

Selected Macro – Economic Variables and its Impact on Chinese and Indian Exports

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Abstract: *There is a wide cleft between the exports from India to the world and exports from China to the world. The share of Chinese and Indian exports is 11.13% and 1.60% (WTO, 2012) respectively of the overall worlds' export. This prompts us to find out the impact of selected Indian and Chinese macro economical variables on the exports from India and China respectively.*

This research is divided at three levels – At first level macro economic variables which put an impact on exports from any country are selected. The selected variables are Gross Domestic Product (GDP), FDI inflows, Exchange Rate, Per Capita Real Income and Inflation. At second level an econometric model has been designed to predict the impact of selected macro economic variables of Indian economy on the export of China and the impact of selected macroeconomic variable of Chinese economy on the export of India. The current research would enable us to predict the export of both China and India and would help in formulating export strategies of the country. At third level policies are suggested on the basis of the model to improve the exports from India.

Principal component regression analysis is used to prepare economic model from the selected independent macro economic variables. Numbers of selected variables are not exhaustive leaving an opportunity for others to further explore them.

Key Words: *Export Policies, Exchange Rate, G.D.P, FDI Inflows & Inflation.*

I. Introduction

India's exports have grown rapidly in the past decade. Simultaneously exports from China have grown in leaps and bound. These two developing nations are rapidly growing as an economic power at world's arena. But China's share is 11.13% of the world's total export and India's share is 1.6% (WTO, 2012) of the world's total export. Total exports from China are almost seven times higher than that of total export from India (calculated from Table-1 in appendix). This shows a significant difference in the export performance of China and India. After primary review it has been found that other economic parameters like G.D.P growth rate, G.D.P per capita, Foreign Direct Investment (F.D.I) net inflows as percentage of G.D.P, and Inflation (at consumer prices) of India and China have shown considerable differences in last one decade. However, all above economic parameters have shown an incremental trend in both India and China but relatively performance of India is weak as compared to China on these economic parameters. We are interested to find out that if there is any impact of these variables on the export performances of both China and India. Therefore at first level of our research we need to justify the selection of these variables. For this intensive literature review is done. At second level of the research an econometric model has been designed to predict the impact of selected macro economic variables of Indian economy on the export of China and the impact of selected macroeconomic variable of Chinese economy on the export of India. At third level policies are suggested on the basis of model to improve the exports from India.

II. Review of Literature

Gross Domestic Product (G.D.P) is considered to be the sum of all the final services and products produced inside the national economy in the given time (Aslanov E., et.al. 2010). GDP real growth means the increase of wealth and social welfare in the country (McConnell and Brue, 2008). China and India have shown a continuous increase in the G.D.P growth rate from 2000 to 2007 slight decline could be seen in G.D.P growth rate from 2007 to 2012 (Table-2). Except for year 2010 there is significant difference in the G.D.P growth rate of two countries from 2000 to 2012. G.D.P growth rate is related with exports, more references could be found in Table-3.

Foreign Direct Investment (F.D.I) net inflows as percentage of G.D.P is the net investment of foreign assets into domestic country in the form of infrastructure, business organization, trade and equipments. F.D.I net inflows have been more than double in China than in India for the year 2011 (see Table-4 in appendix). From years it has been significantly high in China as compared to India. Exports and economic growth rate have shown a positive relationship with F.D.I inflows (see Table-3 for references).

Exchange rate is the price of one country’s money in terms of units of another country’s money (www.research.stlouisfed.org). In the last decade fluctuations in the official exchange rate of China have been less as compared to fluctuation in the official exchange rate of India. Standard deviation in the exchange rate of China is 0.79 while the same has found to be 2.93 for India (See Table – 5 in appendix).

G.D.P per capita income of both countries India and China have shown a significant level of increment. But G.D.P per capita income of India is much less (mean=914.64 US\$, from 2000 to 2012) than the G.D.P per capita of China (mean= 2737.12 US\$, from 2000 to 2012) (see Table – 6 in appendix).

