

Exports Growth and Economic Development:

A Comparative Logit Analysis*

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I. Introduction

International trade is believed to be the engine of development. But, there has been a controversy over the international trade strategies of economic development for more than two decades. A large body of the development literature discussed the benefits and costs of the import substitution and export expansion strategies and their associated protectionist policies. Numerous studies demonstrated the distortions and detrimental effects of the import substitution strategy and its impact on economic performance of the developing countries.¹ Meanwhile, several theoretical and empirical studies analyzed the benefits of the export expansion strategy and its success in countries like Taiwan, South Korea, Singapore, and Brazil.² They concluded that the export expansion strategy has accelerated economic growth and that the high income developing countries had high export-import ratios and more diversified export baskets.³ In particular, Maizels, Kravis, Michaloupoulos, Michaely, Balassa, and Tyler measured a strong positive cross country correlation between exporter perfor-

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¹ See, for example, Krueger, Bear, Burton and Little.

² See, for example, Porter, Balassa and UNCTAD.

³ Meier, 767.

mance and GNP growth and suggested that the developing countries which neglected export sectors through discriminating economic policies were likely to experience slow economic growth.⁴

The present study measures economic development and its interrelationship with exports growth. The technique of estimation is the logit analysis which discriminates the sample countries against each other with respect to their diverse social, economic, and political structures during the process of generating values for an economic development index. The estimated values of this index are transformed into the probabilities of economic development. These probabilities are ranked to illustrate economic performance of the sample countries during the past two decades. The probability distributions are sketched to compare economic development under various rates of net exports growth.

II. Relevant Theory

Economic development is a multidimensional process to improve the quality of life for the entire population. A major goal of development is to satisfy the basic human necessities including food, clothing, shelter, health, and education. Satisfaction of these needs will enable the people to think beyond their immediate problems, and attempt to exploit opportunities to prosper. Growth of per capita income is a necessary, but insufficient condition to satisfy the basic human necessities. A comprehensive development policy must be designed to achieve gradual reduction and eventual elimination of malnutrition, disease, illiteracy, unemployment, and income inequality.⁵ An export-oriented growth strategy expands the foreign exchange earning channels, reduces the balance of payments disequilibrium, and provides funds to finance the development plans.⁶ Economic growth, however, typically leads to a trickle-up effect in favor of the middle class and rich and then benefits the

⁴ Tyler, 129.

⁵ Haq, 30.

⁶ Meier, 671-77.

poor only when the nation moves well into an intermediate level of development. The poor will gain from economic growth only when the government plays an active role to redistribute income.⁷ Economic growth also creates more socio-economic opportunities in cities which induces rural-urban migration. Rapid and uncontrolled urbanization contributes to the deterioration of living conditions if cities fail to supply sufficient employment opportunities and social services.⁸ Another major goal of economic development is to promote social, economic, and political freedom. Freedom expands the range of human choice and enables people to actively participate in removing the constraints in the pursuit of development.⁹ Economic growth does not necessarily promote political freedom. Rising national income accompanied by high concentration of wealth and power can increase the opportunity for the ruling class to exercise control, through mass communication and education, and terror, through highly organized state security apparatus.¹⁰ The lack of political freedom generates severe distortions in social relations and causes enormous losses in human and financial resources

III. Empirical Examination

To measure economic development and its interrelationship with export performance, the following model is designed,

Dependent variable:

EDI = 1 for countries with per capita income \geq \$1000;

EDI = 0, otherwise.

Independent variables:

SXM = share of exports to imports of manufactured goods, percentage change

GNP = per capita GNP, percentage change

GNI = Gini coefficient

UPO = urban population, percentage change

⁷ Adelman, 302-3.

⁸ Todaro, 228-32.

⁹ *Ibid.*, 71-2.

¹⁰ Myrdal, 423.

HLT = population per physician, percentage change
 EDG = student enrollment in secondary education, percentage change

PLI = political institution variable¹¹

PLI = 0 for countries under dictatorship and/or military dominated governments

PLI = 1, otherwise.

This model is estimated for twenty-five countries in 1960, 1965, 1970, 1975, and 1980. The sample countries are listed in Table 1. The main sources of data include various issues of *World Development Reports*, *World Tables*, and *Statistical Yearbook*.

