

An Analysis of the Factors Affecting International Trade of India and China

Archana Singh

Assistant Professor

ARTICLE DETAILS

Article History

Published Online: 16 Aug 2019

Keywords

GFCF, R and D, REER, Total trade.

Corresponding Author

Email: roopa8781[at]gmail.com

ABSTRACT

This study analyzes the relationship between infrastructure and technology expenditure and exchange rate on the volume of international trade. As trade of goods and services is believed to related to physical and social infrastructure and technological adaption. Another significant factor which has been proved to affect the volume of international trade is Exchange Rate. The countries here taken for the study are India and China. The period of study is year 2000 to 2017. GFC has been taken as the proxy of physical and social infrastructure expenditure. R and D expenditure is taken as measurement of technological innovation domestically. REER has been taken as the measure of inflation adjusted exchange rate. These factors have been found to affect the volume of international trade differently in both the countries.

1. Introduction

International trade is considered to be a powerful tool of economic development as well as growth. Empirical Studies supports this view that increased participation in international trade is inductive to economic growth, which is a pre condition for broader array development targets. Connection of global market with developing countries provides a critical channel for the flow of finance, technology and services which are found to further improve productive capacity of agriculture, industry and services. These upgradations are required for structural transformation of economy. Trade led growth had been successfully demonstrated in East Asian and South Asian countries. The essential factor behind swift economic growth has been their ability to strengthen competitive and productive exports capacity. This transition first initiated in traditional agricultural and textile sectors and then in labour-intensive manufactures which then transmitted to high technology sectors such as electronics. This structural transformation was combined result of strategic trade opening and robust policy implementation.

Economic growth is a necessary condition for poverty reduction particularly in low income countries. When GDP of a country is sufficiently large, poverty reduction is matter of redistribution only. Literature suggests that redistributive allocations alone are not sufficient for, sometimes even hinders

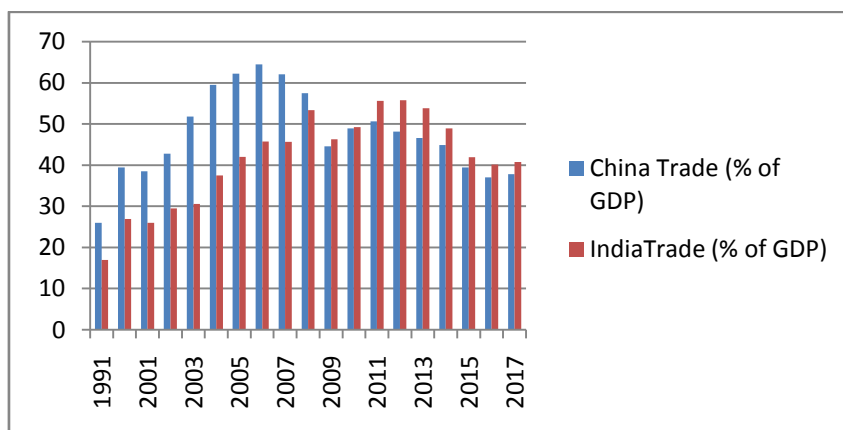
the pace of poverty reduction. Poverty reduction in cases is the judicial mix of enlarging the share of growth as well as distribution of it. That could be measured in higher output per worker, which is usually approximated by GDP per capita.

According to UNCTAD the impact of trade on national income can be described as "income channel". Trade can propel the country's income generating opportunities via 'vent for surplus'.

Through the income channel, trade influences wide range of growth outcomes by influencing relative prices in home economy. Income changes may affect the incentives of particular groups when deciding the entry into formal labour force, which further affects social and economic inclusion.

2. Growth of international trade in India and China after 2000

Trade openness which measures Trade to GDP ratio of countries has been increased significantly for both the countries since 1991. While for china it was 26% in 1991, 40% in 2000, peaked at 64% in 2006, then after it gradually came down to approx 38% in 2017. For india it was 17% in 1991 rose 27% in 2000 while it was at peak in 2012 at 56% and came to 41% in 2017.



