

DO MACRO-ECONOMIC VARIABLES AFFECT FOREIGN TRADE OF INDIA? PANEL REGRESSION APPROACH

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Abstract After the crisis in 1991, the Indian government introduced some changes in its Policy on trade, foreign investment, tariffs, and taxes under the name of 'New Economic Reforms'. The main focus of these reforms has been on liberalisation, openness, and export promotion activity. The paper focuses on the impact of development variables on export from India. Developmental variables include infrastructure, human resource, openness, production & market, research & development, resources, and taxation. Each development variable consists of a set of related variables.

The paper has used principal component analysis (PCA), composite index and panel regression model. These help to know impact of individual developmental variable on India's export. The period of study is 1990 – 2013. The value of KMO is over 0.6 indicating the samples are adequate and the value of Bartlett's test is less than 0.05 ensure suitability of PCA. The overall growth rate Indian foreign trade is 3 percent during last more than two decades. Main macro-economic variables are infrastructure, resources, and taxation. The government should strengthen and incorporate these macro-economic variables while making foreign trade policy (i.e. EXIM policy) policy under the umbrella of WTO.

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INTRODUCTION

Foreign trade has been one of the most significant determinants of economic development of a country. The foreign trade of a country consists of inward and outward movement of goods and services, which result in outflow and inflow of foreign exchange. During present times, international trade is a vital part of development strategy and it can be an effective instrument of economic growth, employment generation and poverty alleviation in an economy. According to traditional pattern of development show that resources are transferred from the agricultural to the manufacturing sector and then into services - sector in an economy. The process of globalisation has got momentum through the process of economic integration, and in the expansion of the volume of International Trade. India has been a relatively new comer to the process of expansion of international trade since its opening up to world trade only began after the crisis in 1991. The opening up to international trade should be seen as a crucial aspect of the new approach to economic policy and as an integral part of the process of reforms. In 1991, the government introduced some changes in its policy on trade, foreign investment, tariffs, and taxes under the name of 'New Economic Reforms'. The main

focus of these reforms has been on liberalisation, openness, and export promotion activity. India's foreign trade and export has significantly changed in the post-reforms period. In absolute terms, trade volume rose and the composition of exports have undergone several significant changes. India's foreign trade continuously increased. It has shown the position of export and import of Indian economy. It was 1.33 billion \$US 1960-61. But in 1980-81 export was increased to 8.58 billion US\$ and after economic reform in 1991-92 export goes up with 17.6 billion US\$ after that at present in 2010-2011 export is 157.2 billion US\$.

With globalisation and WTO, India's export-import turnover has been increased manifold over a period of more than two decades since 1991. This become possible only because of India has adopted liberalised and "New Economic Reforms" after crisis of 1991. The state of Indian economy is considered as main contributor for increasing in export turnover. Macro-economic variables such as infrastructure, resources, openness, production, taxation etc. are indicators of level of development of Indian economy. The main purpose of this paper is to study the overall impact of individual macro-economic variables on the Indian foreign trade performance.

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LITERATURE REVIEW

Sarkar (2001) observes that in the 1980s, India's balance of trade deficit showed a tendency to decline in the face of a more rapid growth of exports than imports. The seven year period under New Economic Policy (NEP) (1991-98), however, did not accelerate the process. Rather there is some indication of its failure on the balance of trade front. Contrary to the claim made in certain pro-NEP circles, exports did not pick up, while imports accelerated. Due to its failure to control domestic inflation vis-a-vis India's trading partners, the real (effective) exchange rate of the rupee appreciated in spite of substantial depreciation of nominal (effective) exchange rate.

Subrahmanya (2004) studies the impact of globalisation and domestic economic reforms on small industry. The study concludes that small industry in India is facing a tough competitive environment since 1991. As a result, its growth in terms of units, employment, output and exports has come down. This has resulted in a less impressive growth in its contribution to national income and exports. Lack of reliable and stable economic infrastructure reduced growth of credit inflow which further caused technological obsolescence. These activities led to inferior quality of the products and low productivity. The study recommends that the financial infrastructure needs to be broadened and adequate inflow of credit to the sector must be ensured.

Shah and Ali (2005) investigate the relationship between Gross Domestic Product (GDP), exports and imports of South Asian Countries. The results of their study shows that output growth and exports provoke imports in case of India. The South Asian countries should continue with the import of necessary raw material for value addition and needed technology to expand capacity and improve productivity to increase output growth.

