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The Implications of Renminbi Revaluation on India's Trade

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THE IMPLICATIONS OF RENMINBI REVALUATION ON INDIA'S TRADE - A STUDY

S. Arunachalaramanan and Ramesh Golait¹

Abstract

The Yuan exchange rate (RMB) has been a moot point in the relations between China and other trading partners from emerging and developed countries, some of whom have directly and indirectly highlighted the impact on their trade in general and exports in particular due to revaluation of RMB. In the Indian context, the analysis of macroeconomic data brought forth the fact that in the last decade and more so in the last few years, China has become a major trading partner in trade activities of India. Taking into consideration of concerns expressed on the impact of revaluation of RMB, the paper attempts to measure the likely effect on India's trade, both exports and imports. The findings of the paper hold that appreciation in RMB will affect the bilateral trade between India and China.

JEL Classification : O25, F31, F33

Keywords: Exchange rate, trade, reserves

Introduction

The revaluation of the exchange rate of the Chinese Renminbi²(RMB) has attracted the attention of academics as well as policy makers. The issue is particularly of concern since China is the centrepiece of global imbalance debate whereby its export dependant development model has invited criticism. It is increasingly alleged that China's export-oriented growth model results in current account surpluses and the resulting surge in reserves invested in the U.S. treasury securities which lowers the U.S.

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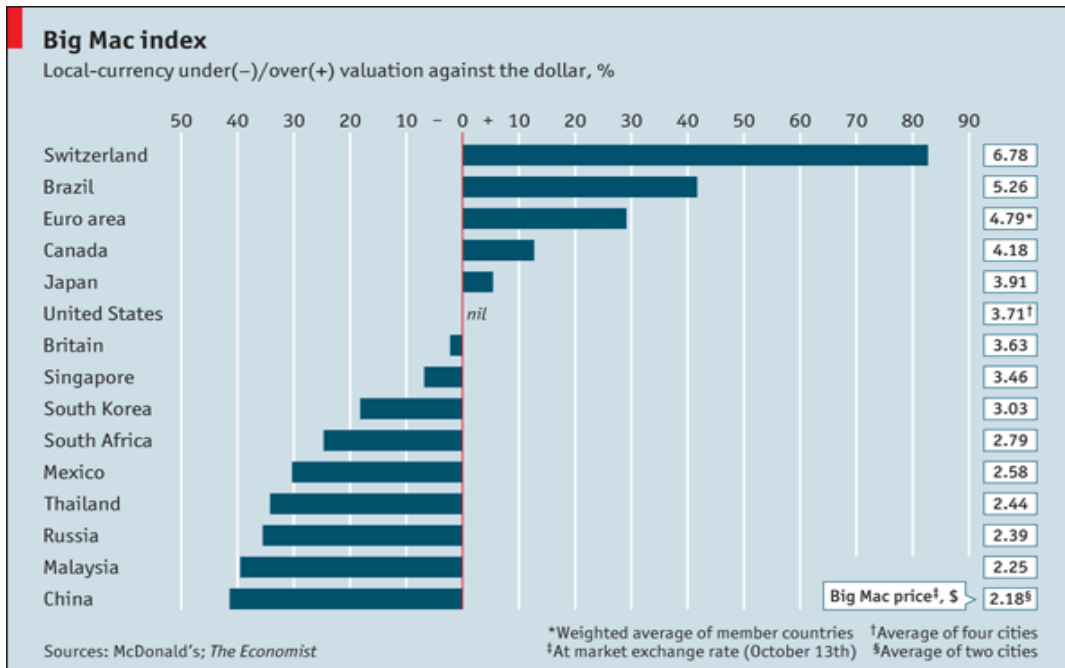
² The Renminbi is the name of the currency meaning 'the people's currency', whereas the Chinese Yuan (CNY) is the basic unit of account issued and administered by the central bank or People's Bank of China (PBC).

interest rates and encourages investment in risky assets. China has emerged as the largest exporting country and its trade surplus has been sharply increasing since the mid-2000s. According to World Bank's International Trade Statistics 2010, China, with its merchandise trade at US \$ 1.20 trillion (9.6 per cent of world merchandise exports) in 2009 became world's largest exporter, followed by Germany, US, Japan, Netherlands, France, Italy, Belgium, Korea and UK. China's rapid progress is evident from the fact that in 1990, China was the 14th largest exporter with export at US \$ 62 billion (1.8 per cent of world export) and after a decade it has become world's 7th largest exporter with export at US \$ 249 billion (3.9 per cent of world exports). Similarly, in terms of merchandise imports, China was the second largest importer in the world in 2009, with its imports at US \$ 1.0 trillion (7.9 per cent of World imports) as compared with its position of 8th largest importer with imports at US 225 billion in 2000 (3.4 per cent of World imports). More than 50 per cent of China's exports are mostly processing exports-oriented goods (Koopman, Wang and Wei 2008). Mirroring the surge in exports which has been growing at a faster pace than imports, China has been maintaining a huge current account surplus, leading to rapid accumulation of foreign exchange reserves.

With increasing importance China's in world economy, aggressive trade policy based on price cutting competition and disequilibrium exchange rate to sustain trade competitiveness has become debatable in various fora. According to the Economist magazine's Big Mac Index³, which measures purchasing power parity based undervaluation/overvaluation of currencies of major countries, China's RMB was undervalued by about 40 per cent and Swiss Franc is most expensive currency as of October 15, 2010 (Chart 1).

³ The Big Mac Index is published by The Economist as an informal way of measuring the purchasing power parity (PPP) between two currencies and provides a test of the extent to which market exchange rates result in goods costing the same in different countries. It "seeks to make exchange-rate theory a bit more digestible. The Big Mac index was introduced in The Economist in September 1986 by Mark Czwierdzinski as a semi-humorous illustration and has been published by that paper annually since then. The index also gave rise to the word burgnomics.

Chart 1: Big Mac Index



To quote Fred Bergsten of Peterson Institute (2010), ‘China’s currency manipulation represents the largest protectionist measure maintained by any major economy since the Second World War’. China has intervened in the foreign exchange markets by an average of \$1 billion a day for the last five years, buying dollars to keep them expensive and selling RMB to keep them cheap, building a huge reserve of \$2.5 trillion in the process. Largely as a result, the RMB is undervalued by at least 20 per cent relative to economic fundamentals. The largest trading country in the world is, therefore, subsidising all exports by at least 20 per cent and imposing an additional tariff of at least 20 per cent on all imports. On the other hand, post global financial crisis, China has argued that the RMB has remained generally stable level essentially for mitigating the impact of the global financial crisis. Recently, the People’s Bank of China (PBC) announced⁴ further reforms for bringing flexibility to RMB exchange rate regime. Table 1 is given below underlining the effect of subsidies on industries in China.

⁴ The similar announcement was made on July 21, 2005 when it stated allowing the RMB to gradually appreciate *vis-a-vis* the US Dollar. That policy was put on hold from July 2008 due to the global financial crisis.