McConnell and Brue (2008) define **inflation** as “rising level of prices”. India’s rate of inflation is higher than China’s rate of inflation, with average growth rate of 6.6% and 2.3% respectively from 2000 to 2012.

All above economic indicators are selected on the basis of the references done by other economist mention in Table-3 as they seem to put an impact on the exports (dependent variable).

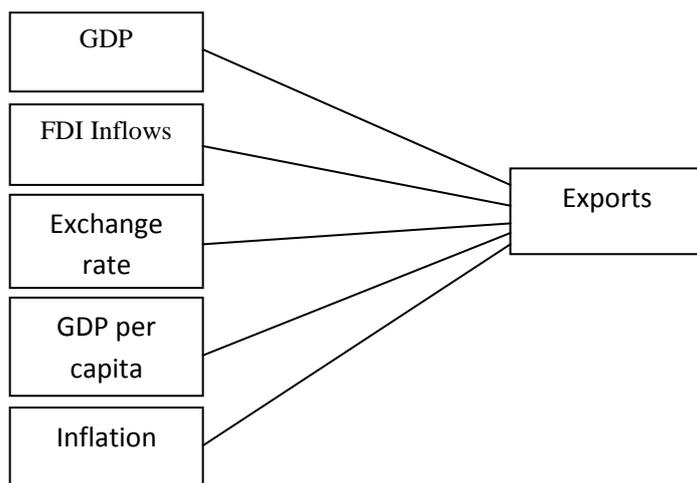
Table-3 Macro-economic variables and its impact on export -

Macro-Economic Variable	Impact on Export	Reference
GDP	The exports and imports were highly significant for three South Caucasus countries - Azerbaijan, Georgia and Armenia. The analysis of the relation between GDP and exports shows that GDP growth is related with export.	Aslanov E. et.al .
FDI inflows	There is a relationship between Exports and FDI inflows in Pakistan.	Shahzad A. & Kaid Al-Swidi A.
	Volume of exports of a country tends to attract the FDI inflows.	Navaretti, G. B. et.al. Markusen, J. R., & Maskus, K. E.
	Import, export and Economic growth, posited to have a positive causal relationship with FDI inflows.	Jayachandran, G., & Seilan, A.
	There is a significant positive impact of foreign trade on FDI inflows	Liu, X., Burridge, P., & Sinclair, P. J. N.
	Positive relationship between imports and FDI inflows	Aizenman, J., & Noy, I.
Exchange - rate	Empirical analysis reveals that indeed over the sample period a currency appreciation had a strong and significant negative impact on Indian firms’ export shares. The real trade-weighted exchange rate and trade partner income are shown to be key determinants of U.S. agricultural exports. <i>China’s undervalued yuan</i> : China held its yuan steady for a decade from 1994 to 2004, enabling its export juggernaut to gather tremendous momentum from an undervalued currency.	Wong Cheung Y. & Sengupta R.
Per capita real income	There is positive correlation between export openness and income levels. Import openness correlates negatively with countries’ incomes.	Zhang S. & Odrich Z.
Inflation	In Azerbaijan and Georgia inflation has an impact on export.	Aslanov E., Gasimov T. & Isayeva A.

III. The Conceptual Model

At second level an econometric model has been designed to predict the impact of selected macro economic variables of Indian economy on the export of China and the impact of selected macroeconomic variable of Chinese economy on the export of India. As mentioned earlier, dependent variable in this study is exports and the independent variables are G.D.P, F.D.I net inflows, exchange rate, G.D.P per capita, and inflation. In our research we are trying to analyze the relationship between dependent and independent variables. Linear model for the two countries are formulated and the conceptual model illustrated in Figure 1 are based on the literature review:

Figure 1:



Data analysis –

Secondary data from 2000 to 2012 has been collected from the official website of World Trade Organisation (WTO). Principal component regression analysis is used to prepare economic model from the selected independent macro economic variables. SPSS 19.0 is used for data analysis and results are tabulated.