Veeramani (2008) explores the relationship between the Real Effective Exchange Rate (REER) and exports for the period 1960-2007. The study confirms that the appreciation of the REER leads to a fall in the dollar value of India's merchandise exports. The analysis suggests that the major downward risk on the growth rate of exports may arise from the fall in the growth rate of India's real GDP. Any slowdown in India's GDP growth would also lead to a fall in the growth rate of exports.

Iyer (2009) investigates for spillover effects in the Indian manufacturing industry. The study reveals that Visits to the supplier's plants were found to be an important channel for this spill over to occur. The domestic firms which had forward linkages (with the MNC selling to the local firms) experienced positive spillover effects. Through backward linkages (with the MNC buying from the local firms), we found that domestic firms experienced positive spillovers.

Positive spillovers were also experienced by domestic firms because of foreign competitors.

Gupta (2012) states that during the two decades of reforms regime the role of foreign trade grown in India and remarkable changes came in its trade scenario. A noteworthy change during the post reforms regime is that India penetrates in global markets more rapidly for services trade than for goods trade. The study finds out steep rise in the share of commercial service exports in total trade of India and a structural shift in its structure during the post reforms regime. The study advocates more entry level and domestic level reforms along with diversification in commercial service exports to gain further momentum and supports trade openness to gain competitive advantage for commercial service trade in the global market.

There is no existing literature which has included comprehensive set of macro-economic variables for the purpose of investigating their impact on the Indian foreign trade performance.

OBJECTIVE OF THE STUDY

- To study the impact of macro-economic variables on the international trade performance of India.

TESTING

- Macro-economic variables do not affect India's foreign trade performance.

EXIM POLICY

The Export-Import Policy (EXIM Policy), announced under the Foreign Trade (Development and Regulation Act), 1992, would reflect the extent of regulations or liberalisation of foreign trade and indicate the measures for export promotion. A very important feature of the EXIM policy since 1992 is freedom. Licensing, quantitative restrictions, and other regulatory and discretionary controls have been substantially eliminated. The Union Commerce Ministry, Government of India announces the integrated Foreign Trade Policy (FTP) every five year. This is also called EXIM policy. This policy is updated every year with some modifications and new schemes. New schemes come into effect on the first day of financial year, i.e., April 1, every year. The Foreign Trade Policy which was announced on August 28, 2009 is an integrated policy for the period 2009-14.

Export-Import (EXIM) Policy frames rules and regulations for exports and imports of a country. This policy is also known as Foreign Trade Policy. It provides policy and strategy of the government to be followed for promoting exports and regulating imports. This policy is periodically

reviewed to incorporate necessary changes as per changing domestic and international environment. In this policy, approach of government towards various types of exports and imports is conveyed to different exporters and importers. Now in the era of globalisation, no economy in the world can remain cut-off from rest of the world. Export and import play a significant role in the economic development of all the developed and developing economies. With the growth of international organisations like WTO, UNCTAD, ASEAN, etc., world trade is growing at a very fast rate.

RESEARCH METHODOLOGY

Data Sources

The required quantitative data are sourced online mainly from UNCTAD and World Bank website. The period of study is 1990-2013. Foreign trade data i.e. export and import of goods and services data are taken from United Nations Conference on Trade and Development (UNCTAD). Macro-economic variables (i.e. socio-economic variables) have been classified into infrastructure, production, resources, openness and taxation. Each macro-economic variable consists of a set of related variables. Macro-economic variables data are collected online from World Bank website. The paper has used principal component analysis (PCA), composite index and panel regression model (fixed effect).

Principal Component Analysis

The paper considers developmental variables like population, GDP, and so on, which is bound to be a high degree of correlation amongst independent variables. There could be three strategies that can be used for dealing with such an econometric problem:

1. Drop all correlated variables, there is a great loss of information.
2. Use Principal Component Analysis (PCA) to determine the “principal variables.”

3. Use PCA for formation of a composite index.

The following consideration should be kept in mind while applying PCA:

1. For determining the retained component we need a criterion.
2. The PCA methodology tells us the total variance explained by each retained principal component as well as the cumulative percentage of the explained variation. This is a measure of the explanatory power of the component for the information content of the procedure.
3. There were various methods of rotation but the most popular method is the Varimax with the Kaiser normalisation. The purpose of the rotation is to make the interpretation of the PCA more meaningful. Method of rotation however retains the same information and explanatory power.

