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SOURCES OF OUTPUT GROWTH OF THE LIBYAN INDUSTRIES

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The aim of this paper is to use a mathematical relationship to throw some light on sources of output growth of the Libyan industries during the period 1986 to 2006. A method is devised in this paper by which management techniques imposed by output expands to evaluate the results for Libyan industries.

The equations of this paper are also used in finding the sources of growth of value-added by sub-groups of industries aggregated from individual industry statistics.

I. INTRODUCTION

Output expands due to one or more of these factors:

(i) Expansion in domestic demand

(ii) Production of goods which were previously imported

(iii) Production of exports of goods which used not be imported

The competition among the few has opened important fields of output growth including non-price competition and customer loyalty in local and global markets. This has been the results of work of many researchers specialized in the field of sources of output growth. This work includes research by Akaike (1969); Barro (1981); Granger (1988); Kormendi and Meguire (1985); Metwally (1997) and Kenneth (2003).

Four lights on sources dominate the country (a situation which is very common for manufactured consumer goods). These include domestic gross output of some industry; domestic value-added of the same industry, imports of competing goods and domestic demand for exported goods.

Consumer loyalty is particularly important for a firm that aims at gaining the loyalty of a certain segment of the market. This segment will not (in the short-run and in the absence of cut through competition) move to another competitor. The implication of this is obvious. If a new firm is to enter a particular market (or an existing firm is to expand its market share), the strategy would be to attract the unattached floating or indifferent customers. Hence, the body of unattached customers would be moving towards some firm depending on the marketing effort used (Metwally, 1973, 1974 and 1997).

Only some part of the firm's potential marketing ability may be in motion. The firm may still be able to inject some new brands or embark on an intensified advertising campaign or improve the quality of its product (Plasser, Schwert and White 1982; Barro and Martin 1995, and Jbil and Kramarenk, 2003). Hence, there are a number of impulses that can be applied to throw some light on sources of output growth of the Libyan industries.

II. THE MATHEMATICAL RELATIONSHIP OF OUTPUT GROWTH:

Let:

Q = Domestic gross output of some industry

A = Domestic value-added of the same industry

M = Imports of competing goods

D = Domestic demand of specified goods

X = Exports of specified goods

S = Total supply

Y = GNP

Define:

$$g = \frac{Q}{S} \tag{1}$$

$$h = \frac{A}{Q} \tag{2}$$

Since $Q = Q(D, X, g)$; where Q is related to g and M, we have:

$$\Delta Q = \int_{D1}^{D2} g\, dD + \int_{X1}^{X2} g\, dX + \int_{g1}^{g2} S\, d\, g \tag{3}$$

And:

$$\Delta A = \int_{D1}^{D2} g^{h}\, dD + \int_{X1}^{X2} g^{h}\, dX + \int_{g1}^{g2} h^{S}\, dg$$

$$+ \int_{h1}^{h2} y^{S} dh \tag{4}$$

In these two equations

$\int_{D1}^{D2} g\, dD$ and $\int_{D1}^{D2} g^{h}\, dD$ express the domestic demand effects (F^{D}) and ($FD^{\wedge}$) respectively.

$\int_{X1}^{X2} g\, dX$ and $\int_{D1}^{D2} g^{h}\, dx$ express the export demand effects (F^{X}) and ($FX^{\wedge}$) respectively.

$\int_{g1}^{g2} Sdg$ and $\int_{g1}^{g2} s^{h} dg$ express the import substitution effects (F^{M}) and ($FM^{\wedge}$) respectively.

$\int_{h1}^{h2} g^{S} dh$ Express changes in the ratio of valued-added to gross output effects ($F^{A/Q}$)

Let us assume that Q, X, S and g grow at a constant exponential rate or:

$$x_t = x_0 e^{at} \tag{5}$$

$$S_t = S_0 e^{Bt} \tag{6}$$

$$Q_t = Q_0 e^{(B+\gamma)t} \tag{7}$$

And hence:

$$g_t = g_0 e^{\gamma t} \tag{8}$$

It follows that:

$$\frac{dx_t}{dt}\frac{1}{x_t} = \alpha \tag{9}$$

$$\frac{ds_t}{dt}\frac{1}{s_t} = \beta \tag{10}$$

$$\frac{dQ_t}{dt}\frac{1}{Q_t} = \beta + \gamma \tag{11}$$

$$\frac{dg_t}{dt}\frac{1}{d_t} = \gamma \tag{12}$$

It is easy therefore to calculate: α; β and λ. Substituting in the R.H.S. of equation 3, we get:

$$F^{(x)} = \int_{x_1}^{x_2} g_t dx_t = \alpha g_0 x_0 \int_{T_1}^{T_2} e^{(\alpha+\gamma)t} dt$$

$$= \frac{\alpha}{\alpha+\gamma}(g_2 x_2 - g_1 x_1) \tag{13}$$

$$F(M) = \int_{g_1}^{g_2} S_t dg_t = \gamma g_0 S_0 \int_{T_1}^{T_2} e^{(\beta+\gamma)t} dt$$

$$= \frac{\gamma}{\beta+\gamma}(g_2 s_2 - g_1 s_1) \tag{14}$$

And:

$$F^{(D)} = (Q_2 - Q_1) - (F^{(x)} + F^{(M)}) \tag{15}$$

Table 1 shows the results for Libyan industries. It can be seen from this table that domestic demand was the most important source of growth of output in Libyan industries during 1986-2006.