The logit analysis is used to estimate the model and discriminate the sample countries against each other with regard to their diverse social, economic, and political structures during the process of generating values for the economic development index. In the logit model, $F(Z)$ denotes the value of cumulative logistic distribution at Z . The index Z is linear in X , while its probability is not,

$$(1) \quad Z = X'\beta$$

where X is the vector of explanatory variable and β is the vector of coefficients. The logit specification is,

$$(2) \quad P = F(Z) = F(X'\beta) = \frac{1}{1 + e^{-Z}}$$

Here, P is the conditional probability of the even occurring given values of the explanatory variables. Multiply equation (2) by $1 + e^{-Z}$,

$$(3) \quad (1 + e^{-Z}) P = 1$$

and divide equation (3) by p ,

¹¹ For socio-political ranking of countries in the world, see Raymond D. Gastit.

$$(4) \quad e^{-Z} = \frac{1 - P}{P}$$

or

$$(5) \quad e^Z = \frac{P}{1 - P}$$

Take natural logarithms from equation (5),

$$(6) \quad \ln \left(\frac{P}{1 - P} \right) = Z = X' \beta$$

Equation (6) is estimated by the maximum likelihood method.¹²

Equation (7) describes the probability of economic development

$$(7) \quad P = F(Z)$$

where,

$$(8) \quad Z = \beta_1 \text{SXM} + \beta_2 \text{GNI} + \beta_3 \text{GNP} + \beta_4 \text{UPO} + \beta_5 \text{HLT} \\ + \beta_6 \text{EDG} + \beta_7 \text{PLI}$$

The unobservable economic development index, Z , is generated on the basis of an information set containing all explanatory variables in the model. The estimated values of this index are transformed into the probabilities of economic development. Table 1 presents these probabilities for each sample country during the period of study. Table 2 shows ranking of the probabilities of economic development to illustrate performance of each nation during the past two decades.

¹² Pindyck and Rubinfeld, 287-9.

Table 1

PROBABILITIES OF ECONOMIC DEVELOPMENT

Country	1960	1965	1970	1975	1980
Argentina	.9217	.9862	.8122	.8628	.9416
Bolivia	.0015	.0008	.0001	.0001	.0004
Brazil	.9495	.9122	.9234	.9875	.9982
Chile	.6132	.9957	.8916	.4238	.3085
Colombia	.3224	.8535	.8417	.7598	.8292
Dominican Rep.	.6101	.4939	.4095	.2220	.3010
Ecuador	.0009	.0002	.0004	.0002	.0001
Egypt	.5416	.3772	.1937	.1586	.1818
Hong Kong	.9975	.9995	.9592	.9942	.9993
India	.7002	.8634	.8019	.6410	.7925
Korea, Rep.	.9954	.9935	.9276	.9825	.9847
Malaysia	.7936	.8241	.7885	.8212	.7882
Mexico	.9461	.9617	.9144	.9416	.9532
Morocco	.1547	.1665	.0095	.2826	.2710
Pakistan	.0239	.0079	.0085	.0151	.0092
Paraguay	.1662	.2014	.3115	.4039	.3315
Peru	.3922	.4975	.4234	.1057	.1238
Philippines	.2117	.3810	.5224	.6550	.4251
Singapore	.9134	.7916	.8820	.8765	.8992
Sri Lanka	.4556	.3225	.4710	.4215	.4910
Taiwan	.9999	.9987	.9725	.9973	.9990
Thailand	.9082	.8922	.9255	.9010	.9889
Tunisia	.0937	.0042	.0105	.0094	.0154
Turkey	.8817	.7866	.2672	.2242	.1957
Uruguay	.7849	.8225	.7831	.7824	.7510

Generally, countries with high net exports growth rates performed well. Three classes were identified for the average growth rate of the share of exports to imports of manufactured goods during each five year period. The first class was 11 ~ 15 percent which included the top ranking countries of Taiwan, Hong Kong, South Korea, and Brazil. These nations have deliberately pursued the export expansion strategy for more than a decade. The second

