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ECONOMIC EFFECT OF INDO –EAST AFRICAN TRADE: A STUDY IN INPUT OUTPUT FRAMEWORK

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INTRODUCTION AND BACKGROUND

Alfred Marshall (1891), followed by Robertson, hypothesized international trade to be the engine of capitalist growth. But the capitalist growth requires an open economy and free trade as the pre requisites of growth. The hypothesis has been derived from practical experience of growth of the economies of Europe on the one hand, and the prediction of the theory of international trade on the other. The classical theory of trade predicted the pattern of trade to be based on comparative cost advantage in production. A country was therefore, expected to export goods in the production of which it has comparative cost advantage over others. Hecksher-Ohlin theory of international trade predicted the pattern of trade to be governed and guided by Factor Endowment of the countries. A capital abundant country is, therefore, expected to export capital intensive goods and import labor intensive goods.

After the Second World War, the Soviet model of planned development, which enabled USSR to achieve a level of growth in few decades that was achieved by capitalist economies, especially U.K. and U.S., in centuries, was imitated by Eastern Europe and many developing countries of the world. Like USSR, its followers assigned not only low importance to international trade in development but these countries also substituted market by the state and open by closed economy (S. Prakash, 1996). Globalisation changed the paradigm of growth again. Globalization brought about integration of large segments of the world economy; countries adopting globalization went for market based open economy and free trade with the specific objective of attaining rapid economic growth. Resurrection of international trade as a part of economic philosophy and its policy paradigm, combined with the its use as an instrument of rapid growth has pushed trade into the centre stage of analysis and policy again.

International economic order has first witnessed the economic grouping of several developed countries of Western Europe for deriving maximum trade and growth gains from free trade with each other. Subsequently, the scope of economic cooperation had been expanded. Success of European Union led to the emergence of similar groupings of both the developed and developing economies of the world. ASEAN and SAARC are two examples of grouping of developing countries.

Early Economists focused only on trade gains of international trade in terms of cheaper and more quantities of more (than those produced indigenously) goods becoming available through trade.

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However, initially the focus was on trade gains in the form of larger quantities of better quality goods at lower prices. Economies of large scale production and more refined division of labor tended to lower the cost. Subsequently, Marshall came out with his postulation of trade as an accelerator of growth. Trade always has had a beneficial impact on growth of output through the expansion of the size of the market. Growth gains of trade, in fact, substantiate Adam Smith's dictum that the development depends upon the extent of the market. But Marshall's thesis remained only at the level of a slogan since neither the conceptually nor empirically trade and growth gains were distinguished. *P.N. Mathur (1962) was probably the first economist to have formally distinguished the trade and growth gains of international trade. Empirical analysis was based on input output framework modeling.* Mathur also explicitly used Smith's postulation of positive impact of expanding market size on growth in a subsequent paper on South-South cooperation. He modified and extended Strout-Leontief Gravity Model in order to incorporate market size as an explicit factor of growth. He used per capita income and population as two determinants of market size.

Though East Africa and India are not members of a formal grouping, yet the trade among them acts as an economic bridge and as an instrument of augmentation of market size of each other's products. Both the Indian and East African economies being relatively less developed, it will be interesting to estimate the growth gains of Indo-East African trade. This paper examines the growth gains from international trade for India and East Africa. East Africa comprises Burundi, Kenya, Rwanda, Tanzania and Uganda. This paper focuses on India's trade with the East African countries, taken as a composite country, and its effect on growth of the two partners. We may impound the role of technology in growth gains by using IO table of India. This impounding also enables us to overcome the data difficulty as IO table of any East African country is not available to us. Besides, estimates of growth gains from East African exports to India represent its potential growth gains when they attain the development stage and structure of Indian economy of 2003-04. On this assumption, growth gains of India from imports shall represent the growth gains of East Africa.

MODEL

Growth is the function of investment. Analysis of growth, therefore, requires capital/investment to be endogenously treated in the model. For this, we need a dynamic input output model. But want of capital matrix has forced us to use the modified Leontief static open model. The modification of static Leonteif model is based on two Prakash's theorems pertaining to comparative economic statics of input output modeling (1988). Growth effect of trade and its differential impact on sectors and between the years shall be captured by the solution of the model with the Leontief inverses of two coefficients matrices A_t and A_{t+1} for 1998-99 and 2003-04. Modified static Input Output model, used in this study, incorporates modification in the specification of final demand vector.

