A STUDY ON DYNAMICS OF EXPORT EARNINGS OF ENGINEERING GOODS EXPORTS IN INDIA

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Abstract: *The gravity model is frequently used to analyse bilateral trade statistics. Manufacturing products and exports have been driving the rapid growth of many dynamic emerging economies. Manufacturing has not been the engine of growth for the Indian economy, it needs to grow at a much faster rate to sustain in the external competitive environment. Lack of depth in technology is one of the foremost issues affecting the growth of manufacturing sector in India. Most Indian manufacturing firms appear to be stuck at the basic or intermediate level of technological capabilities. In a globally competitive scenario, countries completely rely on exports of engineering products and face constraints in the long run development process. As factors,   researcher will consider the classical gravity variables and some suplimentary dummy variables. Also, we will determine, using the estimated equation of the gravity model, the efficiency of India bilateral trade with its partners.*

Key words: *External Trade Efficiency, Econometric Trade Model, Gravity Variables.*

1. INTRODUCTION:

The pattern of economic development associated with structural changes in exports and expansion of export diversification worldwide. In a globally competitive scenario, countries completely rely on exports of engineering products and face constraints in the long run development process. Negative trends in the secular terms of trade, uncertainty arising from price variability and the consequent fluctuating export earnings, difficulties in achieving economic diversification have all proven to be detrimental for such countries amid development challenges and low income. The lack of focused approach in identifying, sustaining and building the country's competitive advantage, concentration of exports in low value categories and relatively poor inflow of Foreign Direct Investment (FDI) especially in export oriented industries is responsible for the relatively weak performance of India's engineering goods exports.

2. REVIEW OF LITERATURE:

Pack, (1993) made clear that companies operating in the area of export are always more efficient in production compared with companies that produce for the local market. His study affirms that these results do not indicate a causal relationship between exports and efficiency resulting from the success of these companies in the technology transfer by foreign trade, and that it may be that the link between exports and efficiency results from the fact that only more efficient companies are able to export their products to global markets, where the competition between these companies is a significant factor that stimulates the expanding level of exports.

Rodrik, (1999), sees that promotion of exports is a part of trade policy, and can be considered as a tool of funding imports. His study shows the experience of 25 developing countries that have witnessed the fastest economic growth rates over the period 1965-1994 and which were characterized as high level (10%).The main notion of this study is that it confirms the significant role of exports to stimulate economic activities and enhance the level of growth.

Alcala and Ciccone, (2003) found that trade and local markets were the major determinants of economic growth over the period 1960-1996. Their study tests trade openness, which they consider as an appropriate measure of trade. In this study, the average growth rate of income per capita is the dependent variable of the study's model, while trade openness, local market size, institutional quality, initial income per capita are the independent variables.

3. METHODOLOGY AND DATA:

This paper is empirical and aims to identify significant influence factors on bilateral trade flows between India and its trade partner countries, in order to estimate the degree of the external trade efficiency, identifying the most effective and the most ineffective foreign trade partnership for India. The econometric model used for this purpose is not a proper gravity model, since the researcher only used the bilateral trade flows between one reference country, India and its trading partners, but it uses gravity variables as explicative factors. The data used in the analysis from World Bank, World Trade Organisation, and the Statistics times. The database contains 30 partner countries with which India has bilateral trade from export and import of engineering goods.

4. GRAVITY MODEL:

The gravity model is widely used in econometric analysis of international statistics. For the foreign trade, the gravity model analyses the determinants of bilateral trade flows, the goal being the development of more precise predictions on the bilateral trade. Newton's gravitational equation measures the maximum force between two masses that are separated in space. Trade gravity equation follows the same principle, measuring trade that may exist between two countries, mainly depending on the distance between them and their level of development, plus a few specific factors.

5. THE STANDARD EXPRESSION FOR THE TRADE GRAVITY EQUATION :

The econometric model proposed to explain India's trade with partner countries has the following form

$$\text{Ln } BTF_i \text{ (Engineering Goods)} = \beta_0 + \beta_1 \text{ Ln } GDP_i + \beta_2 \text{ Ln Per Capita GDP}_i + \beta_3 \text{ Ln Distance}_i + \beta_4 \text{ Language\_dummy} + \varepsilon$$

where

- BTF_i(Engineering Goods) represents the bilateral trade flows between India and the partner country i
- GDP_i is the gross domestic product of the partner country i,
- Per Capita GDP_i is the measure of the partner country i
- $DIST_i$ is the distance in kilometres between New Delhi and the Capital of the partner country i
- Language_dummy is a dichotomical variable that indicates whether the partner country made significant difference in the language of India or not.