Data Source: World Development Indicator, World Bank, 2017.

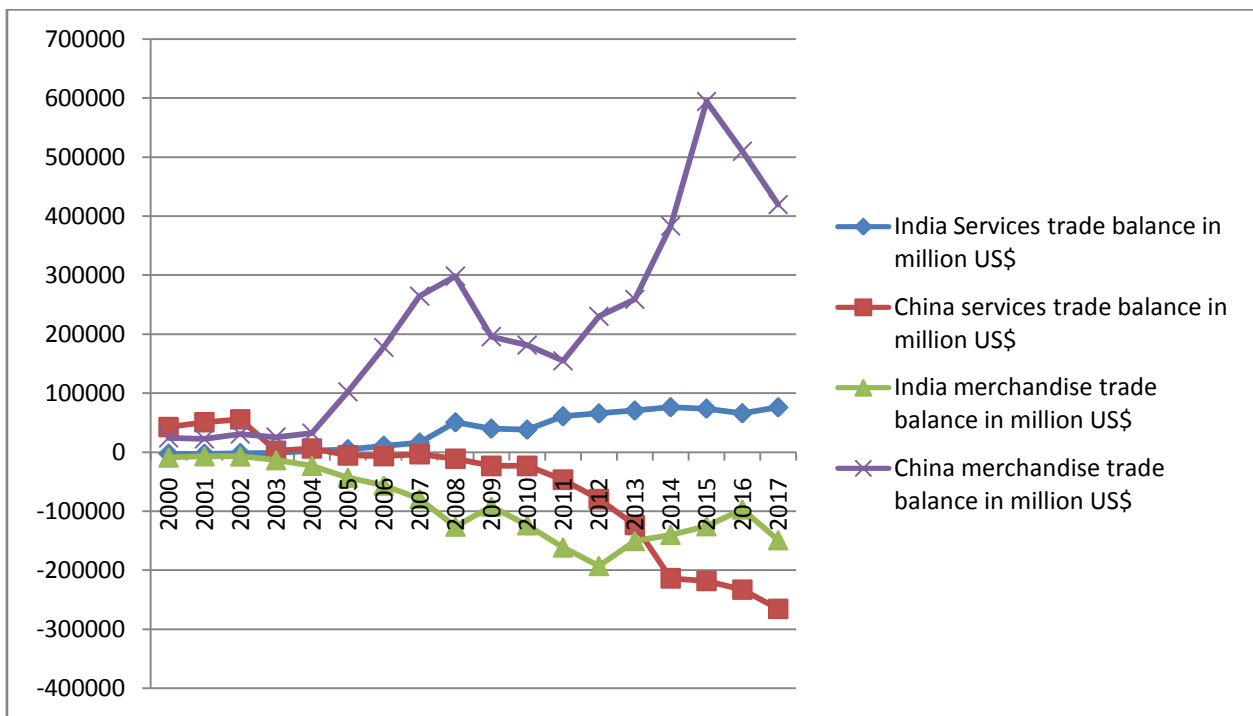
Another strikingly different feature of both the economies is, nature of the trade balance. Goods trade contributed differently to the two countries' trade balances. In China, large and increasing surplus in commodities trade more than offsets its deficit in service trade, results in huge overall trade surplus. India, on the other hand, there is a constant deficit in trade of commodities which has increased considerably over the time. While there has been an significant surplus in service trade, it is far from adequate to cover up the large deficit in merchandise trade.

3. Trade Balance of India and China

We can observe that there is striking contrast between the trade balance pattern of India and China. India has always had negative trade balance in the Merchandise account. This was balanced through positive balance in services account which is positive since 2003. Though the positive balance is not sufficient to cover up the negative balance in merchandise trade and India has negative trade balance.