The following two input - output models have been used in this study:

$$X_{1t} = (I - A_t)^{-1} F_{1t} \quad \ldots\ldots(1)$$
$$X_{2t} = (I - A_{t-1})^{-1} F_{1t} \quad \ldots\ldots(2)$$

Where X_1 and X_2 are gross output vectors, $(I-A)^{-1}$ is Leontief Inverse, F_{1t} is the final demand vector of 2003-04. Temporal technological change is thus incorporated by the use of the Leontief inverse of two periods. But the change in final demand has been impounded by the use of the same final demand vector of 2004. It will enable us to isolate the technology effect from the effect of change of final demand which is represented by import and export trade of India with East Africa. *The use of the same inverse for both partners in trade will quantify the growth gains of East Africa that will arise from the movement of its economy from their own to Indian technology matrix of 2004*. The underlying assumption is that East Africa will be able to attain the economic and technology development of India up to 2004 in some future year, say, 2012. Elements of F_1 are sector wise earnings of India from exports to five East African countries, F_2 contains sector wise export earnings of India from East Africa if the technology of 1998-99 was in use, and t refers to time period. All other elements of final demand shall be zero in order to isolate and estimate trade effect on growth of output.

Other models shall have payments bill of India for imports from East Africa for period t.

$$X_{1t} = (I - A_t)^{-1} F_{2t} \quad \ldots\ldots (3)$$
$$X_{2t} = (I - A_{t-1})^{-1} F_{2t} \quad \ldots\ldots (4)$$

It is obvious that Indian imports, represented by $F_{2t,}$ constitute East African exports to India.

DATA BASE

Input output table of Indian economy for the year 2003-04, prepared by CSO is the basic data base of the study. Data pertaining to export earnings and import bills and their commodity composition have been taken from Economic Survey.

Empirical Results

This part of the study examines the growth gains of India from exports to East Africa and growth gains of East Africa from their exports to India (Indian imports).

Growth Gains from Indo-East African Trade

The table 1 and 2 in the Appendix show the growth gains of India from its exports to East Africa and growth gains of East Africa from its exports to India. First we discuss the growth gains of India from its exports to East Africa and then we shall discuss the growth gains of East Africa from its exports to India.

Growth Gains of East Africa from Exports to India

Indian exports to East Africa are several times more than its imports. Consequently, growth gains from trade with East Africa are expected to be greater than the growth gains from trade for East Africa. Total growth gains, derived by East Africa, from its exports to India in 2003-04 have been estimate to equal Rs (Indian). 1295.233 crore. Average value of output effect of exports of East Africa (growth gain per sector) is Rs. 9.96 crore, which is several times more than the

average value of actual exports. There is both an accelerator and multiplier effect on growth gains. But accelerator and multiplier process of growth are activated through the backward and forward linkages on the one hand, and residentiary linkages on the other (For conceptual and methodological details, See Prakash, 1992). But the growth gains from export earnings to East Africa have varied greatly among the production sectors of the economy. The growth gains have varied between the minimum of the range Rs. 0.5 crore to the maximum of Rs. 207 crore. The coefficient of variation has as high a value as 272 per cent.

A perusal of the table 2, showing the sectoral distribution of growth gains of East Africa will highlight the following pattern of sectoral growth gains from export trade of East Africa with India:

(i) Total growth gains are very well distributed among the sectors of the economy;

(ii) Five broad groups (aggregation of sectors depicting high growth gains and based on classification in table) amount to a total of growth gain in the range of Rs. 107 to Rs. 207 crore;

(iii) Three broad groups of sectors depict moderate growth gains in the aggregative range of Rs. 58 and 78 crore;

(iv) Rest of the sectors of the economy have gained little; their gain being in the range of Rs. 0.5 to 10 crore;

(v) Growth gains from trade depend upon the magnitude and the sector spread of linkages of traded goods;

(vi) In most cases, indirect gains are much greater than the direct gains,

Results suggest that there exists a vast scope for deepening and widening the Indo-East African trade. An interesting facet of the pattern of trade is that there is a very high degree of structural complementarity between the two economies. A trading group shall be highly viable for promoting free trade.