Table 1: National budgetary expenditure on industry

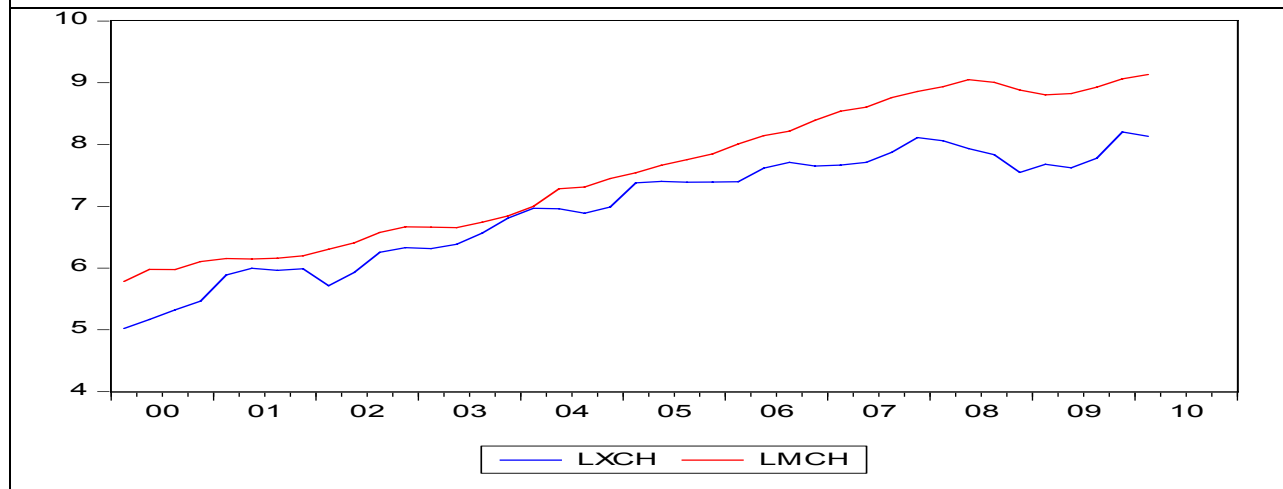
(USD bn)

year	Innovation funds and science and technology promotion funds	Subsidies to loss making State Owned Enterprises	Additional appropriation for SOEs circulating capital	Total
Sum 1985-95	47.3	109.8	3.3	160.3
1996	6.3	4.1	0.5	10.9
1998	7.7	4.0	0.5	12.3
1999	9.3	3.5	0.7	13.4
2000	10.5	3.4	0.9	14.7
2001	12.0	3.6	0.3	15.9
2002	11.7	3.1	0.2	15.1
2003	13.2	2.7	0.1	16.1
2004	15.0	2.6	0.2	17.8
2005	18.2	2.4	0.2	20.8
Total	159.0	143.6	7.5	310.1

Source : China Fiscal Yearbook; China Statistical Year book

It is interesting to note that while China has expanded its trade with advanced countries in absolute terms, the share of advanced economies in China's total exports has declined, its share of trade with developing and emerging economies, especially in Asia has recorded rise. Of particular interest to India, on a bilateral basis, the trade between India and China has witnessed significant turnaround since the late 1990s. India's imports from China (LMCH) have grown at a faster rate than exports (LXCH) in the last few years (Chart 2).

Chart 2: India's Exports and Imports from China

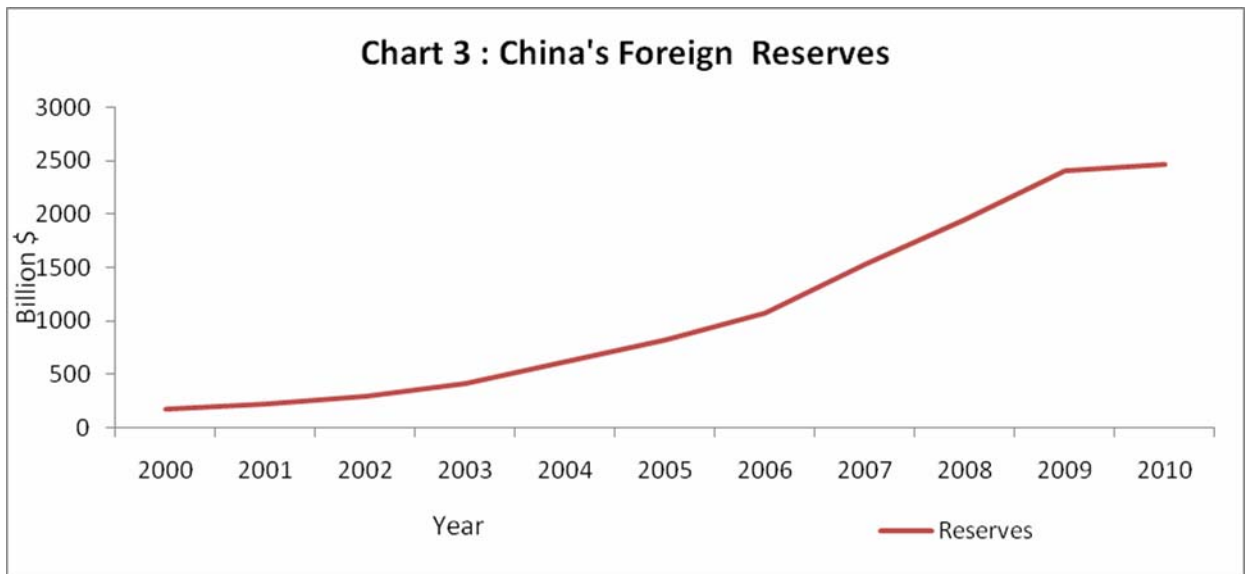


In this milieu, an attempt has been made in the Study to assess the likely effect on India's trade in case of any revaluation of RMB in future. The Study is structured as follows. Section I dwells on China's trade and exchange rate policy. Section II focuses on India-China Trade relation. While Section III comprises of empirical analysis to measure the impact of revaluation of RMB and Section IV concludes with policy implications.

Section - I

China's Trade and Exchange Rate

China's exchange rate policy plays a pivotal role in the domestic economic development strategy, which has lifted over 400 million out of poverty over the past three decades and made China the fourth largest economy and third largest trading nation in the world [World Bank 2008]. However, the tightly managed RMB has created considerable friction with China's trading partners in term of existing current account imbalances, most notably those between East Asia and the United States. According to the Bank for International Settlements (2006), these imbalances pose a serious long term problem for the world economy, and numerous measures have been proposed in the multilateral consultation on current account imbalances promoted by the International Monetary Fund (2007). Thus, China has been maintaining a huge current account surplus, leading to rapid accumulation of foreign exchange reserves (Chart 3).



China's Exchange Rate Policy and IMF

Article IV, Section 1 of the Articles of Agreement of the International Monetary Fund (IMF) commits member countries to "avoid manipulating exchange rates or the international monetary system in order to prevent effective balance-of-payment adjustment or to gain unfair competitive advantage over other member countries." Moreover, the principles and procedures for implementing the Fund's obligation (in Article IV, Section 3) "*to exercise firm surveillance over the exchange rate policies of members*" call for discussion with a country that practices "*protracted large-scale intervention in one direction in exchange markets*"— a succinct description of China's currency policy over the past several years. Article XV (4) of the General Agreement on Tariffs and Trade (GATT), which is now an integral part of the World Trade Organization (WTO), similarly indicates that "*Contracting parties shall not, by exchange action, frustrate the intent of the provisions of this Agreement.*"

The higher degree of current account imbalances among economies indicates that it is impossible for deficit countries to reduce their imbalances unless surplus countries reduce theirs. Nevertheless, restoration of equilibrium exchanges rates is an essential element of an effective global "rebalancing strategy" as agreed by the G-20 forum over the past years as part of its new Mutual Assessment Process. This strategy has been agreed by the Chinese (as well as all other member countries).