Method for Construction of the Index

The method for construction of a composite index is given by Jha and BhanuMurthy (2006). Once the number of retained principal components is determined and the rotated component scores obtained, then there is the choice of using the principal components as such or selecting certain sub-set of variables from the larger set of variables. Jolliffe (2002) proposes selecting one variable to represent each of the retained principal components. The variable that has the highest loading on a component is chosen to represent that component, provided that it has not already been chosen. If it has been chosen, the variable with the next largest loading is selected. The procedure starts with the largest principal component and proceeds to the smallest retained component.

$$\text{Index} = \sum_j^3 w_j x_j$$

X_j = retained variables

W_j = component scores (weights).

Table 1: Developmental Variable Selected through Principal Component Analysis

Variable	Variables Included (in PCA)	Principal Variables Selected (by PCA)	Composite Index
Infrastructure (INFRA)	ENGY, ELCTP, EPC, ATCARR, ATFT, RLYGT, RLYLINE, TEL	ATCARR, ATFT, RLYLINE	IINFRA
Production (PROD)	AG_PW, MFG, IND, SER, GDP	MFG, SER, AG_PW	IPROD
Openness (OPN)	IMD, EXRATE, TOURNO, TOURISM, TOT, RESV, FDI, PORT, TOPN	EXRATE, TOT, PORT	IOPN
Resource (RES)	TNR, GFCF, GDS, FUEL, OREMETAL	GDS, OREMETAL, TNR	IRES
Taxation (TAX)	G&STAX, OTHRTAX, TAXREV, ITTAX	G&STAX, OTHRTAX, TAXREV	ITAX

Panel Regression Model

A common panel data regression model looks like

$$y_{it} = a + bx_{it} + \epsilon_{it},$$

Where y is the dependent variable, x is the independent variable, a and b are coefficients, i and t are indices for individuals and time. The error ϵ_{it} is very important in this analysis. Assumptions about the error term determine whether we speak of fixed effects or random effects. In a fixed effects model, ϵ_{it} is assumed to vary non-stochastically over i or t making the fixed effects model analogous to a dummy variable model in one dimension. The panel model has designed in such a way to capture two effects. The first effect is due to scalar effect. The second effect is due the dynamic changes in the determinants (developmental variables).

Indian Foreign Trade

The general form of the fixed effects model is:

$$(\text{ForeignTrade})_{it} = e^{\{\alpha_0 + \beta_1 * t\}} \cdot (\text{IINFRA})_{it}^{\beta_2} \cdot (\text{IPROD})_{it}^{\beta_3} \cdot (\text{ITOPN})_{it}^{\beta_4} \cdot (\text{IRES})_{it}^{\beta_5} \cdot (\text{ITAX})_{it}^{\beta_6} \dots \dots \dots (1)$$

Taking log on both the side and add error term

$$L(\text{ForeignTrade})_{it} = \alpha_0 + \beta_1 * t + \beta_2 L(\text{IINFRA})_{it} + \beta_3 L(\text{IPROD})_{it} + \beta_4 L(\text{IOPN})_{it} + \beta_5 L(\text{IRES})_{it} + \beta_6 L(\text{ITAX})_{it} + U_{it} \quad (1a)$$

where, α_0 = Intercept

t = 1990, 1991, 2013

β_1 = Growth Rate of India Export

$\beta_2, \beta_3, \beta_4, \beta_5$ and β_6 = Elasticities of Developmental Variables

IINFRA = Composite Index of Infrastructure

IPROD = Composite Index of Production

IOPN = Composite Index of Openness

IRES = Composite Index of Resources

ITAX = Composite Index of Taxation

RESULTS AND ANALYSIS

Results of Principal Component Analysis and Composite Index

Infrastructure

Infrastructure refers to the facilities through which others resources can be efficiently and optimally used. For measuring this variable principal component analysis (PCA)

hasselected following variables as principal variables- Energy production (kt of oil equivalent) (ENGY), Electricity production (kWh) (ELCTP), Electric power consumption (kWh per capita) (EPC), Air transport, registered carrier departures worldwide (ATCARR), Air transport, freight (million ton-km) (ATFT), Railways, goods transported (million ton-km) (RLYGT), Rail lines (total route-km) (RLYLINE), and Telcom (TEL). These variables have been used for construction of composite index, which summarises the information contained in these variables. It involves three steps:

KMO and Bartlett Test of Sphericity is a measure of sampling adequacy that is recommended to check the case to variable ratio for the analysis being conducted. These tests play an important role for accepting the sample adequacy. While the KMO ranges from 0 to 1, the accepted index is over 0.6. Also, the Bartlett's Test of Sphericity relates to the significance of the study thereby shows the validity and suitability of the responses collected to the problem being addressed through the study. For principal component analysis to be recommended suitable, the Bartlett's Test of Sphericity must be less than 0.05. Another important aspect is the rotated component matrix. While deciding how many factors one would analyze is whether a variable might relate to more than one factor. Rotation maximizes high item loadings and minimizes low item loadings, thereby producing a more interpretable and simplified solution. There are two common rotation techniques- orthogonal varimax rotation and oblique rotation. While orthogonal varimax rotation that produces factor structures that are uncorrelated, oblique rotation produces factors that are correlated. Irrespective of the rotation method used, the primary objectives are to provide easier interpretation of results, and produce a solution that is more parsimonious.

Results of Principal Component Analysis of Infrastructure

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.87
Bartlett's Test of Sphericity	Approx. Chi-Square	527.877
	Df	28
	Sig.	0

The value of KMO is 0.87 indicates sample is adequate. Bartlett test suggests that PCA is suitable measure in case of infrastructure. Next step is to select principal components which are being retained. We have eight variables and put condition that three variables have to be selected. The

Table 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.648	95.603	95.603	7.648	95.603	95.603
2	0.167	2.091	97.694	0.167	2.091	97.694
3	0.133	1.659	99.353	0.133	1.659	99.353
4	0.03	0.372	99.725			
5	0.012	0.146	99.871			
6	0.006	0.069	99.94			
7	0.003	0.037	99.977			
8	0.002	0.023	100			

Table 4: Rotated Component Matrix

	Component		
	1	2	3
ATCARR	0.725	0.557	0.388
ELCTP	0.704	0.451	0.544
ENGYD	0.703	0.497	0.501
EPC	0.682	0.528	0.502
RLYGT	0.682	0.575	0.45
ATFT	0.513	0.757	0.396
TEL	0.462	0.746	0.469
RLYLINE	0.455	0.442	0.771

Source: Author's Estimation

retained variables are ATCARR, ATFT, and RLYLINE. Total variance explained by these three variables is 99.35 percent. Table 3 gives the total explained variance captured by three retained components.

Next, we have used varimax rotation method for measuring rotated component score. This would enable us to have a better interpretation of components. It helps to generate the value weights obtained from the factor loading for constructing the composite index. The highest loading of the component is used for construction of composite index of infrastructure.

Composite Index of Infrastructure

$$I_{\text{INFRA}} = .725 * \text{ATCARR} + .757 * \text{ATFT} + .771 * \text{RLYLINE}$$

Openness

Globalisation and WTO policy have objective to promote free movement of factors of production across the countries, which would enable for optimum utilisation of available resources and maximisation of social welfare. Openness is

one dimension of globalisation which permits movement of factor of production in the form of raw materials, goods, capital, labour etc. with less restrictions and tariff duty. Openness can be measured in terms of degree. India has been opened her economy by reducing import tariff and other quantitative and qualitative restrictions and also by promotion of export and investment for other countries since 1991. Openness has considered following variables under the study for measuring openness variable- Customs and other import duties (IMD), Official exchange rate (EXRATE), International Tourism Number (TOURNO), International Tourism (TOURISM), Net barter terms of trade index (TOT), Total Reserves (RESV), Foreign Direct Investment (FDI), Portfolio Equity (PORT) and Trade Openness (TOPN).