Table:2 Growth Gains of East Africa from Exports to India

Paddy	0.64986
Wheat	0.5457
Jowar	0.00054
Bajra	0.00005
Maize	0.01622
Gram	0.06212
Pulses	0.14249
Sugarcane	0.37055
Groundnut	1.23771
Coconut	0.33556
Other oilseeds	2.27776

Jute	0.16382
Cotton	1.37116
Tea	0
Coffee	0
Rubber	2.01454
Tobacco	0
Fruits	0.31658
Vegetables	0.18721
Other crops	3.60696
Milk and milk products	0.28169
Animal services(agricultural)	0.56656
Poultry & Eggs	0.09702
Other liv.st. produ. & Gobar Gas	1.17281
Forestry and logging	15.50856
Fishing	0.05782
Coal and lignite	34.51159
Natural gas	4.98371
Crude petroleum	44.58036
Iron ore	1.22622
Manganese ore	0.09599
Bauxite	4.81223
Copper ore	6.84373
Other metallic minerals	4.90125
Lime stone	0.17893
Mica	0
Other non metallic minerals	5.68549
Sugar	0.22338
Khandsari, boora	0.07964
Hydrogenated oil(vanaspati)	0.01761
	0.56608
Tea and coffee processing	0.03081
Miscellaneous food products	1.30821
Beverages	0.26677
Tobacco products	0
Khadi, cotton textiles(handlooms)	0.04377
Cotton textiles	0.74231
Woolen textiles	7.54662
Silk textiles	0.01982
Art silk, synthetic fiber	3.72376

textiles	
Jute, hemp, mesta textiles	0.58887
Carpet weaving	0.03015
Readymade garments	0.38878
Miscellaneous textile products	0.97503
Furniture and fixtures-wooden	0.07587
Wood and wood products	5.62826
Paper, paper prods. & newsprint	178.0362
Printing and publishing	5.15788
Leather footwear	0.07692
Leather and leather products	0.19246
Rubber products	2.82191
Plastic products	16.4735
Petroleum products	68.90986
Coal tar products	2.63612
Inorganic heavy chemicals	19.41612
Organic heavy chemicals	9.91091
Fertilizers	1.22469
Pesticides	0.89858
Paints, varnishes and lacquers	13.22527
Drugs and medicines	0.59395
Soaps, cosmetics & glycerin	0.4974
Synthetic fibers, resin	10.30081
Other chemicals	22.57978
Structural clay products	0.60278
Cement	0.66133
Other non-metallic mineral prods.	2.47225
Iron, steel and ferro alloys	45.08359
Iron and steel casting & forging	9.86071
Iron and steel foundries	3.59025
Non-ferrous basic metals	198.0326
Hand tools, hardware	3.60981

Miscellaneous metal products	14.05769
Tractors and agri. Implements	0.07596
Industrial machinery(F & T)	0.82216
Industrial machinery(others)	3.55853
Machine tools	4.24837
Other non-electrical machinery	108.7333
Electrical industrial Machinery	17.86007
Electrical wires & cables	1.59001
Batteries	0.64086
Electrical appliances	0.72648
Communication equipments	4.51085
Other electrical Machinery	5.75401
Electronic equipments(incl.TV)	3.08651
Ships and boats	1.78346
Rail equipments	3.13457
Motor vehicles	3.26458
Motor cycles and scooters	3.57361
Bicycles, cycle-rickshaw	0.03119
Other transport equipments	24.03049
Watches and clocks	0
Medical, precision&optical instru.s	0.42884
Jems & jewelry	34.90809
Aircraft & spacecraft	0.07589
Miscellaneous manufacturing	16.82902
Construction	13.10453
Electricity	49.91529
Water supply	0.19298
Railway transport services	16.86077
Land tpt including via pipeline	37.98161

Water transport		1.473
Air transport		0.98619
Supporting and aux. tpt activities		3.40518
Storage and warehousing		0.37563
Communication		12.43588
Trade		60.69844
Hotels and restaurants		2.44355
Banking		37.84214
Insurance		8.74727
Ownership of dwellings		0
Education and research		0.05381
Medical and health		0.22546
Business services		5.39422
Computer & related activities		2.22669
Legal services		1.20355
Real estate activities		0.05833
Renting of machinery & equipment		0.20113
O.com, social&personal services		4.83227
Other services		2.92616
Public administration		0
	G	
	Total	1295.233
	Av	9.96333
	SD	27.07846
	CV	2.717812

Table: 1-Growth Gains From Indian Exports To East Africa

Paddy	319.5454
Wheat	528.7255
Jowar	4.531184
Bajra	0.592964
Maize	32.76176
Gram	73.63453
Pulses	492.5022
Sugarcane	278.2691
Groundnut	392.0333
Coconut	88.32446
Other oilseeds	913.25
Jute	342.4085