Trade Policy

In the macroeconomic scenario of China, growth in exports continues to play an important role for the high and consistent economic growth. To increase exports, China has adopted policies such as fostering the rapid development of foreign-invested factories, which assemble imported components into consumer goods for exports, and liberalising trading rights. Since the adoption of the 11th Five-Year Programme in 2005, however, China has placed greater emphasis on developing a consumer demand-driven economy to sustain economic growth.

Impact of Exchange rate on China's trade

Many researchers have attempted to study the impact of RMB appreciation on China's trade balance. Most of these studies showed that a real appreciation of RMB reduces the trade surplus through exports. A few studies indicated positive impact on the trade surplus. Table 2 summarises the literature and the methodologies used to estimate RMB changes on China's trade balance.

Table 2: Selected Studies on the Estimation of RMB Valuation and its impact

Authors and data	Methodology	Impact of REER on exports/imports	Estimated price Elasticities	Impact of demand
Cerra and Dayal-Gulati, 1999 (Data used Quarterly, 1983–97)	Error Correction Model	No effect on exports/imports for 1983–97. For 1988 to 1997, negative and significant impact on exports and positive and significant on imports	–0.3 (exports) 0.7 (imports)	Significant and positive for 1988–97 period
Cerra and Saxena, 2003 (Data used Quarterly sectoral data,	Dynamic OLS	Price elasticity of exports increases towards end of period. NEER does not have a robust	1985–2001: –1.0 1994–2001: 3.8 (export	-

1985–2001)		significant impact and industry-level results mixed.	supply)	
Dees, 2001 (Data used Monthly, 1994–99)	Error Correction Model	Appreciation decreases exports. Effect stronger on ordinary exports than on processed ones. No significant effect on ordinary imports but appreciation slightly increases processed imports	–0.3 (exports) 0.2 (imports for processing)	Positive and significant for exports and imports
Eckaus, 2004 (Data used Yearly, 1985–2002)	OLS	Negative and significant effect on exports to the U.S. and China's share of U.S. imports.	–0.3 (exports to the US)	Positive and significant effect
Kamada and Takagawa, 2005 (Monthly, 1994–2000)	Theoretical model and OLS estimation	Revaluation causes a one-time import boost in the model but OLS shows no significant effect	-	-
Thorbecke, 2006 (Data used Annual 1982–2003)	Gravity model, Error Correction Model, OLS	In gravity model, an appreciation decreases China's exports. In VEC and OLS, exports to the U.S. decrease in the case of appreciation. No significant coefficient for imports. When studying US-China trade in a gravity model, no clear outcome.	–1.3 (exports)	Positive and significant for exports. Income elasticity for imports not robust.
Voon et al, 2006 Data used (Annual, sectoral data 1978–98)	OLS	Negative impact of an appreciation on exports.	-	Positive and significant for exports.

China's Exchange Rate Regime: Literature Review

In the literature, exchange rate regimes have been broadly identified into three major categories: fixed, floating and managed float. Studies reveal that countries generally float their currencies if (a) their GDP is large, (b) relatively low level of openness, (c) a high inflation differential with other countries, (d) a high degree of integration in international capital markets and (e) substantial diversification in traded goods (Holden & Suss 1979). Given this background, the trend in RMB can be analysed chronologically in five phases. These are briefly presented below.

Phase I: Pre Reform – Before 1978

Till 1978, China was a planned economy without any significant economic transactions with the outside world. Before moving to a composite peg, China had a fixed exchange rate from 1955 to 1972. Accordingly, the RMB was pegged to a basket of 13 currencies and later pegged to the average rates of the U.S. dollar (USD) and the German Mark (Zhang 2001). International trade was centralised and controlled by the state. The official exchange rate played no major role in foreign trade.

Phase II: 1978-1985

With a view to improve the economic status of China, exchange rate undergone changes with China's "open door policy". While foreign trade was decentralised, there were about a dozen foreign trade corporations managing foreign transactions in 1979. By the mid-1980s, there were 800 authorised import and export corporations. The official exchange rate was overvalued and out of line with world prices, which was complemented by an internal rate for trade settlements. This rate was lower than the overvalued official rate, and led to frequent devaluations of the official rate until both ended up merging into one by 1985.

Phase III: 1985-1993

In 1985, regionally based swap markets, known as Foreign Exchanges Adjustment Centres, were created so that joint ventures could swap retained foreign exchange acquired through exports. In 1988, a formal foreign exchange retention

system was established. Local governments and State-Owned Enterprises (SOEs) could now participate in the swap markets as well. Almost 80 percent of foreign exchange transactions were conducted at swap market rates by 1993 (Xu, 2000). From 1978 to 1993, the official “market” rate was clearly lower than the internal settlement rate and the swap rate, suggesting a constant pressure for the RMB to depreciate. Consequently, the official rate was subject to regular devaluations. It was only after the 1994 reforms that the RMB gained stability.

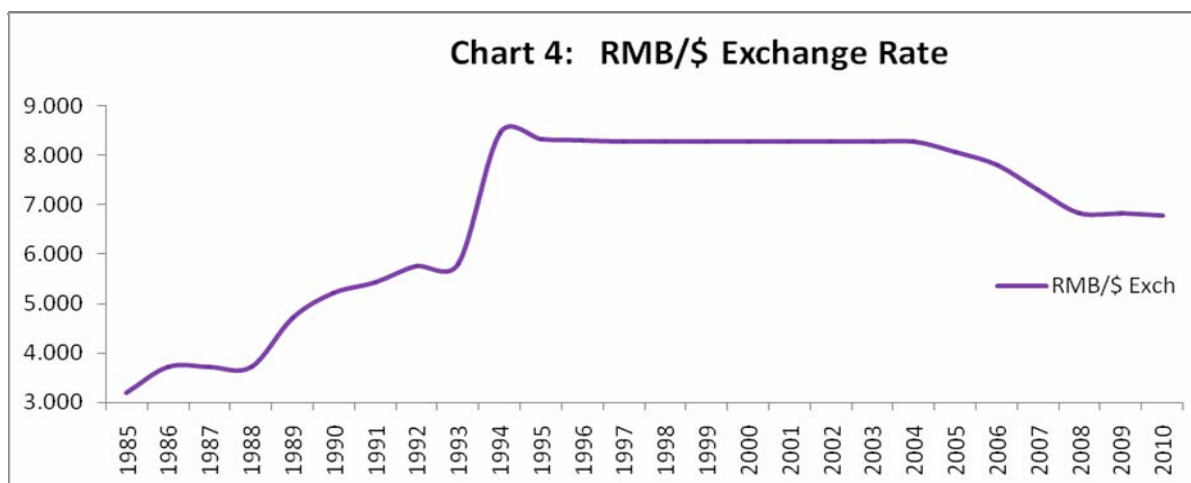
Phase IV: The 1994 reform

A market-based managed float system tying the RMB to the U.S. dollar was introduced. By the end of 1996, the RMB was fully convertible on the current account for trade related purposes (Maria DaCosta, 2004).

Phase V: Since July 2005

China introduced a new currency regime that ended the decade long fixed nominal exchange rate of the RMB *vis-à-vis* USD. The authorities revalued the dollar bilateral rate by 2.1 per cent. Moving it from RMB 2.28 to RMB 8.11 to USD and also announced that the RMB would be managed with reference to a basket of currencies rather than being pegged to USD. PBC announced that the exchange rate has to be made more flexible with its value based on market supply and demand. By the end of 2009, the market rate of the RMB-USD was 6.83 reflecting the cumulative nominal appreciation against USD by 21 per cent during 1990-2000 (Chart 4). The recent data for the month of August 2010 showed that RMB market rate was 6.79 to USD.

