمة بهذه الورقة البحثية.

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