Cotton	2541.695
Tea	400.0301
Coffee	363.7185
Rubber	532.7585
Tobacco	316.5315
Fruits	1146.459
Vegetables	117.336
Other crops	1239.464
Milk and milk products	421.9962
Animal services(agricultural)	475.0917
Poultry & Eggs	56.77326
Other liv.st. produ. & Gobar Gas	829.0781
Forestry and logging	698.3492
Fishing	1741.802
Coal and lignite	8948.355
Natural gas	1630.921
Crude petroleum	8717.731
Iron ore	4371.463
Manganese ore	43.05506
Bauxite	618.5181
Copper ore	894.6281
Other metallic minerals	688.0777
Lime stone	80.26607
Mica	17.392
Other non metallic minerals	2656.124
Sugar	262.249
Khandsari, boora	84.06392
Hydrogenated oil(vanaspati)	1122.981
	460.3828
Tea and coffee processing	27.00462
Miscellaneous food products	4074.89
Beverages	102.2653
Tobacco products	0
Khadi, cotton textiles(handlooms)	269.591
Cotton textiles	6106.009
Woolen textiles	52.14492
Silk textiles	38.96893

Art silk, synthetic fiber textiles	1207.584
Jute, hemp, mesta textiles	170.6517
Carpet weaving	0
Readymade garments	8791.061
Miscellaneous textile products	650.1551
Furniture and fixtures-wooden	41.4298
Wood and wood products	1620.431
Paper, paper prods. & newsprint	2960.849
Printing and publishing	787.9858
Leather footwear	23.54712
Leather and leather products	3482.414
Rubber products	3752.297
Plastic products	4458.605
Petroleum products	13162.96
Coal tar products	791.1203
Inorganic heavy chemicals	3653.168
Organic heavy chemicals	3192.291
Fertilizers	650.1584
Pesticides	368.2319
Paints, varnishes and lacquers	1548.838
Drugs and medicines	192.9201
Soaps, cosmetics & glycerin	82.70154
Synthetic fibers, resin	7311.253
Other chemicals	4137.39
Structural clay products	333.6226
Cement	405.5504
Other non-metallic mineral prods.	1069.427
Iron, steel and ferro alloys	22652.54
Iron and steel casting & forging	9609.824
Iron and steel	2747.519

foundries	
Non-ferrous basic metals	23052.82
Hand tools, hardware	6013.858
Miscellaneous metal products	8731.823
Tractors and agri. Implements	143.7162
Industrial machinery(F & T)	569.0427
Industrial machinery(others)	1217.192
Machine tools	111686.9
Other non-electrical machinery	10127.35
Electrical industrial Machinery	2781.891
Electrical wires & cables	861.0251
Batteries	495.1126
Electrical appliances	1412.784
Communication equipments	4605.751
Other electrical Machinery	4975.669
Electronic equipments(incl.TV)	2625.23
Ships and boats	495.2293
Rail equipments	1335.101
Motor vehicles	6032.002
Motor cycles and scooters	15726.97
Bicycles, cycle-rickshaw	22.69401
Other transport equipments	106610
Watches and clocks	0
Medical, precision&optical instru.s	533.6086
Jems & jewelry	26661.69
Aircraft & spacecraft	133.5476
Miscellaneous manufacturing	5580.6
Construction	8419.466
Electricity	22292.33

Water supply	83.99846
Railway transport services	6029.271
Land tpt including via pipeline	16126.71
Water transport	403.5279
Air transport	541.217
Supporting and aux. tpt activities	1345.228
Storage and warehousing	176.9637
Communication	8446.078
Trade	29001.85
Hotels and restaurants	1347.897
Banking	25011.95
Insurance	7274.043
Ownership of dwellings	0
Education and research	36.47168
Medical and health	103.1154
Business services	3713.388
Computer & related activities	1777.228
Legal services	565.0814
Real estate activities	37.439
Renting of machinery & equipment	308.9431
O.com, social& personal services	2920.783
Other services	1106.456
Public administration	0

Mean	4884.4024
SD	14290.9387
CV	2.92583157

Total growth gains from Indian exports to East Africa are as high as Rs. 634972.3 crore. The growth gains to India are many times more than the growth gains that East Africa derives from its exports to India. Limited number and lower priced goods in East African exports to India explain the difference. It is also partly accounted by the lower stage of economic development of

East Africa. But at the same time, the gains highlight the tremendous future scope for expansion and diversification of exports since East African exports comprise mainly primary goods.

Growth or output gains of India from its exports are, however, not confined only to the sectors producing export goods; number of sectors to which growth gains accrue from exports is much greater than the number of export sectors in the economy. The gains are widely spread over a large number of sectors of the Indian economy. The degree and direction of spread of gains over sectors is explained largely by the pattern of linkages of export sectors. Other features of the growth gains from exports are as follows.

1. Average or per sector growth gains amount to Rs. 4884.403 crore. It is 547 times the average gain of East Africa.

2. Only five out of 130 sectors of the economy show zero growth gains from Indian exports to East Africa. The remaining 125 sectors have registered positive growth/output gains from the exports to East Africa. But the growth gains vary highly among the sectors.