Hypothesis testing -

- I. Exports from China depend on the selected macro-economic variables of China.
 - (a) GDP growth rate of China is related to the exports from China.
 - (b) FDI inflows to China are related to the exports from China.
 - (c) Exchange rates of domestic currency of China are related to the exports from China.
 - (d) GDP per capita of China are related to the exports from China.
 - (e) Growth rate of inflation is related to exports from China.

$$\text{Exports}_{\text{China}} = \beta_0 + \beta_1 \text{G.D.P}_{\text{China}} + \beta_2 \text{FDI}_{\text{China}} + \beta_3 \text{Exchange Rate}_{\text{China}} + \beta_4 \text{G.D.P per capita}_{\text{China}} + \beta_5 \text{Inflation}_{\text{China}}$$

R square tells us how much variance in the dependent variable that is explained by the model (Pallant 2007). Our model explains 96.6% of the variance in the exports which is quite respectable result and considered satisfactory. Also F value is significant suggesting that exports from China depend on the selected macro-economic variables from China. GDP, GDP per capita and inflation in China shows significant and positive relationship with exports from China with p-value 0.009, 0.001 and .008 respectively. This fits with the findings of Aslanov et.al. and Zhang S. (Table – 3). While negative official exchange rate is not significant with exports from China also positive FDI inflows is not significant with exports from China (Table – 8).

Table - 8

Model	SS	dF	MS	Number of obs	= 12
Regression	4.595E12	5	9.190E11	F (5 , 7)	= 396.413
Residual	1.623E10	7	2.318E9	R – Squared	= 0.996
				Adj. R – Squared	= 0.994
				Std. Error	= 14408
Total	4.611E12	12			

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	950316.959	776374.237		1.224	.261
GDPCHINA	38907.675	10961.139	.122	3.550	.009
OERChina	-177943.922	91717.366	-.226	-1.940	.094
GDPPERCapita	248.881	41.936	.709	5.935	.001
FDIChina	69083.082	37615.424	.070	1.837	.109

InflationChina	29092.926	8024.526	.104	3.626	.008
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a. Dependent Variable: ExportChina

II Exports from China depends on the selected macro-economic variables of India.

- (a) GDP growth rate of India is related to the exports from China.
- (b) FDI inflows to India are related to the exports from China.
- (c) Exchange rates of domestic currency of India are related to the exports from China.
- (d) GDP per capita of India are related to the exports from China.
- (e) Growth rate of inflation is related to exports from China.

$$\text{Exports}_{\text{China}} = \beta_0 + \beta_1 \text{G.D.P}_{\text{India}} + \beta_2 \text{FDI}_{\text{India}} + \beta_3 \text{Exchange Rate}_{\text{India}} + \beta_4 \text{G.D.P per capita}_{\text{India}} + \beta_5 \text{Inflation}_{\text{India}}$$

Model explains 99% variation in the exports from China due to selected macro-economic variables of the Indian economy. Also F value is significant suggesting that exports from China depend on the selected macro-economic variables of India. GDP per capita of India, FDI inflows in India and inflation in India have shown significant relationship with exports from China, with p value 0.00, 0.022 and 0.19 respectively. In fact growth rate of inflation in India is inversely related to exports from China. While negative relationship of GDP of India and Chinese exports are not significant also official exchange rate of currency is not significantly related to the exports from China.

Table - 9

Model	SS	dF	MS	Number of obs	= 12
Regression	4.567E12	5	9.134E11	F (5 , 7)	= 145.667
Residual	4.390E10	7	6.271E9	R – Squared	= 0.99
Total	4.611E12	12		Adj. R – Squared	= 0.984
				Std. Error	= 79188

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-860024.078	596212.934		-1.442	.192
GDPIndia	-8077.516	12501.544	-.034	-.646	.539
OfficialExchange	10388.951	11896.957	.049	.873	.411
GDPPERCapita	1799.447	126.049	1.152	14.276	.000
FDIIndia	131353.970	44598.260	.178	2.945	.022
IndiaInflation	-63726.599	21041.479	-.304	-3.029	.019

a. Dependent Variable: ExportChina

III Exports from India depends on the selected macro-economic variables of India.