6. ESTIMATION OF THE ECONOMETRIC TRADE MODEL:

Parameters were estimated using Ordinary Least Squares method, and for the selection of the regression variables was used the stepwise method. The parameters of the econometric model were estimated with SPSS 21.0 software.

Table 1
R Square Statistics for the Selected Models Using Stepwise Method
Model Summary[e]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.852[a]	.726	.726	.47799
2	.890[b]	.792	.792	.41660
3	.896[c]	.803	.802	.40595
4	.902[d]	.813	.812	.39577

a. Predictors: (Constant), GDP
b. Predictors: (Constant), GDP, DISTANCE
c. Predictors: (Constant), GDP, DISTANCE, D_LANG
d. Predictors: (Constant), GDP, DISTANCE, D_LANG, PERCAPITAGDP
e. Dependent Variable: Trade_Balance

Table 1 shows the square of the correlation coefficient values (R Square) obtained for the models based on all the regression factors. It is noted that from the 4 variables entered into the model, the best model selected has four significant influence factors, namely Ln GDP_i, Ln Per CapitaGDP_i,   Ln Distance$_i$, and Language_dummy. The chosen model explains 81.3% from the variation of the dependent variable, the bilateral trade flows between India and partner countries.

Table 2
ANOVA Result for the Selected Models

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	374.373	1	374.373	1638.554	.000[b]
	Residual	141.199	618	.228		
	Total	515.572	619			
2	Regression	408.490	2	204.245	1176.842	.000[c]
	Residual	107.082	617	.174		
	Total	515.572	619			

3	Regression	414.060	3	138.020	837.542	.000[d]
	Residual	101.512	616	.165		
	Total	515.572	619			
4	Regression	419.243	4	104.811	669.153	.000[e]
	Residual	96.329	615	.157		
	Total	515.572	619			

a. Dependent Variable: Trade_Balance

b. Predictors: (Constant), GDP

c. Predictors: (Constant), GDP, DISTANCE

d. Predictors: (Constant), GDP, DISTANCE, D_LANG

e. Predictors: (Constant), GDP, DISTANCE, D_LANG, PERCAPITAGDP

The analysis of the data presented in Table 2, ANOVA results, shows that the models explained significant variation in bilateral trade flows, based on factors included in the model (Sig. <0.05), but the researcher can observe that the model with the lowest residual error is the fourth model, the one that, consequently, has the highest R Square value.

Table 3
Parameter Estimates of the Trade Model
Co-efficient

Model		Unstandardized Co-efficient		Standardized Co-efficient	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4.323	.293		-14.756	.000
	GDP	1.026	.025	.852	40.479	.000
2	(Constant)	-4.038	.256		-15.763	.000
	GDP	1.152	.024	.957	48.302	.000
	DISTANCE	-.309	.022	-.278	-14.021	.000
3	(Constant)	-3.263	.283		-11.532	.000
	GDP	1.098	.025	.912	43.779	.000
	DISTANCE	-.313	.021	-.281	-14.567	.000
	D_LANG	-.211	.036	-.114	-5.814	.000
4	(Constant)	-2.737	.291		-9.415	.000
	GDP	.951	.035	.790	26.953	.000
	DISTANCE	-.241	.024	-.217	-9.913	.000
	D_LANG	-.204	.035	-.111	-5.777	.000
	PERCAPITAGDP	.198	.034	.153	5.752	.000

a. Dependent Variable: Trade_Balance

Analyzing the results presented in Table 3 for the fourth model, the estimated trade equation is:

$$\text{Ln BTF}_i(\text{Engineering Goods}) = -2.737 + 0.951\text{Ln GDP} + 0.198 \text{ Ln Per Capita GDP} - 0.241 \text{ Ln Distance} - 0.204 \text{ Language\_dummy}$$

The results show that BTF are explained by GDP, the distance between the two countries, the partner country's Per Capita GDP in India and the existence of Language difference between India and the partner country.

The positive correlation between
- BTF and GDP show that India has more intense external trade with countries that have higher GDP than with the countries with lower GDP.
- BTF and Per Capita GDP show that India has more intensified trade activities with countries with income more than 100 million dollars, compared to countries with low or zero GDP per capita.

The negative correlation between BTF and the geographical distance shows that the greater the distance between India and the partner country, the lower is the trade volume between the two.