The overview indicates that RMB exchange rate is somewhat a black box to equate any significant real appreciation of the RMB with very slow growth and to regard export as main driver of China’s growth.



Section II: India-China Trade Relations

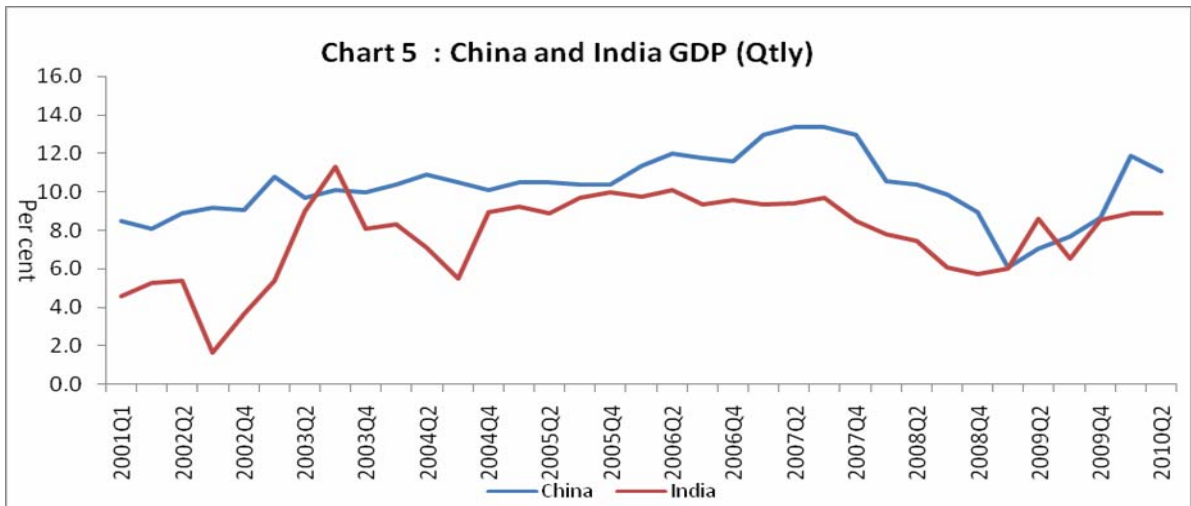
In the context of India, the prevailing macroeconomic environment and the structural factors of the economy in the 'eighties and the early 'nineties contributed to the balance of payment difficulties, with current account deficit getting widened to 3.0 per cent of GDP in 1990-91 and the foreign currency assets getting depleted to less than a billion dollar by July 1991. This necessitated India to embark upon stabilisation and structural reforms to generate impulses for growth. As a result, the exchange rate policy moved from a basket-peg and to a 'managed float' exchange rate system. Table 3 below captures the scenario of India's exchange rate since independence.

1947-1971	Par Value system of exchange rate. Rupee's external par value was fixed in terms of gold with the pound sterling as the intervention currency
1971	Breakdown of the Bretton-Woods system and floatation of major currencies. Rupee was linked to the pound sterling in December 1971
1975	To ensure stability of the Rupee, and avoid the weaknesses associated with a single currency peg, the Rupee was pegged to a basket of currencies. Currency selection and weight assignment was left to the discretion of the RBI and not publicly announced.
1978	RBI allowed the domestic banks to undertake intra-day trading in foreign exchange.
1978-1992	Banks began to start quoting two-way against the Rupee as well as in other currencies. As trading volumes increased, the 'Guidelines for Internal Control over Foreign Exchange Business' were framed in 1981. The foreign

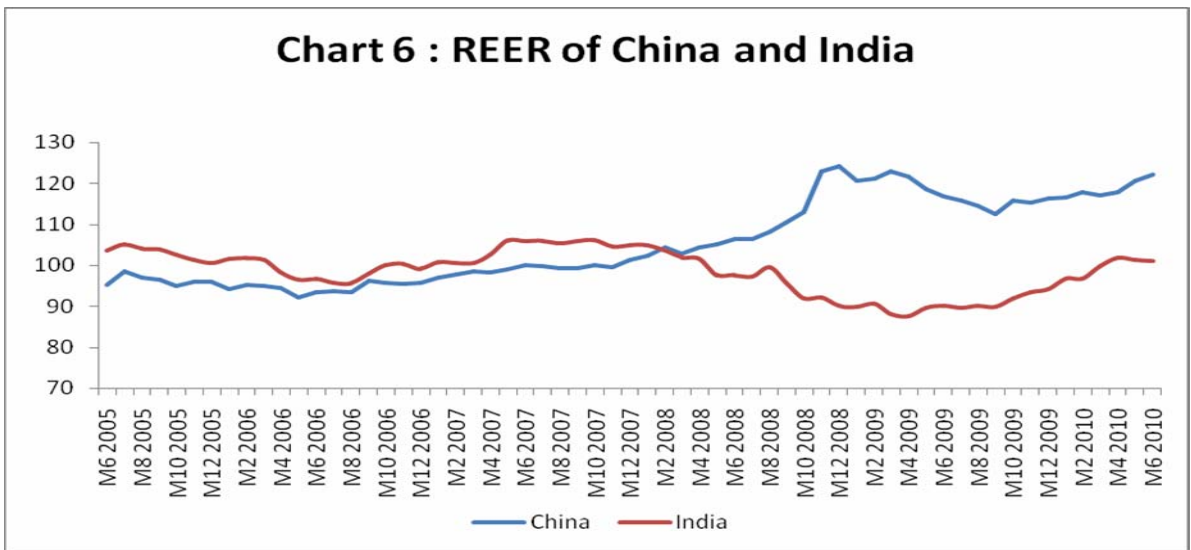
	exchange market was still highly regulated with several restrictions on external transactions, entry barriers and transactions costs. Foreign exchange transactions were controlled through the Foreign Exchange Regulations Act (FERA). These restrictions resulted in an extremely efficient unofficial parallel (hawala) market for foreign exchange.
1990-91	Balance of Payments crisis.
July 1991	To stabilize the foreign exchange market, a two step downward exchange rate adjustment was done (9 per cent and 11 per cent). This was a decisive end to the pegged exchange rate regime.
March 1992	To ease the transition to a market determined exchange rate system, the Liberalized Exchange Rate Management System (LERMS) was put in place, which used a dual exchange rate system. This was mostly a transitional system.
March 1993	The dual rates converged, and the market determined exchange rate regime was introduced. All foreign exchange receipts could now be converted at market determined exchange rates.
Source: Annual Report, Reserve Bank of India, various issues	

Theoretically, any change in the exchange rate (either depreciation or appreciation) will have an impact on the international trade and other financial transactions of a country if the economy functions in a transparent manner. In recent years, trade with China for India is becoming more significant (Annex 1 and 2). Given the fact that the RMB exchange rate is undergoing changes since 2000, it will be interesting to study the pattern of trade between these two countries in the last decade. We have made an attempt to study the pattern of growth and trade related issues.

The resilience of both China and Indian economies enabled them to maintain higher trajectory of growth path during the last decade as portrayed in the Chart 5.