Table 2

RANKING OF PROBABILITIES

Country	1960	1965	1970	1975	1980
Argentina	6	5	10	8	7
Bolivia	24	24	25	25	24
Brazil	4	7	5	3	3
Chile	13	3	7	14	16
Colombia	18	10	9	11	9
Dominican Rep.	14	16	17	19	17
Ecuador	25	25	24	24	25
Egypt	15	18	20	20	20
Hong Kong	2	1	2	2	1
India	12	9	11	13	10
Korea, Rep.	3	4	3	4	5
Malaysia	10	11	12	9	11
Mexico	5	6	6	5	6
Morocco	21	21	22	17	18
Pakistan	23	22	23	22	23
Paraguay	20	20	18	16	15
Peru	17	15	16	21	21
Philippines	19	17	14	12	14
Singapore	7	13	8	7	8
Sri Lanka	16	19	15	15	13
Taiwan	1	2	1	1	2
Thailand	8	8	4	6	4
Tunisia	22	23	21	23	22
Turkey	9	14	19	18	19
Uruguay	11	12	13	10	12

class was 6~10 percent which consisted of Argentina, Chile, India, Mexico, the Philippines, Singapore, Thailand, and Uruguay. In this class, Mexico, Thailand, Singapore, Uruguay, and Argentina ranked relatively high, whereas India and the Philippines experienced fluctuations and Chile suffered from rapid economic deterioration in the 1970s. The third class was 1~5 percent which included Bolivia, Colombia, the Dominican

Republic, Ecuador, Egypt, Malaysia, Morocco, Pakistan, Paraguay, Peru, Sri Lanka, Tunisia, and Turkey. In this class, Colombia and Paraguay improved economically, while Malaysia and Sri Lanka showed satisfactory results and the rest performed very poorly.

To isolate the effect of the export growth variable on the economic development index, the empirical examination continues. Table 3 presents the estimation results of equation (8). The per capita GNP variable had an expected positive sign and was significant at the 10 percent level in 1960, 1970, and 1980 and at the 20 percent level in other periods. The Gini coefficient variable showed a negative sign and was significant at the 10 percent level in 1965, 1975, and 1980 and at the 20 percent level in 1960 and 1970. The countries which suffered from moderate and high income inequality were Argentina, Bolivia, Brazil, Chile, Colombia, the Dominican Republic, Ecuador, Egypt, India, Malaysia, Mexico, Morocco, Pakistan, Paraguay, Peru, the Philippines, Sri Lanka, Thailand, Tunisia, Turkey, and Uruguay.¹³ The urban population variable had a positive sign and was significant only at the 20 percent level in 1960, 1965, and 1980 and at the 10 percent level in 1970 and 1975. The variables representing education and health services were hardly significant. Illiteracy and inadequate medical supplies have established constraints to the development of human capital in the developing countries. The effect measured by the political institution variable appeared to be stable over time since all estimated dummy-variable coefficients were highly significant. Other variables held constant, the value of the economic development index was higher in the presence of political democracy than that of dictatorship. Ranking of probabilities of the economic development index presented in Table 3 revealed that several countries suffered from lack of political freedom and poor economic performance. They were Pakistan, the Philippines, Egypt, Tunisia, Morocco, Bolivia, and Paraguay. In contrast, Argentina, Brazil, and Uruguay ranked relatively high under military regimes. The Dominican Republic, Ecuador, and Peru did not improve substantially when parliamentary democracy replaced the military

¹³ Todaro, 127-31; Meier, 27-32; and World Bank, 1978, 1979, 1980, 1981, 1982, 1983.

rule in the late 1970s. Chile, however, experienced rapid economic deterioration under the military dictatorship established in the early 1970s. Turkey's economic performance worsened during the political freedom era of 1960-75 and under the military rule of 1980. Thailand improved economically under the military dominated monarchy. Taiwan, Hong Kong, South Korea, Mexico, Colombia, India, Singapore, Sri Lanka, and Malaysia performed relatively well under limited political freedom.