Table 4, Validation of Normality Hypothesis
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		620
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.39448685
Most Extreme Differences	Absolute	.111
	Positive	.111
	Negative	-.087
Kolmogorov-Smirnov Z		2.774
Asymp. Sig. (2-tailed)		.000

a. Test distribution is Normal.
b. Calculated from data.

Table 5, Validation of the Independence Hypothesis
Runs Test

	Unstandardized Residual
Test Value[a]	-.09474
Cases < Test Value	310
Cases >= Test Value	310
Total Cases	620
Number of Runs	64
Z	-19.856
Asymp. Sig. (2-tailed)	.000
a. Median	

Model errors were tested for normality and independence. The results are presented in Tables 4 and 5. The assumption that the errors are normally distributed is rejected (Sig. = 0.000> 0.05), as well as the error's independence hypothesis (Sig. = 0.000>0.05).

7. DETERMINATION OF EFFICIENT AND INEFFICIENT TRADE PARTNERSHIPS FOR INDIA:

To analyse the efficiency of India's bilateral trade with a partner country, the model error series is studied from estimating the trade model. Negative error values show that the real value of the trade balance is below the estimated one, and positive error values indicate that the real value is greater than the estimated value. The working hypothesis is that negative error values indicate an inefficient trade, which has not reached its potential and positive error values show an effective trade, above the theoretical potential. To determine the degree of trade efficiency or inefficiency, calculation is made for the error series, the one standard deviation interval around the mean, which is (-1, +1). If the error values are outside the range, then for positive values there is a high efficiency of bilateral trade and for negative values have a highly inefficient trade. The result is presented in Table 6.

Table 6, The Degrees of Efficiency for the Bilateral Trade Flows between India and
Partner Countries

Country	e_i	Efficiency level
Australia	-0.130	Inefficient
Bangladesh	-1.095	Highly Inefficient
Belgium	-0.221	Inefficient
Brazil	-0.231	Inefficient
China	0.523	Efficient
France	-0.232	Inefficient
Germany	0.005	Efficient
Indonesia	0.189	Efficient
Iran	-0.191	Inefficient
Italy	-0.264	Inefficient
Japan	-0.302	Inefficient
Kenya	0.018	Efficient
Korea	0.216	Efficient
Malaysia	0.858	Efficient
Mexico	0.598	Efficient
Nepal	-0.109	Inefficient

Netherlands	0.131	Efficient
Nigeria	-0.466	Inefficient
Oman	-0.186	Inefficient
Saudi Arabia	-0.031	Inefficient
Singapore	0.565	Efficient
South Africa	0.006	Efficient
Spain	-0.363	Inefficient
Sri Lanka	-0.448	Inefficient
Thailand	0.437	Efficient
Turkey	-0.141	Inefficient
UAE	0.574	Efficient
UK	0.013	Efficient
USA	0.105	Efficient
Vietnam	0.775	Efficient

Source: Computed

Table 6 analyses the data and India has the most efficient bilateral trade with partner countries. It has the most inefficient bilateral trade with Bangladesh. The efficient trade relations with partnerships countries are China, Germany, Indonesia, Kenya, Korea, Malaysia, Mexico, Netherlands, Singapore, South Africa, Thailand, UAE, UK, USA, Vietnam and the inefficient trade relations with partnerships countries are Australia, Belgium, Brazil, France, Iran, Italy, Japan, Nepal, Nigeria, Oman, Saudi Arabia, Spain, Sri Lanka and Turkey.

8. CONCLUSION:

The study derived from a gravity model reveals significant explanatory variables for bilateral trade between India and partner countries. Based on the obtained model error values, the partner countries to which India develops, efficient or inefficient, foreign trade activities are determined. Thus, bilateral trade flows are explained on the one hand, by the GDP of the partner country, by the Distance in India, by the per capita GDP of the partner country and the existence of a Language, between positive correlations, and on the other hand, the distance between the two countries, which have a negative correlation with bilateral trade. The efficient trade relations between India and partner countries increase communication with enterprises advanced technology, and to improve trade in international competition and to create more innovation activities, the government plays the important role, which needs to supervise infrastructural facility guide and invest. Finally inefficient trade relations between India and partner countries to minimize the transportation cost, the government need to assist in preserving the order of market operation, enhancing self-discipline, and protecting self benefit. Government should take initiative of providing support for in-house R&D efforts that would help manufacturing industries to reach global market and export earnings of the engineering goods from India.

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