Results of Principal Component Analysis of Openness

KMO value 0.792 indicates about adequacy of sampling in case of openness. Bartlett's test of sphericity explained about the suitability of PCA technique in case of openness because of high level of significance. Openness variable has

Table 5:KMO and Bartlett’s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.792
Bartlett’s Test of Sphericity	Approx. Chi-Square	394.213
	Df	36
	Sig.	.000

Table 6: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.066	78.507	78.507	7.066	78.507	78.507
2	.760	8.447	86.954	.760	8.447	86.954
3	.599	6.653	93.607	.599	6.653	93.607
4	.361	4.016	97.623			
5	.160	1.781	99.405			
6	.033	.366	99.771			
7	.012	.136	99.907			
8	.006	.061	99.969			
9	.003	.031	100.000			

Table 7: Rotated Component Matrix

	Component		
	1	2	3
EXRATE	.895	.122	.217
TOURNO	.778	.571	.238
TOPN	.767	.594	.164
TOURISM	.749	.617	.197
IMD	.682	.596	.298
TOT	.164	.858	.287
FDI	.561	.782	.007
RESV	.659	.668	.284
PORT	.236	.203	.942

Source: Author’s Estimation

introduced its nine sub-variables in PCA and put condition that three variables have to be selected. The retained variables are EXRATE, TOT and PORT. Total variance explained by these three variables is 93.61 percent. Table 6 gives the total explained variance captured by three retained components.

Next, we have used varimax rotation method for measuring rotated component score. This would enable to have a better interpretation of components. It helps to generate the value weights obtained from the factor loading for constructing the composite index. The highest loading value for a component is used for construction of composite index in case openness.

Table 8: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.697
Bartlett's Test of Sphericity	Approx. Chi-Square	147.654
	Df	10
	Sig.	.000

Table 9: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.173	63.464	63.464	3.173	63.464	63.464
2	1.125	22.505	85.969	1.125	22.505	85.969
3	.474	9.472	95.441	.474	9.472	95.441
4	.226	4.520	99.961			
5	.002	.039	100.000			

Table 10: Rotated Component Matrix

	Component		
	1	2	3
GDS	.958	-.059	.249
GFCF	.957	-.050	.255
FUEL	.733	-.422	.358
OREMETAL	-.099	.978	.077
TNR	.351	.084	.928

Source: Author's Estimation

Composite Index of Openness

$$I_{OPN} = .895EXRATE + .858*TOT + .942*PORT$$

Resources

Resource refers to factors of production available in a country. Abundance of availability leads to higher foreign trade. Resource has introduced following variables- Total natural resources rents (TNR), Gross fixed capital formation (GFCF), Gross domestic savings (GDS), Fuel imports (FUEL) and Ores & Metal Imports (OREMETAL). KMO value 0.697 indicates about adequacy of sampling. Bartlett's test of sphericity explained about the suitability of PCA technique in case of resource variable because of high level of significance.

Results of Principal Component Analysis of Resources

Resource variable has introduced its five sub-variables in PCA and put condition that three variables have to be selected. The retained variables are GDS, OREMETAL and TNR. Total variance explained by these three variables is 95.44 percent. Table 9 gives the total explained variance captured by three retained components. Next, rotated component matrix is used for construction of composite index of resource. This would enable to have a better interpretation of component in case of resource. The highest loading value for a component is used for construction of composite index in case of resource.

Composite Index of Resource

$$I_{RES} = .958*GDS + .978*OREMETAL + .928*TNR$$

Taxation

Taxation represents total financial revenue mobilisation by government depends on state of economy, per capita income, foreign trade etc. It includes direct tax, indirect tax and custom and import duties. Higher custom and import duty means higher turnover of foreign trade of the country. Taxation has taken following variables- Taxes on goods and services (G&STAX), Other taxes (OTHRTAX), Tax Revenue (TAXREV), and Taxes on International Trade (ITTAX). KMO value 0.766 indicates about adequacy of sampling. Bartlett’s test of sphericity explained about the suitability of PCA technique for taxation variable because of high level of significance.

percent. Table 12 gives the total explained variance captured by three retained components in taxation. Next, rotated component matrix is used for construction of composite index of taxation. This would enable to have a better interpretation of component. The highest loading value for a component is used for construction of composite index in case of taxation.