The strong fundamentals enabled both China and Indian economies to overcome the damaging effect of recent financial crisis and thereby maintain a better growth as compared to their counterparts in the developing countries as also developed economies. The analysis of exchange rate movement, particularly the trend in the real effective exchange rate (REER), indicates that REER of both the countries moved in tandem from 1990 till 2007 during market reform period (Chart 6).



The analysis of macroeconomic data brought forth the fact that in the last decade and in particular in the last few years, China has become a major trading partner in trade activities of India. This amply got reflected in India's exports to and imports from

China having a share of around 6.7 per cent and 10.8 per cent, respectively, of India's total trade in the recent years. Another major pointer emerges from the trade data since 2005-06 is India's exports to China grew at slower pace than its imports from China. This led to India maintaining an increasing trade deficit with China (Table 4).

Table 4 : India's Trade with China

(US \$ million)

Year	Export	Import	Trade Balance
2001-02	952	2036.4	-1084.4
2002-03	1975.5	2792.0	-816.5
	(107.5)	(37.1)	
2003-04	2955.1	4053.2	-1098.1
	(49.6)	(45.2)	
2004-05	5615.9	7098	-1482.1
	(90)	(75.1)	
2005-06	6759.1	10868.1	-4109.0
	(20.4)	(53.1)	
2006-07	8294	17460.7	-9166.7
	(22.7)	(60.7)	
2007-08	10828.8	27102.4	-16273.6
	(30.6)	(55.2)	
2008-09	9275.6	32092.9	-22817.3
	(-14.3)	(18.4)	
2009-10	11530.8	30749.5	-19218.7
	(24.3)	(-4.2)	

Source: DGCI & S and Ministry of Commerce & Industry.

Note: Figures within bracket indicate growth over the previous year.

The analysis of trade pattern also revealed some more interesting facts. The major item of exports from India to China includes iron ore, engineering goods, chemical and allied products, cotton raw and waste, other ores and minerals, gems and jewellery, which accounted for about 60 per cent, particularly during 2008-09 (Table 5). Nevertheless, the exports of iron ore to China were fluctuating and were in the range of

40 to 50 per cent of the total exports to China in the last five years or so. Exports of various commodities to China alone constitute about 5 to 6.5 per cent in the total exports of India in the last few years. Even though iron ore contributes a major share in exports to China, its share in the total exports of India is only about 3 per cent over the last five years, underlining the growing market for the commodity in terms of China.

Table 5: India's Exports of Major Commodities to People's Republic of China

(US \$ million)

Commodity	2001-02	2005-06	2006-07	2007-08	2008-09	2009-10
1	2	3	4	5	6	7
Iron Ore	207	3273	3333	5403	4330	5114
Engineering Goods	67	797	1378	1067	998	1712
Chemicals & Allied Products	306	930	1196	1211	840	1180
Cotton Raw incl. Waste	0	415	656	1004	277	1089
Other Ores And Minerals	113	319	670	936	682	638
Total Export to People's Republic of China	952	6759	8294	10829	9276	11531
		(20.4)	(22.7)	(30.6)	(-14.3)	(24.3)
Total Export	43827	103091	126414	162904	185295	178662
Percentage Share to Total Export	2.2	6.6	6.6	6.6	5.0	6.5

Source: Directorate General of Commercial Intelligence and Statistics (DGCI&S), Government of India, and Reserve Bank of India

Likewise, major items of imports from China included electronic goods, machinery except electrical and electronics, chemical (organic and inorganic), project goods and iron and steel (Table 6). The share of imports from China has significantly risen to 10.7 percent during 2009-10 from 7.3 per cent five years ago. This underlines the growing imports from China particularly electronic and machinery goods, which are on the rise and forming more than 40 per cent share in the total imports of India.

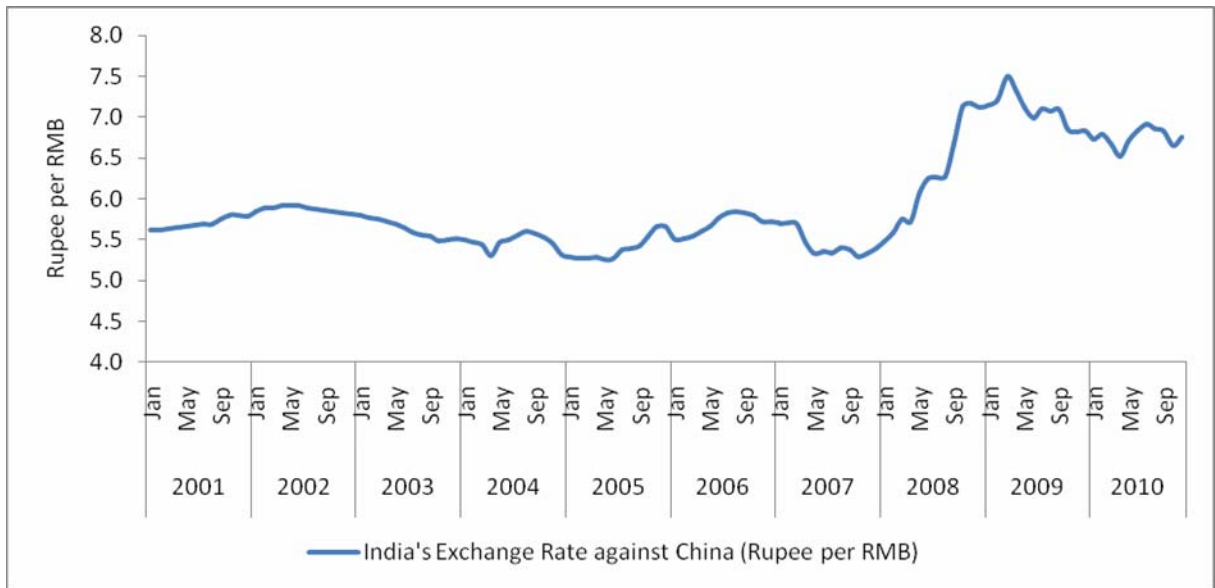
Table 6: India's Imports of Major Commodities from People's Republic of China**(US \$ million)**

Commodity	2001-02	2005-06	2006-07	2007-08	2008-09	2009-10
1	2	3	4	5	6	7
Electronic Goods	383.9	3491.3	5010.5	7860.6	9316.4	9488.3
Machinery except Electrical & Electronics	71.9	1014.4	1840.4	3325.7	4129.9	4537.7
Chemicals, organic & inorganic	301	1164.6	1561.1	2097.8	2658	2779.2
Project Goods	8.1	105.7	497.8	398.3	1223.8	2044.2
Iron & Steel	16.4	393	1559.7	2027	2177.8	1316.9
Total Import from China	2036.4	10868.1	17460.7	27102.4	32092.9	30749.5
Total Import	51413.3	149165.8	185735.2	251439.2	303696.3	286822.8
Percentage Share to Total Import	4.0	7.3	9.4	10.8	10.6	10.7