It is also clear that the contribution of import substitution to output growth over the two decades in consumer, intermediate and investment goods industries were 10.6 per cent, 18.2 per cent and 8.7 per cent respectively, while the contribution of import substitution to the growth of output of the manufacturing industries were 15.5 per cent. Thus it is difficult to accept the widely held hypothesis about the distorted nature of industrial growth.

Table 1
Sources of Output Growth (As Per Cent of Total) by Sub-Groups of Industries in Libya

Industry	$F^{(D)}$	$F^{(M)}$	$F^{(X)}$
1986 -1992			
Consumption	76.4	9.5	14.1
Intermediate	37.5	17.6	44.9
Investment	81.6	5.2	13.2
All Manufacturing	72.2	11.3	16.5
1992 -1998			
Consumption	78.1	9.8	12.1
Intermediate	40.8	20.2	39.0
Investment	75.6	6.5	17.9
All Manufacturing	73.2	10.4	16.4
1998-2006			
Consumption	73.8	10.6	15.6
Intermediate	39.2	18.2	42.6
Investment	81.5	8.7	9.8
All Manufacturing	80.0	15.5	4.5

III. GROWTH OF VALUE-ADDED

Testing for common trends, causality and causal laws in economics and the cross country study which effect sources of growth of value-added; were mentioned by Landau (1983); Stock and Watson (1988) and Zellner (1988).

Let A and h grow at a constant exponential rate during the period . We obtain:

$$A_t = A_0 e^{(\beta+\gamma+\delta)t} \tag{16}$$

Therefore:

$$h_t = h_0 e^{\delta t} \tag{17}$$

It follows that:

$$\frac{dA_t}{dt}\frac{1}{A_t} = \beta + \gamma + \delta \tag{18}$$

And:

$$\frac{dh_t}{dt}\frac{1}{h_t} = \delta \tag{19}$$

Substituting in equation (4), we get:

$$F(x\text{^}) = \int_{x_1}^{x_2} g_t h_t \, dx_t = \alpha \, g_o h_o x_o \int_{T_1}^{T_2} e^{(\alpha+\gamma+\delta)t} dt$$

$$= \frac{\alpha}{\alpha+\delta+\gamma}(g_2 h_2 x_2 - g_1 h_1 x_1) \tag{20}$$

$$F(M\text{^}) = \int_{g_1}^{g_2} h_t s_t dg_t = \frac{\gamma}{\delta+\beta+\gamma}(g_2 h_2 s_2 - g_1 h_1 s_1)$$

$$= \frac{\gamma}{\delta+\beta+\gamma}(A_2 - A_1) \tag{21}$$

$$F(A/Q) = \int_{h_1}^{h_2} g_t\, s_t\, dh_t = \frac{\delta}{\delta+\beta+\gamma}(A_2 - A_1) \tag{22}$$

$$F(D\text{^}) = (A_2 - A_1)\,(F^{(X\text{^})} + F^{(M\text{^})} + F^{(A/Q)}) \tag{23}$$

Equations (20) to (23) are used in finding the sources of growth of value added (as percent of total) by sub-groups of industries aggregated from individual industry statistics. It is clear from Table 2 that expansion contributed more to the growth of value-added in Libyan manufacturing industries than import substitution during the whole period and the two sub-periods. The picture is particularly clean during the period 1998-2006. This is due to the rise in oil prices.

The above conclusion is important since it opens the question of the effect of market limitations on industrialization, given the country's productive capacity and state of technology. The pattern of growth most suitable for over population underdeveloped countries like Libya in the one which puts emphasis on exports of manufacturing goods, And perhaps, the only way to achieve this is to concentrate action with neighboring countries in similar stage of development.

Table 2
Sources of Growth of Value-Added by Sub-Groups of Industries in Libya

Industry Sub–Groups	*F(D^)*	*F(M^)*	*F(X^)*	*F(A/Q)*
1986 -1992				
Consumption	78.6	7.5	12.0	1.9
Intermediate	33.5	15.2	40.3	1.0
Investment	81.3	6.4	5.6	6.7
All Manufacturing	74..4	10.6	12.1	2.9
1992 -1998				
Consumption	73.1	7.2	11.6	8.1
Intermediate	51.0	6.9	38.9	3.2
Investment	77.2	8.6	6.3	7.9
All Manufacturing	71.1	5.1	11.5	12.3
1998 -2006				
Consumption	84.4	6.3	7.6	2.1
Intermediate	48.3	8.6	37.5	5.6
Investment	77.2	8.6	6.3	12.4
All Manufacturing	65.2	4.6	22.4	7.8

IV. CONCLUSIONS

It has been demonstrated in this paper that the measurement of sources of growth in large changes involves summing the values of these sources of growth in all component small changes. However, the measurements do not yield any direct evidence on optimality (or lack of it) of the development patterns which they summarize.

To throw some light on the question of optimality, one should investigate the effective incentives of government policies and the various justifications for interfering with market mechanism.

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