Results of Principal Component Analysis of Taxation

Taxation variable has introduced its four sub-variables and put condition that three variables have to be selected. The retained variables are G&STAX, TAXREV and OTHRTAX. Total variance explained by these three variables is 99.67

Composite Index of Taxation

$$I_{TAX} = .995 * G\&STAX + 1.0 * OTHRTAX + .126 * TAXREV$$

Production

Production means outputs readily available for either for resale or industrial/consumer consumption. Production has considered following variables under the study for measuring production and market variable- Agriculture Value Added (AG_PW), Manufacturing Value Added (MFG), Industry Value Added (IND), Service Valued Added (SER), and Gross Domestic Product (GDP).KMO value 0.772 indicates about adequacy of sampling in case of production. Bartlett’s test of

Table 11: KMO and Bartlett’s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.766
Bartlett’s Test of Sphericity	Approx. Chi-Square	146.264
	Df	6
	Sig.	.000

Table 12: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.963	74.080	74.080	2.963	74.080	74.080
2	1.001	25.020	99.099	1.001	25.020	99.099
3	.023	.571	99.670	.023	.571	99.670
4	.013	.330	100.000			

Table 13: Rotated Component Matrix

	Component		
	1	2	3
G&STAX	.995	-.028	-.040
ITTAX	.995	.014	-.074
TAXREV	.992	.000	.126
OTHRTAX	-.005	1.000	.000

Source: Author’s Estimation

sphericity explained about the suitability of PCA technique in case of production because of high level of significance.

components. The highest loading value for a component is used for construction of composite index in case production.

Results of Principal Component Analysis of Production

Table 14: KMO and Bartlett’s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.772
Bartlett’s Test of Sphericity	Approx. Chi-Square	505.855
	Df	10
	Sig.	.000

Production variable has introduced its ten sub-variables in PCA and put condition that three variables have to be selected. The retained variables are MFG; AG_PW and SER. Total variance explained by these three variables is 99.992 percent. Table 15 gives the total explained variance captured by three retained components. Next, rotated component matrix is used for construction of composite index. This would enable to have a better interpretation of

Composite Index of Production

$$I_{PROD} = .771 * MFG + .774 * SER + .136 * AG_PW$$

of Macro Economic Variables on India’s Foreign Trade Performance

This paper has focused to study the impact of macro-economic variables on the foreign trade performance of India. The Adjusted R Square is 0.997 indicating that explanatory variables have been sufficiently explaining the foreign trade of India. The value of the Durbin-Watson statistic ranges from 0 to 4. As a general rule of thumb, the residuals are uncorrelated is the Durbin-Watson statistic is approximately 2. A value close to 0 indicates strong positive correlation, while a value of 4 indicates strong negative correlation. For our case, the value of Durbin-Watson is 2.622 indicating no serial correlation.

Table 15: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.969	99.376	99.376	4.969	99.376	99.376
2	.026	.514	99.890	.026	.514	99.890
3	.005	.102	99.992	.005	.102	99.992
4	.000	.006	99.998			
5	.000	.002	100.000			

Table 16: Rotated Component Matrix

	Component		
	1	2	3
MFG	.771	.634	.058
IND	.761	.647	.050
AG_PW	.716	.684	.136
SER	.631	.774	.055
GDP	.693	.718	.065

Source: Author’s Estimation

Table 17: Variables Entered/Removed^b

Model	Variables Entered	Variables Removed	Method
1	LPROD, LOPN, LTAX, Time, LINFRA, LRES	.	Enter

a. All requested variables entered.

b. Dependent Variable: Foreign Trade

Table 18: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.999a	.998	.997	.0564447	2.622

a. Predictors: (Constant), LPROD, LOPN, LTAX, Time, LINFRA, LRES

b. Dependent Variable: Foreign Trade

Regression Statistics of India's Export

India's total foreign trade performance has been significantly improved because of change in her export-import policy from 'import substitution' to 'export promotion'. This is also reflected from table 7. The annual compound growth rate of export from India was 3 percent for the period of 24 years and also statistically significant.

Infrastructure: It has a vital role in the capacity-building of any country. The setting up of special economic zone for export promotion has been increasing foreign trade of India.

It should have positive impact on overall foreign trade of India. The result shows that the elasticity is less than one i.e. 0.358. A one percent increase in infrastructure development would lead to a 0.358 percent increase in total foreign trade. It is also statistically significant at 10 percent.