In the case of China, both merchandise and services trade account has positive balance till 2004. After that services account have negative trade balance while merchandise account has ever increasing positive trade balance. The positive balance in the merchandise account is more than the negative balance so China has huge surplus in the trade account.

Merchandise Trade balance of India in 2000 was -9143.6 million US\$ and became -149148 million US\$ in 2017. On services trade account balance was -2502.91 million US\$ which became +75922.87 million US\$ in 2017. For china, merchandise trade balance was +24109 million US\$ in 2000 and increased to the amount of +419554 million US\$ in 2017. While on the services trade account it was +42439.06 million US\$ in 2000 and became -265417 million US\$ in 2017. Over all trade balance of India was -73224.7 million US\$ and +154136.7 million US\$ for China in 2017.



Data Source: World Development Indicator, World Bank,2017

4. Factors affecting differentials in trade performance of both countries

Several studies have been identified a large number of factors which could be a possible explanation behind the different trade performance of the both countries. This paper has taken three factors namely, Gross Fixed Capital Formation, Research and Development expenditure and Real Effective Exchange Rate to study their impact on trade performance of India and China.

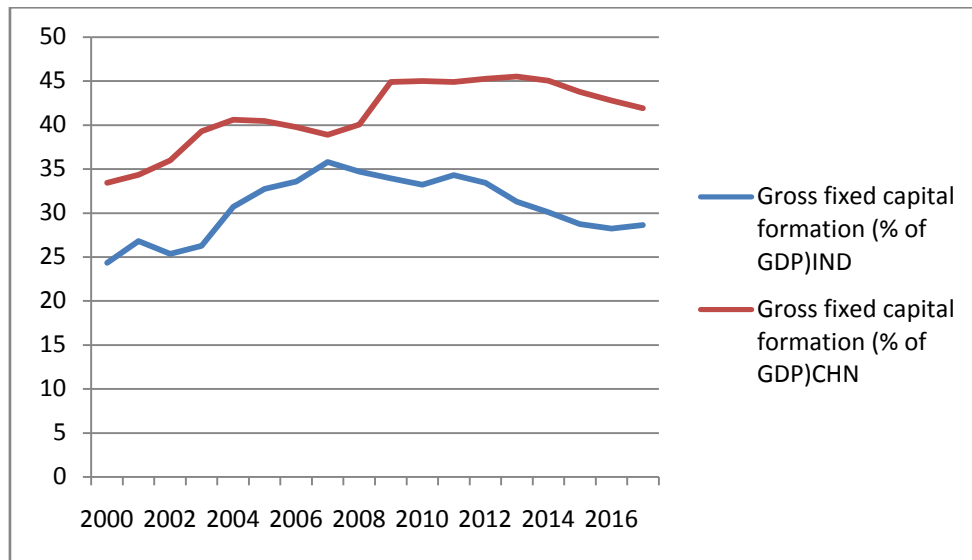
Total Trade- Total trade here has been taken as the exports and imports of the goods and services of the country in one year. It could also be defined as Current Account Balance CAD of the country in one year.

GFC- As per World Bank definition Gross fixed capital formation includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. Data is collected in current U.S. dollars.

Gross fixed capital formation is fundamentally net investment. It captures the net increase in the fixed capital. Empirically investment is highly cyclical due to accelerator effect. This is because if output falls, firm lower their profit expectation this results in cutting back of output rather than increasing it. This has been empirically proved during the recession of 1991 and 2008.

China has one of the highest rates of GFCF across the spectrum of developed as well as developing countries. While

India's trend rate of GFCF is similar to the other developing countries across the globe.



Data Source: World Development Indicator, World Bank, 2017

Initially GFCF as percentage of GDP for India was approx 24% of current GDP in 2000, it increased to 4 points and stood at approx 28 % of current GDP in 2017. While during the same period the point increase for china was 8, it rose to approx 41% of GDP in 2017 from approx 33% of current GDP in 2000. Keeping in view the difference in size of GDP in both the countries in absolute amount this difference is even greater.

between R&D investment in domestic firms and in foreign owned affiliates.