- (a) GDP growth rate of India is related to the exports from India.
- (b) FDI inflows to India are related to the exports from India.
- (c) Exchange rates of domestic currency of India are related to the exports from India.
- (d) GDP per capita of India are related to the exports from India.
- (e) Growth rate of inflation is related to exports from India.

$\text{Exports}_{\text{India}} = \beta_0 + \beta_1 \text{G.D.P}_{\text{India}} + \beta_2 \text{FDI}_{\text{India}} + \beta_3 \text{Exchange Rate}_{\text{India}} + \beta_4 \text{G.D.P per capita}_{\text{India}} + \beta_5 \text{Inflation}_{\text{India}}$
 Model explains 98.7% variations in the exports from India due to selected macro-economic variables of Indian economy. Exports from India significantly depend on the selected macro-economic variables of India. GDP growth rate of India and GDP per capita of India are significantly related to the exports from India. But beta value for GDP is negative showing a negative relationship between GDP growth rate of India and exports from India. **This shows that major contributing sectors in GDP growth rate are not contributing in exports perhaps domestic consumptions of such goods and services are high or produced goods and services are not of export quality.** Therefore further study is required to find out why sectors contributing in GDP growth

rate are not contributing in exports. While all other variables like FDI inflows, official exchange rate and inflation rate of India do not have significant relationship with exports from India.

Table - 10

Model	SS	dF	MS	Number of obs	= 12
Regression	1.080E11	5	2.161E10	F (5 , 7)	= 104.079
Residual	1.453E11	7	2.076E8	R – Squared	= .987
Total	1.95E11	12		Adj. R – Squared	= .977
				Std. Error	= 14408

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	35695.902	108480.261		.329	.752
GDPIndia	-5410.101	2274.642	-.148	-2.378	.049
OERIndia	-1658.533	2164.638	-.051	-.766	.469
GDPPerCapita	252.244	22.934	1.048	10.998	.000
FDIIndia	-6955.627	8114.602	-.061	-.857	.420
InflationIndia	264.903	3828.473	.008	.069	.947

IV Exports from India depends on the selected macro-economic variables of China.

- (a) GDP growth rate of China is positively related to the exports from India.
- (b) FDI inflows to China are positively related to the exports from India.
- (c) Exchange rates of domestic currency of China are related to the exports from India.
- (d) GDP per capita of China are positively related to the exports from India.
- (e) Growth rate of inflation is related to exports from India.

$$\text{Exports}_{\text{India}} = \beta_0 + \beta_1 \text{G.D.P}_{\text{China}} + \beta_2 \text{FDI}_{\text{China}} + \beta_3 \text{Exchange Rate}_{\text{China}} + \beta_4 \text{G.D.P per capita}_{\text{China}} + \beta_5 \text{Inflation}_{\text{China}}$$

The model suggests 98.7% variations in the exports from India due to variations in the macro-economic variables of Chinese economy. GDP per capita income of China has shown significant relationship with exports from India. While all other selected Chinese macro-economic variables have not shown significant relationship with the exports from India.

Table – 11

Model	SS	dF	MS	Number of obs	= 12
Regression	1.080E11	5	2.161E10	F (5 , 7)	= 104.876
Residual	1.442E9	7	2.060E8	R – Squared	= 0.987
Total	1.095E11	12		Adj. R – Squared	= 0.977
				Std. Error	= 14354

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	178419.224	231455.347		.771	.466
GDPCHINA	-21.303	3267.772	.000	-.007	.995
OERChina	-27688.868	27343.095	-.228	-1.013	.345
GDPPerCapita	37.235	12.502	.688	2.978	.021
FDIChina	17135.673	11214.039	.113	1.528	.170
InflationChina	4300.747	2392.299	.100	1.798	.115