Openness: India has changed its export-import policy from 'restrictive' to 'openness'. The degree of openness has been gradually increased since 1991 by liberalizing foreign trade policy (FTP) in the line of WTO. Openness implies not only trade openness but also free movement of factors of production across the countries in the global context. Foreign

Table 19: ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.609	6	4.435	1391.965	.000a
	Residual	.054	17	.003		
	Total	26.663	23			

a. Predictors: (Constant), LPROD, LOPN, LTAX, Time, LINFRA, LRES

b. Dependent Variable: Foreign Trade

Table 20: Coefficients^a

Model		Unstandardised Coefficients		Standardised Coefficients		Sig.
		B	Std. Error	Beta	T	
1	(Constant)	-61.465	20.480		-3.001	.008
	Time	.030**	.012	.199	2.555	.021
	LINFRA	.358***	.210	.176	1.706	.100
	LRES	.558*	.178	.416	3.130	.006
	LTAX	.083**	.099	.059	.841	.012
	LOPN	.012	.008	.031	1.577	.133
	LPROD	.205	.305	.132	.672	.510

a. Dependent Variable: Foreign Trade

Source: Author's Estimation

*at 1% level of significance, **at 5% level of significance &

*** at 10% level of significance

trade turnover should be increased in the form of export and import with the openness. The result shows positive sign and significant at 13.3 percent. However, magnitude is low.

Production: India is considered as a favourable destination for production activities because of cheap labour and availability of raw-materials and ores and minerals. This is called locational advantage for production purpose. Higher production definitely improves and increases export for export from India. Production bears a positive sign and has elasticity equal to 0.205. However, it is not statistically significant.

Resources: Resources means factors of production. Availability of resources ensures surplus production for export. It should have positive impact on the export and import. The sign is positive and elasticity is 0.558 and statistically significant at 1 percent. It means one percent increase in resources lead to increase India's foreign trade by 0.558 percent.

Taxation: Taxation is an important source of revenue especially for Indian government. Low domestic tax and custom duty are desirable for increasing production and import-export. Market friendly and competitive taxation policy leads to increase import-export turnover which consequently increase taxation revenue of the government. Thus, its impact on foreign trade should be positive. Taxation bears a positive sign and elasticity is 0.083 at 5 percent level of significance.

CONCLUSION

KMO and Bartlett Test of Sphericity is a measure of sampling adequacy that is recommended to check the case to variable ratio for the analysis being conducted. The value of KMO in case of macro-economic variables is over 0.6 indicating the samples are adequate for PCA. While the value of Bartlett's test is less than 0.05 in case of macro-economic variables, ensure suitability of PCA. The overall annual compound growth of India's foreign trade is 3 percent during last more than two decades. The results show that infrastructure, resources, openness, production, and taxation bear positive sign and are on the expected line and these macro-economic variables, except production and openness, are also statistically significant. It means these variables have positive impact on India's foreign trade. Main determinants of Indian foreign trade are infrastructure, resources, and taxation. The government should incorporate these macro-economic variables while making Indian foreign trade policy under the umbrella of WTO. In general, macro-economic variables

such as infrastructure, resource, openness, production and taxation are affecting India's foreign trade one way or other.

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APPENDIX

Infrastructure

ENGYD	Energy production (kt of oil equivalent)
ELCTP	Electricity production (kWh)
EPC	Electric power consumption (kWh per capita)
ATCARR	Air transport, registered carrier departures worldwide
ATFT	Air transport, freight (million ton-km)
RLYGT	Railways, goods transported (million ton-km)
RLYLINE	Rail lines (total route-km)
TEL	Telcom

Openness

IMD	Customs and other import duties (current LCU)
EXRATE	Official exchange rate (LCU per US\$, period average)
TOURNO	International tourism, number of arrivals and departure
TOURISM	International tourism (current US\$)
TOT	Net barter terms of trade index (2000 = 100)
RESV	Total reserves (includes gold, current US\$)
FDI	Foreign direct investment, net inflows (BoP, current US\$)
PORT	Portfolio equity, net inflows (BoP, current US\$)
TOPN	Trade Openness

Resources

TNR	Total natural resources rents (% of GDP)
GFCF	Gross fixed capital formation (current US\$)
GDS	Gross domestic savings (current US\$)
FUEL	Fuel imports (% of merchandise imports)
OREMETAL	Ores and metals imports (% of merchandise imports)

Taxation

G&STAX	Taxes on goods and services (current LCU)
OTHRTAX	Other taxes (current LCU)
TAXREV	Tax revenue (current LCU)
ITTAX	Taxes on international trade (current LCU)

Production

AG_PW	Agriculture, value added (current US\$)
MFG	Manufacturing, value added (current US\$)
IND	Industry, value added (current US\$)
SER	Services, etc., value added (current US\$)
GDP	GDP (current US\$)