The export growth variable had an expected positive sign and was significant at the 10 percent level in 1965, 1970, and 1975 and at the 5 percent level in 1960 and 1980. To measure the inter-relationship between export growth and economic development, the mid-point of each class of net export growth replaced the SXM variable in equation (8). Then, the mean values of other ex-

Table 3

RESULTS OF ESTIMATION

Independent Variable	1960	1965	1970	1975	1980
SXM	.22 (1.74) ^c	.24 (1.48) ^b	.19 (1.44) ^b	.27 (1.38) ^b	.21 (1.78) ^c
GNP	.35 (1.65) ^b	.29 (1.25) ^a	.30 (1.49) ^b	.25 (1.27) ^a	.32 (1.67) ^b
GNI	-.53 (-.95) ^a	-.62 (-1.64) ^b	-.58 (-1.22) ^b	-.74 (-1.69) ^b	-.1.28 (-1.53) ^b
UPO	.63 (1.19) ^a	.57 (1.08) ^a	.49 (1.43) ^b	.72 (1.45) ^b	.69 (1.24) ^a
EDG	.32 (1.06) ^a	.45 (.98) ^a	.58 (1.15) ^a	.49 (1.19) ^a	.33 (1.14) ^a
HLT	.12 (.87) ^a	.08 (.69)	.19 (.79)	.22 (1.00) ^a	.11 (.97) ^a
PLI	3.19 (2.14) ^c	3.85 (2.00) ^c	4.61 (1.87) ^c	4.58 (2.29) ^c	5.36 (1.98) ^c

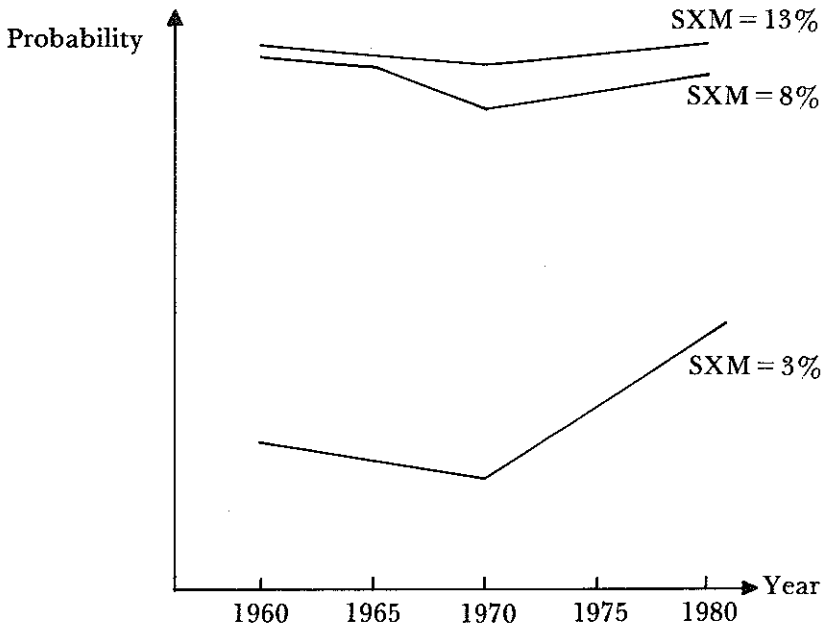
^a Statistically significant at 20 percent.

^b Statistically significant at 10 percent.

^c Statistically significant at 5 percent.

planatory variables were substituted in the equation to compute the Z value and find its probability for each year. Figure 1 shows fluctuations of the probability of economic development for each class. The probability distribution shifts upward as the net exports growth rate rises. When $SXM = 3$ percent, the probability of economic development decreased from 0.2317 in 1960 to 0.2125 in 1965 and 0.2044 in 1970, but increased to 0.2934 in 1975 and 0.4072 in 1980. When $SXM = 8$ percent, the probability fell from 0.9759 in 1960 to 0.9538 in 1965 and 0.9062 in 1970, but rose to 0.9239 in 1975 and 0.9416 in 1980. When $SXM = 13$ percent, the probability declined from 0.9998 in 1960 to 0.9632 in 1965 and 0.9541 in 1970, but increased to 0.9765 in 1975 and 0.9819 in 1980.

Figure 1 PROBABILITIES OF ECONOMIC DEVELOPMENT



IV. Conclusion

Economic development is a multidimensional process to satisfy

the basic human necessities and promote freedom. The empirical examination measures economic development as a function of social, economic, and political variables. It finds a positive interrelationship between economic development and export growth. The probability distribution of the economic development index shifts upward as the net export growth rate rises. These findings support the main hypothesis that net exports growth accelerates the process of economic development.

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