3. The growth gains vary highly among sectors. The inference is supported by the value of CV, which is as high as 293 per cent. Thus, inter sector variation of growth gains of Indian economy from exports vary more sharply among sectors than the growth gains of East African countries. The growth gains vary from the minimum of Rs. 0.59 crore to the maximum of Rs. 106610 crore.

4. Extent of inter sector variation of growth gains may be gauged from the frequency table of sectors in different levels of growth gains.

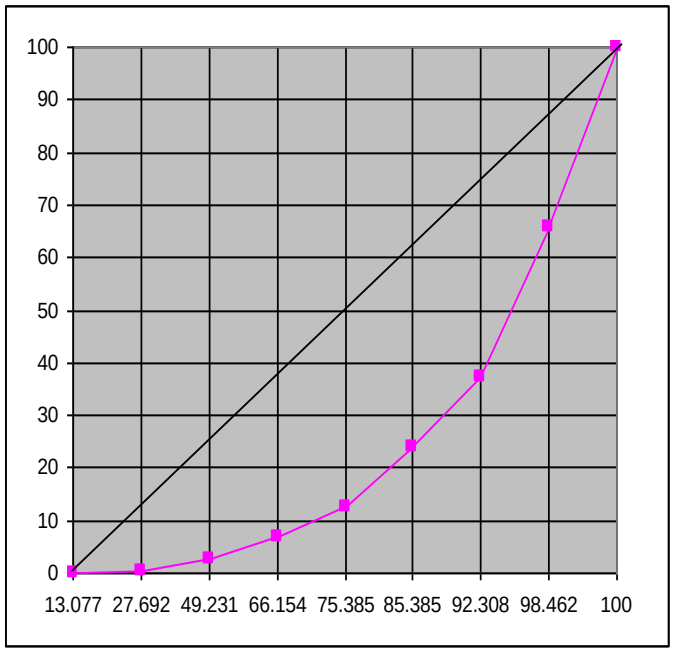
SECTORAL DISRIBUTION OF GROWTH GAINS FROM EXPORTS

GROUPS	**FREQUENCY**	**CUMULATIVE FREQUENCY**	**GAIN**	**CUMULATIVE GAIN**
0-5	7		5.124148	
6 TO 50	10	0.130769	320.764	0.000513
51 TO 300	19	0.276923	2552.532	0.004533
301 TO 700	28	0.492308	13370.15	0.025589
701 TO 1999	22	0.661538	26946.88	0.068027
2000 TO 4000	12	0.753846	37027.65	0.126341
4001 TO 8000	13	0.853846	70970.8	0.238111
8001 TO 15000	9	0.923077	84954.65	0.371904
15001TO 30000	8	0.984615	180526.9	0.65621
30000 AND ABOVE	2	1	218296.9	1

5. Two sectors register as low growth gains as range from 0.59 to a little less than 5 crore.

6. Ten sectors show output gains that lie in the range of 5< G < 50 Rs. Crore, where G denotes output or growth gain from trade.
7. Nineteen sectors derive growth gains between 51 and 300 crore, where as the number of sectors in the range of Rs. 301 to 700 crore is 28..
8. Growth gains of 22 sectors lie between Rs. 701 to 1999 crore, whi.e 25 sectors derive growth gains in the range of Rs. 2000-8000 crore.
9. Nineteen sectors are in three remaining upper groups of growth gains.

The above table reveals an interesting distribution pattern of growth gains of trade. As we move from the lower to each successive ranges of growth gains up to Rs. 700, number sectors tends to rise. However, beyond this range, number of sectors in each successive group of growth range tends to decline sharply. The table does highlight the fact that the growth gains of trade sharply vary between the sectors. The distributional in equality of gains may be gauged from the Lorenz curve given below.



10. Transport equipment sectors register the highest growth gains from Indian exports and even within this group, the highest gain accrues to the other transport equipment producing sector of the economy.
11. Incidentally, export sectors of the economy derive much larger growth gains from trade than the non export sectors. The reason is that the non export sectors derive only indirect benefits from trade while the trade the sectors involved in trade derive both direct and indirect gains.

Conclusions

The main findings of the study reveal that the growth gains of Indian economy from exports to East African countries are quite high. Besides, Indian economy derives larger gins than the African economies. The trade sectors derive much greater growth gains than the non trade sectors. The growth gains vary sharply among the sectors, the variation of gains among sectors

depend upon strength and spread of linkages of trade sectors with the economy. The Indo-East African trade has got tremendous potential for growth and diversification.

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