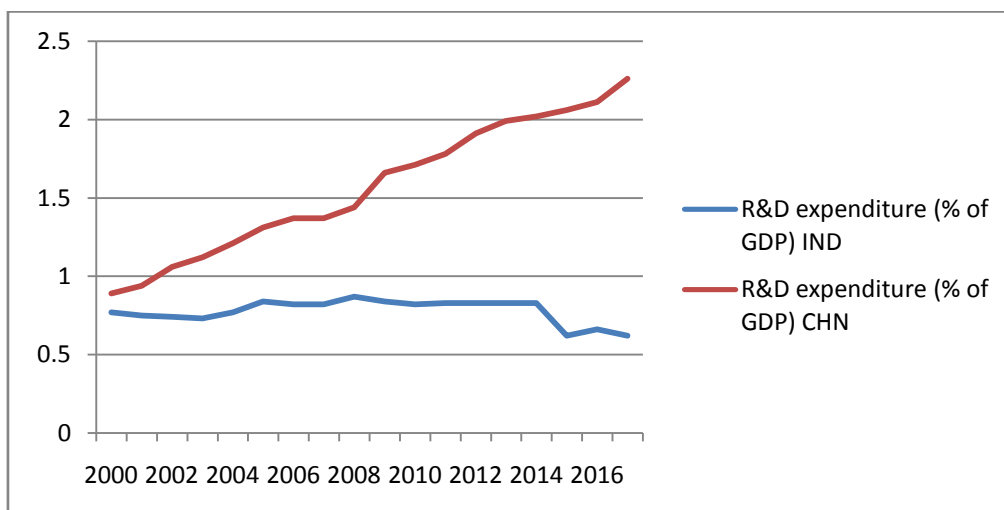
R&D Expenditure- R&D expenditure measures the amount of investment into technological innovation activity. However one disadvantage of this approach is that not all R&D expenditures cause innovations and source of investments is the main determinant of returns.. For example, the return to publicly funded R&D is typically found to be lower than the return to privately funded R&D (Keller, 2010).

Studies have observed that technological progress is determined by domestic innovation as well as by international technology spillovers. In developing countries, where domestic innovation is low, spillovers are considered of great value. Indeed, the dominance of international technology spillovers is a major determinant of the world's income distribution. While global technological spillovers are supposed to promote income convergence worldwide, local spillovers do not.

Moreover, since data is typically collected on the basis of geographical boundaries it often fails to capture the difference

This observation is strongly correlated with the case of India and china. Most of the R&D diffusion and FDI occurred in china via immediate neighbors Hong Kong and Taiwan initially and benefitted China to take advantage of its abundant cheap labour in low technology and high labor intensive exports. in the case of India most of the technology and FDI was coming from USA or Russia. Distance between sender and receiver could not fully utilized both the factors.

R&D expenditure of India and China as percentage of GDP (in constant US\$)



Data Source: World Development Indicator, World Bank, 2017

India's spending on R&D in terms of percentage of GDP has remained stagnant since 2000. It varied between the narrow range of 0.84% to 0.62% of GDP. While the comparative data of China indicates that the R&D expenditure increased substantially over the period. It increased from 0.89% of GDP in 2000 to 2.26% of GDP in 2017.

REER

The effective exchange rate is an indicator to evaluate a country's international competitiveness in terms of its foreign exchange rates. This is different from simple exchange rate in the sense that it does not account for only individual exchange rates between the country's currency and other currencies.