Source: : DGCI&S, Government of India, and Reserve Bank of India

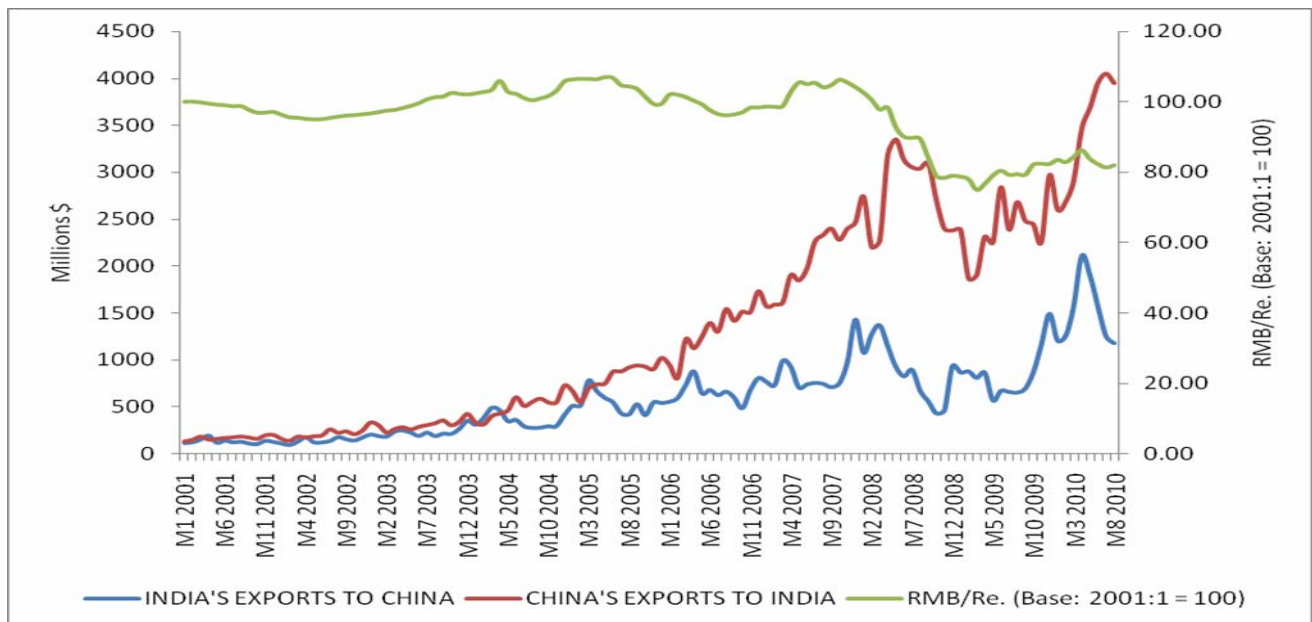
It is important to realize that given the growing bilateral trade relations between these two countries and especially in terms of imports, any valuation of RMB may affect the trade pattern between these two countries. In the context of analysing the trade pattern emerging out of exchange rate movements, it is also important to comprehend the movement of INR to RMB. The exhibit Chart 7 highlights the movement of rupee RMB based on monthly average exchange rate trend.

Chart 7: India's Exchange rate against China



Cumulatively, the Chinese RMB appreciated by 16.7 per cent against the Indian Rupee during 2001-2010. Most of this appreciation occurred since July 2005 (13.7 per cent). In spite of the fact that the Indian Rupee depreciated against the Chinese RMB considerably (especially, since July 2005) making Indian products more competitive, India's trade deficit against China has blown up in the recent period. India's trade deficit has gone up from just US\$ 1.1 billion in 2001-02 to US\$19.2 billion in 2009-10 (Chart 8).

Chart 8: India and China: Bilateral Trade and Exchange Rate



In the context of impact of exchange rate on the trade between India and China, the FICCI Survey on exports (October , 2010) reveals that the price advantage of Chinese products is of a much greater magnitude and for a more and meaningful impact, the Chinese Yuan should appreciate significantly.

Section III

Empirical Analysis – Exchange Rate Impact on Trade between India and China

The main objective of the Study is to find the impact of valuation *i.e.*, appreciation of Chinese RMB on India's trade with China. Towards this goal, we estimated India's export and import function *vis-à-vis* China firstly through single equation model, followed by vector error correction model and explored the significance of usual arguments in the respective functions on exports to and imports from China. The study covers the time period 2001Q₁-2010Q₃. The relevant quarterly data on bilateral trade statistics between India and China have been taken from the Direction of Trade Statistics of the IMF and DGCI&S, Ministry of Commerce, Government of India as also from the Reserve Bank of India for the parameters in the Study. Besides, for deriving terms of trade, exchange rate and price data for both countries were taken from the Reserve Bank of India and 'the Economist' database. We derived the real exchange rate by multiplying the nominal exchange rate with terms of trade (Iser06sa). Terms of trade has been calculated by converting Chinese consumer price inflation (CPI) into an index with 1992-93 as the base year and then dividing it by the Indian wholesale price index (WPI). GDP quarterly data has been sourced from the National Bureau of Statistics, China and Central Statistical Organisation, India. The study attempts to find out the impact of real effective exchange rate between India and China on exports to imports from China.

Methodology for the Study

The Study adopted the following method in the empirical analysis:

1. Firstly, we examined various least squares (LS) specifications for exports and import functions.

2. We also tested for relevant time series properties of the variables for unit root and co-integration tests.
3. On finding the existence of cointegration, we tested the sample data for a vector error correction model.
4. To ensure the significance of the data set, we conducted diagnostic tests check for robustness of periodicity chosen and our rolling tests identified 2001 - 2010 as robust sample period.

We regressed Indian exports to China on indexed rupee-RMB exchange rate (YR4) and terms of trade (adjusting the prices) (TT), as well as GDP growth of China (CHYSA) as indicated in Table 7. For the purpose of export function under Least Square (LS), due to the fact that the India is exporting mostly primary commodities to China which are assumed to be sensitive to terms of trade we decided to include in our model indexed exchange rate between RMB and rupee and terms of trade, separately. The LS results appearing in Table No. 7 clearly shows that the short term elasticity for exports coefficients have the desired signs and are statistically significant. From the near term point of view, least square estimation shows that a percentage depreciation in rupee-yuan exchange rate impacts value of exports to China positively which goes up by 1.1 per cent.

Table 7: Estimation of Export Function

Dependent Variable: LXCH				
Method: Least Squares				
Date: 01/23/11 Time: 19:39				
Sample (adjusted): 2001Q1 2010Q1				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.37635	3.205185	-5.421325	0.0000
LYR4	1.074643	0.295894	3.631850	0.0010
LTT	-2.473825	0.960477	-2.575621	0.0148
LCHYSA	1.207508	0.264961	4.557312	0.0001
LXCH(-1)	0.217081	0.125188	1.734039	0.0925
R-squared	0.979124	Mean dependent var		7.135854
Adjusted R-squared	0.976515	S.D. dependent var		0.759696
S.E. of regression	0.116423	Akaike info criterion		-1.338084
Sum squared resid	0.433738	Schwarz criterion		-1.120393
Log likelihood	29.75456	Hannan-Quinn criter.		-1.261338
F-statistic	375.2166	Durbin-Watson stat		1.669587
Prob(F-statistic)	0.000000			

In the case of import function, in selecting the independent variables, we chose exchange rate adjusted for prices since India's import from China are in the nature of machinery, electrical and other type of capital goods which are primarily determined by competition in the market. The least squares regression of India's imports from China on the rupee-RMB exchange rate and India's GDP growth rate displays theoretically correct signs and also exhibit statistically significant result in the case of exchange rate in the short run (Table 8). Hence, the estimation results show that if there is one percent depreciation of rupee *vis-a-vis* RMB, it is likely to reduce India's imports from China by around 0.43 per cent and vice versa.