IV. Suggestions for Export Policy

Among five selected macroeconomic variables **GDP per capita have come out to be the most significant variable, which has positive relationship with the exports.** Therefore both countries must focus on increasing GDP per capita to give a positive thrust to the export sector. There is an increase in the export of India if the GDP per capita of the both the country increases. Same is applicable on the China, if GDP per capita of India and China increases than Chinese exports also increases. **FDI inflows in India have significantly increased Chinese exports, we need to explore the reasons behind this phenomenon perhaps FDI inflows in India are enhancing export led industrial growth of China.** Also, FDI inflows in China have shown positive but insignificant growth in the Indian exports. Moreover FDI inflows in India have shown negative and insignificant relationship with exports from India that means, FDI inflows in India have not contributed in the development of the export led industries. Therefore governments try to attract such FDI inflows in India which contributes in the development of exports from India. As per Liu, X. et.al., there is a positive relationship between imports and FDI inflows, in India imports are higher than exports therefore it could be the reasons of FDI inflows in India. Inflation growth rate in India have significant and negative relationship with exports from China. Inflation growth in India has not shown significant relationship with exports from India. Official exchange rate of India has not shown significant relationship with either India or China therefore results are inconsistent with the earlier finding of the Wong Cheung & Sengupta (Table –III). Exhaustive study is required to find out more variables which influence exports from these countries.

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Appendix

Table-1 Exports from India and China at current prices in US \$ Million

Years	China	India
2000	249203	42379
2001	266098	43361
2002	325596	49250
2003	438228	58963
2004	593326	76649
2005	761953	99616
2006	968978	121808
2007	1220456	150159
2008	1430693	194828
2009	1201612	164909
2010	1577754	266350
2011	1898381	302905
2012	2048714	294158
Mean	998537.8	143487.3
SD	619888.1	95518.5

Table - 2 G.D.P growth rate of India and China in percentage

Years	China	India
2000	8.4	3.9
2001	8.3	4.9
2002	9.1	3.9
2003	10	7.9
2004	10.1	7.8
2005	11.3	9.2
2006	13.7	9.2
2007	14.2	9.8
2008	9.6	3.8
2009	9.2	8.4
2010	10.4	10.5
2011	9.3	6.3
2012	7.8	3.2
Average	10.10769	6.830769
SD	1.945705	2.607804

Table - 4 Foreign direct investment, net inflows (% of GDP)

Year	China	India
2000	3.204014	0.755062
2001	3.33943	1.111329
2002	3.391597	1.076139
2003	3.0139	0.699958
2004	3.215294	0.799808
2005	4.612902	0.871405
2006	4.573693	2.11029
2007	4.471861	2.03663
2008	3.793481	3.545985
2009	2.625733	2.605982
2010	4.096004	1.548994
2011	3.829036	1.718775
Average	3.680579	1.573363
SD	0.653733	0.877314

Table - 5 Official exchange rate (LCU per US\$, period average)

Year	China	India
2000	8.278504	44.94161
2001	8.277068	47.18641
2002	8.276958	48.61032
2003	8.277037	46.58328
2004	8.276801	45.31647
2005	8.194317	44.09998
2006	7.973438	45.30701
2007	7.607533	41.34853
2008	6.948655	43.50518
2009	6.831416	48.40527
2010	6.770269	45.72581
2011	6.461461	46.67047
2012	6.312333	53.43723
Average	7.57583	46.24135
SD	0.787211	2.929231

Year	China	India
2000	949.1781	455.4438
2001	1041.638	464.7269
2002	1135.448	485.5537
2003	1273.641	564.6188
2004	1490.38	649.7104
2005	1731.125	740.1159
2006	2069.344	830.1632
2007	2651.26	1068.679
2008	3413.589	1042.084
2009	3749.272	1147.239
2010	4447.756	1419.113
2011	5441.759	1533.666
2012	6188.194	1489.235
Average	2737.122	914.6421
SD	1766.152	396.822

Year	China	India
2000	0.255305	4.009434
2001	0.722903	3.684807
2002	-0.76595	4.3922
2003	1.15591	3.805866
2004	3.884183	3.767238
2005	1.821648	4.246353
2006	1.463189	6.145522
2007	4.750297	6.369997
2008	5.864384	8.351816
2009	-0.70295	10.87739
2010	3.314546	11.9923
2011	5.41083	8.857845
2012	2.65244	9.312446
Average	2.294364	6.601016
SD	2.224346	2.952564