In the case of least-developed countries (LDCs), several cross-country empirical studies have suggested that foreign aid inflows are associated with an appreciation of the real exchange rate (Lartey, 2007; Elbadawi, 1999). This has also been proved in the case of country study of Burkina Faso, Côte d'Ivoire, Senegal and Togo (Adenauer and Vagassky, 1998), Cape Verde (Bourdet and Falck, 2006), Ghana (Opoku-Afari et al., 2004) and Nigeria (Ogun, 1998). The same empirical evidences have been found in the case of oil-rich countries where exchange rate appreciation has been associated with the influx of petro-dollars (*The Economist*, 2007). There are, however, several instances which contradict the results described above. For example, a few Latin American and Asian countries i.e. – Chile, Indonesia and Malaysia – that were recipient of huge capital inflows between 1989 and 1992 did not face a significant real exchange rate appreciation (Corbo and Hernandez, 1994). Similarly, empirical evidence suggests that foreign aid flows have often been considered to have been associated with exchange rate depreciation. This includes the findings of Mongardini and Rayner (2009) for 36 sub-Saharan African countries, Issa and Ouattara (2008) for Syria, Li and Rowe (2007) for Tanzania and Sackey (2001) for Ghana. An extensive literature suggests that both China and India have de facto pegged exchange rates, where policy makers desire to influence the bilateral exchange rate against the USD (Shah et al., 2005; Frankel, 2009; Patnaik, 2007). It is believed that there exists an inverse relationship between exchange rate

Analysis for India

$$\log \text{Totaltrade} = 0.641752392313 * \log \text{GFC} + 0.74451057508 * \log \text{RandD} - 2.5076868957$$

After analyzing the Log regression of the data, the coefficient of REER has not been found significant at the 5% level of p value. Rest of the variables, GFC and R and D has been found significant at the p value of less than 5%. Since data has been converted in logarithmic form therefore changes in the coefficients of variables has to be interpreted in the term of elasticity. Result can be interpreted as If GFC increases by 1% it increases the volume of total trade by 0.64%. Similarly if R and D increases by 1% it increases total trade volume by 0.74%. REER has not been found affecting the Total Trade volume in India.

Analysis for China

volatility and trade volume The basic argument behind this theory is that an increase in exchange rate volatility increases the risks and transaction costs and these reduce the incentive to trade. While early studies suggest the adverse effects of exchange rate volatility on trade (Ethier, 1973; Clark 1973; Baron, 1976; Cushman, 1983; Peree and Steinherr, 1989) subsequent studies report very small impacts (Franke, 1991; Sercu and Vanhulle, 1992). To measure the volatility of the volatility of REER concept of Standard Deviation (S.D.) is applied.

5. Data and specifications of the study

The data in the present study has been collected from website of World Development Indicator (WDI) and IMF. Data of Total trade, Gross Fixed Capital and Research and Development has been taken for the period 2000 to 2017. All data has been taken in constant prices of 2010 as a base period.

All data except Real Effective Exchange Rate (REER) has been converted in the natural Logarithmic form for further analysis. In time series analysis log transformation is considered to stabilize the variance of a series.

Data has been analyzed on Log-Linear Regression model which is expressed in the following equation-

$$\log Y_t = \alpha_1 \log X_1 + \alpha_2 \log X_2 + \alpha_3 \log X_3 + \dots + C$$

where $\alpha_1, \alpha_2, \alpha_3$ are coefficients of variables X_1, X_2, X_3 respectively.

After putting the dependent and independent variables of the present study the equation takes the form of

$$\log \text{Totaltrade} = \alpha_1 \log \text{GFC} + \alpha_2 \log \text{RandD} + \alpha_3 \text{REER} + C$$

To check the goodness of the study Serial correlation LM test, Heteroskedasticity Test and Normality test has been performed.

Results of the study have been interpreted at the level of p value >5%.

$$\log \text{Totaltrade} = 1.75350571727 * \log \text{GFC} - 0.0136538077499 * \text{REER} - 6.03379055474$$

In the analysis of China RandD expenditure has not been found significant at the 5% level of p value so it has been omitted from the representation equation. Log regression equation can be analyzed as below If GFC increases by 1% totaltrade increases by 1.75% Similarly if REER increases by 1% it decreases totaltrade by 0.014%. RandD expenditure has not been found significant at the p value of 5% to affect the Total trade in China.