Table 8: Estimation of Import Function

Dependent Variable: LMCH				
Method: Least Squares				
Date: 02/07/11 Time: 18:14				
Sample (adjusted): 2001Q1 2010Q1				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.841011	4.475038	-1.752166	0.0890
LYIND	0.726064	0.375250	1.934880	0.0616
LSE06SA	-0.429061	0.110397	-3.886518	0.0005
LMCH(-1)	0.840804	0.076751	10.95492	0.0000
R-squared	0.996342	Mean dependent var		7.716050
Adjusted R-squared	0.996009	S.D. dependent var		1.047375
S.E. of regression	0.066168	Akaike info criterion		-2.491433
Sum squared resid	0.144481	Schwarz criterion		-2.317280
Log likelihood	50.09152	Hannan-Quinn criter.		-2.430036
F-statistic	2995.698	Durbin-Watson stat		1.527802
Prob(F-statistic)	0.000000			

Cointegration and Vector Error Correction Estimates

It has been argued in the literature that regression on levels without testing for stationarity of variables might lead to spurious results and therefore, it may be necessary to undertake the same tests in a time series framework. We, therefore, adopted two major steps for testing the data in time series framework - (i) we decided to check for unit roots of data for both exports and imports function which have been seasonally adjusted and brought out in log form; and (ii) we conducted test for assessing co-integration between set of variables.

Testing for Unit Roots

Step I

The Maximum likelihood approach to test for co-integration proposed by Johansen necessitates that the variables be integrated of the same order. Hence, the first step in conducting co-integration test is to pre-test each variable

to determine their order of integration. In this respect, we use the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests to identify the integration properties of the variables (Table 9).

Table 9: Unit root tests

Variables	ADF –test		Phillips-Perron	
	Levels	First Difference	Levels	First Difference
XCH (exports to China)	-1.91 (0.32)	-5.21 (0.00)	-2.73 (0.08)	-5.16 (0.00)
CHYSA(GDP of China)	4.33 (1.00)	-3.68 (0.03)	2.25 (0.99)	-1.97 (0.04)
YIND (GDP of India)	1.14 (0.99)	-7.74 (0.00)	1.33 (0.99)	-7.73 (0.00)
MCH (imports from China)	-0.34 (0.91)	-4.38 (0.00)	-0.71(0.83)	-4.44 (0.00)
LSER06SA (real RMB - rupee exchange rate)	0.69 (0.99)	1.51 (0.99)	-1.31(0.61)	-3.90 (0.00)
LTT (terms of trade)	1.07 (0.99)	-8.98 (0.00)	0.80 (0.99)	-6.65 (0.00)
LYR4 (nominal RMB-rupee exchange rate)	-1.62 (0.46)	-3.50 (0.01)	-1.15 (0.69)	-3.59 (0.01)

Note: Figures in parentheses are p-values.

The test statistics for testing the null hypothesis that the individual series have a unit root against the alternative that the series is a stationary process is compared against the critical values. The results indicate that the null is rejected at 1 per cent significance level for all the variables (except LSER06SA under ADF) under consideration in first differences while it is accepted in levels. However, the exchange rate variable (LSER06SA) rejects the null of unit root only under Phillips Perron, which is a more robust than ADF test. This confirms that the variables in levels are non-stationary while they are stationary in first differences, suggesting that they are integrated of first order.

The next step is to examine the co-integration properties of the set of variables using the Johansen Method. The test statistics (λ_{TRACE} and λ_{MAX}) for testing null hypothesis that number of co-integrating vector $r = i$ against the alternative hypothesis that $r \leq 1+i$ are presented in Table 10.

Table 10: Results of Johanssen Cointegration Test

Variables	Hypothesis	Eigenvalue	λ_{TRACE}	λ_{MAX}
<i>XCH, YR4, TT and CHYSA</i>	$r = 0$	0.755926	77.98617	47.85613
	$r \leq 1$	0.367228	25.80570	29.79707
	$r \leq 2$	0.201625	8.872825	15.49471
<i>MCH, YIND and SER06SA</i>	$r = 0$	0.654361	47.13166	29.79707
	$r \leq 1$	0.190533	7.824310	15.49471
	$r \leq 2$	8.87E-05	0.003283	3.841466

The results of Table 10 indicate that there is one co-integrating relationship in all the relations at 5 per cent significance level. When two series are co-integrated, it suggests that even though both processes are non-stationary, there is some long-run equilibrium relationship linking both series so that relationship is stationary. This long-run relationship is represented by the linear combination implicit in the co-integration relationship. It appears from the above that the co-integrating vectors have the desirable signs supporting the import and export functions obtained under least square framework.

The first cointegrating relationship which is furnished in Table 11 shows exports to China are strongly and positively related coupled with exchange rate and China's GDP. Variance decomposition of exports shows that variations in exports are explained by shocks to exports itself in the first few quarters which in turn shows that exports may be rising with conducive global economic conditions characterised by rise in global exports and growth. Exchange rate and China's GDP gradually lay their its impact on exports with exchange rate explaining more than 19.0 per cent of the variations in exports and China's GDP about 6.6 per cent of the variations in exports by the fourth quarter. But exchange rate explains about 36.0 per cent of the variations in China's GDP in the first quarter which peaks at 45.0 per cent by the third quarter implying thereby how sensitive China's GDP is to variations in its exchange rate. This may partly be attributed to the Chinese development model which is geared around exports.

Table 11: Error Correction Term in Difference Equation VARs

Export Function		Import Function	
Variables	Normalised Coefficients	Variables	Normalised Coefficients
LXCH	[1	LMCH	[1
LTT	3.20(2.49)	LYIND	-6.56(-8.18)
LYR4	-2.38(-7.34)	LSER06SA	2.86(7.78)]
LCHYSA	-1.77(-7.49)]		

In the import function in the second co-integrating relationship, there is a strong cointegrating relationship between imports from China, India's GDP and rupee-RMB exchange rate. India's GDP has a strong expansionary impact on imports from China explaining around 18.0 per cent of the variations in imports by the seventh quarter. Real exchange rate, on the other hand, explains around 10.0 per cent of the variations in imports in the second quarter which increases to 15.6 per cent by the fourth quarter. Imports also have an expansionary impact on India's GDP and this result is supported by the fact that 40.0 per cent of the imports from China are machinery and electronic goods implying thereby that Chinese imports cater to both final demand component as well as demand for intermediate goods. Imports explain over 24.0 per cent of the variations in Rupee-RMB exchange rate in the first quarter which increases to 68.5 per cent by the fourth quarter. Understandably, exchange rate is partly determined by demand and supply for foreign exchange arising out of exports and imports (Annex 3 and 4).

Given the fact that co-integration is far more superior econometric tool than LS, we may safely infer that long run elasticity of export with respect to exchange rate is 2.38 while that of import it is 2.86. Higher exchange rate elasticity of import than export perhaps might explain the deteriorating trade deficits between India and China.