6. Conclusion –

Domestic R and D has been found significant determinant of international trade in India. While this expenditure does not

seem to affect the total trade volume in China during the same time period. One possible explanation for this might be that rather than depending solely on domestic technology upgradation, large volume of trade has been possible by international technology transfer agreements in China which might not be captured by domestic technological expenditure.

GFC has been found to play significant role in influencing the trade volume in India and China both. However the impact of better infrastructure has been more significant in the case of China than India. REER has not been found significant to affect international trade in India. While in the case of China it has been found weakly and negatively related to trade.

Appendices

Table 1-

	R&D expenditure (% of GDP) IND	R&D expenditure (% of GDP) CHN
2000	0.77	0.89
2001	0.75	0.94
2002	0.74	1.06
2003	0.73	1.12
2004	0.77	1.21
2005	0.84	1.31
2006	0.82	1.37
2007	0.82	1.37
2008	0.87	1.44
2009	0.84	1.66
2010	0.82	1.71
2011	0.83	1.78
2012	0.83	1.91
2013	0.83	1.99
2014	0.83	2.02
2015	0.62	2.06
2016	0.66	2.11
2017	0.62	2.26

Source: WDI(World Development Indicator)

Table 2-

year	Gross fixed capital formation (% of GDP) ²	Gross fixed capital formation (% of GDP)
	IND	CHN
2000	24.32	33.43
2001	26.79	34.33
2002	25.34	35.98
2003	26.25	39.27
2004	30.71	40.58
2005	32.76	40.47
2006	33.58	39.75
2007	35.81	38.87
2008	34.72	40.06
2009	33.95	44.90
2010	33.23	44.99
2011	34.31	44.89
2012	33.44	45.27

2013	31.30	45.51
2014	30.08	45.04
2015	28.73	43.76
2016	28.22	42.78
2017	28.64	41.89

Source: WDI(World Development Indicator)

Table -3
Table for India

Year	Total Trade of goods and services(constant 2010 US\$ in million)	Gross fixed capital formation (constant 2010 US\$ in million)	R&D Expenditure(constant 2010 US\$ in million)	REER
2000	215793	185890	6701	100
2001	223535	214336	6828	100
2002	259991	213402	6989	99
2003	290564	235953	7472	99
2004	362065	292538	8486	99
2005	467833	340635	9978	100
2006	565933	387895	10607	98
2007	611154	451234	11327	104
2008	726288	465671	12420	99
2009	702700	501420	13041	99
2010	825328	556807	13776	108
2011	975329	624142	14659	105
2012	1037458	654968	16110	99
2013	1026744	665198	17345	95
2014	1040213	682514	18851	94
2015	980391	727088	14227	99
2016	1026644	787800	17270	100
2017	1142451	861253	17439	103

Data Source: WDI (World Development Indicator)

Analysis for India

Dependent Variable: LOGTOTALTRADE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGFC	0.641752	0.224023	2.864673	0.0125
LOGRANDD	0.744511	0.313017	2.378496	0.0322
REER	0.004987	0.006508	0.766319	0.4562
C	-2.507687	0.817989	-3.065673	0.0084
R-squared	0.985738	Mean dependent var		13.31000
Adjusted R-squared	0.982681	S.D. dependent var		0.584143
S.E. of regression	0.076873	Akaike info criterion		-2.100185
Sum squared resid	0.082733	Schwarz criterion		-1.902325
Log likelihood	22.90167	Hannan-Quinn criter.		-2.072903
F-statistic	322.5347	Durbin-Watson stat		1.320055
Prob(F-statistic)	0.000000			

Source: Author's calculation

Table-4
Table for China

Year	EX+IM(constant 2010 million US\$)	GFC (CONSTANT 2010 US\$ in million)	R&D expenditure (constant 2010 US\$ in million)	REER
2000	881645.4993	747946.4437	19981	104.28
2001	933768.7556	832140.827	22790	108.6
2002	1130645.772	951716.7782	27980	107.63
2003	1507694.127	1142881.082	32607	102.9
2004	1906948.316	1300352.532	38936	100.86
2005	2220730.468	1444750.922	46691	100
2006	2594578.675	1599444.688	55069	101.18
2007	2854688.169	1786909.794	63110	105.14
2008	2895823.956	2019225.688	72817	113.88
2009	2459601.22	2475796.528	91651	117.23
2010	2982550.614	2744742.642	104317	117.26
2011	3381284.491	3000057.281	118639	121.34
2012	3467320.889	3262470.525	137360	127.61
2013	3616494.899	3534910.707	154570	133.28
2014	3739692.525	3753405.203	168427	136.59
2015	3514597.743	3897933.773	183193	146.12
2016	3520122.393	4066021.567	200393	138.2
2017	3841208.256	4255951.543	227831	140.31

Source: WDI (World Development Indicator)

Analysis for China
Dependent Variable: LOGTOTALTRADE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGFC	1.753506	0.792904	2.211498	0.0441
LOGRANDD	-0.270567	0.606532	-0.446089	0.6624
REER	-0.013654	0.003404	-4.011012	0.0013
C	-6.033791	4.965790	-1.215072	0.2444
R-squared	0.952904	Mean dependent var		14.69151
Adjusted R-squared	0.942812	S.D. dependent var		0.484219
S.E. of regression	0.115796	Akaike info criterion		-1.280840
Sum squared resid	0.187723	Schwarz criterion		-1.082980
Log likelihood	15.52756	Hannan-Quinn criter.		-1.253558
F-statistic	94.42170	Durbin-Watson stat		1.270342
Prob(F-statistic)	0.000000			

Source: Author's calculation

References

- Bhattacharya R, Patnaik I, Shah A. (2008), 'Early warnings of inflation in India', *Economic and Political Weekly*, 62–67, Available at: <http://ajayshahblog.blogspot.com/2008/08/workingpaper-early-warnings-of.html>
- Countries', *Macroeconomic Linkage: Savings, Exchange Rates and Capital Flows*, Ito T., Krueger A.(eds.), University of Chicago Press, Chicago
- Frankel J, Wei SJ. (1994), 'Yen Bloc or Dollar Bloc? Exchange Rate Policies of the East Asian
- Frankel J. A, Wei S. J. (2007), 'Assessing China's Exchange Rate Regime', *NBER Working Paper 13100*, Available at: <http://www.nber.org/papers/w13100.pdf>.

5. Goldstein M, Lardy N. (2008), 'Debating China's Exchange Rate Policy', Institute for International Economics, Peterson
6. Patnaik I. (2007), 'India's currency regime and its consequences', *Economic and Political Weekly*, Available at: <http://openlib.org/home/ila/PDFDOCS/11182.pdf>.
7. Prasad E. (2008), 'Monetary Policy Independence, the Currency Regime, and the Capital Account in China', *Debating China's Exchange Rate Policy*, Goldstein M. and Lardy N., pp. 77-93, Peterson Institute of International Economics, Washington D.C.
8. Shah A, Zeileis A, Patnaik I. (2005), "What is the new Chinese currency regime?", *Technical report*, Wirtschaftsuniversit"at Wien. Available at: <http://www.mayin.org/ajayshah/papers/CNY-regime>.
9. Zeileis A, Shah A, Patnaik I. (2008), 'Testing, Monitoring, and Dating Structural Changes in Maximum Likelihood Models', *Research Report Series 70*, Department of Statistics and Mathematics, Wirtschaftsuniversit"at Wien