Section IV

Issues and Policy Implications

From the analysis of trend in the trade between India and China as also the findings of empirical analysis, the following issues and policy implications are identified:

1. The empirical findings of the study clearly indicate that revaluation of RMB (depreciation of rupee *vis-a-vis* RMB) will have impact on the trade of India, particularly with higher elasticity for imports. In this context, one of the factors favouring China is the cost advantage of its exports (imports for India) influenced by various domestic factors. Factor like production-oriented firms/industries subsidies does support China Model. The cost of production as well as productivity of labour also becomes an added advantage in its export promotion.
2. By keeping RMB undervalued against the USD and depreciating it in line with the USD in the international market without taking into account the economic fundamentals of China, it invariably and distinctly provides competitive advantage over its trade competitors and trade partners including India.
3. In India, the share of the imports from China has significantly risen to 10.7 per cent during 2009-10 from 7.3 per cent five years ago. This underlines growing imports from China particularly electronic and machinery goods which are on the rise forming more than 40 per cent share in the total imports of India. To avoid the implications in terms of imports, there is a strong need to diversify imports of these items.
4. The unit cost of labour in China has declined by 20 to 80 per cent. On the one hand, in the case of India, increases in labour compensation outpaced increase in productivity, driving the unit cost by 10 to 100 per cent (Bart Van Ark et.al 2010). Therefore, there is a need to address the issue of labour improvement in productivity.
5. China's current currency policy gives its exporters a distinct advantage over other countries that have to deal with currency volatility. Given the fact that the policies of China are export-oriented, pro-FDI and keeping the exchange rate undervalued etc., the

emerging market economies which have allowed their currencies to float will have to face distinct issues in their management of balance of payments.

6. To sum up, the study brings out the fact that appreciation in RMB will have impact on the bilateral trade between India and China in terms of both exports and imports. Since in both exports and imports functions in the model underline the significance of exchange rate supported by similar signs from the co-integration results, there is a case for revaluation of RMB. Further the findings show that higher exchange rate elasticity of import than export perhaps explain the deteriorating trade deficit with China may be due to their unfavourable exchange rate management policies.

7. However, there is scope for further research by looking at other parameters contributing to the trade between India and China than those covered in the Study.

Annex 1: Share and Growth of India's Imports from Major Sources

Group/Country	Shares			Percentage Variation	
	2007-08	2008-09R	2009-10P	2008-09 over 2007-08	2009-10 over 2008-09
1. People's Republic of China	11.0	10.5	10.9	26.2	-11.6
2. USA	5.4	6.1	6.2	46.8	-12.2
3. UAE	5.4	7.8	6.1	92.5	-33.2
4. Saudi Arabia	7.5	6.5	5.9	15.1	-23.1
5. Switzerland	4.0	4.1	4.7	34.2	-2.7
6. Australia	3.1	3.6	4.3	49.1	3.5
7. Iran	4.3	4.0	4.0	22.1	-13.5
8. Germany	3.8	3.9	3.7	35.4	-18.8
9. Indonesia	1.9	2.1	3.0	41.7	23.7
10. Kuwait	2.8	3.1	3.0	49.0	-19.7
11. South Korea	2.4	2.8	3.0	58.8	-11.1
12. Iraq	2.4	2.7	2.6	46.1	-18.8
13. Japan	2.5	2.6	2.3	34.5	-23.0
14. Belgium	2.0	1.9	2.2	26.5	-2.2
15. Singapore	3.1	2.5	2.1	6.4	-26.5
16. South Africa	1.4	1.9	2.0	74.2	-6.9
17. Malaysia	2.5	2.4	1.8	28.8	-37.3
18. Hong Kong	1.2	1.9	1.6	122.5	-30.5
19. UK	2.0	2.0	1.5	28.4	-35.0
20. France	1.1	1.4	1.5	73.6	-13.0
Share of Top 20	69.7	73.7	72.4	39.5	-16.4
Others	30.3	26.3	27.6	14.6	-10.9
Total Imports	100.0	100.0	100.0	32.0	-14.9
Groups					
OECD Countries	31.1	31.9	33.1	35.6	-11.8
EU	13.9	13.8	13.6	31.2	-16.1
OPEC	29.9	32.9	31.5	45.0	-18.4
SAARC	0.8	0.6	0.6	-2.1	-16.9
Other Asian Developing Countries	24.8	25.0	25.0	33.2	-15.0
Africa	3.7	4.2	4.4	49.2	-10.7
Latin American Countries	2.2	1.7	2.5	1.4	25.2
RoW	7.5	3.7	2.9	-35.0	-33.1
Total	100.0	100.0	-	-	-14.9
Total imports (Million US\$)	206146	272038	231452	32.0	-14.9

P - Provisional; R-Revised

Source: Directorate General of Commercial Intelligence and Statistics (DGCI&S), Ministry of Commerce, Government of India, and RBI

Annex 2 : Share and Growth of India's Major Export Destinations					
Group/Country	Shares			Percentage Variation	
	2007-08	2008-09R	2009-10P	2008-09 over 2007-08	2009-10 over 2008-09
1. UAE	9.7	13.2	12.9	67.1	-13.4
2. USA	13.1	11.4	10.8	7.2	-15.4
3. PR of China	6.0	4.7	6.1	-3.6	15.4
4. Hong Kong	3.9	3.5	4.3	9.8	10.1
5. Singapore	4.2	4.6	4.2	32.6	-19.2
6. Netherlands	3.1	3.4	3.8	32.0	0.9
7. UK	4.2	3.5	3.6	2.6	-8.0
8. Germany	3.1	3.3	3.1	30.5	-18.4
9. Saudi Arabia	2.1	2.8	2.2	61.3	-27.9
10. Belgium	2.6	2.4	2.1	15.7	-23.4
11. France	1.6	1.6	2.1	22.1	17.1
12. Japan	2.2	1.6	2.0	-10.5	10.3
13. South Korea	1.7	1.7	2.0	24.2	2.1
14. Italy	2.4	2.0	1.9	3.5	-16.6
15. Indonesia	1.2	1.3	1.8	40.0	16.6
16. Malaysia	1.4	2.0	1.7	67.9	-24.2
17. Bangladesh	1.5	1.3	1.4	11.0	-9.9
18. South Africa	1.5	1.1	1.2	-11.6	-2.8
19. Sri Lanka	1.7	1.3	1.2	-3.3	-22.2
20. Iran	1.4	1.4	1.1	23.3	-28.3
Share of Top 20	68.6	68.1	69.3	22.0	9.5
Others	31.4	31.9	30.7	24.5	-14.2
Total	100.0	100.0	100.0	22.8	-11.0
OECD Countries	39.5	36.9	36.3	14.5	-12.5
EU	21.1	20.9	20.6	21.7	-12.5
Other Asian Developing Countries	24.5	22.6	24.7	13.4	-2.8
OPEC	16.6	21.2	20.9	57.6	-12.6
Africa	7.5	6.4	5.9	5.8	-18.5
SAARC	5.5	4.6	4.7	2.7	-9.3
Latin American Countries	3.1	3.3	3.4	30.5	-8.9
RoW	3.3	4.9	4.2	81.2	-23.9
Total	100.0	100.0	100.00	-	-
Total Exports (Million US\$)	130657	160438	142765	22.8	-11.0

P - Provisional; R-Revised

Source: Directorate General of Commercial Intelligence and Statistics; RBI

Annex 3: Adjustment of EC Terms in Difference Equations: Export Equation

Diagnostic Equations	D(LXCH)	D(LTT)	D(LYR)	D(LCHYSA)
EC Adjustments Speed	-0.36 (-1.84)	-0.049 (-2.52)	0.082 (2.39)	0.066 (1.59)
R square	0.41	0.59	0.48	0.56
F-Statistic	2.08	4.38	2.73	3.83

Annex 4: Adjustment of EC Terms in Difference Equations: Import Equation

Diagnostic Equations	D(LMCH)	D(LYIND)	D(LSER06SA)
EC Adjustments Speed	-0.33 (-2.56)	0.009 (0.40)	-0.31 (-3.40)
R square	0.55	0.31	0.86
F-Statistic	3.2	1.17	15.6

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